ISSN 0125-6068

The Thai Journal of SURGERY

Official Publication of the Royal College of Surgeons of Thailand
www.surgeons.or.th/ejournal

Volume 35 July-September 2014 Number 3

ORIGINAL ARTICLES

REVIEW ARTICLE

ABSTRACTS

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Official Publication of the Royal College of Surgeons of Thailand

Vol. 35 July - September 2014 No. 3

Original Article

Incidence and Risk Factors for Late Postoperative Seizures in Patients Who Underwent Intracranial Tumor Removal

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Abstract

Objective: **To estimate the incidence of late postoperative seizure (beyond 1 week to 2 years after surgery) in patients undergoing intracranial surgery for brain tumors and to identify risk factors for late postoperative seizure (POSz).**

Method: **A retrospective review of 252 patients who underwent intracranial brain surgery from June 2006 to April 2008 was done. Data were collected including the demographics, clinical onset, neurosurgical procedure, pathology report, postoperative antiepileptic drug (AED), and occurrence of POSz. The incidence of late POSz at one and two years was estimated. Demographic and clinical factors possibly associated with the occurrence of late postoperative seizure were identified using univariable and multivariable logistic regression analysis.**

Results: **The overall incidence of late POSz (at 1 year) was 11% (28/252). The incidence of late POSz in the supratentorial extra-axial group was 16% (12/77), 48% (16/33) in the intra-axial group, and none for other locations. In terms of tumor pathology, the incidence of late POSz was 46% (12/26) in the low grade glioma (LGG) group, 40% (4/10) in the high grade glioma (HGG) group, 8% (11/130) in meningioma group, while other pathology groups had no occurrence of seizures. Factors significantly associated with late POSz on univariable analysis included pathology of tumor, location of tumor, cortical incision and dissection, history of previous seizures, as well as early POSz and radiation therapy (RT). However, on multivariable analysis only early POSz was independently and significantly related to late POSz. The overall incidence of late POSz at 2 years was also 11% (20/191). The incidences of late POSz at two years subclassified according to location and pathology were similar to those at one year. Factors significantly associated with late POSz within two years were also similar to those at one year.**

Conclusion: **Patients with intracranial glioma and meningioma, located in the supratentorial cortical and subcortical areas, having a history of previous seizures, having early POSz, as well as RT and STR, are at high risk for late POSz. Approximately 97% of late POSz occurred within 1 year. Careful follow up and monitoring of AED levels in patients with a high risk for late POSz in first year after surgery should be done.**

Keywords: **brain tumor removal, late postoperative seizure**

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Background

Seizure is a common symptom in patients with brain tumors. Approximately 30% of patients with brain tumors develop epilepsy and in 30 to 50% of these patients, seizure heralds the clinical onset of the tumor[1]. The use of antiepileptic drug (AED) in patients with brain tumors who present with seizure is generally recommended. However, AED prophylaxis in patients with brain tumors who have no history of seizure is controversial. In the year 2000, the American Academy of Neurology stated that prophylactic AED is of no benefit in patients with brain tumors who have no history of seizures, and to withdraw these drugs in the first week after surgery if patients have never had a seizure[2]. AED associated side effect is especially common and occasionally life threatening[2].

Postoperative seizure (POSz) is a common problem in patients with brain tumors who have undergone intracranial surgery. There are two types of POSz: early onset and late onset POSz. Early onset seizures occur within one week after surgery, and late onset seizures occur beyond one week. The incidence of seizures in patients who underwent supratentorial surgery for non-traumatic pathology is estimated to be from 15 to 20%[3,4,5], and between 1 to 5% for infratentorial operations[6,7]. One randomized controlled study reported the incidence of early seizures after surgery for supratentorial brain tumors to be about 12%[5]. A recent study from Prasat Neurological Institute (PNI) reported an incidence of early POSz of 9.7 %[8]. But the incidence of late POSz after brain tumor surgery has never been reported from the Institute.

Many factors have been shown to have an association with the risk of late POSz, such as a previous history of seizures before surgery, pathology of the tumor, and cortical incision or dissection. However, location of the tumor, onset of early postoperative seizures, adjuvant radiation, and complications after surgery have not been reported to be associated with POSz[9,10]. The aims of the present study are to assess the incidence of late POSz in patients undergoing surgery for intracranial brain tumors at PNI, and to identify factors that may be associated with late POSz.

Patients and Methods

We reviewed the medical records of patients who underwent intracranial surgery for brain tumors at PNI from June 2006 to April 2008. Inpatient admission notes, daily progress notes, operative record, pathologic reports and outpatient notes were reviewed and data of interest were abstracted. These included demographic data such as age and gender. We also included the pathology of the tumors, classified as meningioma, glioma, and others (e.g., pituitary adenoma, schawannoma, metastasis, and craniopharyngioma). History of previous surgery (yes/no) was obtained. Location of the tumors was recorded and classified as supratentorial cortical (or extra axial), supratentorial subcortical (or intra axial), posterior fossa (include brainstem and fourth ventricular tumor), sellar and parasellar, intraventricular (lateral and third ventricle), pineal region, and others (including cavernous sinus location).

Other factors were also examined and abstracted, including duration of surgery (classified as less than or more than six hours); performance of cortical incision and dissection (yes/no); postoperative surgical complications such as hematoma at surgical site, ischemia, hydrocephalus, and meningitis (yes/no); extent of tumor removal reported in the operative notes (gross total removal or subtotal or partial tumor removal); history of preoperative clinical seizure (yes/no), early POSz (yes/no), tumor recurrence (yes/no), administration of radiotherapy (yes/no). Patients were excluded if they underwent stereotactic or opened biopsy, and if the follow-up time was less than one year. Postoperative information was gathered from one week to two years, or to the last follow up. We recorded time of onset of late POSz, the type of seizure, and the details of AED used. The use of prophylactic AED, and duration of postoperative AED, depended on the judgment of the risk of seizures made by individual surgeons.

Statistical analysis was done with the SPSS 16.0 for Windows. Tests for differences between patients with late POSz and those without POSz were done using Mann-Whitney U test for continuous variables, and chi-square test or Fisher's exact test for categorical variable. *P*-values < 0.05 were considered statistically significant. Odds ratios and 95% Confidence Intervals (95% CI) were obtained from logistic regression analyses. Factors which were significantly associated with late POSz on univariable analysis were tested in a multivariable model.

Results

Overall 252 consecutive cases of brain tumor surgery were seen at PNI from June 2006 to April 2008. All 252 patients were followed for more than 1 year. There were 90 men and 162 women. The mean age was 44.4 years (ranged from 9 to 83 years). Forty three patients (17%) had a history of previous seizures and 17/43 (39%) of these had late POSz. Twenty six patients (10%) developed early POSz and 10/26 (39%) of these had subsequent late POSz. The overall incidence of POSz (early and late onset seizures) was 44/252 (18%). See Table 1 for further details.

The overall incidence of late POSz within 1 year was 28/252 (11%). The incidence of late POSz in cortical (extra-axial), and subcortical (intra-axial) groups were 16% and 48%, respectively. Patients who had posterior fossa, sellar and parasellar, pineal, intraventricular, or cavernous sinus tumors did not develop late POSz. The incidence of POSz was 46% (12/26) for low-grade gliomas, 40% (4/10) for high-grade gliomas, and 8% (11/130) for meningiomas. There were no late POSz for patients with craniopharyngioma and pituitary tumors (Table 2).

We examined the univariable association between potential factors and late POSz. These included age, sex, tumor pathology, previous surgery, tumor location, cortical incision and dissection, duration of surgery, extent of tumor removal, complications of surgery, history of previous seizures, early POSz, tumor recurrence, and radiotherapy (RT), presented in Table 3. Six factors were significantly associated with the late POSz: pathology of tumor, tumor location, cortical incision and dissection, history of previous seizures, early POSz, and postoperative RT. On multivariable analysis, only early POSz was significantly and independently associated with late POSz.

At 2 years after operation, 61 patients were lost to follow up, thus only 191 patients were available for analysis. There were 62 men and 129 women. There were only 20 patients remaining who had late POSz, giving the incidence of late POSz at two years as 11% (20/191), similar to that at one year, because only one patient had further late POSz after one year. All estimates of the incidence of late POSz at two years were similar to those at one year, when subclassified in terms of location and pathology of tumor. Within statistical errors the result of univariable analysis of risk factors for late POSz at two years was similar to that at one year. Notable differences included the lack of association between RT and late POSz at two years, but a significant association between subtotal resection and POSz was seen at two years. Multivariable analysis was not done for the risk at two years because of the small number of outcomes.

Of the 29 patients who had late POSz, 69% (20/29) occurred within 6 months, 97% (28/29) occurred within one year, while only one patient had seizures occurring at 20 months of follow up (see Figure1). Nine of these patients were lost to follow up at two years, thus only 20 patients with late POSz remained at two years. Of the 29 patients with late POSz, the seizures were de novo in 7 patients, in 11 patients the seizures begun before surgery, in 4 patients the seizures

Table 1 Incidence of late postoperative seizures, classified by tumor location, at 1 year and 2 years.

Location	Incidence at 1year (%)	Incidence at 2 years (%)
Cortical (extra-axial)	12/77 (15.58)	9/58 (15.52)
Subcortical (intra-axial)	16/33 (48.48)	11/22 (50)
Posterior fossa	0/57 (0)	0/50 (0)
Sellar / parasellar lesion	0/59 (0)	0/43 (0)
Pineal location	0/2 (0)	0/2 (0)
Intraventricular lesion	0/10 (0)	0/7 (0)
Others	0/14 (0)	0/9 (0)

Table 2 Incidence of late postoperative seizures, classified by tumor pathology, at 1 year and 2 years.

Type of tumor	Incidence at 1 year (%)	Incidence at 2 years (%)
Meningioma	11/130 (8.5)	8/101 (7.9)
Previous seizure	5/19 (26.3)	2/12 (16.6)
New onset seizure	6/111 (5.4)	6/89 (6.7)
Low grade glioma	12/26 (46.2)	10/19 (52.6)
Previous seizure	10/17 (58)	9/14 (64.3)
New onset seizure	2/9 (22.2)	1/5 (20)
High grade glioma	4/10 (40)	2/5 (40)
Pituitary adenoma	0/21 (0)	0/16 (0)
Schawannoma	0/31 (0)	0/27 (0)
Metastasis	0/1 (0)	(0)
Craniopharyngioma	0/15 (0)	0/9 (0)
Others	0/18 (0)	0/14 (0)

Table 3 Association between potential risk factors and late postoperative seizures within 1 year.

Variable factor	Seizure (n = 28) (%)	Non seizure (n = 224) (%)	*P* value	OR	95%CI
Age (mean)	49.3	43.8	0.099	1.03	0.99 to1.057
Sex female	22/28 (78.6)	140/224 (62.5)	0.094	2.2	0.86 to 5.65
Previous surgery	5/28 (17.9)	15/224 (6.7)	0.055	3.03	1.01 to 9.10
Pathology of tumor			<0.001		
Meningioma	11/28 (39.3)	119/224 (53.1)			
Glioma	16/28 (57.1)	20/224 (8.9)		8.66	3.51 to 21.33
Others	1/28 (3.6)	85/224 (37.9)		0.13	0.16 to 1.01
Location of tumor			<0.001		
Cortical [extra axial]	12/28 (42.9)	65/224 (29.0)			
Subcortical [intra axial]	16/28 (57.1)	17/224 (7.6)		5.1	2.03 to 12.785
Others	0/28 (0)	142/224 (58.7)			
Location in cortex (n = 71)	0.362				
Occipital	1/26 (3.8)	6/45 (13.3)			
Frontal	12/26 (46.2)	25/45 (55.6)		2.88	0.31 to 26.68
Temporal and insular	5/26 (19.2)	5/45 (11.1)		6.00	0.52 to 69.754
Parietal	8/26 (30.8)	9/45 (20.0)		5.33	0.52 to 54.34
Cortical incision and dissection	25/28 (89.3)	49/224 (21.9)	<0.001	29.76	8.62 to 102.72
Duration of surgery [> 6 hr]	10/28 (35.7)	93/224 (41.5)	0.556	1.28	0.56 to 2.89
Extent of tumor removal [STR]	11/28 (39.3)	58/224 (25.9)	0.134	1.85	0.82 to 4.19
Complication	3/28 (10.7)	31/224 (13.8)	0.999	0.75	0.21 to 2.62
Previous seizure	17/28 (60.7)	26/224 (11.6)	<0.001	11.77	4.97 to 27.86
Early postoperative seizure	10/28 (35.7)	16/224 (7.1)	<0.001	7.22	2.83 to 18.22
Recurrence	3/28 (10.7)	21/224 (9.4)	0.737	1.16	0.32 to4.17
RT	10/28 (35.7)	33/224 (14.7)	0.013	3.22	1.37 to 7.57

Table 4 Multivariable analysis of risk factors for late postoperative seizures within 1 year.

Variablefactor	OR	95% CI	*p*-value
Pathology of tumor			0.479
Meningioma	0.60	0.14 to 24.79	
Glioma	3.84	0.23 to 63.10	
Others	-	-	
Location of tumor			0.797
Cortical [extra-axial]	-	-	
Subcortical [intra-axial]	0.32	0.11 to 9.10	
Others	-	-	
Cortical incision and dissection	3.30	0.77 to 14.10	0.108
History of previous seizure	1.67	0.54 to 5.15	0.372
Early postoperative seizure	4.64	1.21 to 17.71	0.025
RT	1.50	0.36 to 6.26	0.578

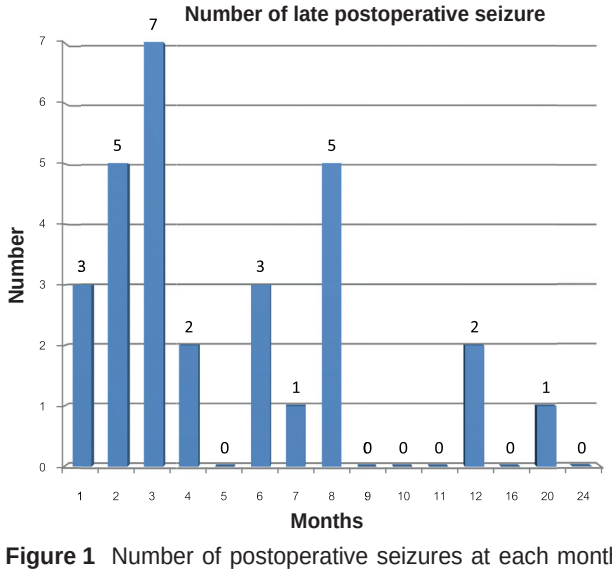

Figure 1 Number of postoperative seizures at each month of follow-up within 2 years after surgery.

were early onset, and in 7 patients these seizures occurred both before surgery and early after surgery. Types of late POSz included simple partial seizures in 6 patients, complex partial seizure in 5 patients, generalized tonic clonic seizures in 15 and unspecified type in 3.

Five patients with late POSz did not receive antiepileptic drugs (AED). Seven patients had AED

but at a subtherapeutic level, eight patients who received AED did not have their AED levels checked, while three patients received AED at the therapeutic level but had tumor recurrence.

Discussion

The present study is probably the first to estimate the incidence of, and to identify risk factors for, late POSz in Thai patients who underwent craniotomy for tumor removal, at one year and two years of follow-up. The overall incidence of late POSz both at one and two years was 11%. The incidence of late POSz in the supratentorial location was 14% in the present study, which was similar to a previous study of POSz after supratentorial surgery of non-trauma pathology (15 to 20%) but the latter included early and late POSz[3,4]. In a subgroup analysis, the incidence of late POSz was 16% in the supratentorial extra-axial, and 49% in supratentorial intra-axial, groups. Other groups had no late POSz. Again, this result was similar to those of previous studies which showed the incidence of early seizures following posterior fossa surgery to be 0.7 to 5.9 %, with no reported incidence of late POSz[6,7]. The present study showed that tumors located only at the supratentorial area were related to late POSz.

Hwang et al. found the incidence of postoperative seizures in patients with astrocytic tumors and a history of previous seizures to be 54%, while those who had no previous seizures had an incidence of 8%[11]. Pace et al. found that 56% of patients had recurrent seizures and 23% had late-onset seizures[12]. These findings are similar to those of the present study. However, the incidences of late POSz in the meningioma group (8%), in patients who have a history of previous seizures (26%), and in patients with new onset seizures (5%) in the present study, were lower than those in a previous study[10]. In that study, patients with meningioma who had a history of previous seizures had postoperative seizures in 37%, and 5% of patient had new onset seizures.

Of the 29 patients who had late POSz, 69% occurred within 6 months, and 97% occurred within 1 year. This tendency for seizures to occur relatively soon after craniotomy was in agreement with previous studies. Hwang et al. reported that patients with gliomas and a history of previous seizures had the occurrence of seizures in 59% within 6 months, with new onset seizures occurring in 64% within 6 months[11]. Pace et al. reported that postoperative seizures occurred within 6 months in 67% of patients with gliomas[12].

The present study showed that in patients with late POSz most within one year and patients had either discontinue AED, had subtherapeutic level of AED, or tumor recurrence. This emphasized the need for close follow-up, and to monitor AED levels in patients undergoing surgery and at high risk for developing postoperative seizures within one year after operation.

The present study showed that late POSz only occurred in patients with gliomas (both high and low grade) and meningiomas. This is in accord with previous studies which demonstrated high incidence of seizures in patients with gliomas and meningiomas, with no seizures in patients with hemangioblastoma, schawannoma and pituitary tumors[1,13]. This finding emphasized the need to prevent postoperative seizures in patients with gliomas and meningiomas.

We found significantly higher rates of late POSz in patients with supratentorial tumors, whereas those with posterior fossa, pineal, intraventricular, sellar and parasellar areas did not have late POSz. This was a similar finding to that of a review by Shamji et al., which showed a high incidence of seizures in tumors near the cortical area, and that tumors at the infratentorial and sellar regions had low incidence of seizures[13].

Corticotomy and dissection significantly increased the risks for developing POSz. Similar results were reported in Foy et al., who presented a high incidence of seizures in patients undergoing corticotomy and cortical dissection[4,14]. This increased incidence probably occurred because of extensive cortical damage and cortical injuries may lead to epilepto-genicity[4,14].

Patients with a history of previous seizures had significantly higher risk of late POSz than patients with no previous history, a similar finding to that reported in the literature[9,11,15,16]. Furthermore, Hwang et al. reported that a duration of preoperative seizures longer than six months increases the incidence of post-operative seizures[11].

Postoperative RT was significantly related to late POSz within one year but not within two years. This is likely a statistical artifact. Whether such an association truly exists is controversial. Khan and Onar reported that whole brain RT increased the risk for recurrence seizures[20]. Other studies of adjuvant RT did not find an increased risk of late POSz[11,15], while 2 small series[18,19]

showed a seizure frequency reduction of 75% or greater after RT. Nevertheless, seizure frequency may increase occasionally after RT, secondary to complication such as bleeding, edema and radiation necrosis[21]. Further studies of the effect of postoperative RT on post-operative seizures should be done.

Subtotal tumor removal was significantly related to late POSz only at two years, not at one year. This result was similar to that of a previous study[15]. But a statistical chance finding may explain this association as well. Patients who had early onset seizures had a higher rate of late POSz. A previous study by Foy et al. reported that early seizures were frequently followed by late seizures, in 41%[3]. Other studies also reported that early POSz is a risk factor for developing late POSz[17].

One risk factor which was not statistically significant but should be mentioned is location of the tumor within the cortex. The present study showed that late POSz occurred more often, but not significantly so, when the tumor was located in temporal and insular lobe, and parietal lobe, but less often when located in the frontal and occipital lobes. This result was similar to those of previous studies, which reported higher incidence of postoperative seizures for tumors located at the temporal and parietal lobes[1,5,13]. The lack of statistical significance in the present study could be due to the smaller sample size and fewer number of outcomes, being a subgroup analysis.

The present study was retrospective and observational, so the decision to continue or discontinue AED was not controlled. Because many patients were lost to follow up and excluded from the study, especially patients with glioblastoma multiforme and brain metastasis, and many patients were referred for follow-up or RT elsewhere. It was unclear whether patients excluded from the study were similar or different from those in the study (selection bias). Thus, a prospective study should be done.

Conclusion

Late POSz is a common problem in patients undergoing surgery for intracranial brain tumors, with an incidence of approximately 11% both within 1 year and within 2 years. Most late POSz (97%) occurred within 1 year. The incidence of late POSz varied according to tumor location and pathology. Tumors in the supratentorial cortical and subcortical locations have a high risk for late POSz. Gliomas and meningiomas also have a high risk for late POSz. Patients who have a history of previous seizures, early POSz, have higher risks for postoperative seizures as well. Patients with a high risk for late POSz should be closely followed, with serum AED level monitoring, especially during the first year after surgery.

REFERENCES

1. Van Breemen MS, Wilms EB, Vecht CJ. Epilepsy in patients with brain tumours: epidemiology, mechanisms, and management. Lancet Neurol 2007(6):421-430. doi:10.1016/S1474-4422(07)70103-5
2. Glantz MJ, Cole BF, Forsyth PA, et al. Practice parameter: anticonvulsant prophylaxis in patients with newly diagnosed brain tumors: report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 2000; 54:1886-93.
3. Foy, Copeland GP, Shaw MDM. The incidence of postoperative seizure. Acta Neurochir 1981;55:253-64.
4. Foy, Copeland GP, Shaw MDM, The natural history of postoperative seizure. Acta Neurochir 1981;57:15-22
5. De Santis A, Villain R, Sinisi M, et al. Add-on phenytoin fails to prevent early seizure after suregery for supratentorial brain tumor: a randomized controlled study. Epilepsia 2002;43(2): 175-82.
6. Suri A, Mahapatra AK, Bithal P. Seizure following posterior fossa surgery. Br J Neurosurgery 1998;12:41-44.
7. Lee ST, Lui TN, Chang CN, et al. Early postoperative seizure after posterior fossa surgery. J Neurosurgery 1990;73:541-4.
8. Veerasarn K, Tadadontip P. Incidence and risk factors or early postoperative seizure in patients with intracranial tumor removal. Thai J Surg 2011;32:124-30.
9. Das RR, Artsy E, Hurwitz S, et al. Outcome after discontinuation of antiepileptic drug after surgery in patients with low grade brain tumors and meningiomas. J Neurooncol 2012May 3;107:565-70.
10. Chozick BS, Reinert SE, Samual H, et al. Incidence of seizures after surgery of supratentorial meningiomas: a modern analysis. J Neurosurgery 1996;84:382-6.
11. Hwang SL, Leiu AS, Kuo TH, et al. Preoperative and postoperative seizure in patient with astrocytic tumors: analysis of influence and influencing factors. J Clin Neurosci 2001; 8(5):426-9.
12. Pace A, Bove L, Innocenti P, et al. Epilepsy and gliomas: incidence and treatment in119 patients. J Exp Clin Cancer Res 1998;17:479-82.
13. Shamji MF, Fric-Shamji EC, Benoit BG. Brain tumor and epilepsy pathophysiology of peritumoral changes. Neurosurg Rev 2009;32:275-85.
14. Foy PM, Chadwick DW, Rajopalan N, et al. Do prophylactic anticonvulsant drugs alter the pattern of seizure after

craniotomy ? J Neurol Neurosurg Psychiatry 1992;55:753-7
15. Chang EF, Potts MB, Keles GE, et al. Seizure characteristics and control following resection in 332 patients with low-grade gliomas. J Neurosurg 2008;108:227-35.
16. Franceschetti S, Binelli S, CasazzaM, et al. Influence of surgery and antiepileptic drugs on seizures symptomatic of cerebral tumours. Acta Neurochirurgica 1990;103:47-51.
17. Bartolini E, Lenzi B, et al. Incidence and Management of Late Postsurgical Seizures in Clinical Practice. Turk Neurosurg 2012;22(5):651-5.
18. Rogers LR, Morris HH, Lupica K. Effect of cranial irradiation on seizure frequency in adults with low-grade astrocytoma and medically intractable epilepsy. Neurology 1993;43:1599-601.
19. Chalifoux R, Elisevich K. Effect of ionizing radiation on partial seizures attributable to malignant cerebral tumors. Stereotact Funct Neurosurg 1996;67:169-82.
20. Khan RB, Onar A. Seizure recurrence and risk factors after antiepilepsy drug withdrawal in children with brain tumors. Epilepsia 2006;47:375-9.
21. Hildebrand J. Management of epileptic seizures. Curr Opin Oncol 2004;16:314-7.

The THAI Journal of SURGERY 2014;35:76-80.
Official Publication of the Royal College of Surgeons of Thailand

Original Article

A Prospective Comparison Between Laparoscopic and Open Inguinal Hernia Repair

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Abstract

Background: **The standard groin hernia repair for many years is the open Lichtenstein technique which has been challenged by laparoscopic totally extraperitoneal repair (TEP) technique. In this study, the advantages, safety and efficacy of these two techniques are compared.**

Method: **Seventy-two (72) patients were randomized equally into the open Lichtenstein group and the laparoscopic TEP group. The early post-operative pain, recovery time, operative time, complications and recurrence during one year follow-up were recorded.**

Results: **The visual analog pain score (VAS) on day 1 was better in the TEP group than that in the Lichtenstein group (2.9 ± 1.4 vs. 3.9 ± 1.3, $p = 0.004$). The TEP group had shorter time to return to light activity (3.0 ± 1.1 vs. 3.8 ± 1.2 days, $p = 0.003$). There was no significant difference in the proportion of patients who used opioid drugs (20% vs. 6%, $p = 0.085$), or hospital length of stay (1.1 ± 0.3 vs. 1.1 ± 0.3 days, $p = 0.696$). One recurrence was found in open group, with no statistical significance (1% vs. 0, $p = 0.455$). There were some minor complications in both groups, with no statistical significance except more groin numbness in Lichtenstein group (17% vs. 0, $p = 0.023$). The operative time was significantly longer in TEP group (55.4 ± 18.9 min vs. 45.1 ± 12.7 min, $p = 0.008$), but there was no open conversion.**

Conclusion: **TEP is a safe operation and superior to the Lichtenstein repair in terms of early post-operative recovery, and is associated with less groin numbness.**

Keywords: **Groin hernia, totally extraperitoneal repair (TEP), Lichtenstein repair**

Introduction

Inguinal hernia is a common disease worldwide. Approximately 20 million groin hernias are repaired each year[1]. The lifetime risk of having inguinal hernia repair has been estimated to be 27% for men and 3% for women[2]. Once diagnosed, most inguinal hernias are operated on electively in order to treat symptoms or prevent complications.

Open groin hernia repair has shifted from tissue repair (non-mesh) to a tension-free repair (mesh-based). Mesh repairs appear to have lower rates of recurrence[3-5] and shorter recovery periods[6-8]. Among various techniques of mesh repair, the Lichtenstein repair is the most popular technique and is the current standard for inguinal herniorrhaphy[9-10]. However, the Lichtenstein repair is now being challenged by newer laparoscopic techniques.

Many published studies claim that laparoscopic techniques are superior to conventional open repairs

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in many respects[11-13]. However, standard guidelines do not recommend which technique as being superior, especially for elective, primary unilateral hernia repair[14].

After an initial experience performing 20 laparoscopic groin hernia repairs, we designed a study to compare the standard open Lichtenstein repair with laparoscopic repair (totally extraperitoneal herniaplasty, TEP) in groin hernia patients. The primary aim was to compare the postoperative pain and recovery time. The secondary aim was to compare operative results, including early recurrence and operative time, between the two groups, to inform clinical decision making in practice.

The present study was a randomized clinical trial of elective hernia repairs at Lampang Hospital performed between January 2012 and May 2013.

Patients and Methods

We included patients with direct or indirect inguinal hernia, or both, who consented to joining our study. This study was approved by Lampang Hospital Research Ethics Committee. We excluded patients who had femoral, bilateral, incarcerated, very large hernias (more than 15 cm in size), and those with previous lower abdominal operations.

Patients were randomly allocated to the open or the laparoscopic repair groups, and operated on by the author. Prophylactic antibiotics were used in all cases. Patients were asked to empty the urinary bladder before operation in the laparoscopic group. Post-operative pain was managed by oral acetaminophen, 1,000 mg, as required, every 6 hours. Pethidine injection was given as needed if the pain score exceeded 4.

We performed the Lichtenstein technique according to Lichtenstein[15], using 3-0 polypropylene sutures to secure the polypropylene mesh over the inguinal floor defect.

We performed the TEP technique according to McKernan[16-17], in which three trocars were placed along the midline between the infraumbilical and suprapubic regions. Under CO_2 insufflation, we dissected the preperitoneal space from pubis to anterior superior iliac spine (ASIS), then reduced the hernia sac, and covered the inguinal floor defect with a polypropylene mesh. We fixed the mesh to Cooper's ligament medially and just above ASIS laterally. A drain was placed if needed.

Patients' general characteristics were recorded, including sex, age, comorbid disease, maximal hernia size, and body weight. The operative time, defined as the period between the beginning of the skin incision and skin closure, and the need for open conversion were recorded. The visual analog pain score (VAS), ranging from 0 (no pain) to10 (maximum pain), was evaluated in the morning on the day after operation. The number of patients who required opioid drugs was also recorded, as were the hospital postoperative length of stay (LOS) and the day on which the patient returned to light activity. Complications occurred were assessed and recorded on days 1 and 14, and 3 months and 1 year after operation.

Data were analyzed using STATA version 11.0. Continuous variables were compared using independent sample *t*-test and categorical variables were compared using Fisher's exact test. A p-value less than 0.05 was considered statistically significant.

Results

Of the 87eligible cases of elective inguinal hernia repair seen between January 2012 to May 2013, 12 patients were excluded: 6 patients due to bilateral hernia, 3 patients due to incarcerated hernia, 2 patients due to previous lower abdominal incision, and 1 patient due to very large hernia. Thus 75 patients were enrolled and randomized into 2 groups. One patient from the TEP arm and two patients from the Lichtenstein arm were lost to follow-up at the end of study (May 2014; Figure 1).

Characteristics of patients were similar in both arms (see Table 1). These included gender (over whelming male gender), age (approximately 60 years on average), comorbid disease (seen in about a third of cases), maximal hernia size (mostly between 5 to 10 cm), side (slight right-side predominance) and body weight (approximately 55 kg on average).

Postoperative pain measured using the VAS pain score were lower in the TEP group (mean 2.9 vs 3.8, $p = 0.004$). The difference in the proportion of patients who used opioid drugs was of borderline significance (20.0% vs 5.6%, $p = 0.085$), being used more frequently in the TEP group. The postoperative length of stay (LOS) was not significantly different between the two groups (see Table 2).

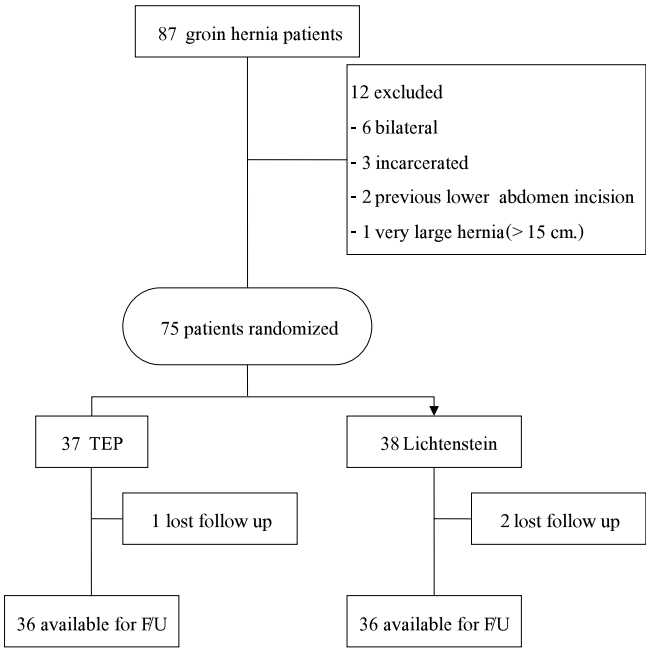

Figure 1 Flow of randomized patients

Table 1 Characteristics of patients

Variables	TEP (n = 36)	Lichtenstein (n = 36)	*p*-value
Male sex: n (%)	34 (94)	32 (89)	0.674
Age (y): mean ± SD (range)	59.1 ± 14.3 (16-84)	64.1 ± 14.6 (17-88)	0.147
Comorbid disease: n (%)			
no	22 (66)	23 (64)	0.864
HT	7 (19)	5 (14)	
DM	1 (3)	0 (0)	
COPD	1 (3)	1 (3)	
Other	5 (14)	7 (19)	
Hernia size: n (%)			
≤ 3 cm.	4 (11)	6 (17)	0.899
> 3, ≤ 5 cm.	10 (28)	11 (31)	
> 5, ≤ 10 cm.	19 (53)	17 (47)	
> 10, ≤ 15 cm.	3 (8)	2 (6)	
Side: n (%)			
Right	24 (66.7)	21 (58.3)	0.627
BW (kg): mean ± SD (range)	54.6 ± 9.7 (34-76)	53.6 ± 11.2 (35-88)	0.678

Table 2 Primary outcomes

Variables	TEP (n = 36)	Lichtenstein (n = 36)	*p*-value
VAS pain score day one (scale from 0 to 10):			
mean ± SD (range)	2.9 ± 1.4 (1-7)	3.9 ± 1.3 (1-7)	0.004
Opioid use: n (%)	7 (20.0)	2 (5.6)	0.085
Postop. length of stay day: mean + SD (range)	1.1 ± 0.3 (1-2)	1.1 ± 0.3 (1-2)	0.696
Day return to light activity (day): mean + SD (range)	3.0 ± 1.1 (2-6)	3.8 ± 1.2 (2-7)	0.003

There were significantly more groin numbness in both the early phase (< 3 months after operation) and late phase (> 3 months) in Lichtenstein group (17 % vs 0%, $p = 0.023$, see Table 3). The frequency of other complications was not significantly different: these included seroma, scrotal emphysema, scrotal swelling, urinary retention requiring catheterization, persistent groin pain, and the recurrence rate at one year. There was no conversion from laparoscopic to open repair, but the operative time was significantly longer in the TEP group (mean 55.4 mins vs. 45.1 mins, $p = 0.008$)

Discussion

The Lichtenstein "tension free" repair is the most effective open hernia repair in terms of recurrence rate[3-5,18-19] and time to return to work[6-8]. Therefore, it was the most commonly performed groin hernia operation at our hospital for many years. In the era of laparoscopic surgery, the totally extraperitoneal hernia repair (TEP) seems to be superior to the transabdominal preperitoneal repair (TAPP) because of fewer complications, such as organ injury or bowel obstruction[20]. In the present study, we compared the clinical outcomes of TEP with those of the Lichtenstein repair.

Table 3 Operative time, complications, and recurrence

Variables	TEP (n = 36)	Lichtenstein (n = 36)	*p*-value
Complication: n (%)			
Day 1 - mo 3			
Early complications: seroma, scrotal emphysema, swelling, numbness & pain	29 (81)	23 (64)	0.114
3 months - 1 year			
Groin numbness	0 (0.0)	6 (17)	0.023
Recurrence	0 (0.0)	1 (1)	0.455
Operation time (min), mean ± SD (range)	55.4 ± 18.9 (30-130)	45.1 ± 12.7 (25-80)	0.008

We focused on the early post-operative period, measuring the acute post-operative pain and time to recovery because these influenced the patient's return to work. Our results showed that patients in the TEP group had significantly less postoperative pain and earlier return to light activities. These results are consistent with previous meta-analyses of similar studies[11-13,21,22] confirming the advantage of TEP over open surgery.

Because of concerns over the safety and efficacy of laparoscopic surgery compared with open surgery, we recorded postoperative complications, operative time and recurrence up to one year. Within the relatively short follow-up time, we found no significant difference in the recurrence rate, similar to the results of previous short term follow-up (no longer than 18 months) studies[22,23]. These results are in contrast to those of Neumayer et al[24] which concluded that the recurrence was significantly more common in laparoscopic group. Recent meta-analyses including longer term (> 48 months) follow-up studies also showed no significant difference in the recurrence rates of both groups[25-26]. Different techniques, size of mesh used, surgeon experience, and specialization might have affected the recurrence rates. Longer follow-up is necessary in our study. Although our study did not see cases of chronic groin pain (>3 months) in any group, one advantage of TEP in our study was less groin numbness, which was also noted in previous studies[21,27].

No serious complications of TEP such as organ or vessel injuries were found in this study. No TEP cases required open conversion. The few minor complications associated with TEP, namely, subcutaneous emphysema and seroma, all resolved within 14 days. The only disadvantage of TEP in the present study was longer operative time, similarly seen in most studies[7,19,28]. As this is skill-related, we expect a reduction in operative time with more experience. Other disadvantages of TEP but not examined this study included the higher operative cost, and the need for general anesthesia. Also, certain patients such as those with previous lower abdominal surgery or incarcerated hernia are not suitable for TEP.

In summary, except for the longer operative time in laparoscopic hernia repair, the TEP technique was superior to the open Lichtenstein technique with respect to early postoperative pain, faster time to return to activity, and less groin numbness.

References

1. Bay-Nielsen M, Kehlet H, Strand L, et al. Quality assessment of 26,304 herniorrhaphies in Denmark: a prospective nationwide study. Lancet 2001;358:1124.
2. Primatesta P, Goldacre MJ. Inguinal hernia repair: incidence of elective and emergency surgery, readmission and mortality. Int J Epidemiol 1996; 25:835-9.
3. Butters M, Redecke J, Joninger J. Long-term results of a randomized clinical trial of Shouldice, Lichtenstein and transabdominal preperitoneal hernia repairs. Br J Surg 2007; 94:562-5.
4. Nordin P, Bartelmess P, Jansson C, Svensson C, Edlund G. Randomized trial of Lichtenstein versus Shouldice hernia repair in general surgical practice. Br J Surg 2002;89:45-9.
5. Van Veen RN, Wijsmuller AR, Vrijland WW, Hop Wc, Lange JF, Jeekel J. Long-term follow-up of a randomized clinical trial of non-mesh versus mesh repair of primary inguinal hernia. Br J Surg. 2007; 94:506-10.
6. Bittner R, Sauerland S, Schmedt CG. Comparison of endoscopic techniques vsShouldice and other open nonmesh techniques for inguinal hernia repair: a meta-analysis of randomized controlled trials. Surg Endosc 2005;19:605-15.
7. McCormack K, Scott NW, Go PM, Ross S, Grant AM; EU Hernia TrialistsCollaboration . Laparoscopic techniques versus open techniques for inguinal hernia repair. Cochrane Database Syst Rev 2003;(1): 001785
8. Scott NW, McCormack K, Graham P, Go PM, Ross SJ, Grant AM. Open mesh versus non-mesh for repair of femoral and inguinal hernia. Cochrane Database Syst Rev 2002;(4): 002197
9. Bergman S, Feldman LS: inguinal hernia repair in: Souba W., Fink MP Jurkovich GJ, editor. ACS surgery principle and practice 6th edition, Philadelphia: Lippincott Raven; 2009.
10. Bringman S, Ramel S, Heikkinen TJ, England T, Westman B and Ardenberg B: Tension-free inguinal hernia repair: TEP versus mesh-plug versus Lichtenstein: a prospective randomized controlled trial. Ann Surg 2003;237:142-7.
11. Collaboration EH.Laparoscopic compared with open methods of groin hernia repair:Systematic review of randomized controlled trials.Br J Surg 2000;87:860-7.
12. Grant AM:EH Hernia Trialist Collaboration. Laparoscopic versus open groin hernia repair: Meta-analysis of randomized trials based on individual patient data. Hernia 2002;6:2-10.
13. Memon Ma, Cooper NJ, Memon B, et al. Meta-analysis of randomized trials comparing open and laparoscopic inguinal hernia repair. Br J Surg 2003;90:1479.
14. Brunicardi F, Anderson D, Sherman V, Macho JR. Inguinal Hernias. In: Brunieard F, et al. editors., Schwart'z Principle of Surgery. 9th ed. New York: Megrow - Hill; 2010. p. 1305-42.
15. Amid PK, Shulman AG, Lichtenstein IL. Open çtension-freeé repair of inguinal hernias: The Lichtenstein technique. Eur J Surg 1996;162:447-53.
16. McKernan JB, Laws HI. Laparoscopic repair of inguinal hernias using a totally extraperitoneal prosthetic approach. Surg Endosc 1993;7:26.
17. McKernan JB. Extraperitoneal inguinal herniorrhaphy. In:

MacFayden BV, Ponsky JL, editors. Operative laparoscopy and thoracoscopy. Philadelphia: Lippincott-Raven; 1996. p. 225-31.

18. Schulman A, Amid P, Lichtenstein I. The safety of mesh repair for primary inguinal hernias: Results of 3,019 operations from five diverse surgical sources. Am Surg 1992;5:255.
19. Kark AE, Kurzer MN, Belsham PA: Three thousand one hundred seventy-five primary inguinal hernia repairs: Advantages of ambulatory open mesh repair using local anesthesia. J Am Coll Surg 1998;186:447.
20. Kald A, Anderberg B,Smedh K. Transperitoneal or totally extraperitoneal approach in laparoscopic hernia repair: results of 491 consecutive herniorrhaphies. Surg Laparosc Endosc 1997;7:86.
21. Colak T, Akca T, Kanik A, Aygin S. Randomized clinical trial comparing laparoscopic totally extroperitonealapproach with open mesh repair in inguinal hernia Surg Laparosc Endosc Percutan Tech 2003;June 13(3):191-5.
22. Lal P, Kajla RK, Chander J, et al. Randomized controlled study of laparoscopic total extraperitoneal versus open Lichtenstein inguinal hernia repair. Surg Endosc 2003;17(6):850.
23. Lau tl, Patil NG, Yen WK. Day case endoscopic totally extraperitonial inguinal hernioplasty versus open lichenstein hernioplasty for unilateral primary inguinal hernia in males; a randomized trial. Surg Endosc 2006;20:76.
24. Neumayer L, Giobbie-Hurder A, Jonasson O, et al. Open mesh versus laparoscopic mesh repair of inguinal hernia. N Engl J Med 2004;350:18-19.
25. Simons MP, Aufenacker T,Bay-Nielsen M, et al. European hernia society guildlines on the treatment of inguinal hernia in adult patients. Hernia 2009;13:343-403.
26. Koning GG, Wetterslev J, Larhoven CS, Kevs F. The totally extraperitoneal method versus lichenstein technique for inguinal hernia repair; A systematic review with meta-analysis and trial sequential analysis of randomized clinical trials. PLOS One 2013;8(1): e52599.
27. Hallen M, Bergenfelz A, Westerdahl J. Laparoscopic extraperitonial inguinal hernia repair versus open mech repair; long term follow up of a randomized controlled trial. Surgery 2008;143:313-7.
28. Subwongcharoen S. Outcome of inguinal hernia total extraperitoneal laparoscopic hernia repair versus open tension free repair (Lichtenstein technique). J Med Assoc Thai 2002; 85(10):1100-4.

The THAI Journal of SURGERY 2014;35:81-85.
Official Publication of the Royal College of Surgeons of Thailand

Original Article

Kidney Transplantation at Suratthani Hospital

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Abstract

Background and objective: **Kidney transplantation is associated with improved quality of life and better survival among patients with end-stage renal disease. The aim of this study is to assess the experience of Suratthani Hospital's kidney transplant program which began in 2008.**

Materials and Methods: **The records of 8 pairs of donors and recipients who received kidney transplants over a 5-year period were collected and analyzed. All received kidneys from live donors.**

Results: **The mean donor age was 39.3 ± 8.8 years (range, 28 to 53 years) and the mean recipient age was 32.0 ± 9.3 years (range, 21 to 48 years). There were 4 male donors (50%) and 4 female donors (50%), while the 8 recipients included 6 males (75%) and 2 females (25%). The donors were siblings of the recipients in 3 cases (37.5%), parents in 3 cases (37.5%), a relative in 1 case (12.5%) and a spouse in 1 case (12.5%). No acute graft rejection was seen in all cases. One case had delayed graft function due to CMV infection. Graft survival was 100%. One recipient died three years after transplantation from unknown cause, but the kidneys were working well for the other seven cases. Six recipients developed post transplant infections, including urinary tract infection, varicella, herpes zoster, tuberculosis and CMV infection.**

Conclusion: **Even though the experience with kidney transplantation in Suratthani is limited, the reported results are encouraging and offer a promising option for people with kidney disease on dialysis who live in the upper southern Thailand.**

Keywords: **Kidney transplantation, live donor, graft survival**

INTRODUCTION

Kidney transplantation is the treatment of choice for most patients with end-stage renal disease (ESRD). It improves the quality of life and increases survival rates of all end stage renal disease. Also, it is more cost effective, especially when compared with hemodialysis or peritoneal dialysis, the conventional treatment modality for ESRD.

Current advances in kidney transplantation have resulted in better graft and patient survival, and the improved quality of life has made kidney transplantation a favored option for patients with ESRD. Suratthani Hospital is the medical center covering the upper part of southern Thailand, an area with a reported annual incidence of ESRD of 434 cases per million. There are approximately 578 patients on hemodialysis and 922 patients on peritoneal dialysis (updated data in 2013).

The hospital's kidney transplantation program was begun in March 2008 and in its first five years, eight kidney transplantations were done, all from living-

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related donors. The recipients received cyclosporine-based drugs and steroids, according to the national immu-nosuppressive protocol. The present study aimed to conduct an initial assessment and to report on the experience of kidney transplantation program at Suratthani hospital.

Patients and Methods

Potential donors and recipients were first informed by a nephrologist about risks and advantages of the procedure for living donor kidney transplantation. The donor evaluation included blood group compatibility and cross matching. Subsequently, potential donors had medical and psychological evaluation. Kidney function was measured by testing serum creatinine levels, GFR, 24-hour urine collection for creatinine clearance and protein excretion, and urinalysis. When proteinuria and/or microscopic hematuria were present, the donor was rejected. All donors and recipients underwent screening for hepatitis B and C viruses. The potential donor underwent routine Computed Tomography Angiography (CTA) to determine their kidney's vascular and ureteric anatomy.

Donors with no vascular abnormalities detected by kidney angiograms underwent left nephrectomy, the kidney of choice internationally. In those with vascular anomalies in their left kidney, a right nephrectomy was performed. Left-to-right or right-to-left transplantation was the routine, as was the case internationally. At our center, both donor nephrectomy and kidney transplantation are performed by experienced urologists and general surgeons well-trained in vascular surgery. The donors and recipients were operated on in separate operating rooms. The incisions of each donor and the recipient were made at the same time. Warm and cold ischemic times were recorded. The anastomosis of each donor's renal artery was performed end to side to the recipients' external iliac artery. The renal vein anastomosis was end to side to the external iliac vein. A neo-ureterocystostomy was performed by the urologist.

All donors were monitored postoperatively for five to seven days before discharge and were followed-up regularly, according to hospital protocol.

All recipients received Basiliximab (IL-2 monoclonal antibody) and immunosuppression maintenance, consisting of steroids, cyclosporine and mycyphenolate mofetil (MMF), i.e., the triple therapy. Delayed graft function was defined as a transplanted kidney requiring dialysis initially posttransplantation. The cyclosporine level was monitored and kept within the range 150 to 250 ng/ml.

Quantitative variables were expressed as mean values + standard deviation. The student *T* test was used to compare donor and recipient characteristics before and after transplantation.

Results

A total of eight living related kidney transplantation were performed between August 2008 and August 2013. The mean age ± SD of the donors was 39.3 ± 8.8 years (range, 28 to 53 years). The age distribution of the donors showed the highest frequency in the age group 36 to 40 years, which was 37.5% of the whole group. The mean age ± SD of recipients was 32.0 ± 9.3 (range, 21-48 years).

Half the donors were male but there was a gender difference in the recipient group, with 6 male recipients (75%) and 2 female recipients (25%). Half the donors and recipients had blood group O+. This was followed in frequency by blood groups A+ and B+ (25%), and lastly B+ and AB+ (12.5%). Among the eight pairs, three donors were siblings of the recipients, three were parents of the recipients, one was the recipient's spouse, and the other was a relative of the recipient.

The main cause of ESRD in the present series was glomerulonephritis with hypertension, seen in five cases, one was due to reflux nephropathy and two had unknown causes. The mean duration of hospital stay for recipients was 27.4 ± 6.7 days (range, 20 to 41 days). Among the recipients, 7 of 8 cases (87.5%) had left to right kidney transplant, while 1 case (12.5%) had right to left kidney transplant because the donor's left kidney had some abnormalities. The average duration of cold ischemic time was 24.6 ± 5.3 min (range, 15 to 31 min) and the mean operative time was 3.36 ± 0.25 hour (range, 3.05 to 4.20 hours) (Table 1).

There was no early or late surgical mortality in the first year after transplantation. A donor had early complications after the nephectomy with fluid collection at the operative site and was successfully treated with antibiotics and drainage. None of the donors had increased serum creatinine or blood

Table 1 Glomerular filtration rate (GFR) before and after Kidney transplantation, cold ischemic time (CIT), and operative time

No.	Donor-Recipient	CIT (min)	Operative time (hour)	Hospital stay (day)	Age (year)	GFR-Before	GFR-After Kidney Transplantation							
							1 month	3 months	6 months	1 year	2 years	3 years	4 years	5 years
1	R1.M	20	3.45	22	26	4.22	77.79	61.06	57.47	77.19	76.62	76.08	76.50	75.56
	D1.M				28	96.80	87.46	86.53	72.43	81.30	83.24	98.94	94.82	82.45
2	R2.M	27	3.30	22	48	4.46	60.01	59.05	56.20	48.49	44.60	44.50	39.76	
	D2.M				32	92.04	57.80	58.09	58.09	60.05	56.94	66.77	66.39	
3	R3.M	26	3.50	26	34	3.43	117.61	124.79	117.61	94.16	94.12	90.91		
	D3.M				36	106.95	73.52	72.81	72.12	63.21	62.87	65.32		
4	R4.F	29	4.20	20	21	2.89	71.10	70.09	70.01	61.45				
	D4.F				40	66.03	77.68	66.03	74.66	73.34	72.98	72.63		
5	R5.M	22	3.15	41	22	5.29	116.12	118.19	73.37	99.87	87.41			
	D5.M				51	80.02	43.61	49.03	48.68	52.23	52.03			
6	R6.M	15	3.05	29	40	3.62	43.52	32.03	30.55	43.50	35.41			
	D6.F				40	86.94	70.10	73.71	73.71	73.34	72.98			
7	R7.M	31	3.10	30	36	5.45	101.60	80.50	66.39					
	D7.F				34	87.27	67.46	67.46	67.46					
8	R8.F	27	3.55	29	29	3.46	66.60	51.47	18.88					
	D8.F				53	79.75	61.64	55.22	49.95					

pressure after the nephrectomies.

During the early period of follow up (three months posttransplantation), a recipient had fluid leakage from their operative wound, which was a suspected lymphocele. The patient was taken back to the operating room and a peritoneal window was made. However, he later developed seizures and severe headache, which on MRI proved to be due to posterior leukoencephalopathy. He was treated with antihypertensive, anticonvulsion medications, and his cyclosporine dosage was reduced.

After three months, the most common complication after transplantation in our hospital was infection. There were six infections. Two recipients developed upper urinary tract infections, one recipient had a varicella infection, and the other had herpes zoster infection and tuberculous pleuritis. All were males and all recovered completely after treatment with appropriate antibiotics and supportive treatment. A female recipient developed a CMV infection that caused her GFR to drop to 18.88 mL/min by 6 months, but she had no major posttransplant surgical complications. Other non-infective complications were bone and metabolic complications with one recipient developing avascular necrosis and required left total hip arthroplasty.

The immunosuppression regimen included methylprednisolone, mycophenolate mofetil (MMF) and cyclosporine, while maintenance therapy comprised of cyclosporine and MMF. Acute graft rejection was not seen in any of the eight recipients, but delayed graft function occurred in one case because of CMV infection. The overall graft survival at 6 months was 100 % while recipient survival at 36 months was also 100%. One recipient died three years after transplantation, of unknown causes. The average hospital stay for the donors was 7 days and for the recipients, 27.4 days (see Table 1). Recipient and donor kidney functions at the time of discharge were all acceptable. At last follow-up, all donors were in excellent health.

Discussion

The first successful kidney transplantation in the human was performed using the recipient's identical twin as a donor in 1954[1,2]. With the advances in immunosuppressive drugs such as prednisone and azathioprine, the use of kidney transplantation became widespread[3,4]. More than 50% of ESRD patients are on chronic hemodialysis world-wide[5]. A significant portion of health care costs is used for these patients.

In the United States, since Medicare bears much of this cost, data analyses were performed during the

1988-1995 period and suggestions made to decrease this economic burden. In one analysis, kidney transplantation was projected to save US$42,000 per patient over a period of 10 years[6]. The quality of life is improved after kidney transplantation compared to dialysis, and the majority of dialysis patients preferred a kidney transplant[7].

In the USA, from 1988 to 1995, the median waiting time for a kidney transplant increased from 400 days to 842 days[8]. This severe shortage of organs has led to exploring ways to increase the donor pool, including using marginal kidneys, allowing for higher donor age, using non-heart-beating donors, and developing more effective immunosuppression drugs. Living organ donation is the favored option due to the excellent graft and patient survival rates[5,6,8,9-12].

Data from the United Network of Organ Sharing (UNOS) reported in the US that 1 year patient and graft survival rates of living-related kidney transplants were 97.5% and 95.7% respectively[10]. The establishment of Suratthani Hospital's kidney transplant program is relatively recent but has provided the opportunity for many patients from all parts of upper southern Thailand to seek treatment at this center. In the past, patients in the upper south of Thailand who needed a kidney transplant had to travel to medical centers in Bangkok or abroad to seek such treatment. During the five years at Suratthani Hospital, the general attitude towards kidney transplantation has changed considerably, with more family members willing to donate organs for relatives on dialysis. There has been a steady increase in the number of patients requiring dialysis and a further steady increase is expected over the following years.

The one delayed graft function in the present study was due to CMV infection six months after renal transplantation. There was no acute rejection, and a graft survival rate of 100% in three years after surgery is comparable to that of studies from other countries[2-4]. Kim et al[14] in 1999 reported the benefit of MMF, cyclosporine and prednisolone-based triple-therapy in reducing the incidence of acute rejection after living donor renal transplantation, and this regimen was used at our center. The reported one-year graft survival among groups receiving similar immunosuppressive protocol to ours was as high as 92% to 100%[15]. There was no vascular complication at our center, probably due to improved surgical technique.

The introduction of cyclosporine has revolutionized the practice of solid organ transplantation. Cyclosporine-based regimen was used in our transplant patients, since it was associated with improved early and long-term graft and patient survival[16].

The long-term renal consequences of kidney donation by living donors are attracting increased interest. A number of studies have suggested that living kidney donors have similar survival rates to that of non-donors and that their risk of ESRD is not increased. Most donors have normal glomerular filtration rate, normal albumin excretion, and an excellent quality of life. However, some studies have observed that the quality of life of donors may be lower than usual and may be at risk of experiencing more stressful life events. Therefore, medical care should continue for donors for some time to compensate for mental and psychosocial problems[17].

Cytomegalovirus is considered the most important infectious cause of mortality and morbidity in organ transplant recipients. A recipient who is negative for the anti-cytomegalovirus IgG antibody and receives an allograft from a positive donor, has a greater chance of developing cytomegalovirus disease and poorer survival. At our center, a case of cytomegalovirus-positive recipient had delayed graft function six months after renal transplantation

At our center, none of the donors developed any renal disease post-nephrectomy. Some studies reported a small incidence (0.5%) of minor complication[18]. We routinely follow the serum creatinine and urine analysis of donors for six months, and have found no significant health problems.

Conclusions

Our experience with living renal transplantation has been similar to that of other centers. The success of our renal transplantation program was due to the combined efforts of general surgeons, urologists, nephrologist, and transplant coordinators. Most of medical centers have the facility to run such a program. Being well-trained will be key to the success of these transplantation programs.

References

1. Bay-Nielsen M, Kehlet H, Strand L, et al. Quality assessment of 26,304 herniorrhaphies in Denmark: a prospective nationwide study. Lancet 2001;358:1124.
2. Primatesta P, Goldacre MJ. Inguinal hernia repair: incidence of elective and emergency surgery, readmission and mortality. Int J Epidemiol 1996; 25:835-9.
3. Butters M, Redecke J, Joninger J. Long-term results of a randomized clinical trial of Shouldice, Lichtenstein and transabdominal preperitoneal hernia repairs. Br J Surg 2007; 94:562-5.
4. Nordin P, Bartelmess P, Jansson C, Svensson C, Edlund G. Randomized trial of Lichtenstein versus Shouldice hernia repair in general surgical practice. Br J Surg 2002;89:45-9.
5. Van Veen RN, Wijsmuller AR, Vrijland WW, Hop Wc, Lange JF, Jeekel J. Long-term follow-up of a randomized clinical trial of non-mesh versus mesh repair of primary inguinal hernia. Br J Surg. 2007; 94:506-10.
6. Bittner R, Sauerland S, Schmedt CG. Comparison of endoscopic techniques vsShouldice and other open nonmesh techniques for inguinal hernia repair: a meta-analysis of randomized controlled trials. Surg Endosc 2005;19:605-15.
7. McCormack K, Scott NW, Go PM, Ross S, Grant AM; EU Hernia TrialistsCollaboration . Laparoscopic techniques versus open techniques for inguinal hernia repair. Cochrane Database Syst Rev 2003;(1): 001785
8. Scott NW, McCormack K, Graham P, Go PM, Ross SJ, Grant AM. Open mesh versus non-mesh for repair of femoral and inguinal hernia. Cochrane Database Syst Rev 2002;(4): 002197
9. Bergman S, Feldman LS: inguinal hernia repair in: Souba W., Fink MP Jurkovich GJ, editor. ACS surgery principle and practice 6th edition, Philadelphia: Lippincott Raven; 2009.
10. Bringman S, Ramel S, Heikkinen TJ, England T, Westman B and Ardenberg B: Tension-free inguinal hernia repair: TEP versus mesh-plug versus Lichtenstein: a prospective randomized controlled trial. Ann Surg 2003;237:142-7.
11. Collaboration EH.Laparoscopic compared with open methods of groin hernia repair:Systematic review of randomized controlled trials. Br J Surg 2000;87:860-7.
12. Grant AM:EH Hernia Trialist Collaboration. Laparoscopic versus open groin hernia repair: Meta-analysis of randomized trials based on individual patient data. Hernia 2002;6:2-10.
13. Memon Ma, Cooper NJ, Memon B, et al. Meta-analysis of randomized trials comparing open and laparoscopic inguinal hernia repair. Br J Surg 2003;90:1479.
14. Brunicardi F, Anderson D, Sherman V, Macho JR. Inguinal Hernias. In: Brunieard F, et al. editors. Schwart'z Principle of Surgery. 9th ed. New York: McGraw - Hill; 2010. p. 1305-42.
15. Amid PK, Shulman AG, Lichtenstein IL. Open çtension-freeé repair of inguinal hernias: The Lichtenstein technique. Eur J Surg 1996;162:447-53.
16. McKernan JB, Laws HI. Laparoscopic repair of inguinal hernias using a totally extraperitoneal prosthetic approach. Surg Endosc 1993;7:26.

    17. Johnson EM, Anderson JK, Jacobs C, et al. Long-term follow-up of living kidney donors: quality of life after donation. Transplantation 1999;67:717-21.
18. Fehrman-Ekholm I, Nordien G, Lennerling A. et al. Incidence of end-stage renal disease among live kidney donors. Transplantation 2006;82:1646-8.

The THAI Journal of SURGERY 2014;35:86-90.
Official Publication of the Royal College of Surgeons of Thailand

Original Article

Management of Barrett's Esophagus

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Abstract **Barrett's esophagus is a precancerous abnormality commonly associated with chronic gastroesophageal reflux disease (GERD). In this update we briefly review the pathogenesis, risk factors, screening, monitoring and treatment of the disease. We emphasize the need for early detection and management of Barrett's esophagus with high grade dysplasia. Both endoscopic and surgical options for treatment are highlighted. A summary of the results of treatment from the literature is presented. This review should be useful for busy general surgeons and residents as a quick refresher on the state-of-the-art knowledge of Barrett's esophagus.**

Keywords: **Barrett's esophagus, GERD, adenocarcinoma**

Barrett's Esophagus (BE) is a pre-cancerous abnormality in which the squamous type epithelium in the lower esophagus is replaced by columnar epithelium with metaplasic changes. BE is most often diagnosed in people who have chronic gastroesophageal reflux disease (GERD). It is estimated that about 10% of patients who have chronic GERD will develop BE. Of these about 10% will go on to develop dysplasia, which then may progress to adenocarcinoma. The highest incidence of BE is found in the western part of the world such as the U.S. and Europe[1,2].

Pathogenesis

GERD is the most important risk factor preceding the occurrence of BE[3,4]. BE patients often have symptoms of severe and chronic acid reflux which may be combined with decreasing lower esophageal sphincter tone. The disease is primarily caused by acid reflux, but can less commonly also result from prolonged bile reflux into the esophagus[5].

Obesity is also associated with the occurrence of BE, there is a higher incidence of GERD in obese people, and GERD causes BE. However, medical science still does not understand clearly why obese people are prone to acid reflux disease[6], although there are several assumptions, such as obesity causes more abdominal fat which causes pressure in the abdomen and pressure in the stomach, which finally causes acid reflux[7]. In addition, obesity is also associated with adenocarcinoma-type cancers of the esophagus[8-10].

A small number of BEs have a congenital cause, although a low proportion compared to other risk factors. Studies have found that about 7% of BE patients have a history of BE in the first or second family hierarchy[11,12]. The congenital BE patients are usually young, and BE in this age group is not associated with

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obesity. This genetic pathogenesis may be an autosomal dominant abnormality[13,14].

Screening

BE screening is important because it offers several advantages such being reliable and cost-efficient, and focusing on the higher-risk population, patients with chronic GERD. It is also effective in that treating the disease is more effective if it is detected early. The population at highest risk recommended for screening is Caucasoid men older than 50 years with symptoms of acid reflux disease, or those recommended by a physician[15].

General screening is based on endoscopy and biopsy of suspected lesions for pathological examination and diagnosis. The main area normally screened is the lower esophagus and the junction between the esophagus and stomach. Overall, this method has a sensitivity of 82% and a positive predictive value 34% in symptomatic Caucasoid patients or others suspected of having BE. The positive predictive value drops to 15% in the case of African men[16]. Males have twice the incidence of BE of females[17]. Endoscopic biopsy for BE generally uses the Seattle protocol (four quadrant biopsies at 1 cm intervals)[18].

Treatment

When a patient has been diagnosed with BE, the normal first-line treatment is recommending conservative life-style modifications such as reducing smoking and weight reduction, with regular medical supervision to follow the course of the disease[19]. A proton pump inhibitor (PPI) is also routinely prescribed as standard treatment for BE. A recent 5-year follow-up U.S. study reported that PPIs can reduce the incidence of dysplasia in patients with BE by up to 75%[20]. Another study from Australia, with a median follow-up of 4.5 years, found that patients who did not take a PPI had a risk of low grade dysplasia 5.6 times greater than patients who did take a PPI, and a risk of high grade dysplasia or cancer 20.9 times greater than the PPI group[21].

In addition to drug treatment of patients with BE, fundoplication is often recommended, with a surgical endoscopic approach through the abdomen (laparoscopic fundoplication) to enhance the strength of the lower esophageal sphincter. The hope is that it can reduce acid reflux and decrease the BE, or at least prevent the disease from progressing to dysplasia or esophageal cancer[22]. However, a meta-analysis comparing PPI groups with anti-reflux surgery groups to prevent BE found that the incidence of cancer patients per year was 4.8/1000 in surgical group and 6.5/1000 in the drug group, which was not statistically significantly different ($p = 0.32$)[22]. This result was also noted in other studies[23,24].

Monitoring

The recommendations for monitoring BE patients varies with the level of dysplasia. In general, in the absence of endoscopic esophageal dysplasia, a repeat biopsy is recommended in one year, at which time, if there is still no dysplasia, the recommendation is surveillance with endoscopy and biopsy every 3-5 years. In the case of low grade dysplasia, the recommendation is endoscopy and repeat biopsy in six months and following repeated once a year. In the case of high grade dysplasia, the doctor should consult a pathologist to confirm the finding. For selected cases not treated by esophagectomy or therapeutic endoscopic procedure, it is suggested that a repeat biopsy be done every three months[15,25-27].

High grade dysplasia (HGD) management

The diagnosis of patients with HGD is very important because it is the precursor and marker for the development to adenocarcinoma. Generally BE without dysplasia will progress to cancer in 3.3 to 5.69 cases/1,000/year[28,29]. In cases of low grade dysplasia (LGD) the incidence increases to 16.9 cases/1,000/year[29], and for HGD, the incidence is as high as 65.8/1,000/year[30].

The doctor must always exercise caution in the diagnosis or detection of HGD, even after endoscopic biopsy and be careful to provide regular follow up. It is thus important for the doctor to explain to the patient the importance not missing the follow-up endoscopy appointments[31].

Endoscopic therapy

The two most often used techniques of endoscopic treatment are ablation and resection. The first technique uses heat, chemicals, laser or radiofrequency to destroy the abnormal mucosa of the esophagus. However, these methods cannot harvest tissue for pathological examination since it has been destroyed.

Table 1 The treatment results of esophageal surgery in patients with HGD and early esophageal cancer (modified from Gilbert, et al.[40])

		Pathological stage (n)				Complications (%)		
Study	**n**	HGD	0	1	operation	morbidity	leak	Mortality
Prasad (2007)	70	1	4	5	THE/TTE	38	0	1.4
Williams (2007)	38	28	4	5	THE/TTE	37	3	0
Peyre (2007)	49	20	29	-	VES/THE/TTE	35	2	2
Moraca (2006)	36	11	11	12	TTE/THE	44	5.6	0
Reed (2005)	49	31	-	9	THE/TTE	NR	4	2
Rice (2006)	111	59	40	6	NR	NR	NR	0
Chang (2005)	34	14	9	7	THE/TTE	29	3	0
Westerterp (2005)	120	13	41	76	THE	NR	NR	4

THE = transhiatal esophagectomy
TTE = transthoracic esophagectomy
VSE = vagal nerve sparing esophagectomy
NR = not reported

The other common technique is resection, which involved cutting out the abnormal mucosa of the esophagus. This technique has the advantage of retaining post-procedure abnormal tissue for pathological examination, which can detect abnormal spread of cancer cells if present, and affect the decision on further treatment. However, this method relies on the expertise of the doctor, as it is a delicate procedure which can have severe complications such as esophageal perforation or long-term postoperative esophageal stricture[32].

Treatment with surgery

Patients diagnosed with HGD are at high risk to have early stage esophageal cancer, because small biopsies taken from a random site can easily miss areas of abnormal mucosa. A study in 111 BE patients who had been diagnosed with HGD on biopsy from esophagoscopy and treated with an esophagectomy found that 45% had early stage esophageal cancer[33]. A number of studies have found that HGD patients had a 14-59% chance to progress to esophageal cancer[34,35]. Doctors who support an esophagectomy for HGD give the reason that if HGD progresses to early esophageal cancer, the cancer is likely to spread to nearby lymph nodes which makes the prognosis worse[36,37]. An esophagectomy can remove both the esophagus and peri-esophageal lymph nodes. The surgical procedure can use either a transthoracic or transhiatal approach, and either technique can use an open surgical incision (open surgery) or thoraco-laparoscopy (minimal invasive surgery) approach. Minimally invasive surgery helps in reducing some complications after surgery such as postoperative pain, and helps the patient recover faster[38].

Results of surgical treatment

Table 1 is a summary of the results of a number of studies involving patients with HGD and early esophageal cancer who were treated with surgery to remove the esophagus. In HGD patients there will be no chance of esophageal cancer later, in contrast to patients with early esophageal cancer who are likely to have a cancer recurrence after surgery. In particular, one study found that the group in which the cancer had spread to the lymph nodes had a 5-year recurrence free survival of only 33% compared with the group in which the cancer had not spread to the lymph nodes, which had a 94% recurrence-free rate[39]. Similarly, the 5-year survival rate after surgery in HGD patients was 95%, while the cancer patient group was only 64%.

However, the esophagectomy procedure is a major surgery, with a chance of complications of about 33% and an anastomosis leakage rate of 2.8%, while the likelihood that the patient will die from the surgery is 1.4%[40]. The most important factor for good postoperative results is treatment at a hospital with a high volume of esophageal surgery with expert surgeons[33].

Conclusion

Patients with chronic GERD should have a BE screening test, as this disorder has a high risk of progressing to cancer of the esophagus. If BE is detected, it must be treated by treating the GERD. A

follow-up endoscopy is highly recommended. BE patients with HGD should be treated as special cases because there is a risk of early stage esophageal cancer. Treatment options include esophageal endoscopic treatment and surgery to remove the esophagus, depending on the opinion of the treating doctor and wishes of the patient.

REFERENCES

1. Barbera M, Fitzgerald RC. Cellular mechanisms of Barrett's esophagus development. Surg Oncol Clin N Am 2009 Jul;18(3):393-410.
2. Nelsen EM, Hawes RH, Iyer PG. Diagnosis and management of Barrett's esophagus. Surg Clin North Am 2012 Oct;92(5): 1135-54.
3. Eisen GM, Sandler RS, Murray S, et al. The relationship between gastroesophageal reflux disease and its complications with Barrett's esophagus. Am J Gastroenterol 1997 Jan;92(1):27-31.
4. Eloubeidi MA, Provenzale D. Clinical and demographic predictors of Barrett's esophagus among patients with gastroesophageal reflux disease: a multivariable analysis in veterans. J Clin Gastroenterol. 2001 Oct;33(4):306-9.
5. Song S, Guha S, Liu K, et al. COX-2 induction by unconjugated bile acids involves reactive oxygen species-mediated signaling pathways in Barrett's oesophagus and oesophageal adenocarcinoma. Gut 2007 Nov;56(11):1512-21. Epub 2007 Jun 29.
6. Cook MB, Greenwood DC, Hardie LJ, et al. A systematic review and meta-analysis of the risk of increasing adiposity on Barrett's esophagus. Am J Gastroenterol 2008 Feb;103(2):292-300.
7. Pandolfino JE, Zhang QG, Ghosh SK, et al. Transient lower esophageal sphincter relaxations and reflux: mechanistic analysis using concurrent fluoroscopy and high-resolution manometry. Gastroenterology 2006 Dec;131(6):1725-33.
8. Chak A, Falk G, Grady WM, et al. Assessment of familiality, obesity, and other risk factors for early age of cancer diagnosis in adenocarcinomas of the esophagus and gastroesophageal junction. Am J Gastroenterol. 2009 Aug;104(8):1913-21.
9. Steffen A, Schulze MB, Pischon T, et al. Anthropometry and esophageal cancer risk in the European prospective investigation into cancer and nutrition. Cancer Epidemiol Biomarkers Prev. 2009 Jul;18(7):2079-89.
10. Corley DA, Kubo A, Zhao W. Abdominal obesity and the risk of esophageal and gastric cardia carcinomas. Cancer Epidemiol Biomarkers Prev 2008 Feb;17(2):352-8.
11. Chak A, Lee T, Kinnard MF, et al. Familial aggregation of Barrett's oesophagus, oesophageal adenocarcinoma, and oesophagogastric junctional adenocarcinoma in Caucasian adults. Gut 2002 Sep;51(3):323-8.
12. Chak A, Ochs-Balcom H, Falk G, et al. Familiality in Barrett's esophagus, adenocarcinoma of the esophagus, and adenocarcinoma of the gastroesophageal junction. Cancer Epidemiol Biomarkers Prev 2006 Sep;15(9):1668-73.
13. Chak A, Chen Y, Vengoechea J, et al. Variation in age at cancer diagnosis in familial versus nonfamilial Barrett's esophagus. Cancer Epidemiol Biomarkers Prev 2012 Feb;21(2):376-83.
14. Sun X, Elston R, Barnholtz-Sloan J, et al. A segregation analysis of Barrett's esophagus and associated adenocarcinomas. Cancer Epidemiol Biomarkers Prev 2010 Mar;19(3):666-74.
15. Wang KK, Sampliner RE; Practice Parameters Committee of the American College of Gastroenterology. Updated guidelines 2008 for the diagnosis, surveillance and therapy of Barrett's esophagus. Am J Gastroenterol 2008 Mar;103(3): 788-97.
16. Eloubeidi MA, Provenzale D. Does this patient have Barrett's esophagus? The utility of predicting Barrett's esophagus at the index endoscopy. Am J Gastroenterol 1999 Apr;94(4):937-43.
17. Cook MB, Greenwood DC, Hardie LJ,et al. A systematic review and meta-analysis of the risk of increasing adiposity on Barrett's esophagus. Am J Gastroenterol. 2008 Feb;103(2):292-300.
18. Reid BJ, Sanchez CA, Blount PL, et al. Barrett's esophagus: cell cycle abnormalities in advancing stages of neoplastic progression. Gastroenterology. 1993 Jul;105(1):119-29.
19. Sampliner RE. Medical treatment of Barrett's esophagus: can it prevent cancer? Surg Oncol Clin N Am. 2009 Jul;18(3):503-8.
20. El-Serag HB, Aguirre TV, Davis S, et al. Proton pump inhibitors are associated with reduced incidence of dysplasia in Barrett' s esophagus. Am J Gastroenterol. 2004 Oct;99(10):1877-83.
21. Hillman LC, Chiragakis L, Shadbolt B, et al. Proton-pump inhibitor therapy and the development of dysplasia in patients with Barrett's oesophagus. Med J Aust 2004 Apr 19;180(8):387-91.
22. Chang EY, Morris CD, Seltman AK, et al. The effect of antireflux surgery on esophageal carcinogenesis in patients with barrett esophagus: a systematic review. Ann Surg 2007 Jul;246(1):11-21.
23. Wassenaar EB, Oelschlager BK. Effect of medical and surgical treatment of Barrett's metaplasia. World J Gastroentero 2010 Aug 14;16(30):3773-9.
24. Galmiche JP, Hatlebakk J, Attwood S, et al; LOTUS Trial Collaborators. Laparoscopic antireflux surgery vs esomeprazole treatment for chronic GERD: the LOTUS randomized clinical trial. JAMA 2011 May 18;305(19):1969-77.
25. Spechler SJ, Sharma P, Souza RF, et al; American Gastroenterological Association. American Gastroenterological Association technical review on the management of Barrett's esophagus. Gastroenterology 2011 Mar;140(3):e18-52; quiz e13. doi: 10.1053/j.gastro.2011.01.031.
26. Hirota WK, Zuckerman MJ, Adler DG, et al; Standards of Practice Committee, American Society for Gastrointestinal Endoscopy. ASGE guideline: the role of endoscopy in the surveillance of premalignant conditions of the upper GI tract.

Gastrointest Endosc 2006 Apr;63(4):570-80.
27. Playford RJ. New British Society of Gastroenterology (BSG) guidelines for the diagnosis and management of Barrett's oesophagus. Gut 2006 Apr;55(4):442.
28. Desai TK, Krishnan K, Samala N, et al. The incidence of oesophageal adenocarcinoma in non-dysplastic Barrett's oesophagus: a meta-analysis. Gut 2012 Jul;61(7):970-6.
29. Wani S, Puli SR, Shaheen NJ, et al. Esophageal adenocarcinoma in Barrett's esophagus after endoscopic ablative therapy: a meta-analysis and systematic review. Am J Gastroenterol 2009 Feb;104(2):502-13.
30. Rastogi A, Puli S, El-Serag HB, et al. Incidence of esophageal adenocarcinoma in patients with Barrett's esophagus and high-grade dysplasia: a meta-analysis. Gastrointest Endosc 2008 Mar;67(3):394-8.
31. Kariv R, Plesec TP, Goldblum JR, et al. The Seattle protocol does not more reliably predict the detection of cancer at the time of esophagectomy than a less intensive surveillance protocol. Clin Gastroenterol Hepatol 2009 Jun;7(6):653-8.
32. Spechler SJ, Davila R. Endoscopic therapy in Barrett's esophagus: when and how? Surg Oncol Clin N Am 2009 Jul;18(3):509-21.
33. Rice TW. Pro: esophagectomy is the treatment of choice for high-grade dysplasia in Barrett's esophagus. Am J Gastroenterol 2006 Oct;101(10):2177-9.
34. Reid BJ, Levine DS, Longton G, et al. Predictors of progression to cancer in Barrett's esophagus: baseline histology and flow cytometry identify low- and high-risk patient subsets. Am J Gastroenterol 2000 Jul;95(7):1669-76.
35. Buttar NS, Wang KK, Sebo TJ, et al. Extent of high-grade dysplasia in Barrett's esophagus correlates with risk of adenocarcinoma. Gastroenterology 2001 Jun;120(7):1630-9.
36. Rice TW, Zuccaro G Jr, Adelstein DJ, et al. Esophageal carcinoma: depth of tumor invasion is predictive of regional lymph node status. Ann Thorac Surg 1998 Mar;65(3):787-92.
37. Rice TW, Blackstone EH, Adelstein DJ, et al. Role of clinically determined depth of tumor invasion in the treatment of esophageal carcinoma. J Thorac Cardiovasc Surg 2003 May;125(5):1091-102.
38. Sunpaweravong S, Chewatanakornkul S, Ruangsin S. Initial experience and result of thoracoscopic and laparoscopic esophagectomy. J Med Assoc Thai 2008 Aug;91(8):1202-5.
39. Westerterp M, Koppert LB, Buskens CJ, et al. Outcome of surgical treatment for early adenocarcinoma of the esophagus or gastro-esophageal junction. Virchows Arch 2005 May;446(5):497-504.
40. Gilbert S, Jobe BA. Surgical therapy for Barrett's esophagus with high-grade dysplasia and early esophageal carcinoma. Surg Oncol Clin N Am 2009 Jul;18(3):523-31.

The THAI Journal of SURGERY 2014;35:91-99.
Official Publication of the Royal College of Surgeons of Thailand

Original Article

Outcome of Peritoneal Washing Cytology Results and the Appropriate Management in Thai Patients with Gastric Adenocarcinoma

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Abstract

Objective: **To present an estimate of the prevalance of positive peritoneal washing cytology (+PWC) in gastric cancer and to identify risk facctors for +PWC.**

Method: **Medical charts of 54 patients with gastric cancer who underwent D2 gastrectomy between January 2006 and December 2013 were reviewed.**

Results: **A total of 12 patients (22%) had +PWC. Factor significantly associated with +PWC include serosal invasion, nodal metastasis and poorly differentiated histology. All patients with +PWC developed peritoneal recurrence. The 5-year overall survival rate for patients with +PWC and -PWC were 0% and 83%, respectively.**

Conclusion: **Gastric cancer with +PWC should be considered as stage IV diseases. PWC should be included in the staging of gastric cancer.**

Keywords: **Gastric cancer, peritoneal washing cytology, staging, prognosis**

Introduction

About 50% of gastric cancer patients develop recurrent disease even after curative resection in the first two years of follow-up[1-4]. Peritoneal recurrence represents one of the most frequent patterns of recurrence in advanced gastric cancer[2,5-9]. Peritoneal dissemination is the most frequent cause of death, with a median survival time of only 3 to 6 months following peritoneal recurrence[9-12] and 5-year survival rate is almost nil[13-14].

The method of peritoneal lavage cytology was first described in 1961[15]. Intraperitoneal free cancer cell (IFCC) detection by conventional cytology is still the current gold standard[16]. The assessment of peritoneal lavage or ascitic fluid in gastric cancer patients serves to identify patients who, despite no evidence of gross peritoneal dissemination, have intraperitoneal free cancer cells (IFCC). Identification of IFCC in gastric cancer patients have been used to predict the risk of peritoneal recurrence and predict overall survival[17-18].

Diagnostic laparoscopy has been recommended for suspected advanced disease (serosal invasion or

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nodal metastasis on preoperative imaging) without evidence of distant metastasis[19]. However, its use remains uncommon. A study from Ontario in 2010 showed that only 5.1% of patients undergoing curative resection had diagnostic laparoscopy[20]. In the US, based on data from SEER-Medicare, 8.3% of patients with gastric cancer undergoing surgery had diagnostic laparoscopy[21]. Thus the use of diagnostic laparoscopy as an essential investigation in gastric cancer is not universally established[16].

Several studies supported the belief that IFCC detection is a potential useful tool for clinical decision-making, although this belief remains debatable. The purpose of the present study was to describe the detection rate of IFCC and to suggest an approach to the appropriate management of positive peritoneal washing cytology in Thai patients with gastric cancer.

Patients and Methods

Between January 2006 and December 2013 (8 years) a series of 54 patients with gastric carcinoma underwent curative D2 gastrectomy with intraoperative peritoneal washing cytology (PWC) by one surgeon (CE) were reviewed.

Patients were included if there was no macroscopic evidence of peritoneal dissemination or distant metastasis, and if intraoperative peritoneal washing cytology was performed, as described elsewhere[22-23]. Briefly, after the surgeon had evaluated the possibility of performing a curative resection, 100 mL of normal saline solution (NSS) was instilled into the upper abdomen and manually dispersed. A sample of about 50 ml of the fluid was subsequently aspirated from the left subphrenic space and cul de sac (Pounch of Douglas). Cytological examination of this fluid was used for assessing the presence of intraperitoneal free cancer cell (IFCC). The result of cytological examination was reported one week after surgery, such that the D2 gastrectomy was carried out without the knowledge of the PWC status.

Disease recurrence was categorized as peritoneal, lecoregional or distant recurrence. The diagnosis of disease recurrence was made on the basis of radiological or endoscopic findings. Peritoneal recurrence was determined clinically, based on clinical symptoms or physical signs of bowel obstruction, ascites, and signs of peritoneal disease on digital rectal examination, and usually confirmed by barium study and CT scan. Cytological confirmation was obtained only for patients who underwent paracentesis or re-laparotomy.

The Chi-square test was used to test for differences in categorical variables between groups. The *t*-test or rank test was used for quantitative variables, as appropriate. The Kaplan-Meier method was used for constructing survival curves, and the log-rank test was used to test for significant differences in the survival curves between groups. Statistical significance was defined as a two-sided p-value < 0.05. Statistical analyses were performed using Stata version 12 (Stata Corp, College Station, TX, USA).

Results

Of the 54 patients in the study, 12 (22%) had a positive peritoneal washing cytology (+PWC). Clinicopathological characteristics of all patients are presented in Table 1. In patients with positive peritoneal washing cytology, serosal invasion was more likely to be present (100% vs. 33%; $p = < 0.001$), as was nodal metastasis (100% vs. 91%; $p = 0.267$), and poorly differentiated tumors (83% vs. 67%; $p = 0.265$), although the latter two observations were not statistically significant. In our series, cytological positivity did not occur in any patient without serosa invasion or without nodal metastases.

Table 1 Differences in the clinical and pathological characteristics and peritoneal recurrence between positive and negative cytology groups in the current series of gastric cancer patients

Characteristic	Positive cytology N = 12	Negative cytology N = 42	*p*-value
Serosal invasion	12 (100%)	14 (33%)	< 0.001
Lymph node metastasis	12 (100%)	38 (91%)	0.267
Poorly differentiated/signet ring cell	10 (83%)	28 (67%)	0.265
Peritoneal recurrence	12 (100%)	4 (10%)	< 0.001

Table 2 Comparing follow-up time, deaths, and 5-year survival between positive and negative cytology groups in the current series of gastric cancer patients

Outcome	Positive cytology N = 12	Negative cytology N = 42	*p*-value
Follow-up time (months)			
Median (range)	13.5 (7 to 42)	25.5 (5 to 84)	0.005
Mean (SD)	18 (10.5)	31 (18.1)	0.022
Death	12 (100%)	6 (14%)	< 0.001
5-year survival (95% Confidence Interval)	0	83% (65.2% to 92.2%)	< 0.001*

*p-value by log-rank test

Table 3 Differences in the clinical and pathological characteristics and peritoneal recurrence between positive and negative cytology groups in the previous series of gastric cancer patients (2007)42

Characteristic	Positive cytology N = 22	Negative cytology N = 75	*p*-value
Serosal invasion	22 (100%)	61 (81%)	0.028
Lymph node metastasis	22 (100%)	61 (81%)	0.028
Poorly differentiated/signet ring cell	20 (91%)	50 (67%)	0.026
Peritoneal recurrence	22 (100%)	14 (19%)	< 0.001

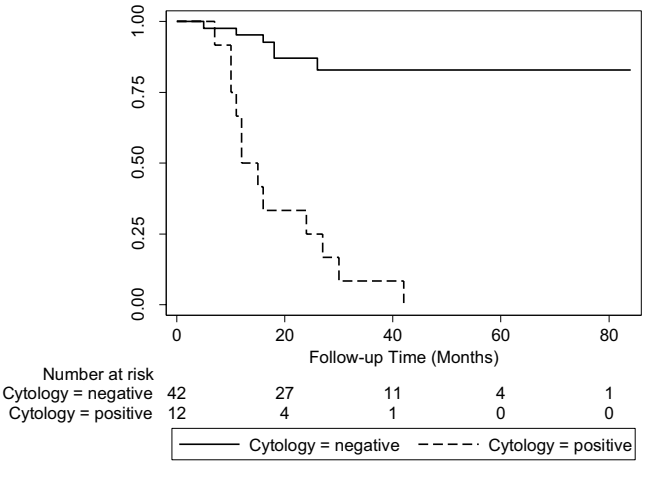

Figure 1 Comparing survival curves between peritoneal washing cytology positive and cytology negative groups (log-rank test p-value < 0.001) in the current series of gastric cancer patients

All 12 patients with +PWC developed peritoneal recurrence. Patients with negative PWC, however, developed peritoneal recurrence in only 10%. Also, all 12 patients with +PWC died from peritoneal recurrence. Most of the deaths occurred within two years after surgery (Table 2). The median survival time for +PWC patients was 13.5 months (range 7 to 42 months) and for patients with negative PWC, the median survival time was 25.5 months (range 5 to 84 months).

There was no 5-year survival for patients with +PWC. Patients with negative PWC had a 5-year survival rate of 83%. The Kaplan-Meier estimates of the survival curves for patients with positive or negative PWC are presented in Figure 1.

Discussion

PWC for detecting IFCC was first established by Moore et al. in 1961[15]. Previous studies reported that PWC was a good prognostic factor[3,8,17,24-29]. In the present study the prevalence of +PWC was 22%. The prevalence of +PWC in the literature ranged from 4.4 to 55%[6,17,22-23,29-31]. This wide variation reflects differences in case selection, as some studies considered only patients undergoing curative gastrectomy, while others focused on patients with serosal invasion, or patients with macroscopic peritoneal dissemination or malignant ascites.

The first step in peritoneal dissemination is considered to be the detachment of cancer cells from the serosal surface of the primary tumor, followed by their dissemination within the peritoneal cavity. These floating cancer cells reach the peritoneal surface,

invade the subperitoneal connective tissue and proliferate to form peritoneal nodules[27].

In the present study, serosal invasion, nodal metastases and poorly differentiated histology were associated with +PWC. When tumor invasion was limited to the gastric wall, PWC was usually negative. Previous studies also reported that serosal invasion was associated with a higher cytological positivity[3,6]. All +PWC patients had nodal metastases in the present series. Similarly, other reports found nodal metastases to be associated with a high prevalence of +PWC[6,18]. These results suggested that the rate of +PWC could increase proportionately when the tumor invades the serosal wall or regional nodes, and when the tumor has lost differentiation[32-36].

Despite variability in the prevalence of +PWC, all studies uniformly showed that patients with IFCC (+PWC) had a significantly higher risk of peritoneal recurrence and lower survival rate compared to patients with negative IFCC (negative PWC)[29,34,37-41]. From our previous report[42] (Table 3), 23% had +PWC. Positive washing cytology was often found in tumors invading the serosa or with LN metastases. All patients with+PWC developed peritoneal recurrence. The peritoneal recurrence rate in curative gastric cancer patients with +PWC ranged from 51 to 100%[24,42-46], while the peritoneal recurrence rate in curative gastric cancer patients with negative PWC ranged from 2.5 to 51%[24,42-48].

The treatment strategy for patients with gastric cancer depends on the stage of their disease at the time of diagnosis and treatment[44-50]. Although peritoneal dissemination commonly occurs in advanced gastric cancer, neither ultrasonography nor CT scan is sufficiently accurate for staging gastric cancers, especially for patients in whom the peritoneal or omental deposits are small and ascites is not yet present[51-55].

Hence, the idea behind staging laparoscopy for gastric cancer is that accurate preoperative staging can avoid unnecessary laparotomy. Staging laparoscopy (SL) is usually performed in the operating room under general anesthesia, and is thus invasive and expensive. It is difficult to justify SL as a routine preoperative examination. Because of its invasiveness, risk of complications and relatively high cost, studies of preoperative SL have been limited to relatively small cohorts[55-58]. Some investigators have suggested that SL should be limited to patients who have radiologic suspicion of peritoneal metastases on CT scans[59].

Although the prognostic significance of IFCC in gastric cancer is widely accepted, clinical applications remain unclear. There is no consensus regarding the incorporation of peritoneal washing cytology into the algorithm of gastric cancer treatment.

Obtaining PWC at the time of diagnostic laparoscopy was recommended by the Society of American Gastroenterologists and Endoscopic Surgeons (SAGEST) in 2008[19], but they failed to indicate how the results of PWC should impact management decisions. The European Society for Medical Oncology (ESMO) in 2010[61] considered obtaining PWC to be optional and not routine. The NCCN guidelines of 2010[60] did not incorporate PWC into the gastric cancer treatment algorithm, despite later considering +PWC a criterion of unresectability and an indication for palliative therapy[61]. The most recent TNM classification (7th edition 2010) included IFCC detection as part of the staging process, denoting M1 disease[62]. In the 2nd English edition 1998 of the Japanese Gastric Cancer Association (JGCA) guidelines, the presence of IFCC was considered an independent prognostic marker in gastric cancer[63].

All patients with +PWC in the present study developed peritoneal recurrence and was associated with poor prognosis, even following curative resection, with no 5-year survival. Positive PWC as an independent predictor of survival has been previously reported by many investigators[6,17,26,33,41]. Patients with +PWC are considered to have stage IV disease even in the absence of macroscopic peritoneal dissemination.

From our previous study of 97 patients (1995-2005), 22 patients (23%) had +PWC. Positive peritoneal washing cytology was also found only in tumors involving the serosa and all patients with +PWC developed peritoneal recurrence[42].

Through the designation as stage IV disease[42] and the well-established associated poor prognosis, patients with +PWC have traditionally been offered palliative treatment[64-65]. There is, however, controversy regarding whether the initial palliative treatment should be a gastrectomy or systemic chemotherapy[66-70]. Although the optimal management for patients with +PWC is unknown, some investigators suggest that the prognosis of patients with +PWC can be improved.

We accept that curative gastrectomy alone does

not provide a survival benefit for these patients. The problem is that the results of intraoperative PWC require a one week waiting period. Thus, if intraoperative PWC is positive, a more aggressive and multimodal approach would be necessary to prevent peritoneal recurrence. Even when curative gastrectomy is performed on patients with positive intraoperative PWC, some adjuvant therapy specifically focused on peritoneal recurrence is needed.

There is no universally accepted regimen for gastric cancer with peritoneal dissemination. ECF (epirubicin + cisplatin + 5FU) and DCF (docetaxel+ cisplatin + 5FU) regimen are often used in Western countries[70-74]. In Japan, the S-1 plus cisplatin regimen is the standard for metastatic gastric cancer[75].

The administration of most chemotherapeutic agents cannot hope to achieve therapeutic doses in the peritoneum because of the blood-peritoneum barrier[76]. S-1 has been reported to pass through the blood-peritoneum barrier and enter the ascetic fluid decreasing peritoneal recurrence[77], and to prolong the survival of gastric cancer patients with peritoneal dissemination[12,78-81]. S-1 for gastric cancer patients seemed to be more effective than conventional chemotherapy against peritoneal dissemination[77,82-84].

Kodera et al in 2007 reported a phase III study of radical surgery followed by postoperative S-1 for gastric cancer with IFCC[85]. The median survival time was 23.5 months and the 2-year survival rate was 47%. Because a higher response rate has been reported with S-1 plus cisplatin compared with S-1 alone in a phase III study of metastatic gastric cancers[75], we expect S-1 plus cisplatin to be more effective against peritoneal recurrence than S-1 alone. Some investigators reported the complete disappearance of peritoneal metastases in gastric cancer patients with S-1 plus cisplatin[86-87]. At present, S-1 plus cisplatin is recognized as the standard chemotherapy for patients with +PWC in Japan[88].

Kobayashi et al. in 2006 demonstrated paclitaxel to be a promising drug for the treatment of malignant ascites in gastric cancer patients[89]. The concentration of paclitaxel in the ascetic fluid was maintained within the optimal level for the killing of cancer cells for up to 72 hours after IV administration.

In patients with +PWC obtained during staging laparoscopy, eradication of IFCC may improve outcomes in medically fit patients. These patients should receive induction chemotherapy[37,76]. If subsequent restaging reveals response to induction chemotherapy (negative PWC without macroscopic evidence of peritoneal dissemination), the patient may be offered curative gastrectomy with postoperative systemic chemotherapy and/or intraperitoneal chemotherapy[90]. Induction chemotherapy can lead to IFCC negativity in a subset of patients and improves their survival[90].

Mezhir et al. in 2010 proposed that patients with positive IFCC alone should undergo chemotherapy for 6 to 12 months. If there is no clinical progression, repeat PWC is performed. Patients who remain positive for IFCC are treated palliatively[90]. Patients who become IFCC-negative ("converted") and have good performance status are considered for curative gastrectomy. They stressed the importance of both patient status and re-evaluation in determining the aggressiveness of subsequent treatment. They reported a resection rate of 74% for IFCC-positive patients who become converted.

Lorenzen et al. in 2010 demonstrated that gastric cancer patients whose IFCC status converted from positive to negative following induction chemotherapy had an improved median survival time (36.1 months vs. 9.2 months) and longer 2-year survival (71% vs 25%) compared with persistently IFCC-positive patients[91]. This allows the surgeon to selectively offer aggressive resection to patients in whom there is a response to induction chemotherapy.

Some investigators reported good outcomes with intraperitoneal chemotherapy for peritoneal dissemination[92]. There is also a strong rationale for using intraperitoneal chemotherapy to prevent peritoneal recurrence. Drug concentration within the peritoneal cavity is higher than what can be achieved after IV administration[85]. Intraperitoneal chemotherapy was demonstrated to be prophylactic against peritoneal recurrence and to result in improved survival[19,93]. The use of extensive intraoperative peritoneal lavage followed by intraperitoneal chemotherapy has also been demonstrated in a phase III study to improve the survival of advanced gastric cancer with +PWC[94].

Conclusion

Approximately 22% of patients undergoing curative D2 gastrectomy for gastric cancer had +PWC.

There were significant associations between +PWC and serosal invasion, nodal metastasis and poorly differentiated histology. Positive PWC was a significant predictor of peritoneal recurrence, indicating poor prognosis and no 5-year survival. These patients should be considered to have stage IV disease and may benefit from additional chemotherapy rather than surgery alone.

Acknowledgment

We would like to thank Mrs. Woraporn Sriyodwieng for preparing this manuscript.

REFERENCES

1. Allum WH, Powell DJ, McConkey CC, Fielding JW. Gastric cancer: a 25-year review. Br J Surg 1989;76:535-40.
2. D'Angelica M, Gonen M, Brennan MF, et al. Patterns of initial recurrence in completely resected gastric adenocarcinoma. Ann Surg 2004;240:808-16.
3. Chuwa EW, Khin LW, Chan WH, et al. Prognostic significance of peritoneal lavage cytology in gastric cancer in Singapore. Gastric Cancer 2005;8(4):228-37.
4. Moriguchi S, Maehara Y, Korenaga D, et al. Risk factors which predict pattern of recurrence after curative surgery for patients with advanced gastric cancer. Surg Oncol 1992;1: 341-6.
5. Yoo CH, Noh SH, Shin DW, et al. Recurrence following curative resection for gastric carcinoma. Br J Surg 2000;87:236-42.
6. Boku T, Nakane Y, Minoura T, et al. Prognostic significance of serosal invasion and free intraperitoneal cancer cells in gastric cancer. Br J Surg 1990;77:436-9.
7. Siewert JR, Lordick F, Ott K, et al. Curative vs palliative strategies in locoregional recurrence of gastrointestinal malignancies. Chirurg 2006;77:227-235.
8. Marrelli D, Roviello F, de Manzoni G, et al. for the Italian Research Group for Gastric Cancer (IRGGC). Different patterns of recurrence in gastric cancer depending on Lauren histological type: a longitudinal study. World J Surg 2002;26: 1160-5.
9. Maekawa S, Saku M, Maehara Y et al. Surgical treatment for advanced gastric cancer. Hepatogastroenterology 1996; 43:178 -86.
10. Kodera Y, Nakanishi H, Yamamura Y, et al. Prognostic value and clinical implications of disseminated cancer cells in the peritoneal cavity detected by reverse transcriptase-polymerase chain reaction and cytology. Int J Cancer 1998; 79:429-33.
11. Ikeguchi M, Matsumoto S, Yoshioka S, et al. Laparoscopicassisted intraperitoneal chemotherapy for patients with scirrhous gastric cancer. Chemotherapy 2005;51:15-20.
12. Kitamura Y, Hayashi K, Sasagawa T, et al. Pilot study of S-1 in patients with disseminated gastric cancer. Drugs Exp Clin Res 2003;29:125-30.
13. Hagiwara A, Takahashi T, Kojima O, et al. Prophylaxis with carbon-absorbed mitomycin C against peritoneal recurrence of gastric cancer. Lancet 1992;339:629-31.
14. Yonemura Y, Sawa T, Kinoshita K, et al. Neoadjuvant chemotherapy for high-grade advanced gastric cancer. World J Surg 1993;17:256-62.
15. Moore GE, Sako K, Kondo T, et al. Assessment of the exfoliation of tumor cells into the body cavities. Surg Gynecol Obstet 1961;112:469-74.
16. Leake PA, Cardoso R, Seevaratnam R, et al. A systematic review of the accuracy and indications for diagnostic laparoscopy prior to curative-intent resection of gastric cancer. Gastric Cancer 2012;15 Suppl 1:S38-S47.
17. Bonenkamp JJ, Songun I, Hermans J, et al. Prognostic value of positive cytology findings from abdominal washings in patients with gastric cancer. Br J Surg 1996;83:672-4.
18. Schott A, Vogel I, Krueger U, et al. Isolated tumor cells are frequently detectable in the peritoneal cavity of gastric and colorectal cancer patients and serve as a new prognostic marker. Ann Surg 1998;3:372-9.
19. Hori Y. Diagnostic laparoscopy guidelines: this guideline was prepared by the SAGES Guidelines Committee and reviewed and approved by the Board of Governors of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), November 2007. Surg Endosc 2008;22:1353-83.
20. Coburn NG, Lourenco LG, Rossi SE, et al. Management of gastric cancer in Ontario. J Surg Oncol 2010;102(1):54-63.
21. Karanicolas PJ, Elkin EB, Jacks LM, et al. Underuse of staging laparoscopy for gastric cancer results in a high rate of futile laparotomy in the USA. J Am Coll Surg 2010;211(3 Suppl): S106.
22. Ribeiro U Jr, Safatle-Ribeiro AV, Zilberstein B, et al. Does the intraoperative peritoneal lavage cytology add prognostic information in patients with potentially curative gastric resection? J Gastrointest Surg 2006;10(2):170-7.
23. Kodera Y. Disseminated cancer cells in the peritoneal cavity:what can we do when we detect them? Gastric Cancer 2008;11(4):192-3.
24. Kodera Y, Yamamura Y, Shimizu Y, et al. Peritoneal washing cytology: prognostic value of positive findings in patients with gastric carcinoma undergoing a potentially curative resection. J Surg Oncol 1999;72:60-5.
25. Hayes N, Wayman J, Wadehra V, et al. Peritoneal cytology in the surgical evaluation of gastric carcinoma. Br J Cancer 1999;79:520-4.
26. Wu CC, Chen JT, Chang MC, et al. Optimal surgical strategy for potentially curative serosa-involved gastric carcinoma with intraperitoneal free cancer cells. J Am Coll Surg 1997; 184:611-7.
27. Nakajima T, Harashima S, Hirata M, et al. Prognostic and therapeutic values of peritoneal cytology in gastric cancer. Acta Cytol 1978;22:225-9.

28. La Torre M, Ferri M, Giovagnoli MR, et al. Peritoneal wash cytology in gastric carcinoma. Prognostic significance and therapeutic consequences. Eur J Surg Oncol 2010;36(10): 982-6.
29. Suzuki T, Ochiai T, Hayashi H, et al. Peritoneal lavage cytology findings as prognostic factor for gastric cancer. Semin Surg Oncol 1999;17:103-7.
30. Cetin B, Atalay C, Aslan S, et al. Peritoneal carcinoembryonic antigen level for predicting locoregional and distant spread of gastric cancer. Surg Today 2005;35(11):919-24.
31. Lehnert T, Rudek B, Kienle P, et al. Impact of diagnostic laparoscopy on the management of gastric cancer: prospective study of 120 consecutive patients with primary gastric adenocarcinoma. Br J Surg 2002;89:471-5.
32. Benevolo M, Mottolese M, Cosimelli M, et al. Diagnostic and prognostic value of peritoneal immunocytology in gastric cancer. J Clin Oncol 1998;16:3406-11.
33. Bentrem D, Wilton A, Mazumdar M, et al. The value of peritoneal cytology as a preoperative predictor in patients with gastric carcinoma undergoing a curative resection. Ann Surg Oncol 2005;12:347-53.
34. Burke EC, Karpeh MS, Conlon KC, et al. Peritoneal lavage cytology in gastric cancer: an independent predictor of outcome. Ann Surg Oncol 1998;5:411-5.
35. Ohno S, Maehara Y, Ohiwa H, et al. Peritoneal dissemination after a curative gastrectomy in patients with undifferentiated adenocarcinoma of the stomach. Semin Surg Oncol 1994; 10:117-20.
36. Ichikura T, Fujino K, Ikawa H, et al. Proposal of a risk score for recurrence in patients with curatively resected gastric cancer. Surg Today 1993;23:759-64.
37. Makino T, Fujiwara Y, Takiguchi S, et al. The utility of pre-operative peritoneal lavage examination in serosa-invading gastric cancer patients. Surgery 2010;148(1):96-102.
38. Iitsuka Y, Shiota S, Matsui T, et al. Relationship between the cytologic characteristics of intraperitoneal free cancer cells and the prognosis in patients with gastric cancer. Acta Cytol 1990;34:437-42.
39. Ikeguchi M, Oka A, Tsujitani S, et al. Relationship between area of serosal invasion and intraperitoneal free cancer cells in patients with gastric cancer. Anticancer Res 1994;14:2131-4.
40. de Manzoni G, Verlato G, Di Leo A, et al. Peritoneal cytology does not increase the prognostic information provided by TNM in gastric cancer. World J Surg 2006;30:579-84.
41. Bando E, Yonemura Y, Takeshita Y, et al. Intraoperative lavage for cytological examination in 1,297 patients with gastric carcinoma. Am J Surg 1999;178:256-62.
42. Euanorasetr C, Lertsithichai P. Prognostic significance of peritoneal washing cytology in Thai patients with gastric adenocarcinoma undergoing curative D2 gastrectomy. Gastric Cancer 2007;10:18-23.
43. Ito S, Nakanishi H, Kodera Y, et al. Prospective validation of quantitative CEA mRNA detection in peritoneal washes in gastric carcinoma patients. Br J Cancer 2005;93(9):986-92.
44. Katsuragi K, Yashiro M, Sawada T, et al. Prognostic impact of PCR-based identification of isolated tumour cells in the peritoneal lavage fluid of gastric cancer patients who underwent a curative R0 resection. Br J Cancer 2007;97: 550-6.
45. Nekarda H, Geb C, Stark M, et al. Immunocytochemically detected free peritoneal tumour cells (FPTC) are a strong prognostic factor in gastric carcinoma. Br J Cancer 1999; 79:611-9.
46. Yonemura Y, Endou Y, Fujimura T, et al. Diagnostic value of preoperative RT-PCR-based screening method to detect carcinoembryonic antigen-expressing free cancer cells in the peritoneal cavity from patients with gastric cancer. ANZ J Surg 2001;71(9):521-8.
47. Wu CW, Lo SS, Shen KH, et al. Incidence and factors associated with recurrence patterns after intended curative surgery for gastric cancer. World J Surg 2003;27:153-8.
48. Roviello F, Marrelli D, de Manzoni G, et al. Prospective study of peritoneal recurrence after curative surgery for gastric cancer. Br J Surg 2003;90:1113-9.
49. Yu W. A review of adjuvant therapy for resected primary gastric cancer with an update on Taegu's phase III trial with intraperitoneal chemotherapy. Eur J Surg Oncol 2006;32(6): 655-60.
50. Ozmen MM, Zulfikaroglu B, Ozalp N, et al. Staging laparoscopy for gastric cancer. Surg Laparosc Endosc Percutan Tech 2003;13(4):241-4.
51. Feussner H, Omote K, Fink U, et al. Pretherapeutic laparoscopic staging in advanced gastric carcinoma. Endoscopy 1999;31:342-7.
52. Stell DA, Carter CR, Stewart I, et al. Prospective comparison of laparoscopy, ultrasonography and computed tomography in the staging of gastric cancer. Br J Surg 1996;83:1260.
53. O'Brien MG, Fitzgerald EF, Lee G, et al. A prospective comparison of laparoscopy and imaging in the staging of esophagogastric cancer before surgery. Am J Gastroenterol 1995;90:2191-2194.
54. Burke EC, Karpeh MS, Conlon KC, et al. Laparoscopy in the management of gastric adenocarcinoma. Ann Surg 1997;223:262-7.
55. Lowy AM, Mansfield PF, Leach SD, et al. Laparoscopic staging for gastric cancer. Surgery 1996;119:611-4.
56. Nakagawa S, Nashimoto A, Yabusaki H. Role of staging laparoscopy with peritoneal lavage cytology in the treatment of locally advanced gastric cancer. Gastric Cancer 2007;10:29-34.
57. Yano M, Tsujinaka T, Shiozaki H, et al. Appraisal of treatment strategy by staging laparoscopy for locally advanced gastric cancer. World J Surg 2000;24:1130-1136.
58. Song KY, Kim JJ, Kim SN, Park CH. Staging laparoscopy for advanced gastric cancer: is it also useful for the group which has an aggressive surgical strategy? World J Surg 2007;31: 1228-3.
59. Davies J, Chalmers AG, Sue-Ling HM, et al. Spiral computed tomography and operative staging of gastric carcinoma: a comparison with histopathological staging. Gut 1997;41:

314-9.
60. Okines A, Verheij M, Allum W, et al. Gastric cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol 2010;21(Suppl 5):v50-v54.
61. Ajani JA, Barthel JS, Bekaii-Saab T, et al. Gastric cancer. J Natl Compr Canc Netw 2010;8(4):378-409.
62. Sobin L, Gospodarowicz M, Wittekind C. TNM classification of malignant tumours. 7th ed. New York: Wiley; 2009.
63. Japanese Gastric Cancer A. Japanese classification of gastric carcinoma, 2nd English edition. Gastric Cancer 1998;1:10-24.
64. Japanese Gastric Cancer, A. Japanese classification of gastric carcinoma. 3rd English edition. Gastric Cancer 2011;14:101-12.
65. Badgwell B, Cormier JN, Krishnan S, et al. Does neoadjuvant treatment for gastric cancer patients with positive peritoneal cytology at staging laparoscopy improve survival? Ann Surg Oncol 2008;15:2684-91.
66. Kim JP. Surgical results in gastric cancer. Semin Surg Oncol 1999;17:132-138.
67. Ouchi K, Sugawara T, Ono H, et al. Therapeutic significance of palliative operations for gastric cancer for survival and quality of life. J Surg Oncol 1998;69:41-44.
68. Hanazaki K, Sodeyama H, Mochizuki Y, et al. Palliative gastrectomy for advanced gastric cancer. Hepatogastroenterology 2001;48:285-9.
69. Hartgrink HH, Putter H, Klein Kranenbarg E, et al. Value of palliative resection in gastric cancer. Br J Surg 2002;89:1438-43.
70. Doglietto GB, Pacelli F, Caprino P, et al. Palliative surgery for far-advanced gastric cancer: a retrospective study on 305 consecutive patients. Am Surg 1999;65:352-5.
71. Cunningham D, Allum WH, Stenning SP, et al. Perioperative chemotherapy versus surgery alone for resectable gastroesophageal cancer. N Engl J Med 2006;355:11-20.
72. Boige V, Pignon J, Saint-Aubert B, et al. Final results of a randomized trial comparing preoperative 5fluorouracil (F)/cisplatin (P) to surgery alone in adenocarcinoma of stomach and lower esophagus (ASLE): FNLCC ACCORD07FFCD 9703 trial. J Clin Oncol 2007;25:4510.
73. Ross P, Nicolson M, Cunningham D, et al. Prospective randomized trial comparing mitomycin, cisplatin, and protracted venous-infusion fluorouracil (PVI 5-FU) with epirubicin, cisplatin, and PVI 5-FU in advanced esophagogastric cancer. J Clin Oncol 2002;20(8):1996-2004.
74. Van Cutsem E, Moiseyenko V, Tjulandin S, et al. Phase III study of docetaxel and cisplatin plus fluorouracil compared with cisplatin and fluorouracil as first-line therapy for advanced gastric cancer: a report of the V325 Study Group. J Clin Oncol 2006;24(31):4991-7.
75. Koizumi W, Narahara H, Hara T, et al. S-1 plus cisplatin versus S-1 alone for first-line treatment of advanced gastric cancer (SPIRITS trial): a phase III trial. Lancet Oncol 2008;9(3):215-21.
76. Okabe H, Ueda S, Obama K, et al. Induction chemotherapy with S-1 plus cisplatin followed by surgery for treatment of gastric cancer with peritoneal dissemination. Ann Surg Oncol 2009;16:3227-36.
77. Oshima T, Yamada R, Hatori S, et al. Pharmacokinetics of S-1 in patients with peritoneal dissemination of gastric cancer. Oncol Rep 2006;16:361-6.
78. Narahara H, Fujitani K, Takiuchi H, et al. Phase II study of a combination of S-1 and paclitaxel in patients with unresectable or metastatic gastric cancer. Oncology 2008;74:37-41.
79. Koizumi W, Kurihara M, Nakano S, et al. Phase II study of S-1, a novel oral derivative of 5-fl uorouracil, in advanced gastric cancer. Oncology 2000;58:191-7.
80. Osugi H, Takada N, Takemura M, et al. Oral fluoropyrimidine anticancer drug TS-1 for gastric cancer patients with peritoneal dissemination. Oncol Rep 2002;9:811-5.
81. Ishizone S, Maruta F, Saito H, et al. Efficacy of S-1 for patients with peritoneal metastasis of gastric cancer. Chemotherapy 2006;52(6):301-7.
82. Yoshida K, Ninomiya M, Takakura N, et al. Phase II study of docetaxel and S-1 combination therapy for advanced or recurrent gastric cancer. Clin Cancer Res 2006;12:3402-7.
83. Mochiki E, Ohno T, Kamiyama Y, et al. Phase I/II study of S-1 combined with paclitaxel in patients with unresectable and/or recurrent advanced gastric cancer. Br J Cancer 2006;95:1642-7.
84. Inokuchi M, Yamashita T, Yamada H, et al. Phase I/II study of S-1 combined with irinotecan for metastatic advanced gastric cancer. Br J Cancer 2006;94:1130-1135.
85. Kodera Y, Ito S, Mochizuki Y, et al. Chubu Clinical Cancer Group. A phase II study of weekly paclitaxel as second-line chemotherapy for advanced gastric cancer (CCOG0302 study). Anticancer Res 2007;27:2667-71.
86. Satoh S, Hasegawa S, Ozaki N, et al. Retrospective analysis of 45 consecutive patients with advanced gastric cancer treated with neoadjuvant chemotherapy using an S-1/CDDP combination. Gastric Cancer 2006;9(2):129-35.
87. Akatsu Y, Saikawa Y, Kubota T, et al. Clinical and pathological disappearance of peritoneal dissemination in a patient with advanced gastric cancer receiving chemotherapy with S-1 and low-dose cisplatin. Gastric Cancer 2004;7(2):128-33.
88. Homma Y, Ushida S, Yamada M, et al. Positive peritoneal washing cytology in multiple cavities can predict poor prognosis of advanced gastric cancer patients. Ann Surg Oncol 2010;17(2):455-60.
89. Kobayashi M, Sakamoto J, Namikawa T, et al. Pharmacokinetic study of paclitaxel in malignant ascites from advanced gastric cancer patients. World J Gastroenterol 2006;12:1412-5.
90. Lorenzen S, Panzram B, Rosenberg R, et al. Prognostic significance of free peritoneal tumor cells in the peritoneal cavity before and after neoadjuvant chemotherapy in patients with gastric carcinoma undergoing potentially curative resection. Ann Surg Oncol 2010;17:2733-9.
91. Mezhir JJ, Shah MA, Jacks LM, et al. Positive peritoneal cytology in patients with gastric cancer: natural history and outcome of 291 patients. Ann Surg Oncol 2010;17(12):3173-80.
92. Yonemura Y, Endou Y, Bando E, et al. Effect of intraperitoneal

administration of docetaxel on peritoneal dissemination of gastric cancer. Cancer Lett 2004;210:189-96.

93. Yu W, Whang I, Suh I, et al. Prospective randomized trial of early postoperative intraperitoneal chemotherapy as an adjuvant to resectable gastric cancer. Ann Surg 1998; 228(3):347-54.
94. Kuramoto M, Shimada S, Ikeshima S, et al. Extensive intraoperative peritoneal lavage as a standard prophylactic strategy for peritoneal recurrence in patients with gastric carcinoma. Ann Surg 2009;250(2):242-6.

The THAI Journal of SURGERY 2014; 35:100-120.
Official Publication of the Royal College of Surgeons of Thailand

Abstracts of the 39th Annual Scientific Congress of the Royal College of Surgeons of Thailand, 10-13 July 2014, Ambassader City Jomtien Hotel, Jomtien, Pattaya, Cholburi, Thailand (Part I)

BREAST SURGERY

THE ROLE OF INTERACTION BETWEEN HER2 AND VEGF IN THAI BREAST CANCER PATIENTS

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Breast cancer is the most frequent cancer of women worldwide and also in Thailand. Vascular endothelial growth factor (VEGF), the key modulator of angiogenesis has been implicated in breast cancer susceptibility and aggressiveness. Without determination of VEGF status, several clinical trials showed significant benefit of anti-VEGF therapy. Assessment of VEGF status along with hormone receptor and Human epidermal growth factor receptor 2 (HER2) status may improve outcome of adjuvant treatments.

To investigate the effect of interaction between VEGF and HER2 on breast cancer aggressiveness, VEGF expression was determined in 101 breast cancer tissues by means of reverse-transcription polymerase chain reaction and immunohistochemistry. HER2 status was determined by immunohistochemistry. Associations between clinico-pathological data, survival and VEGF, HER2, and hormone receptor status were evaluated.

High VEGF mRNA expression was significantly correlated with presence of lymphovascular invasion, locally advanced, and metastasis breast cancer. The patients were classified into four groups according to hormone receptor and HER2 status. Triple negative breast cancer was correlated with high VEGF mRNA expression. In non-luminal A group, high VEGF mRNA expression was correlated with presence of lymphovascular invasion, axillary nodal metastasis, and lower overall survival.

These findings indicated that non-luminal A patients who had higher VEGF level had more aggressive disease and determination of VEGF status in this group of patients should result in better benefit of anti-VEGF treatment.

RANDOMIZED CONTROLLED TRIAL TALC REDUCING POSTOPERATIVE DRAINAGE AFTER MASTECTOMY

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Background: Talc, the most common pleurodesis agent, has recently been shown to prevent seroma and decrease drain duration when placed subcutaneously after large subcutaneous dissection accompanying open ventral hernia repair and axillary dissection in porcine, demonstrated no talc-related local or system complication.

Purpose: Hypothesis that talc would decrease amount of seroma and drain duration, prevent seroma after mastectomy without complication.

Method: The patients with diagnosis of breast carcinomas in Ramathibodi Hospital who underwent mastectomy or/and axillary lymph node dissection were prospectively randomized to application of subcutaneous talc group and control group (TALC vs. NOTALC). Amount of seroma and duration of drain removal were recorded and analyzed by blinded physician.

Result: Amount of seroma formation in TALC group compared with non-TALC group was 252 + 136 mL to 240 + 120 mL in IPD period, and 642 + 130 mL to 735 + 135 mL in OPD period, respectively. Expected drain duration in TALC group compared with non-TALC group was 13.1 days to 13.3 days and actual drain duration was 16.4 to 16.5 days. The result showed no statistical significant of seroma volume and drain duration between TALC group and non-TALC group (*P* value> 0.78).

Conclusion: We found that total amount of seroma formation and duration of drain removal were not different in both groups.

ASSOCIATION BETWEEN BREAST CANCER STEM CELL MARKERS (CD44+/CD24-/ALDH1+) AND POOR PROGNOSTIC MARKERS IN TRIPLE NEGATIVE BREAST CANCER (TNBC) PATIENTS

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Background: Breast cancer has been reported to contain a subpopulation of CD44+/CD24-/ALDH1 tumor cell (Cancer stem cell marker) in various intrinsic molecular subtypes. In TNBC subgroup, early recurrence and systemic metastasis was associated with poor outcome of treatment. Until now, no predictive markers for predict response of systemic treatment. CD44 was the cell adhesion glycoprotein and trans-membrane receptor for the extracellular matrix and has play central role of cancer initiation,invasion and metastasis. CD24 is highly glycosylated cell adhesion molecule, originated in B-cell but is also expressed in endothelium, platelets and malignant cell. CD24 has also play central role cell invasion and metastasis. CD44+/CD24-/ALDH1+ phenotype appear to be the most common in Basal-like tumors (lack of expression ER,PR,HER2) and in BRCA1 hereditary breast cancer. We have investigated on expression of CD44+/CD24-/ALDH1+ phenotypes in TNBC patients and association between expression of this marker and poor prognostic factors of this group of patients.

Objective: First, we investigated the relation between expression of CD44+, CD24-, ALDH1+ to poor prognostic factors of TNBC patients (High Grade, LVI, Advance TNM or stage, High Ki67, High p53 mutation) and second was investigated the incidence of CD44+/Cd24-/ALDH1+ expression in TNBC patients.

Material and Methods: 140 cases triple negative breast cancer patients (ER- .PR- / HER2-0 or 1+) who were surgery at NCI Thailand during 2553-2556 were reviewed. Primary modes of surgery were lumpectomy, total mastectomy and MRM. Tissue diagnosis was confirmed to triple negative breast cancer by IHC staining. Data such as age, tumor size, lymph node status, metastatic site, staging (TNM), LVI, p53, Ki67, tumor type were recorded from pathology report. CD44/CD24/ALDH1 was tested by IHC from paraffin-embedded tissue of primary tumor. Association between CD44+/CD24-/ALDH1+ expression by IHC and poor prognostic factors from primary tumor was calculated by Peason's Correlation Method ($p < 0.05$ was statistically significant)

Results: In 140 cases of TNBC patients, expression of CD44+/CD24-/ALDH1+ phenotypes was found in 23 cases, 16.42% of all cases. CD44+/CD24- was found in 82 cases, 58.57% . Mean age of patient was 53.5 year. In most cases are Invasive ductal CA (90%), Stage II disease (62.2%), Histologic grade III (75%). No statistically significant different between CD44, CD24, ALDH1 subgroups in all pathological factors. Expression of CD44+/CD24-/ALDH1+ phenotype was associated only with high Ki67 value (p = 0.026) but not other poor prognostic factors (Advanced Staging, Age , Lymph node status, Grading, p53, High Ki). All Pearson's correlation was *p* value > 0.05. But in subgroup of CD44-/CD24- and CD44-/CD24-/ALDH1- was associated with age of the patients (p = 0.042,0.043 respectively).

Conclusion: Expression of CD44+/CD24-/ALDH1+ markers in TNBC patients was associated with High Ki-67, but not associated with age, high grade, LVI, staging, lymph node status, p53 of the patients. CD44-/CD24- and CD24-/Cd24-/ALDH1- subgroups were associated with age of the patients. These phenotypic markers need further study whether they are predictive makes for systemic treatment of TNBC patients.

CARDIOTHORACIC SURGERY

SPR CONNECTOR: A SINGLE TUBE ICD CONNECTOR

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Background: Intercostal drainage is a common procedure in surgical practice, especially in trauma. In pneumo-hemothorax, if a single bottle system is used, the blood drained from pleural cavity will raise up the water level and results in difficult subsequent drainage. If a double bottle system is applied, there may be a reflux phenomenon, that when the patient takes a deep breath, the high negative

pressure will suck the water from the water sealed bottle into the reservoir bottle and cause open pneumothorax. Furthermore, the size of the tube of conventional connector is so small and usually causes a bottle neck phenomenon when connected to the chest tube, renders a difficult and inadequate drainage. From the problem of these two systems, an SPR connector is designed and invented.

Objective: To present an ICD connector which can solve the problems of both single and double bottle systems.

Materials and Method: The concept of SPR connector was to make a level-adjustable draining tube with larger diameter. When the water level increases, the tube is adjusted up to keep a constant 2 cm underwater. With this technique, it can remove an unnecessary reservoir bottle.

The SPR connector was composed of two parts, the SPRcap and a large draining tube. The cap was designed as a screwcap with a cylindrical tube in the center. The cylindrical tube was used as the passage of draining tube. It had four small sideholes, connecting its lumen to the outside air. There was a screwlock above the sideholes, used to fix the draining tube. The draining tube was a large long tube with a marker of 2 cm from the end.

To compose the apparatus, the draining tube is inserted into the cylindrical tube of the SPRcap and connected to the bottle. The lower tip of draining tube is placed at 2 cm below the water level and locked. There will be a space between the lumen of cylindrical tube and the draining tube. This space is used as an exit of air (from the pleural cavity), through the sideholes and out of the bottle. Once the drained blood increases the water level, the draining tube could be pulled up to keep the 2 cm underwater level.

Result: SPR connector could be applied to pneumo-hemothorax patient with only single bottle required, which will prevent a reflux phenomenon. With adjustable large draining tube, it offers a more convenient subsequent drainage. As a single tube designed, it can prevent a misconnection between chest tube and short tube of conventional connector.

Conclusion: SPR connector is an innovation which can solve the problems of conventional single and double bottle systems.

REPAIR OF SECUNDUM ATRIAL SEPTAL DEFECTS ON BEATING HEART

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Background: Even current cardioplegic myocardial protection techniques provide safe and effective cardiac protection.Also, reperfusion injury after declamping aorta was found due to ischemic period.We considered that closing atrial septal defect with this strategy could eliminate the ischemic component. We present our experience of repair secundum atrial septal defect with the absence of complications.

Objective: To demonstrate our experience of beating heart atrial septal defect repair

Patients and Methods: From August 2010 through April 2014, 96 patients (62 females and 34 males; ages 8-68 yr) underwent atrial septal defect closure by this method.

Results: The mean cardiopulmonary bypass time was 30.84 ± 12.55 minutes. All patients withstood the procedures well without complications.They were extubated within 6 hours after being transferred to intensive care unit and discharged within 4 days after the operation. No residual shunt was found in immediate intraoperative trans-esophageal echocardiogram.

Conclusion: Our primary aim of the beating-heart technique which is to avoid ischemic-reperfusion injury was achieved. It is a safe, reproducible and effective technique for the closure of atrial septal defect secundum type at our unit.

QUALITY OF SAPHENOUS VEIN GRAFT FROM MINIMALLY INVASIVE DIRECT VISIONS VERSUS CONVENTIONAL OPEN HARVESTING TECHNIQUE FOR CORONARY ARTERY BYPASS GRAFTING

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Background: A minimally invasive direct vision (MIDV) saphenous vein graft harvesting technique for coronary bypass graft (CABG) may reduce donor site wound complications when compared with conventionally open (CO) technique. However, we hypothesized that MIDV technique may injure venous graft by excessive force and traction.

Objectives: To compare (1) the integrity of saphenous vein grafts harvested by MIDV technique to ones harvested by CO technique and (2) donor site wound complications between two groups. (3) To identify associated factor(s) for

venous graft injury.

Method: Of 419 patients who underwent CABG at Siriraj Hospital from October 2012 to August 2013, 50 patients were included in the study. Other 369 patients were excluded because of private case (n=152), multiple vein graft harvesters or harvester outside of the study scope (n=92), patient unwilling (n=38), emergency or redo operation (n=26), venous disease (n=26) and peripheral vascular disease (n=22) and no available venous sample (n=13). Of 50 eligible patients, 25 had MIDV techniques. Venous graft integrity was determined macroscopically by total number of suture repair of side branch avulsion and microscopically by CD31 stain. Venous integrity and donor site wound complications in both groups were compared at the time of operation and at 1 month post CABG, respectively.

Results: Both groups were similar regarding age (CO 66 ± 11 years, MIDV 66 ± 10 years, $p = 0.95$), male gender (CO 56%, MIDV 64%, $p = 0.56$), cardiopulmonary bypass and aortic cross clamp time (CO 105 ± 39 min, MIDV 121 ± 34 min, $p = 0.14$; and CO 72 ± 29 min, MIDV 86 ± 24 min, $p = 0.06$, respectively), the number of vein graft segment (CO 1.8 ± 0.6, MIDV 1.6 ± 0.8, $p=0.16$) and total length of the vein graft (CO 396 ± 83 mm, MIDV 414 ± 142 mm , $p = 0.59$). However, the patients in CO group had lower LVEF (42 ± 31% versus 53 ± 27 %, $p= 0.008$), greater number of diabetes mellitus (64% versus 36% $p = 0.048$), longer operative time (215 ± 71 min versus 261 ± 50 min, $p = 0.010$), longer saphenous harvesting time (52 ± 17 min versus 72 ± 31 min, $p = 0.010$), and longer total incision length (464 ± 98 mm versus 281 ± 95 mm, $p < 0.001$).

The total number of suture repair of side branch avulsion were comparable in both groups (CO 0.88 ± 1.54, MIDV 1.68 ± 3.34, $p = 0.28$) even when compared by per unit length of the vein graft (CO 0.22 ± 0.36/cm, MIDV 0.37 ± 0.66/cm, $p = 0.32$) or by percentage to the non-avulsed branch (CO 7.9 ± 14.8%, MIDV 8.1 ± 13.7%, $p=0.95$). The CD31 immuno-staining in both groups were similar ($p = 0.48$).

Both groups were similar regarding first 72-hour total pain score (CO 19 ± 17, MIDV 18 ± 10, $p = 0.75$) and overall donor site wound complications (CO 56%, MIDV 60%, $p = 0.77$). However, wound echymosis was more prevalent in MIDV group (32% versus 8%, $p = 0.034$).

The associated factors for vein graft injury were dyslipidemia (relative risk 2.6, 95%CI 1.1 to 6.2, $p = 0.031$), and thigh vein harvesting (relative risk 3.5, 95%CI 1.3 to 9.2, $p = 0.031$). Saphenous vein graft side branch avulsion predicted donor site wound ecchymosis (relative risk 4.1, 95%CI 1.2 to 14.1, $p = 0.022$).

Conclusions: The saphenous vein graft integrity harvested by minimally invasive direct vision technique was comparable to conventionally open harvesting technique. The donor site wound complications were also similar in both groups. And thigh vein harvesting was associated with venous side branch avulsion.

THE POSTERIOR PERICARDIOTOMY. DOES IT REDUCE THE INCIDENCE OF POSTOPERATIVE ATRIAL FIBRILLATION AFTER CORONARY ARTERY BYPASS GRAFTING?

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Atrial fibrillation (AF) is the most common arrhythmia after coronary artery bypass graft surgery (CABG). Posterior pericardiotomy (PP) was reported to reduce pericardial effusion, AF trigger, and reduce the length of hospital stay and hospital costs without significant complications. A total of 20 patients, diagnosed as coronary artery diseases to be treated by an elective or urgency CABG between August and December 2013, were randomly divided into two groups; 10 patients received PP (PP group) and 10 patients did not receive PP (control group). The incidence of AF was equal (40% in both groups). Early pericardial effusion was slightly higher in the PP group (PP 70%, control 60%; $p = 1.00$). The incidence of left pleural effusion and pneumonia were higher in the PP group than in the control. Moreover, one patient in the PP group developed perioperative myocardial infarction (MI) that required intensive care with medication. The duration of ICU stay of the PP group was significantly longer than that of the control group.In conclusion, PP did not reduce the incidence of postoperative AF nor did early pericardial effusion. Rather, PP increased post-operative complications such as perioperative MI, left pleural effusion, and pneumonia resulting in prolonged ICU stay.

THE RESULTS BETWEEN BIATRIAL AND LEFT ATRIAL MAZE IN CONCOMITANT OPEN HEART SURGERY

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Background: Atrial fibrillation (AF) is associated with increased morbidity and decreased survival following

cardiac surgery. The Cox-maze III procedure remains the surgical treatment with the highest cure rates but it is lengthy and technically demanding. Many surgeons have tried to simplify the maze procedure.

Objective: The aim of this study was to assess the results of bi-atrial and left atrial maze procedure using radiofrequency (RF) ablation.

Methods: Between July 2011 and October 2013, 48 patients underwent modified maze procedure using the RF ablation technique for permanent AF associated with concomitant open heart surgery. The maze procedure was simultaneously performed with mitral valve surgery (n = 45) double valves replacement (n = 2), tricuspid annuloplasty (n = 16) and LA reduction (n = 33). Twenty four patients underwent biatrial ablation (group A), while 24 patients underwent left atrial and cavotricuspid isthmus ablation (group B).The pre-operative, perioperative and postoperative results were compared between two groups.

Results: The clinical characteristics of the patients in both groups were similar. Follow up was 96% completed, with median follow up time at 15 months. The hospital mortality was 8.4% in group A and 4.2% in group B. Freedom from AF at 6 months, 1 year and 2 years was 92%, 100% and 86% in the biatrial group and 68%, 63% and 38% in the left atrial group. Overall freedom from AF is significantly higher in biatrial group (*p*value 0.0002, Hazard ratio =2.01, 95% CI: 0.97- 4.17). Restoration of sinus rhythm in the first half and the last half cases was 89%, 100% and 45%, 100% in group A and B, respectively.

Conclusions: Bi-atrial maze procedure is superior to left atrial maze procedure in the restoration of sinus rhythm of concomitant AF. Restoration of sinus rhythm also related to the learning curve phenomenon in both groups.

MAJOR NEUROLOGIC COMPLICATION AND MYOCARDIAL PRESERVATION OF SINGLE CLAMP TECHNIQUE VERSUS MULTIPLE CLAMP TECHNIQUE IN CORONARY ARTERY BYPASS GRAFTING

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Background: Effective myocardial preservation and minimize the risks of post-operative cerebral dysfunction are main requirements for successful coronary artery surgery which may be determined by the surgical technique used or the direction of cardioplegia delivery. The increased aortic manipulation during coronary artery bypass surgery is known to be associated with embolic events. The use of the single cross-clamp technique for minimal handling of the aorta reduce the incidence of adverse neurological events post-operatively.

Objectives: Major neurologic complication and myocardial preservation of single clamp technique versus multiple clamp technique in coronary artery bypass grafting

Materials & Methods: Patients undergoing elective isolated CABG at QSHC and Srinakarin hospital from January 2010 to October 2012, identified as having multiple clamp technique (aortic cross clamp and side biting clamp) or single clamp technique (aortic cross clamp only), were included in the study. Data were collected by study personnel and clinicians to determine major neurologic complication, post-operative MI, low cardiac output state and mortality rate for 619 patients, with single clamp technique 197 pts (32%) and multiple clamp technique 420 pts (68%).

Results: Six hundred and nineteen patients consisted ofsingle clamp technique 197 pts (32%), multiple clamp technique 420 pts (68%) There were no differences in mean age, previous stroke, hypertension, or diabetes. Intraoperatively, patients with single clamp technique had shorter bypass times, longer aortic cross clamp time. Postoperatively, no difference in major neurological complication, post-operative MI and low cardiac output start. The single clamp group had higher hospital stay (16 days vs 13.5 days, $p = 0.008$)

Conclusions: During elective CABG in patients with no clinical evidence of aortic or cerebro-vascular disease the incidence of peri-operative MI/low cardiac output state and post-operative neuropsychological disturbances are no difference in both techniques.

PRELIMINARY REPORT OF MITRAL VALVE REPAIR IN RHEUMATIC MITRAL STENOSIS AT LAMPANG HOSPITAL

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Between January 2010 and September 2013,we have performed 255 cases of mitral repair at our unit. Ninety four patients with rheumatic mitral stenosis (mean age 50.0 ±8.72 years) underwent mitral valve repair. Fifty six patients (59.6%) had preoperative atrial fibrillation. Twenty-three cases (24.5%) were in NYHA class 3 or 4. Sixty-five cases (69.1%) had pure mitral stenosis (MS) and twenty-nine cases (30.9%) had mixed mitral stenosis and regurgitation. The repair procedures include leaflet correction 53 (56.4%), chordal-correction 75 (79.8%), commissurotomy

94(100%), commissuroplasty 7 (7.4%), papillotomy muscle splitting 85 (90.4%), ring or band annuloplasty 85 (90.4%). Early mortality was 1(1.1%). Follow-up ranged from 2 months to 45 months(mean 28.05 ± 8.12 months). 83 (88.3%) had trivial to mild mitral stenosis, 11 (11.7%) had moderate mitral stenosis, 88 (93.6%) had trivial to mild mitral regurgitation and 6 (6.4%) had moderate to severe mitral regurgitation. Four patients underwent re-operation (redo MVR). There were 1 TIA and 1 late embolic stroke. There were 1(1.1%) 30-day mortality and 1 (1.1%) late death. MV repair in rheumatic mitral stenosis is feasible with acceptable in early follow-up.

At the latest follow-up, the MR grade was none/trivial in 64.5 of patients, mild in 22.6, moderate in 6.5, moderately severe in 4.8 and severe in 1.6%. Two patients had redo mitral surgery. At 5 years postoperatively, the estimated rates of freedom from reoperation and valve failure were 96.8 and 91.6%, respectively.

Age and sex distribution of patients

Age(years)	Male	Female	Total(%)
0-20	0	0	0(0)
21-40	0	8	8(8.5)
41-60	22	52	74(78.7)
>60	4	8	12(12.8)
Total	26(27.7%)	68(72.3)	94(100)

BILATERAL IMA IN CABG

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The clinical and prognostic benefits of coronary artery bypass grafting (CABG) are well accepted for certain subgroups of patient with coronary artery disease, and most CABG patients require grafting of more than two coronary arteries. For the last 20 years the standard operation has achieved this using a single internal mammary artery (SIMA) with saphenous vein grafts. Although this procedure achieves good short and mid-term outcome, the long term results are limited by progressive vein graft failure. The possibilitythat bilateral mammary artery grafting may offer additional clinical and survival benefits to SIMA grafting, especially in long term outcome, has been addressed in several studies. On the other hand several studies reported BIMA grafting is risk factor of sternal ischemia and infection.

Recently we try to work on CABG (including OPCAB) using BIMA actively, and this study evaluated the mortality and morbidities of BIMA grafting compared with SIMA grafting in our institute.

From December 2012 to June 2014, 117 patients underwent isolated CABG in our institute, and BIMA was used in 67 patients (57.3%). Seventy two patients (61.5%) underwent OPCAB (67.1% in BIMA group and 54.0% in SIMA group), and average anastomosis was 2.53 (2.77 ± 0.63 in BIMA group and 2.20 ± 0.88 in SIMA group). There were no significant difference between BIMA group and SIMA group in preoperative characteristics.

In BIMA group, hospital mortality rate is 2.9% (6.0%, in SIMA group). One patient (1.5%) had sternal infection (0% in SIMA group), the other (1.5%) had re-sternotomy for bleeding (4.1% in SIMA group) and no patient had stroke (1.5% in SIMA group). There were no significant difference between both groups about mortality and morbidities.

In our study, CABG with BIMA was a safe procedure with no risk factor of sternal infection.

COLORECTAL AND ANAL SURGERY

AN INTERIM ANALYSIS OF A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL : CAN CO_2 MAKE COLONOSCOPY QUICKER THAN ROOM AIR?

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Background: Colonoscopy is the most accurate and complete modalities in screening and surveillance for colorectal cancer. Room air insufflations are still routinely used during colonoscopy. However, from recent studies, Carbon dioxide (CO_2) insufflations have more advantages in terms of less post procedural pain, decreased abdominal distention, patient satisfaction and acceptance for another colonoscopy if indicated but no previous study shows that CO_2 insufflations may make colonoscopy quicker than room air insufflations.

Objectives: Aims of this randomized double-blinded

controlled trial are to evaluate effects of CO_2 insufflations in comparison with room air insufflations on cecal intubation time, post procedural pain, end tidal CO_2, abdominal circumferences and patient satisfaction and acceptance for another colonoscopy if indicated.

Materials and Methods: Fifty three patients who met inclusion criteria were enrolled into this study between June 2012-December 2013. After computer randomization, 27 patients were in CO_2 insufflation group and 26 patients were in room air group. Double-blinded methods for colonoscopy in all patients were done. The primary end point is cecal intubation time and the secondary end points are measuring of post procedural pain (at 15, 30, 60 minutes after colonoscopy), abdominal circumferences (before and 15, 30, 60 minutes after colonoscopy), end tidal CO_2 immediate before and after colonoscopy and patient satisfaction and acceptance for another colonoscopy if indicated were recorded. Sample size calculation for achievement of power 0.8 and alpha 0.05 shows that 132 patients have to be enrolled into each study group.

Results: The demographic characteristics between two groups were similar. The median cecal intubation time (min-max) was 10 (4-27) minutes in CO_2 group and 11 (5-50) minutes in room air group (*p*-value = 0.377). There was association between body mass index (BMI) and cecal intubation time in CO_2 group (-4.66, *p*-value = 0.016). Median increased values of end tidal CO_2 (min-max) was -1.5 (-27 to 13) mmHg in CO_2 group and -1.5 (-19 to 15) mmHg in room air group, (*p*-value = 0.828). Mean visual analog scale (VAS) score of post procedural pain (max = 10, min = 0) in CO_2 group at 15, 30, 60 minutes were 0.56 (± 1.863), 0.48 (± 1.905), 0.32 (± 1.201) and in room air group were 1.08 (± 1.758), 0.91 (± 1.418), 0.46 (± 1.108) (*p*-value = 0.112, 0.243, 0.399). Median increased length of abdominal circumferences (cm) at 15, 30, 60 minutes in CO_2 group were -0.98 ± 2.81, -0.5 ± 2.92, -0.42 ± 3.45 and in room air group were -1.42 ± 2.69, -1.28 ± 3.09, -1.12 ± 3.75 (*p*-value = 0.879, 0.748, 0.784) Mean satisfactory VAS score (max = 10, min = 0) in CO_2 group was 9.12 ± 0.978 and in room air group was 9.5 ± 2.147 (*p*- value = 0.43). The patient acceptances for another colonoscopy if indicated in CO_2 group were 100% and in room air group were 95.8 % (*p*- value = 0.49).

Conclusion: Although without statistical significant differences of parameters in the interim analysis, the study showed the trends of faster cecal intubation time, reduction of post colonoscopy pain and safety use of CO_2 insufflations in colonoscopy. Lower BMI was the risk factor that may predict prolonged cecal intubation time, therefore trainee and less experienced colonoscopist should be aware of possibility of incomplete total colonoscopy in thinner patient. The study will be continued until the calculated sample size is reached, then studied parameters will be again analysed and more definite conclusion can be reached.

FACTORS DETERMINING LOW ANTERIOR RESECTION SYNDROMEAFTER RECTAL CANCER RESECTION; A STUDY IN THAI PATIENTS

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Aims: Defective defecation function known as low anterior resection syndrome (LARS) is a common problem after surgical treatment of rectal cancer that had an effect of quality of life. This study aimed to look for the incidence of LARS in patients whose native rectum could be kept and determine factors influencing major LARS.

Methods: Rectal/rectosigmoid cancer patients who underwent tumor removal with mesorectal excision and colorectal anastomosis by a single colorectal surgeon during the year 2004 and 2013 were asked to participate in a structured interview using the verified version of Low Anterior Resection score. Clinical parameters were analyzed against the major LARS (LARS score > 30). Cut-off anastomotic level that the best discriminate risk of having major LARS was calculated by using a receiver operating characteristic curve.

Results: One hundred and thirty-one cases (68 males and 63 females) participated in the study. Minor and major LARS were detected at 16.8% and 17.6%, respectively. On univariate analysis, factors associating with major LARS consisted of extent of operation, presence of temporary ostomy, and chemo-radiation therapy. Major LARS was found at 27% in those who underwent low anterior resection, which was significantly higher than the incidence of 5% in the anterior resection ($p < 0.01$). Radiation therapy was the only factor independently associated with major LARS at the odds ratio 6.5 (95%CI: 2.37-18.15). ROC curve plot between sensitivity and 1-specificity of anastomotic level in determining major LARS showed area under the curve at 0.74. The cut-off anastomotic level that best predicted major LARS was at 5 cm, which give negative predictive value at 89%. Individual defecation symptoms that were significantly associated with major LARS included pain on defecation, difficulty-holding stool and need to use pad.

Conclusion: LARS is a significant problem found in a half of rectal cancer patients after colorectal anastomosis. Symptoms that were concerned included pain on defecation and decrease ability to hold. Risk of having major LARS increases with adjuvant treatment and lower anastomotic level.

INFLUENCE OF PAYER SOURCES ON TREATMENT AND OUTCOMES IN COLORECTAL CANCER PATIENTS IN A UNIVERSITY HOSPITAL IN THAILAND

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Aim: The study aimed to compare between 2 types of insurance used by colorectal cancer (CRC) patients in a university hospital in Thailand; universal coverage (UC) and "Civil Servant Medical Benefit Scheme" (CSMBS) in terms of hospital expenditure and survival outcomes.

Methods: CRC cases stage I-IV who were operated on and had completed their adjuvant therapy in Songklanagarind Hospital during the year 2004 and 2013 were retrospectively reviewed regarding their hospital expenditure focusing on surgical expenditure and chemotherapy cost. Cases were allocated into 2 groups according to their registered type of payment. Survival analysis was done by Kaplan-Meier survival probability plot and Log-rank test.

Results: Of 1,013 cases analyzed, 524 (51.7%) were in the UC group while 489 (48.3%) belonged to the CSMBS. Cases with stage IV disease were significantly higher in the UC group. Average total treatment expenditure (TTE) was THB 143,780. The TTE increased with tumor stage and chemotherapy cost contributed the most to the TTE increment. TTE in the CSMBS group was significantly higher than the UC group in stages II-III CRC. When the majority of cases in the UC group (65.5%) used deGramont or Mayo as their first line regimen, proportion of cases who started with capecitabine-based regimen (XELOX or Xeloda®) was significantly higher in the CSMBS group (61.0% compared with 24.5% in the UC group, p-value < 0.01). On survival analysis, overall survival (OS) and progress free survival in the CSMBS group were significantly better than those of the UC group. The 5-year OS in the CSMBS and the UC were 84.3% and 74.6%, respectively (p-value < 0.01).

Conclusion: The study concluded that type of insurance influenced resource utilization, especially choice of chemotherapy, in CRC. The disparity in treatment, in turn, resulted in a gap in treatment outcome.

OUTCOME OF SURGICAL CORRECTION IN ANORECTAL MALFORMATION IN MAHARAJNAKORN CHIANG MAI HOSPITAL

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Background: Anorectal malformation [ARM] is a very interesting topic in Pediatric Surgery. In MaharajNakorn Chiang Mai Hospital, patients with ARM vary in different aspects, such as age at diagnosis, treatment and outcome. Many benefits in early definitive surgery [Posterior Sagittal Anorectoplasty, PSARP]. Suitable age for surgical correction depends on surgeon skill, anesthetic and nursing availability. But the major problem in Anorectal Malformation surgical correction in Maharaj Nakorn Chiang Mai Hospital is age-group variation. We conducted a retrospective descriptive study to demonstrate and compare the outcome of surgical correction in anorectal malfor-mation in MaharajNakorn Chiang Mai hospital.

Objective: This aim of this research was to study about results of definitive surgery for anorectal malformation in many aspects and age group that related to effective outcome for definitive surgery for anorectal malformation.

Patients and Methods: A retrospective descriptive study was performed on all anorectal malformation without cloacal and rare malformation that registed in electronic record data between 2548-2555. We evaluated character, diagnosis, treatment and used Krickenbeck classification for outcome evaluation of definitive treatment.

Results: The study included 121 patients with ARM. The proportion of patients with low and non-low type [male 26.15% vs 73.85% p 0.005, female 51.79% vs 48.21% p 0.003, age 18.9 vs 22.5 p 0.680, weight 6.04 vs 9.64 p 0.999] are not different. Association anomaly are not significant in two groups. The proportion of colostomy [low-type 17.58% vs non low-type 82.42% p 0.000] are different. Results showed that PSARP had soiling complication [Anoplasty 8.33% PSARP 75.00% AP Pull Through 16.67% P value 0.017].

Conclusion: Definitive surgery for anorectal malfor-mation in many aspects in MaharajNakorn Chiang Mai Hospital is very different. Age group is not related to effective outcome for definitive surgery for anorectal malformation in Maharaj Nakorn Chiang Mai Hospital.

A DARN TECHNIQUE FOR RECTOCELE REPAIR

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Background: Transvaginal rectocele repair shows the impressive success rate (79-87%), and transvaginal mesh repair demonstrates a very good outcome (94% of anatomical success rate) but carries high morbidities such as mesh erosion, dyspareunia and pelvic abscess. With aim to minimize complications from a foreign material, while maintaining the good outcomes, we followed the idea of darn hernia repair by using 2-0 polypropylene for darning of rectocele defect.

Materials and methods: Twelve rectocele patients who met the inclusion criteria; difficult defecation, digital assisted defecation, retaining contrast in post-defecation phase of defecogram and non-active sexual life, were recruited for transvaginal darn technique rectocele repair.

Results: The mean follow-up was 14.8 months with no complication (erosion, wound infection or defecographic recurrence). Anatomical defect of all patients were corrected (100% anatomical success rate) which were confirmed by defecogram. Most of the patient symptoms were improved. But there was one patient who had recurrent of symptoms caused by pelvic floor descent.

Conclusion: Transvaginal darn technique rectocele repair can achieve a good result in the term of clinical and anatomical success rate (100%) without complication (graft erosion or infection) due to reduced foreign body reaction. However, long-term follow-up and high patient volume are needed for safety aspect.

LAPAROSCOPIC LATERAL PELVIC LYMPH NODE DISSECTION

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Background: The colorectal cancer at lateral pelvic lymph node (LPLN) is still debated whether it is regional or distant lymphadenopathy. However, the survival rate in patients with LPLN metastasis alone is better than in patients with metastases in other organs. The lymphadenectomy may benefit in this group of patients, especially with laparoscopic approach.

Objective: To demonstrate the technique of laparoscopic LPLN dissection in case of metastatic LPLN disease.

Materials and Methods: The VDO demonstrates the laparoscopic techniques for dissection of LPLN in patient with single metastatic LPLN disease.

Results: This technique needs advanced laparoscopic skills. LPLN dissection should be considered in many cases.

Conclusions: Though the necessity to dissect LPLN is debatable, LPN dissection should be considered in many cases. Laparoscopic technique can remove the lesion, with less complication and it should be chosen when the expertise, and facility are available.

ENDOSCOPIC MANAGEMENT OF COLONIC ANASTOMOTIC STRICTURE, THE NOVEL APPROACH: COMBINED BALLON DILATATION WITH STRICTUREPLASTY

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Introduction: Stricture occurs in 5.8-20% of colonic anastomoses.The incident is higher in the patients with adjuvant chemotherapy. Symptomatic strictures have previously been treated by resection and re-anastomosis and more recently by radiographically guided dilatation. However, balloon dilatation alone shows high failure and recurrent rate.

Method: This video describes the endoscopic management of colonic anastomotic stricture by using balloon dilatation combined with strictureplasty in patients with previous colorectal anastomosis due to rectal cancer.

Result: From October 2012 to September 2013, The procedure were performed in 13 patients with colonic anastomotic stricture. Average time of procedure was 32 min. Average number of sessions required was 1.8 sessions. The procedure was in all patients without recurrent after six months follow up. Longest time of follow up was 19 months. There was no mortality and major complication occurred.

Conclusion: The balloon dilatation combined with stricturoplasty is effective and safe for treatment of colorectal anastomotic strictures.

ENDOSCOPIC TRANSANAL TOTAL MESORECTAL EXCISION (EATME)

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Introduction: Total mesorectal excision is the

standard procedure for rectal cancer. However, the procedure, either laparoscopic or open technique, requires a very good surgical skill especially in large low rectal tumors, narrow pelvis or obese patients. In those cases, it is difficult to reach the pelvic floor for making a secure anastomosis and adequate distal margin. We have developed the "endoscopic transanal total mesorectal excision" which may have benefits to these patients.

Method: The video shows technique of first endoscopic transanal total mesorectal excision in human soft cadaver. Left side colonic mobilization was performed until reaching the peritoneal reflection distally. Purse string suture was placed 2 cm. below the tumor transanally . Then transanal intersphincteric dissection was performed. After entering intersphincteric plane, SILStm Port was inserted into the anal canal and sutured to anal verge. Gas insufflation was done and flexible tip laparoscope was inserted. The dissection was performed along TME plane under direct vision until fully mobilized of rectum. The specimen was removed transabdominal approach.

Result: The endoscopic transanal total mesorectal excision shows clear anatomical plane and the dissection could be simply performed in stepwise.

Conclusion: Transanal minimally invasive surgery is a feasible and promising technique. The technique may provide benefits in patient with difficult pelvic access for transabdominal TME.

COMPARISON OF INTERSPHINCTERIC ABDOMINOPERINEAL RESECTION, CONVENTIONAL ABDOMINOPERINEAL RESECTION, AND LOW HARTMANN'S PROCEDURE: A CASE-MATCHED STUDY

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Aim: To compare the short-term outcomes of intersphincteric abdominoperineal resection (IS-APR) with conventional abdominoperineal resection (APR) and low Hartmann's procedure (LHR).

Methods: A cross-sectional study of patients between January 2012 and April 2014, reviewed a total of 60 patients with low rectal cancers, who were enrolled at a tertiary care hospital and underwent IS-APR (N=15), APR (N=30), and LHR (N=15). Patients with poor sphincter tone, advanced age, and a high risk of coloanal anastomosis were candidates for IS-APR. The clinicopathological parameters were matched and short-term outcomes were collected and analyzed. The IS-APR was performed in patients with tumors located at 1.5-3 cm from the dentate line, without involvement of the external sphincter or invasion of the pelvic floor musculature. The extent of tumor involvement was determined by digital rectal examination, computed tomography, magnetic resonance imaging, endoanal ultrasound, or a combination.

Results: Operative times and post-operative complications were not different between the three groups ($P = 0.173$ and $P = 0.808$, respectively). The overall rate of complete (R0) resection was 81.7%. The rate of R0 resection and number of resected lymph nodes were comparable ($P = 0.683$ and $P = 0.630$, respectively) in all groups. There were no significant differences between groups in terms of time to diet, 24-h postoperative pain, and length of hospital stays. The distal margin in the LHR group was significantly smaller than in the other two groups ($P = 0.002$). The overall postoperative complications were comparable in all groups, occurring in a total of 16 patients in all three groups (26.7%). Perineal complications in the IS-APR group was lower, when compared to APR group, but not statistically significant (0% vs 13.3%, $P = 0.168$).

Conclusion: In selected patients, IS-APR can be performed safely with comparable short-term outcomes, but with less perineal complications than APR and a longer distal margin than LHR.

PROSPECTIVE STUDY FOR SAFETY AND EFFICACY OF TRANSLEVATOR VENTRAL RECTOPEXY FOR TREATMENT OF RECTAL PROLAPSE

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Introduction: Translevator ventral rectopexy was first described by Dr.Pattana-arun et al. as the optional procedure for rectal prolapse treatment especially with concomitant pelvic floor descent. Our propose is to evaluate the safety and efficacy of the procedure in patients suffering from rectal prolapse with difficult defecation.

Method: From May 2013 to March 2014, 19 patients with rectal prolapse underwent translevator ventral rectopexy. The preoperative status, complications, recurrent rate and postoperative status were assessed. Data were collected prospectively at base line and three months after operation from standardized questionnaires for the assessment of constipation by modified Longo's obstructed defecation syndrome (ODS) score system.

Results: Twenty translevator ventral rectopexy were

performed in 19 patients with rectal prolapse. Mean age of patients was 65.47 years. Mean operative time was 2.08 hours. Average pain score at 24 hour was 2.88. One perioperative complication was found as rectal injury (5.2%) which could be managed by direct repair. One recurrence found immediately after surgery and another at 2 months after surgery (10.5%). At 3 months follow-up, significant improvement in the constipation scoring system was observed with *p* value < 0.0001 (mean ± SD preoperative= 16 ± 4.59 VS postoperative = 4 ± 2.13). The symptoms of constipation improved in 95% of patients at 3 months after surgery.

Conclusion: Translevator ventral rectopexy is effective with significant improve obstructive defecation symptom in patients with rectal prolapse and can be performed safely without major morbidity or mortality.

OUTCOME AND SURVIVAL OF URGENT/EMERGENT PELVIC EXENTERATION IN 31 PATIENTS WITH UNFIT CONDITIONS AT KING CHULALONGKORN MEMORIAL HOSPITAL

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Background: Pelvic exenteration, the definite approach for locally advanced pelvic tumor, carries high morbidity and mortality rate. Mostly, this procedure is performed in medically fit patients in an elective setting. However, pelvic exenteration may be reasonable in patients with poor preoperative conditions. The outcome of pelvic exenteration in the patients with unfit conditions has never been reported. Aim of this study is to report the short-term outcome and survival of 31 patients with inappropriate preoperative status who underwent pelvic exenteration at King Chulalongkorn Memorial Hospital.

Methods: A retrospective review of 31 patients who underwent pelvic exenteration at King Chulalongkorn Memorial Hospital between October 2006 and June 2012 was performed. The inclusion criteria was patients with urgent/emergent was performed conditions or poor preoperative status e.g. albumin < 3.5 g/dL, Cr. = 2 mg/dL, Hct < 30% and ASA = 3.

Results: Of 31 patients, 25 (80.6%) had primary colorectal cancer, 3 (9.7%) had recurrent colorectal cancer, 2 (6.5%) had gynecologic malignancies and 1 (3.2%) had other pelvic tumor. Seventeen (54.8%) cases underwent total pelvic exenteration, 7 (22.6%) underwent posterior pelvic exenteration, 6 (19.4%)underwent total pelvic exenteration with sacrectomy and 1 underwent posterior pelvic exenteration with sacrectomy (3.2%). Pelvic exenteration was performed in 22 (71%) urgent cases and 9 (29%) emergent cases. Nine of these emergent cases, 4 (44.45%) were perforation, 3 (33.33%) were obstruction, 1 (11.11%) was pelvic abscess and 1 (11.11%) was uncontrolled UTI sepsis from tumor invasion. The median operative blood loss was 2,100 (500-9,000) mL., the mean operative time was 571.61 ± 137.36 minutes, median postoperative ICU stay was 1 (0-24) day and mean postoperative hospital stay was 22.77 ± 14.71 days. The 30-day morbidity was 48.4% and 50% of the patients could be managed with conservative treatment. There was no 30-day mortality. The median follow up time was 30 months (range 3-90 months), the 2-year overall survival was 71%. The 2-year disease free survival was 54.6%.

Conclusion: Pelvic exenteration for urgent/emergent situation and poor preoperative conditions can provide acceptable outcome.

ACCURACY OF SELF-CHECKED FECAL OCCULT BLOOD TESTING FOR COLORECTAL CANCER DETECTION

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Background and Objective: Using fecal occult blood testing (FOBT) as a screening tool for colorectal cancer (CRC) has been associated with a 20% reduction in CRC incidence and a 33% decrease in cancer-related mortality. However, this conventional FOBT required stool collection and stool handling, which may be inconvenient for participants. The EZ-DetectTM (Siam Pharmaceutical Thailand) is an FDA-approved chromogen-substrate based FOBT which is basically a self-checked FOBT (no stool handling required). This study aimed to evaluate the accuracy of EZ-Detect for CRC detection.

Materials and Methods: This prospective study was conducted at Siriraj Hospital between November 2013 and May 2014. Some 96 patients with histologically-proven CRC and 101 patients with normal colonoscopic findings were invited to perform self-checked FOBT according to the EZ-Detect manufacture's instruction. Results were compared with endoscopic and pathologic findings. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for CRC detection were calculated.

Results: The present study revealed the sensitivity, specificity, PPV and NPV of this self-checked FOBT for CRC detection to be 41% (95% CI: 31-51), 97% (95% CI: 92-99), 93% (95% CI: 81-98) and 63% (95% CI: 55-70), respectively. The overall accuracy of EZ-Detect for identifying CRC was

70%. The sensitivity for CRC detection based on 7th AJCC staging was 29% for stage I, 32% for stage II and 50% for stage III/IV (P= 0.19). The sensitivity was 33% for proximal colon and 42% for distal colon and rectal cancer (P= 0.76). However, none of 9 infiltrative lesions had a positive FOBT.

Conclusion: The self-checked FOBT had an acceptable accuracy of CRC detection, except for infiltrative tumors. This home-administrated or 'DIY' do-it-yourself FOBT could be considered as one of non-invasive and convenient tools for CRC screening.

LAPAROSCOPIC PERITONEAL LAVAGE FOR PERFORATED SIGMOID DIVERTICULITIS

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Background: Standard treatment of perforated sigmoid diverticulitis is Hartmann's operation. Recently, laparoscopic peritoneal lavage has been introduced for this condition. However, it is questioned about safety and effectiveness of this procedure.

Objectives: The aim of this study was to evaluate outcome and safety of this procedure at Ratchaburi Hospital.

Materials and Methods: All patients with perforated sigmoid diverticulitis between January 2004 and May 2014 were retrospectively reviewed. Patients treated with laparoscopic peritoneal lavage were included in this study. Data retrieval included patients' demographic data, intraoperative parameters and postoperative outcomes.

Results: Three of 20 patients with perforated sigmoid diverticulitis were treated with laparoscopic peritoneal lavage. All patients are female with the mean age of 76 years (73-78). They received intravenous broad spectrum antibiotics preoperatively. Diagnostic laparoscopy was performed to confirm diagnosis and peritoneal lavage with normal saline solution was done after aspiration of purulent fluid. Two patients were found to have free perforation with purulent discharge (Hinchey stage 3) while one patient had pelvic abscess (Hinchey stage 2). All patients were successfully treated with laparoscopic procedure. Mean operative time was 60 minutes (55-64) whereas mean length of stay was 17 days (13-20). There was no morbidity and mortality during postoperative period. All patients refused to undergo definitive sigmoid resection. There were no recurrent symptoms of diverticulitis during mean follow-up period of 10 months (8-11).

Conclusion: Laparoscopic peritoneal lavage is safe, feasible and effective for treatment of perforated sigmoid diverticulitis. It should be an alternative treatment for this condition and may be a new standard treatment in future.

ENDOCRINE SURGERY

SAFETY AND COST-EFFICIENCY IN THYROID SURGERY

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Australia

Aim: Recent developments in technology aim to reduce operative time and improve safety, albeit at significant cost. Thyroidectomy is a common procedure worldwide and an assessment of cost-efficiency is important.

Method: An audit of prospectively collected data on all thyroidectomies performed by a single endocrine surgeon at 2 private hospitals from 2009 to 2013. The technique was a conventional open dissection emphasizing capsular dissection with diathermy, ligature and Ligaclip and without intra-operative nerve monitoring. Multivariate analysis was performed with the primary end point being operative duration.

Results: There were 503 thyroidectomies with the expected mix of pathologies including multinodular goiter, benign tumors, carcinoma and Graves' disease. There were zero permanent recurrent laryngeal nerve injuries (0.5% temporary, 746 nerves at risk), 0.6% permanent hypoparathyroidism (19.5% temporary, 308 completion and total thyroidectomies) and 0.6% hematoma. These outcomes compare favorably with published best practice.

The median skin to skin operating time was 59 minutes for total thyroidectomies and 35 minutes for hemithyroidectomies. The cost was lower and operating times shorter than reported with the use of vessel sealing devices.

Conclusion: Despite the current popularity of vessel sealing devices and the promotion of intra-operative nerve monitoring, their routine use may not be justified. Technique is more important than technology.

COMPARATIVE STUDY OF ENDOSCOPIC THYROIDECTOMY VERSUSCONVENTIONAL OPEN THYROIDECTOMY IN BENIGN THYROIDNODULE (CLINICAL SOLITARY THYROID NODULE)

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Background: Endoscopic technique for thyroid

surgery have recently been applied at Thabo Crown Prince Hospital. This technique improved in postoperative cosmetic outcome. The purpose of this study was to evaluate and compare the complication between endoscopic thyroidectomy and conventional open thyroidectomy in unilateral clinical solitary thyroid nodule

Method: Retrospective study of patients between January 2009 and March 2014 at Thabo Crown Prince Hospital was performed. Thirty three patients were enrolled, 15 patients underwent open thyroidectomy and 18 patients underwent endoscopic thyroidectomy via trans axillary approach. Data analysis include demographic data, size of lesion, operative time, hospital stay, and complication within 30 days post operation between two groups. The Chi-square test, Mann-Whitney U test, mean, and mode were used for statistical analysis.

Result: The age group of endoscopic thyroidectomy was younger than open thyroidectomy. Size of lesion of endoscopic technique was close to conventional technique. Hospital stay was shorter in endoscopic thyroidectomy. But operative time of conventional open thyroidectomy was shorter than endoscopic thyroidectomy (48.46 min and 117.55 min). Complication in open technique was found in only 2 cases(13.33%) from wound pain post operation. For complications of endoscopic thyroidectomy, we detected burning sensation in 8 cases(44.44%), hoarseness in 1 case(5.5%), seroma in 1 case(5.5%), skin burn in 1 case(5.5%)

Conclusion: According to our experience, endoscopic thyroidectomy had a statistic significance in complication comparing with conventional open thyroidectomy. Serious complication such as skin burn from dissection was present, but endoscopic technique gave benefit in cosmetic outcome in young patients. Endoscopic thyroidectomy needs advanced laparoscopic skill and experience to achieve good outcome.

TRANSORAL ENDOSCOPIC THYROIDECTOMY: A FIRST NOTES THYROID SURGERY IN THAILAND

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Endoscopic thyroidectomy has become widely accepted over the past 10 years. Various approaches and techniques have been invented and preformed. The aim of these procedures is to prevent the neck scar but it still has the scar on the skin incision of each approach. We performed the transoral endoscopic thyroidectomy which is the first natural orifice transluminal endoscopic surgery(NOTES) and the first case in Thailand. The patient had the recurrent left thyroid cyst about 4 × 3 cm. The patient was in supine position under nasotracheal intubation. We used the 3-port technique. The incisions were at the vestibule of mouth, in the oral cavity. The space was created under the Platysma muscle from the oral vestibule down to the sternal notch. The left thyroid gland with cyst was found and dissected using both harmonic scalpel and monopolar coagulator. The recurrent laryngeal nerve was revealed and preserved. No surgical drain was placed. The oral vestibule incisions were closed using polyglactin 4/0 double layer. Bleeding was 20 cc. No complication was found. Average pain score was 4/10 on day 1 postoperatively and the patient had no pain at all from day 2 after surgery. The patient was discharge on day 4 postoperatively. Transoral endoscopic thyroidectomy is safe and feasible and has the best and excellent cosmetic result among the various thyroid surgeries.

LOCAL ADVANCED PAPILLARY CELL CARCINOMA OF THYROID WITH TRACHEAL INVASION PRESENTED WITH STRIDOR

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Introduction: Papillary carcinoma of the thyroid (PTC) infrequently invades upper aerodigestive tract which can present as airway Insufficiency & dysphagia, and causes a significant morbidity, in this condition with an otherwise good prognosis. Invasive thyroid cancer, the most commonly involved structures included the strap muscles (53%), recurrent laryngeal nerve (47%), trachea (37%). Stridor is the presenting symptoms in approximately one third of patients with laryngotracheal invasion.

Case presentation: A 60-year-old woman with long standing thyroid goiter presented with on & off shortness of breath, noisy breathing with impending stridor. There was a history of rapid enlargement over past two-month duration. Clinical examination revealed multinodular goiter with retrosternal extension. As patient presented with stridor, she underwent emergency tracheostomy. It was a difficult procedure as the tumor had invaded tracheal lumen from thyroid isthmus extending below to the level of jugular notch. Patient was stable after that and we optimized patient and performed with total thyroidectomy. We have selected to perform complete excision of the thyroid cancer, without resection of the trachea. Her postoperative period was uneventful.

Discussion: Papillary thyroid carcinoma is known for their indolent nature and erratic behavior. A judicious combination of surgical clearance combined with

radioablation is the key to the management of such tumors. In conclusion there is no consensus regarding the management of patients with thyroid malignancies invading larynx and trachea. The surgeon would decide between a complete ablation of tumor at the cost of extensive mutilation and a less radical dissection which leaves residual tumor to be treated by complementary radiotherapy and radio-iodine.

HEPATOBILIARY AND PANCREATIC SURGERY

PROGRESS IN SURGICAL ONCOLOGY: RECENT SURGICAL TREATMENT FOR HEPATOCELLULAR CARCINOMA

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Hepatocellular carcinoma (HCC) is the fourth common cancer in Japan. Many small HCC less than 5 cm in diameter are detected because of the nature of the health care system and the establishment of screening programs. Therefore, the strategy for HCC in Japan has shifted to earlier stages of HCC than in other countries. There are a variety of treatment options ranging from radiofrequency ablation therapy to molecular targeting treatment. An overview of surgical treatment for HCC in Japan with particular focus on small HCC will be presented.

ANTERIOR APPROACH TO RIGHT HEPATECTOMY WITH CAUDATE LOBECTOMY FOR PERIHILAR CHOLANGIOCARCINOMA

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The anterior approach has been conventionally used for giant hepatocellular carcinoma in the right liver. Takasaki et al. reported the safety of this approach in 1984. Liu et al. reported that compared with the conventional approach, the anterior approach improved surgical and survival outcomes (2000). Right liver mobilization followed complete mobilization of the caudate lobe before parenchymal dissection is considered as a basic maneuver in right hepatectomy with caudate lobectomy for PHC. The right liver should be rotated to the left side in the conventional method. However, it is sometimes difficult to dissect the caudate lobe from the inferior vena cava before hepatectomy becauseof the inflammation between caudate lobe and inferior vena cava due to cholangitis or abscess and /or the deep surgical view of the caudate lobe. Further, the remnant left liver would be congested by this rotation to the right side and the lymphatic vessels and the artery in the ligament would be dissected. In this presentation, we would like to show the video of an anterior approach without the Pringle maneuver to right hepatectomy with caudate lobectomy for PHC and its surgical outcomes. This approach allows removal of the right liverand caudate lobe safely from the ventral side with excellent surgical view, with minimal mobilization of the remnant left liver and limited disturbance of hemodynamics.

METOCLOPRAMIDE VERSUS ITS COMBINATION WITH DEXAMETHASONE IN THE PREVENTION OF POSTOPERATIVENAUSEA AND VOMITING AFTER LAPAROSCOPIC CHOLECYSTECTOMY: A DOUBLE-BLIND RANDOMIZED CONTROLLED TRIAL

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Background and objectives: Postoperative nausea and vomiting (PONV) are significant problems in laparoscopic surgery. This double-blind, randomized controlled trial compares the prophylactic use of metoclopramide and its combination with dexamethasone in the prevention of PONV in patients undergoing laparoscopic cholecystectomy (LC). The present study aimed to provide a simple, safe, inexpensive, and effective postoperative nausea and vomiting prevention method in LC.

Patients and methods: One hundred patients aged 18 to 75 with American Society of Anaesthesiologists (ASA) class I-II who were candidates for elective LC were included in the study. All of the patients underwent general anesthesia

with similar medications. Patients were randomly divided into two groups of A and B. Group A received 8 mg dexamethasone and 10 mg metoclopramide, and Group B received 10 mg metoclopramide. These medications were administered intravenously when the gallbladder was removed from gallbladder bed. Postoperatively the incidence of nausea and vomiting was assessed at four time intervals (0-2 hours, 2-6 hours, 6-12 hours and 12-24 hours after the operation). An overall score of PONV in each patient (0 = no nausea and vomiting, 1 = nausea, 2 = nausea with vomiting, 3 = repeated vomiting 2 times) was used to compare groups. STATA software version 11.0 was employed to analyze the data. *T* test/Rank sum test and Fisher's exact test were performed to analyze baseline characteristics, and general operative data with the level of significance $P < 0.05$. Ordinal logistic regression was performed for analyzing the antiemetic effect of the two groups.

Results: There were no significant differences between age, gender proportion, body mass index (BMI), ASA class, and operative time of patients in the two groups. The combination of dexamethasone and metoclopramide group indicated a greater antiemetic effect with significant statistical analysis, odds ratio = 0.25 ($p = 0.001$, confidence interval 0.11-0.55). The postoperative hospital stay in the combined group and metoclopramide group were: 1 day = 47 (94%) and 37 (74%), > 2 days = 3 (6%) and 13 (26%), respectively ($p = 0.012$).

Conclusions: Intravenous administration of dexamethasone combined with metoclopramide had significant effects in the prophylaxis of nausea and vomiting after laparoscopic cholecystectomy and also shortened the hospital stay.

COMBINATION OF ETORICOXIB AND LOW PRESSURE PNEUMOPERITONEUM VERSUS STANDARD TREATMENT FOR THE MANAGEMENT OF PAIN AFTER LAPAROSCOPIC CHOLECYSTECTOMY: A RANDOMIZED CONTROLLED TRIAL

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Background and Objectives: Postoperative pain is a significant problems in laparoscopic surgery, especially during first 6-12 hours postoperatively. This randomized controlled trial aim to investigate the effect of combined pre-emptive etoricoxib 120 mg and low pressure pneumoperitoneum for the management of pain after laparoscopic cholecystectomy (LC).

Patients and methods: One hundred and twenty patients aged 18 to 75 with American Society of Anaesthesiologists (ASA) class I-II who were candidates for elective LC included in the study. Patients were randomly divided into two groups. Treatment group received preemptive analgesia (etoricoxib 120 mg) and intra-abdominal pressure 7 mmHg, control group received placebo and intra-abdominal pressure 14 mmHg. The study medications were administered orally 2 hours before surgery. Postoperativepain score at rest and on movement were record on numeric rating scale (NRS) every hour for the initial 2 hours and then every 4 hours until discharge. STATA software version 11.0 was employed to analyze the data. *T* test/Rank sum test and Fisher's exact test were performed to analyze baseline characteristics, and general operative data with the level of significance $P < 0.05$. Random effects model was performed for analyzing postoperative pain of the two groups.

Results: There were no significant differences in baseline characteristics of the two groups. Pain score of treatment versus control group of incisional pain were significant at rest and on movement; at rest: -0.15 [2.69] VS -0.12 [3.20], $p = 0.022$, and on movement: -0.18 [3.59] VS -0.14 [4.57], respectively ($p = 0.032$). Pain score of the other sites (abdominal, shoulder, and flank pain) were lower in treatment group, but not statistically significant. The postoperative hospital stay in the treatment group and control group was: 1 day = 53 (96.4%)and45 (75.0%), >1 day = 2 (3.6%) and 15 (25.0%), respectively ($p = 0.001$).

Conclusions: Combination of preemptive analgesia (etoricoxib) and low pressure pneumoperitoneumhad significant effects in decreasing incisional pain after LC, and also shortened the hospital stay.

THE ROLE OF OPEN COMMON BILE DUCT EXPLORATION FOR PATIENTS WITH COMMON BILE DUCT STONE IN ENDOSCOPIC ERA

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Introduction: At King Chulalongkorn Memorial Hospital(KCMH), a medical institute with highly experienced endoscopic center in Thailand, we prefer endoscopic treatment for the patients with common bile duct(CBD) stone and have very high success rate of CBD

stone removal.

Objectives: The purpose of this study is to report the remaining role and outcomes of open CBD exploration at KCMH in endoscopic era.

Methods: The retrospective chart reviews of all open CBD explorations at King Chulalongkorn Memorial Hospital over a period of 11 years were conducted. Demographic data, indication for CBD exploration, surgical techniques and perioperative outcomes were recorded.

Results: Thirty one open CBD explorations were performed during study period. There were emergency cases in 7 (22.5%). The indications were failed endoscopic treatment in 13 (41.9%), gangrenous or empyema cholecystitis in 6 (19.3%), unable to exclude biliary tract malignancy in 6 (19.3%), recurrent primary CBD stone in 1 (3.2%), anatomical problem in 1 (3.2%) and doctor preference in 4 (12.8%). The mean duration of surgery was 197 mins (60-570). The mean blood loss was 374 ml (10-1,500). Stone clearance rate was 90.3%. Complete intra-operative choledochoscopic CBD exploration was done in 16 from 31 (51.6%). Retained CBD stone was found 7 from 31 (22.5%). Subgroup analysis revealed that the patients with complete intra-operative choledochoscopic CBD exploration tended to have lower rate of retained CBD stone compared with the patients without choledochoscopic CBD exploration (12.5% vs 33.3%, p = 0.16). Four bilioenteric bypasses were performed (2 choledochoduodenostomy and 2 roux-en-Y choledochojejunostomy) due to recurrent primary CBD stone, impacted CBD stone and impacted concomitant IHD stone. Overall morbidity rate was 48.3% (retained CBD stone, fluid collection, wound infection, splenic injury, *T*-tube dislodgement, *T*-tube leakage). Mortality rate was 6.4% due to sepsis with multi-organ failure.

Conclusions: Open CBD exploration still plays an important role for patients with CBD stone in endoscopic era. The general surgery resident should learn the proper surgical techniques of open CBD exploration.

DETECTION OF SERUM GOLPH3 IN CHOLANGIOCARCINOMA PATIENTS: EVALUATION OF DIAGNOSTIC ACCURACY

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Background: At present, there is no available tumor marker that can differentiate cholangiocarcinoma from benign bile duct disease. Previous studies demonstrated that a high serum Golgi phosphoprotein 3 (GOLPH3) level is detected in patients with various cancers. However, the clinical significance of serum GOLPH3 in cholangiocarcinoma patients remains unknown.

Methods: This study was designed to determine whether the serum levels of GOLPH3 can discriminate cholangiocarcinoma patients from benign biliary tract disease patients in comparison to carcinoembryonic antigen (CEA) and carbohydrate antigen 19-9 (CA19-9). We measured the level of CEA, CA19-9 and GOLPH3 in the serum of 43 cholangiocarcinoma and 40 benign biliary tract diseases patients.

Results: The serum levels of CEA, CA19-9 and GOLPH3 were significantly higher in the patients with cholangiocarcinoma compared with benign biliary tract disease patients (Mann Whitney U; $p < 0.001$). A receiver operating characteristic (ROC) curve analysis revealed that the detection of the serum GOLPH3 level is reasonably accurate in differentiating cholangiocarcinoma from benign biliary tract disease patients (area under curve = 0.71; 95% CI = 0.596-0.826) while the areas under the curve of the ROC curves for CEA and CA19-9 were 0.76 (95% CI = 0.660-0.866) and 0.76 (95% CI = 0.662-0.865), respectively.

Conclusion: Serum GOLPH3, CEA and CA19-9 appear to be a valuable diagnostic marker in the discrimination of cholangiocarcinoma from benign biliary tract disease. Further prospective studies for the serum measurement should be carried out to further investigate the potential of this molecule as a biomarker of cholangiocarcinoma.

LAPAROSCOPIC RADICAL CHOLECYSTECTOMY FOR POSSIBLE GALLBLADDER CANCER

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Background: Gallbladder cancer is a fatal disease. Radical surgical resection including regional lymph node dissection and liver resection is applied in possible gall bladder cancer to provide the beneficial survival outcomes.

Objectives: The aim of this study was to assess whether laparoscopic radical cholecystectomy is beneficial to patients with early gallbladder cancer and a safe procedure for possible gallbladder tumor cases.

Material & Methods: A 65-year-old man with history of check-up screening ultrasound finding gallbladder mass was included in the study.

The magnetic resolution imaging abdomen revealed polypoid shape soft tissue lesion at superolateral wall of

gallbladder of about 1.6 ± 0.9 cm. His laboratories reported CEA, CA19-9 were normal, also his liver function test was normal. Laparoscopic radical cholecystectomy with lymph node dissection was performed. The operative time was 180 minutes and total blood loss was 300 ml.

Results: There was no 30-day postoperative morbidity and mortality. The patient starts diet post-operative day on 1 and discharge on day 9. Now he is doing well 1 month after operation. The pathology result was Adenomatous polyp.

Conclusion: Laparoscopic radical cholecystectomy is an effective surgical treatment in possible gallbladder tumor.

RIGHT ANTERIOR SECTIONECTOMY: HOW I DO IT

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Introduction: Glissonean pedicle approach is one of many methods for anatomical liver resection. This technique can be applied to many types of liver resection which helped shorten operative time and created bloodless surgery. We here presented a video demonstration right anterior sectionectomy which detailed steps to perform of this procedure.

Methods: A 51-year-old female with underlying chronic hepatitis B viral infection for 20 years which her annual imaging was diagnosed with HCC involving segment V and VIII of liver. Right anterior sectionectomy was performed. Operation started with mirror-L incision, cholecystectomy and right lobe of liver was mobilized. Right anterior (RAP), right posterior (RPP) and left portal pedicle (LP) were encircled. RAP and RPP were clamped during parenchymal transection between right anterior and right posterior section, then RAP and LP were clamped during transection between right anterior section and segment IV. RAP was ligated and specimen was removed in the last step.

Results: The operation was done without intra-operative complication. Operative time was 240 minutes and blood loss was 50 ml. Post-operative course was uneventful. Patient was discharged on 6th post-operative day. Pathological report revealed a 6.5 × 5.3 × 4.7 cm, moderate differentiated HCC with free resection margin. The patient did not receive any adjuvant treatment and was doing well at 6 month after operation.

Conclusions: Anatomical knowledge of liver and glissonean system is a great tool to perform Glissonean approach in liver resection. With increasing experience, this technique is likely to become the best method for liver operation.

EXTENDED RIGHT HEPATECTOMY WITH LEFT COLECTOMY IN GIST LIVER METASTASIS AND LOCAL PERITONEAL SEEDING: A CASE REPORT

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Introduction: Gastrointestinal stromal tumor (GIST) is a neoplasm of the gastrointestinal tract of usually less aggressive behavior but 40% of patients can develop metastasis and recur after a long remission period. The emergence of tyrosine kinase inhibitors has altered controversy over the surgical role in this advanced case. We here report a successful operation in the patient who failed second line medical treatment.

Methods: A 49-year-old man was diagnosed with a small bowel GIST and received an exploratory laparotomy with small bowel resection 10 years ago. He presented with abdominal pain for 6 months, imaging showed large liver mass and mesenteric tumor, compatible with liver metastasis and peritoneal seeding. His condition was controlled by imatinib as first line treatment for 3 years. After disease progressed, treatment was changed to high-dose imatinib followed by sunitinib with no response.

Results: Extended right hepatectomy with left colectomy was performed. Operative time was 490 minutes and blood loss was 3500 ml. Pathological report revealed a 20 cm, high grade GIST in liver, tumor involved liver segment IV, V, VI, VII & VIII containing necrotic tissue inside and a 15 cm, high grade GIST at mesentery which adhered left side colon, free all resection margin. Post-operative course was uneventful. Length of ICU stay was 1 day and hospital stay was 7 days. He did not receive any adjuvant treatment. He is doing well 12 months after operation.

Conclusions: In the event of progression of disease after second line treatment, surgery may be curative when all metastases have been eradicated and negative surgical resection margins are attained.

SPONTANEOUS RUPTURE OF HEPATOCELLULAR CARCINOMA: A CASE SERIES

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Introduction: One of life-threatening complications of hepatocellular carcinoma (HCC) is rupture of the tumor with intraperitoneal hemorrhage. Advancement of imaging

equipment and screening program allowed early detection of HCC but mortality rate was still high when patient came with rupture condition. We here reported experience of the management of spontaneous ruptured HCC in 16 cases.

Methods: From January 2009 to December 2013, medical record of 16 ruptured HCC patients referred to our institute were reviewed. Cases included 14 men and 2 women, giving male to female ratio of 7:1, with a mean age of 58.6 years (range 34-85). Ruptured HCC was diagnosed by CT scan in 13 stable patients. Three remaining unstable patients with history of advanced HCC were evaluated by obtaining blood from abdominal paracentesis. According to Child-Pugh classification, number of patients categorized as Child A, B and C were 7, 2 and 7 respectively. Mean tumor diameter was 12.7 cm, ranging from 4 to 21 cm. Location of tumor was right side in 13 cases and left side in 3 cases.

Results: Seven cases(6 men and 1 woman) with Child C classification and large tumor(more than 10 cm) who received best supportive treatment expired within 7 days from massive bleeding or subsequently multi-organ failure. Two cases (1 man and 1 woman) with Child B classification was treated by embolization, serial Transarterial chemoembolization(TACE) and targeted therapy, both of them alive with lung metastases until now (12 and 24 months). Last seven men with Child A classification received successfully various treatments including emergency exploratory laparotomy with liver packing (2 cases), embolization (2 cases) and conservative treatment (3 cases). All of them were scheduled for surgical resection but one case loss follow up. Right hepatectomy was performed in 4 cases with large tumor, disease free survival ranged from 3 to 12 months and overall survival ranged from 14 to 22 months. All of them died of carcinomatosis peritonii or lung metastases. Remaining 2 cases with small tumor(less than 5 cm) who received left lateral segmentectomy and segment V resection, are alive until now(6 months and 24 months).

Conclusions: Prognosis of patients with ruptured HCC depended on liver function and size of tumor. Prolonged survival can be achieved in selected patients with ruptured HCC with liver resection.

MINIMAL INVASIVE AND ROBOTIC SURGERY

LAPAROSCOPIC GASTRECTOMY: HOW I DO IT

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In Japan, standard gastric cancer treatment is based on Japanese gastric cancer treatment guidelines (3rd edition) and Japanese Classification of Gastric Carcinoma (14th edition).

In this lecture, we divided my talk into three parts; First, our procedure of laparoscopic gastrectomy, then challenging cases in gastric cancer, and finally treatment guideline of gastric cancer in Japan.

In the first part, we will show the precise technique of LNs dissection and reconstruction following purely laparoscopic distal gastrectomy with video.

In the difficult cases, proximal gastrectomy and total gastrectomy with splenectomy in our department will be presented by the video.

Finally, in the Japanese gastric cancer guidelines part, we will focus on the strategy for surgical treatment of gastric cancer, especially for the range of LNs dissections.

STRICTURE OF GASTROJEJUNAL ANASTOMOSIS IN LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS USING 21-MM OR 25-MM CIRCULAR STAPLER : A PRELIMINARY REPORT OF PROSPECTIVE RANDOMIZED CLINICAL TRIAL

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Introduction: Bariatric surgery is considered to be the effective long-term treatment for morbid obesity. Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) is the preferred bariatric procedure for the treatment of morbid obesity. The most common early complication after LRYGB is stricture of gastrojejunal anastomosis (GJA). The stricture rate appears to be correlated with the size of the circular

stapler.

Objective: We compared the anastomoses performed with 21-mm or 25-mm circular stapler.

Methods: Morbidly obese patients, scheduled for our standardized LRYGB, were randomized into 21-mm or 25-mm circular-stapler. Stricture of GJA was defined as patient complainted of frequent nausea, emesis and/or dysphagia with liquids or meals leading to endoscopy within 12 weeks of surgery, in which a 9-mm endoscope would not pass through the anastomosis without dilation. Stricture of GJA, %EWL at 6 months after surgery, perioperative complications and mortality were evaluated.

Results: Fourty six patients were randomized to 27 patients in 21-mm group and 19 patients in 25-mm group. There was no difference in basic characteristics between both groups. Stricture of GJA was reported in 1 patient of 21-mm group and 1 patient of 25-mm group (3.7% vs 5.3% respectively, p = 0.79) (Table 2). Patient of 21-mm anastomosis developed stricture 3 weeks after surgery, and patient of 25-mm anastomosis developed 7 weeks postoperatively. Perioperative complication and %EWL at 6 months after surgery were no significant difference. There was no operative-related mortality.

Conclusion: In this preliminary report, 21-mm and 25-mm circular stapled gastrojejunal anastomosis are safe, effective and feasible technique with our standardized Laparoscopic Roux-en-Y Gastric Bypass. There were no difference in stricture rate and bariatric results. However, a final report of this prospective randomized clinical trial and long-term follow-up are mandatory.

A PROSPECTIVE RANDOMIZED TRIAL FOR EVALUATE EFFECT OF 3D IMAGING SYSTEM TO TIME FOR COMPLETE LAPARSCOPIC SKILL TEST COMPARE WITH 2D IMAGING SYSTEM

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Background: Development of three-dimensional (3D) imaging system can improve depth perception of surgical field and facilitate surgeons to operate laparoscopic surgery. We compared the effect of 3D imaging system to time for complete laparoscopic skill test over two-dimensional (2D) imaging system.

Materials and Methods: Forty of 4th and 5th year medical student were assigned in to two groups (2D and 3D) to perform 4 laparoscopic skill tests (ring transfer, threads the silk, pattern cutting, grasp and transfer object into collecting bag). Time to complete all tasks and each task was measured and number of mistake was noted in both groups. All participants completed questionnaires about inconveniences that occurred when performed skill tests.

Results: Time to complete all tasks in 3D group was shorter than 2D group (912.9 versus 1401.05 seconds, $p <$ 0.001). When we evaluated each task the result showed shorter time in 3D group than 2D group for ring transfer 432.65 versus 548.40 seconds (p = 0.007), threads the silk 239.05 versus 440.9 seconds (p= 0.001), and pattern cutting 168.05 versus 295.15 seconds ($p <$ 0.001). In task grasp and transfer object into collecting bag, times were not different. About mistake in ring transfer, there was significantly difference in number of ring drop between 2D and 3D group, 6.05 versus 4.75 (p = 0.047). Number of gross deviation from marking in pattern cutting was higher in 2D group, 5.45 versus 2.75 ($p <$ 0.001). There were only two side effects that was significantly different in two groups; disorientation, 9 versus 1 (p= 0.003) and poor visualization, 9 versus 2 (p = 0.013).

Conclusions: Three-dimensional imaging display system can improve inanimate laparoscopic skill training by reducing time to achieve skill test and can facilitate the non-experienced trainees about depth perception, eye-handed coordination, spatial transfer, two hand maneuver and precision to train their basic laparoscopic skills.

LAPAROSCOPIC TOTALLY EXTRAPERITONEAL REPAIR (LAP TEP): BASIC AND ANATOMY

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Inguinal hernia repair is the most frequently performed operation in general surgery. The standard method for inguinal hernia repair had changed a little over one hundred years. Totally extraperitoneal (TEP) inguinal hernia repair has gained popularity in the recent two decades since the first introduction in 1992 by J. L. Dulucq.

Laparoscopic inguinal hernia repair has been shown to be advantageous for bilateral or recurrent hernias and for morbid obesity because it reduces postoperative pain and the patient can return to work earlier when compared

with the open technique. However, it has not gained widespread acceptance. One of the reasons for this is the more learning curve compared to the open technique. In general it is considered to be more difficult than the latter because of the peculiarity of anatomy and limitation of working space. Therefore it has been assigned with a "steep learning curve" that the surgeon needs to climb steadily and slowly. I believe that a better understanding of the laparoscopic anatomy is extremely important before one can attempt this technique.

This VDO presents the basic of groin anatomy in preperitoneal space, operative field set up, step and technique of the operation by using picture combined with the video of the real operation. I hope this VDO will help spectator to better understand anatomy and step of the operation for reducing learning curve and perform the best outcome for the patient.

TOTAL EXTRAPERITONEAL LAPAROSCOPIC HERNIA REPAIR

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Background: Laparoscopic hernia repair has many advantages over open repair, such as less early postoperative pain, less long term nerve pain, equal or lower risk of recurrence, and bilateral hernias are easily done with the same incision.

Method: A total extraperitoneal repair was done on a 82-year-old Thai male presenting with a recurrent left indirect inguinal hernia.

Conclusion: Laparoscopic inguinal hernia repair is a promising alternative to open surgery. This video aims to provide a step-by-step guide on how to perform the procedure.

TIPS AND TECHNIQUES IN STANDARD COLONOSCOPYWITH MAGNETIC GUIDANCE-ASSISTED IMAGING

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Backgrounds: Colonoscopy was accepted to be a gold standard method for colorectal cancer screening and treatment of colorectal polyps. Today many surgeons perform colonoscopy as a common routine procedure and in part of general surgery resident training program. To perform colonoscopy effectively and safely still required a learning curve. There are many published papers of innovations and techniques to date to reduce learning curves effect. Magnetic guidance imaging system is the one of this kind, by detecting position & locate of the scope relate to patient anatomy help the operator understand how the loop is created and how to correct the looping of the scope. This VDO helps learning of colonoscopy easier by combining many tips and techniques in both manipulating scope skills and relate to magnetic imaging to understand how to correct the loop, and prove to be useful in learning colonoscopy.

Methods: This VDO was recorded from the patents that had received screening colonoscopy in Surgical Endoscopy Unit, Rajavithi Hospital between 1-30 November 2013. After Informed consent, by the use of ScopeGuide system (Olympus) for magnetic guidance imaging, the patient position related with surgeon manipulation was recorded at the same time as patient colonoscopic view and magnetic view. The images were recorded and edited for this presentation.

BENEFITS OF LAPAROSCOPIC SURGERY IN VESICAL FISTULA POST RADIATION FOR CANCER: NCI EXPERIENCE

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Background: Diverticulitis accounts for approximately 50%-70% of vesicoenteric fistulae, almost all of which are colovesical. Crohn disease accounts for approximately 10% of vesicoenteric fistulae and is the most common cause of an ileovesical fistula. Malignancy accounts for up to 20% of vesicoenteric fistula and is the second most common cause of enterovesical fistula. Rectovesical fistula is the most common presentation, as rectal carcinoma is the most common colonic malignancy resulting in fistula formation. The increased risk of radiation bowel injury is recognized in patients who have had previous operations. Surgery to manage radiation-induced fistulae can be difficult. In severe cases, the colorectal and adjacent organs are matted together with no natural planes, making mobilization and resection hazardous. In this situation, diverting proximal colostomy or ileostomy is advisable. Small bowel resection is recommended with localized segments of disease. Bypass operations are preferable to avoid any extensive dissections. Multiple operative procedures should be anticipated because the natural

history of radiation bowel injury is slowly progressive. Future treatment of typical enterovesical fistulae may focus on development and refinement of minimally invasive surgical techniques, such as laparoscopic and robotic, to shorten recovery time and to potentially decrease hospital stay.

Aim: To present the early outcome of a minimally invasive surgical treatment of enterovesical fistula in cancer cases after radiation, laparoscopic total exclusion of the fistula.

Material & Methods: We reported 2 cases of an 84-year-old female with enterovesical fistula post rectal cancer therapy, low anterior resection-radiation-chemotherapy about 20 year ago and a 54-year-old female with sigmoid colovesical fistula post cervical cancer radiation therapy 1 year ago. Both underwent laparoscopic total exclusion of fistula.

Results: The surgical outcome was successful in both patients.

Discussion: It would seem that this technique is applicable for treating enteric fistulas in the bottom of the pelvic cavity, which were difficult to be managed. Total exclusion of the fistula from the gastrointestinal tract, either by excision or by total bypass, is mandatory to achieve satisfactory results. Improved surgical techniques, including laparoscopic procedures that greatly enhance visualization of the operative field, hold promise for fewer fistula-related complications of gynecologic and urologic procedures.