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ORIGINAL ARTICLES

CASE REPORT

ABSTRACTS

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Original Article

Comparison between Ventriculoatrial Shunt and Ventriculoperitoneal Shunt: Revision Rate and Complications

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Abstract

Background and Objective: **Hydrocephalus is a common problem in neurosurgical field. In current clinical practice guidelines, ventriculoatrial shunt and ventriculoperitoneal shunt are recommended treatment options. No previous study reported differences between two procedures in term of complications and revision rates.**

Methods: **Chart review of all patients who underwent ventriculoatrial (VA) or ventriculoperitoneal (VP) shunts at the Prasat Neurological Institute, Bangkok, Thailand during 1 May 2012 and 31 October 2013 was carried out. Patients with previous VA or VP shunt operation were excluded. Complications and revision rate were recorded at the postoperative interval of one week, one month, and three months.**

Results: **Thirty eight patients were divided by surgeon preferences. Twelve underwent VA shunt surgery and 26 underwent VP shunt surgery. The rates of complications were 16.7% and 38.5% in the VA shunt and VP shunt respectively. Only 2 patients (7.7%) from VP shunt group required revision.**

Conclusion: **In this study, no difference in complications and revisions between VA and VP shunts was found. Patients with VP shunt placement were more likely to experience complications and revisions than patients with VA shunt placement.**

Keywords: **Ventriculoatrial shunt, ventriculoperitoneal shunt, revision rates, complications**

INTRODUCTION

Hydrocephalus is a common problem in neurosurgical field which could be caused by congenital disorders, post infectious disorders, neurological disorders, vascular disorders and tumors.

In the past, there are many locations of the shunt available: right atrium of the heart (ventriculo-atrial), the peritoneal cavity (ventriculo-peritoneal), pleural cavity (ventriculo-pleural) and gallbladder. In current clinical practice guidelines, shunting to the right atrium

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and the peritoneal cavity is recommended. However, both locations require revision surgery due to blockage of the shunt and other complications such as infection, seizures, circulation system complication, internal organ complication and death.

There are many researches about the comparison of ventriculoatrial (VA) and ventriculoperitoneal (VP) shunts but the researches do not provide statistically significant differences for the rate of revision and complications.

Methods

There were 38 patients enrolled in the study. These patients either have ventriculoatrial (VA) or ventriculoperitoneal (VP) cerebrospinal fluid shunts for hydrocephalus or related conditions. The study was conducted at Prasat Neurological Institute, Bangkok, Thailand during 1 May 2012 and 31 October 2013.

Patients who underwent previous VA or VP shunt operations were excluded.

Patients were divided by surgeon preferences and the placement of either VA or VP shunts. The results were compared between the two groups (VA or VP shunts) using age, gender, diagnosis, underlying disease, the past surgical history, and the operative data.

Patients were followed postoperatively at one week, one month, and three months complication and revision.

Measurements

Complications and revision rates between the two groups were compared.

Statistic analysis

Statistical analysis was done with SPSS 15.0 for Windows. Continuous and categorical variables were expressed as median and interquartile range. Regarding categorical data, Fisher's exact was used. The significant level was set at 0.05.

Table 1 Demographic data

	VA	VP	*P* value
Population	12	26	
Sex			
Male	8 (66.7%)	9 (34.6%)	
Female	4 (33.3%)	17 (65.4%)	
Age	59.0	58.5	0.540
(Median, IQR) (47.25-61.50)	(51.50-71.75)		
ASA			
1	2 (16.7%)	1 (3.8%)	
2	8 (66.7%)	14 (53.8%)	
3	2 (16.7%)	11 (42.3%)	
DM	3 (25.0%	7 (26.9%)	1.000
HbA1c	5.4	5.4	0.468
(Median, IQR) (90.75-145.00)	(102.25-145.50)		
HT	8 (66.7%)	13 (50%)	0.337
Alcohol	4 (33.3%)	2 (7.70%)	0.066
Smoking	3 (25.0%)	3 (11.5%)	0.357
ESR	26.5	30.0	0.950
(Median, IQR) (11.50-58.75)	(17.75-55.20)		
ANC	4948	4969	0.660
(Median, IQR) (4673-6457)	(3122-7253)		
BMI	23.95	22.70	0.066
(Median, IQR) (23.00-29.97)	(18.90-24.70)		
KPS	65	50	0.179
(Median, IQR) (35.0-87.5)	(30.0-62.5)		
EVAN	0.37	0.34	0.186
(Median, IQR) (0.33-0.44)	(0.31-0.38)		

Table 2 Preoperative data

		VA	VP	*P* value
Diagnosis				
	Tumor	2 (16.7)	9 (34.6%)	
	Trauma	1 (8.3%)	1 (3.8%)	
	Vascular	5 (41.7%)	7 (26.9%)	
	NPH	1 (8.3%)	5 (19.2%)	
	Infection	2 (16.7%)	4 (15.4%)	
	Congenital	1 (8.3%)	0 (0%)	
Duration (Months)	1.5	1.0	0.344	
(Median, IQR)	(0.35-200)	(0.30-1.00)		
Previous				0.180
Operation				
	Craniotomy	7 (58.3%)	15 (57.6%)	
	Cranioplasty	3 (25%)	0 (0%)	
	Other	0 (0%)	6 (23%)	
Prior Ventriculostomy		2 (16.7%)	4 (15.4%)	1.000

Table 3 Operative data

		VA	VP	*P* value
Position				
	RF	7 (58.3%)	13 (50.0%)	
	LF	3 (25.0%)	8 (30.8%)	
	RP	2 (16.7%)	5 (19.2%)	
Shunt				0.504
	Adjustable	4 (33.3%)	12 (46.2%)	
	Low	0 (0%)	1 (3.8%)	
	Medium	8 (67.7%)	13 (50.0%)	
Duration time	90	70	0.039	
(Minutes)	(75.00-116.25)	(60.00-91.25)		
(Median, IQR)				
Blood loss (ml)	35	20	0.098	
(Median, IQR)	(22.5-87.5)	(17.5-50.0)		
Type of Wound				1.000
	Clean	9 (75.0%)	19 (73.1%)	
	Clean-Contaminated	3 (25.0%)	7 (26.9%)	
CSF profile				
	WBC	5.0	0.0	0.118
	(Median, IQR)	(0.00-7.00)	(0.00-5.25)	
	PMN	0.5	0.0	0.550
	(Median, IQR)	(0.00-72.25)	(0.00-0.00)	
	RBC	92.5	75.0	
	(Median, IQR)	(0.00-912.00)	(0.00-1525.00)	
	Protein	63.5	37.5	0.540
	(Median, IQR)	(13.00-17500)	(12.20-123.50)	
	Sugar	62.,0	67.5	0.838
	(Median, IQR)	(43.00-90.25)	(57.00-7475)	

Results

From the study, the total of 38 patients received the treatment for hydrocepholus, 12 patients underwent VA shunt surgery and 26 patients underwent VP shunt surgery.

Table 1 represents basic characteristic of 38 patients demographically. The majority of patients who underwent VA shunt surgery are in ASA class 2, which accounts for 66.7%. The patients who underwent VP shunt were in ASA class 2 for 53.8% and class 3 for 42.3%. For Evans ratio in VA group 0.37 (0.33-0.44) and in VP group 0.34 (0.31-0.38).

In Table 2 the main cause of the disease in VA shunt populations was the vascular, which accounted to 41.7% of the overall enrolled patients. In the VP shunt group, the diseases were caused by tumor and vascular, which accounted for 34.6% and 26.9% respectively from the total enrolled patients.

The average progress period of the disease was 1.5 month and 1 month respectively.

Table 3 shows the operation durations of the two procedures. For VA shunt placement, the mean duration of the operation was 90 minutes (range 75 - 116.25 minutes). For VP shunt placement, the mean duration of the operation was 70 minutes (range 60 - 91.25 minutes) ($p = 0.039$).

Table 4 Complications

	VA (n=12)	VP (n=26)	*P* value
Complication	2 (16.7%)	10 (3.85%)	0.268
Infection	0 (0%)	4 (15.3)	0.287
Revision	0 (0%)	2 (7.7%)	0.287

In the VA shunt group the mean operative blood loss was 35 ml (range 22.5-87.5 ml) and in the VP shunt group, the mean operative blood loss was 20 ml (range 17.5-50.0 ml) ($p = 0.098$).

The rate of complications in the VA shunt group was 16.7% (2 out of 12 patients) and in the VP shunt group 38.5% (10 out of 26 patients) ($p = 0.268$). Out of 26 patients from the VP shunt group, only 4 patients (15.3%) had procedure-related infections ($p = 0.287$). Only 2 patients from VP shunt group (7.7%) required revision as shown in Table 4.

The detailed explanations of complications in these patients were stated in Table 5.

Table 5 Complications cases

Case No.	Sex	Age	VA/VP	Diagnosis (Days)	Duration	Complication	Treatment
4	Male	58	VA	Right Basal Ganglion Hemorrhage	153	Seizure	AED
7	Female	35	VA	Sparganosis	325	Slit Ventricle	Supportive treatment
14	Male	58	VP	Brain Stem Glioma	35	Distal end Malposition	Revision
15	Male	64	VP	Left Frontal OG	3	Meningitis (MRSA)	Systemic ATB
17	Female	65	VP	Left ICA Aneurysm	225	Wound dehisence Meningitis	Externalization Revision
19	Male	17	VP	Encephalitis	32	SDH	Supportive treatment
26	Female	57	VP	Meningitis	41	Isolated Hydrocephalus	Second VP shunt
29	Female	58	VP	Tuberculum Meningioma	34	Wound dehisence	Dressing
32	Male	74	VP	NPH	40	Skin infection	Dressing
33	Male	71	VP	NPH	10	Meningitis	systemic ATB
37	female	86	VP	Left Thalamic Hemorrhage	31	(Meninitis Sustemic ATB	

Discussion

In comparison between ventriculoatrial and ventriculoperineal shunts, the study showed no significant difference in related complications and the rate of revisions. However, the findings of this study appear to contradict previous studies mentioned below.

In 1975, RJ.Iynelzi found that VA developed more serious complications than VP shunt[4]. Olsen L. conducted research on 172 children and found that VP shunt had more complications but lesser degree of severity, and the procedure was easier and faster to perform[6]. Fernell found that VP had higher risk of infection but complications from VA were more severe[7]. In 1997, CH. CAM conducted retrospective research and found that two groups had similar complications

but VP case of placement had lesser severity of potential complication[10].

Complications associated with VA shunt from the previous studies include endocarditis[13], pulmonary hypertension[14], nephritis and overdrainage of CSF[12]. This study only found Slit Ventricle Syndrome condition in patients and the patients were asymptomatic. There were no additional complications observed in this study.

Even though the study could not be obviously concluded in term of the difference in complications and revisions between VA and VP shunts, patients with VP shunt placement were more likely to experience complications and revisions than patients with VA shunt placement. This finding may be due to cautiousness of staff when performing vascular surgery and the longer surgery time spent during VA shunting than in VP shunting. Additionally, patient selection might contribute to the result of this study as well.

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Original Article

Open Surgical Management of Atherosclerotic Aortoiliac Occlusive Diseases (AIOD) Type 1

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Abstract

Objective: **The common techniques for open anatomical revascularization of aortoiliac occlusive diseases (AIOD) type 1 are aortofemoral bypass (AFB) and aortoiliac endarterectomy (AIE). These procedures are suitable for hospital where endovascular facility is not available. The aims of this study were to review and compare morbidity, mortality and 3-year patency rate of AFB and AIE at the Lampang Regional Hospital.**

Methods: **Patients with AIOD who underwent AFB or AIE for lower extremity ischemia were identified from prospective medical records during November 2007-November 2013. Demographic and clinical data including outcome data were obtained from clinical summary records. The decision to perform which operation was based on surgical risk and surgeon's preference. Kaplan-Meier analysis was performed to examine the survival of patients.**

Results: **A total of 10 patients underwent 5 AFB and 5 AIE. The 30-day mortality rate was 10%. One-year survival rate was 75%. One-year graft patency rate was 100%. Late complication occurred in two patients including worsening of congestive heart failure and another case with empyema thoracis after treatment HAP. The overall 3-year survival rate of both AIE and AFB were 40%.**

Conclusions: **AIE has provided the advantage of avoiding prosthesis. This technique is safe and equally effective as AFB in term of patency and survival.**

Keywords: **aortoiliac occlusive diseases, aortoiliac endarterectomy, aortofemoral bypass**

INTRODUCTION

The syndrome of thrombotic obliterans of the aortic bifurcation (type 1) is relatively rare (5-10%) arterial occlusive diseases[1], first described in 1948 by Lerich and Morel[2], compared to type 2 (25%) (extended to external iliac artery and type 3 (65%) (stenosis within aorta, iliac and common femoral artery)[3]. In the past, thromboendarterectomy, first described by Dos Santos of Lisbon in 1947 and Edwin j. Wylie adapted this technique to aortoiliac region in 1951, has been well standardized. The survival treatment of aortoiliac occlusive diseases (AIOD) reported in the literature with major complication including 10-20% occlusion rate at 5 years and 25-30% at 10 years[4-8]. Although the advent of interventional treatment has brought a paradigm shift of aortoiliac occlusive diseases (AIOD) management, but this method may be use in a small group of patient. However, the open surgical revascularization is still important for unsuitable lesion and non-specialize vascular unit hospital.

The aim of this study was to evaluate the morbidity, mortality and 3-year patency rates and survival of type

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1 AIOD patients managed by AIE or AFB at one hospital.

Surgical technique

The operations were carried out under general anesthesia. All cases were approached through transperitoneal exposure with careful dissection of the abdominal aorta between the proximal aortic neck and both common iliac artery. In case of AIE, a vertical aortotomy was performed and extended to right common iliac artery, separation arteriotomy of left common iliac artery to avoid nerve plexus located just proximal to left common iliac artery. Artherosclerotic plaque and thrombus were removed. Then tacking suture with 4/0 double end prolene was placed circularly at the cut edge of the intemal plaque. For the AFB, bifurcated knitted Dacron graft was performed in all patients. The limb of grafts was tunneled as an anatomical bypass and anastomosis onto common femoral artery with profundaplasty. For one patient, concomitant iliofemoral bypass was done.

Materials and Methods

Between November 2007-November 2013 medical records of ten patients (7 males and 3 females) presented with critical limb ischemia undergoing open aortic anatomical bypass to treat aortoiliac occlusive diseases type 1 at Lampang Regional Hospital were reviewed retrospectively. Ethical approval was obtained from Lampang Regional Hospital Research Ethic Committee.

All patients in this retrospective cohort study had undergone screening for the presence of cardiovascular risk factor including DM, HT smoking and medical co-morbidity (Table 1). CT angiography was performed to delineate the extent and distribution of occluded lesion (Figure 1). In selected cases, intra-operative duplex ultrasound was used to demonstrate stenotic lesion. For one patient, atherothrombotic plaque extended to proximal external iliac artery and concomitant iliofemoral bypass with expanded polytetrafluoro-ethilene 6 mm was performed.

Postoperatively all patients were followed in out-patient department for the clinical assessment and vascular examination with duplex ultrasound imaging studies as indicated.

Mortality data was obtained from hospital record. One patient died after 6 months and 2 patients lost follow-up at 10 months and 20 months respectively.

Comparisons between the groups were made using the Fisher exact test with $p < 0.05$ considered to be significant. The patency of AIE, AFB and survival rates were all analyzed using the Kaplan-Meier analysis

Table 1 Patients' characteristic (no; %)

Age (year)	**Mean + SD (67.75+12.34)**
Sex	
Male	6 (60)
Female	4 (40)
Cardiovascular risk factor	
Smoking	4 (40)
DM	1 (10)
HT	5 (50)
Co-morbidity	
COPD	3 (30)
CKD	2 (20)
CHF	1 (10)

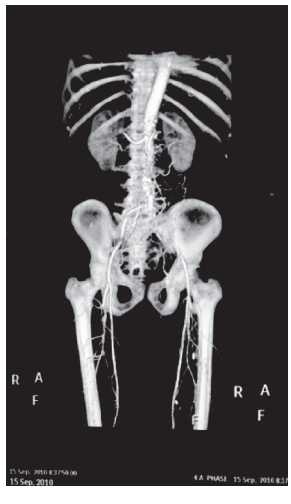

Figure 1 CTA finding for AIOD type 1

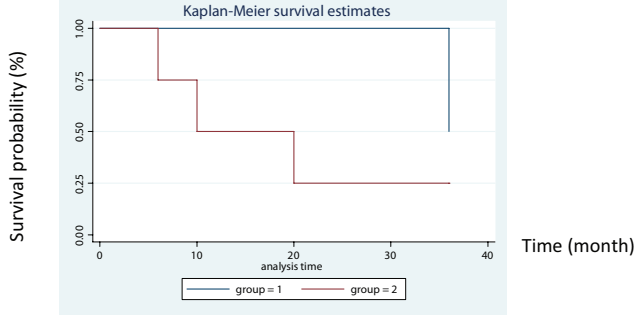

Figure 2 Comparison of survival and patency between group 1 (AIE) and group 2 (AFB)

Table 2 Symptom and indication for bypass (no %)

Severe claudication	2 (20)
Ischemic limb	4 (40)
Rest pain	4 (40)

Table 3 Operative morbidity (no %)

Mid foot amputation	1 (10)
Left hip disarticulation	1 (10)
Left AK amputation	1 (10)
Toe amputation	1 (10)

(Figure 2).

Results

During the 3-year follow-up period, 10 patients with critical limb ischemia from AIOD type 1 with or without additional femoro-tibio-crural diseases were operated. All patients had cardiovascular risk factor, but no definite treatment for coronary artery diseases. Clinical indication for bypass surgery included severe claudication, ischemic limb and rest pain (Table 2).

Of 10 patients with AIOD type 1, 5 were AIE and 5 were AFB. All cases were performed with trans-peritoneal approach (Table 4). There were no significant differences among the two groups (p = 0.548). One postoperative death occurred after AIE on day 29. One patient against advice after AFB had post-operative worsening of congestive heart failure, left pleural effusion, hospital acquired pneumonia, DVT and eventually left empyema thoracis. In this case, the duration of hospital stay was 69 days.

Three patients were amputated at the same level of pre-operative ischemic demarcation (Table 3). One patient was amputated above the level of ischemic tissue loss after AFB (Figure 3, 4). No amputation required for severe claudication patients.

Table 4 Characteristics of patients

	AIE	AFB	p-value
Age	63.5±7.14	72±16.02	
Sex			
Male	4	1	0.103
Female	2	4	
Clinical presentation			
Ischemic limb	2	2	0.548
Non-ischemic limb	2	4	
Duration of follow up (month)	24.75±13.04	18±13.36	

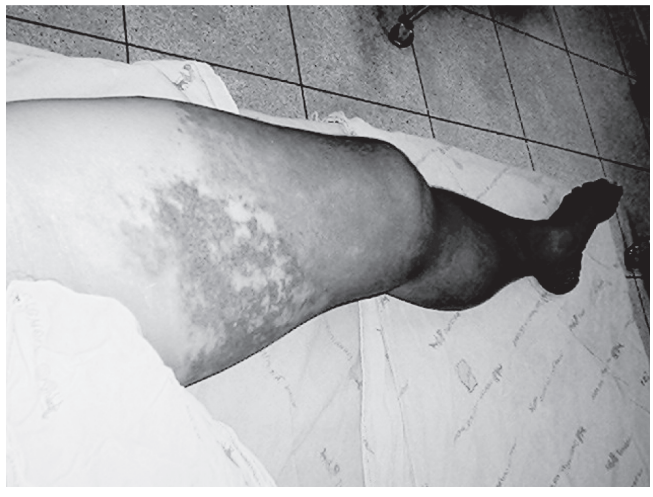

Figure 3 Ischemic demarcated line of further hip disarticulation patient

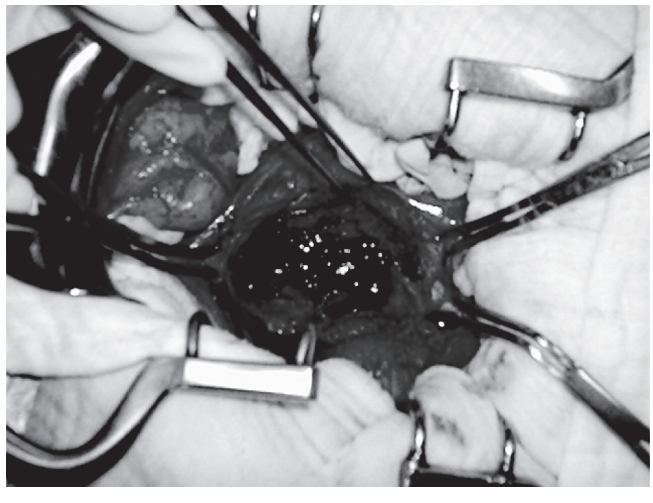

Figure 4 Fresh clotted blood in the abdominal aortic lumen

The remaining 8 patients were discharged from the hospital with satisfactory surgical outcome. All patients were follow up 1 month, 3 months, 6 months and 1 year after operation then received further follow up treatment for each medical condition.

At 3-year follow-up, there were additional 3 deaths due to cardiovascular diseases, COPD and one additional graft loss but no further operative intervention was identified.

DISCUSSION

Aortoiliac occlusive (inflow) diseases have been

Table 5 Duration of patency

	AIE	AFB	*p*-value
< 18 month	2	2	0.757
18-36 month	2	2	

Table 6 Cause of death after open anatomical AIOD type 1 management

Cause of death	Number of patients
Cardiovascular	4
COPD	1

classified into three categories. Less than 10% of inflow diseases are limited to aorta and common iliac artery. Patients with type 1 AIOD are frequently asymptomatic due to the development of collateral. However, for subgroup of patients with AIOD type 1, additional femoro-tibial or tibio-crural diseases with critical limb ischemia has been considered the surgical management for AIOD. An option for AIOD which was summarized by Rutherford included anatomical and extra-anatomical bypass[9]. Because of many type 1 lesions are now treated by endovascular intervention. In the hospital not amenable to catheter-based therapies, the open surgical management of AIOD would be appropriated.

In this study, AIE and AFB for treatment AIOD can be performed with acceptable peri-operative morbidity and mortality. Both AIE and AFB provided good symptomatic relief of AIOD patients. AIE patients appear to have better patency rate after 3 years follow up but limited number of patient (Figure 2).

The recent article by Van Den Akker noted that patient symptom, survival and graft thrombosis were significantly poorer for critical ischemic patients[10]. This observation by Crawford et al. reported significantly early (6% versus 3%) and late mortality (55% versus 33%) rate in patients with rest pain when compared with claudication alone[11].

There were additional two deaths between one and two years after operation in this review. One case was due to cardiovascular with COPD and another case suspicious from acute graft thrombosis followed by further cardiovascular problem.

One case after AIE and concomitant ilio-femoral bypass survived until complete follow up. The most common cause of death for AIOD patient, same as peripheral artery occlusive disease is cardiovascular event (Table 6), as noted by Hertzer NR et al[12].

CONCLUSION

Open anatomical aortic reconstruction, both AIE and AFB, would be safe and effective for symptomatic relief of AIOD type 1 patients with critical limb ischemia in hospital where stent deployment is not possible. The AIE procedure appeared to be safe and equally effective as AFB in term of graft patency and survival (Table 5).

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Original Article

"Sawanpracharak" Connector: A Single Tube Intercostal Drainage Connector

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Abstract

Background: **Intercostal drainage (ICD) is categorized as a minor operation. The system used to drain content may be either single or double bottle system. The problem of a single bottle system occurs when the content is above the water level. In a double bottle system, if the patient takes very deep breath, the water may be siphoned from water-seal bottle into reservoir bottle and causes open pneumothorax.**

Objective: **To present an ICD connector that can prevent the problem of both single and double bottle systems.**

Materials and Method: **The "Sawanpracharak" (SPR) connector was designed with the concept that if the draining tube could be adjusted up to keep the lower end at 2 cm below water all the time, it could correct the problem of a single bottle system. At the same time, it could remove the reservoir bottle and hence, correct the problem of a double-bottle system.**

Result: **The SPR connector was designed, invented and had been applied to patients with pneumo/hemothorax and parapneumonic effusion. It could drain the pleural content easily and comfortably. No problem of the two systems is found with this connector.**

Conclusion: **The SPR connector is a new instrument which can solve the problem of both single- and double-bottle systems.**

Keywords: **Intercostal tube, chest tube connector**

Introduction

Intercostal drainage is a common procedure in surgical practice but also a life-saving procedure, especially in trauma[1,2]. For pneumo-hemothorax, if a single-bottle system is used, the blood drained from pleural cavity will raise water level and result in difficult subsequent drainage. If a double bottle system is applied, the reservoir bottle collects the content and makes water level of water-seal bottle undisturbed. The latter system, however, has some other problems. When the patient breathes heavily i.e. patient with hypoxia or head injury, the high negative pressure will reflux the water from water-seal bottle into reservoir bottle and cause open pneumothorax (Figure 1). Moreover, the size of the chest tube and the size of the draining tube of the conventional connector are very different and, when connected together, can cause "bottle neck" effect (Figure 2). The drainage is filled up and finally clogged. Due to these problems, the Sawanpracharak (SPR) connector was designed and invented to overcome the problems.

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Figure 1 Problem of single bottle and double bottle system

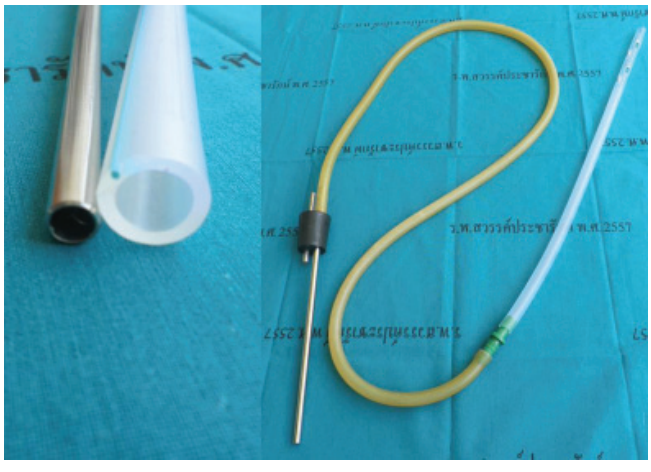

Figure 2 Size of draining tube of conventional connector and chest tube Fr 32

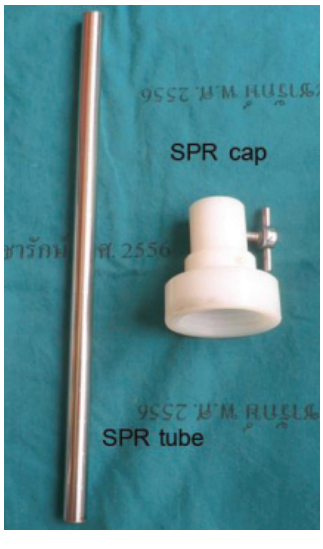

Figure 3 SPR tube and SPR cap

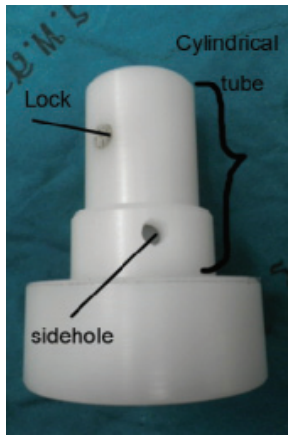

Figure 4 SPR cap

Figure 5 Size of conventional draining tube and SPR tube

Figure 6 Marker level at 2 and 4 cm

Materials and Methods

The SPR connector composed of two parts, the SPRcap and the SPR tube (Figure 3). The cap was designed as a screwcap with a cylindrical tube in the center. The cylindrical tube was used as the passage of SPR tube. There were four small side holes around it, connecting its lumen to the outside atmosphere (Figure 4). There was a lock above the side holes, used to fix the SPR tube. The SPR tube was an extra large tube with a diameter of nearly 10 mm, much larger than conventional draining tube (Figure 5). At both distal ends, there were markers to indicate its depth (Figure 6). The connecting apparatus that used to connect

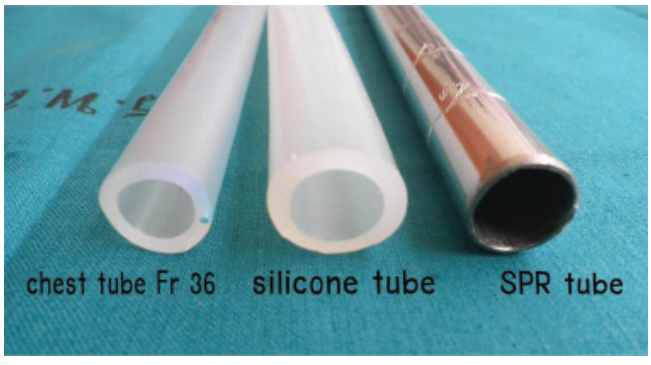

Figure 7 Compared size between chest tube, silicone tube and SPR tube

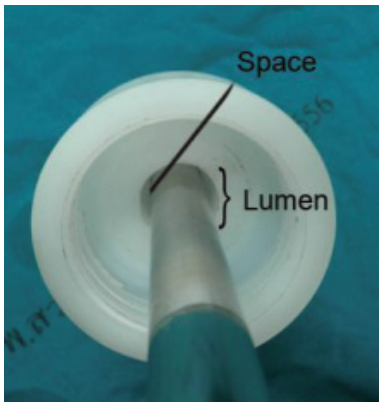

Figure 8 The space between the lumen of cylindrical tube and SPR tube

Figure 9 Airflow from the bottle through the space and side holes

between chest tube and SPR tube was a large silicone tube. Its diameter was about 10 mm, large enough to wear on both chest tube and SPR tube (Figure 7), preventing the bottle neck phenomenon.

To compose the apparatus, the SPR tube is inserted into the cylindrical tube of the SPR cap, with a space between the lumen of cylindrical tube and SPR tube. This space is used as an exit of air (from the pleural cavity), through the side holes and out of the bottle (Figure 8, 9). The SPR cap is screw locked to the bottle. The lower tip of SPR tube is adjusted at 2 cm below the water level (Figure 10). Once the content increases the water level, the SPR tube is unlocked, pulled up and kept at the 2-cm underwater level. To test for small pneumothorax, clamp the silicone tube, unlock the SPR tube and pull it up to just under the water level and lock, then unclamp the silicone tube and ask the patient to cough and look for the bubble to emerge.

Figure 10 Complete set of SPR connector no 'bottle neck' junction

Figure 11 Applied to hemothorax patient

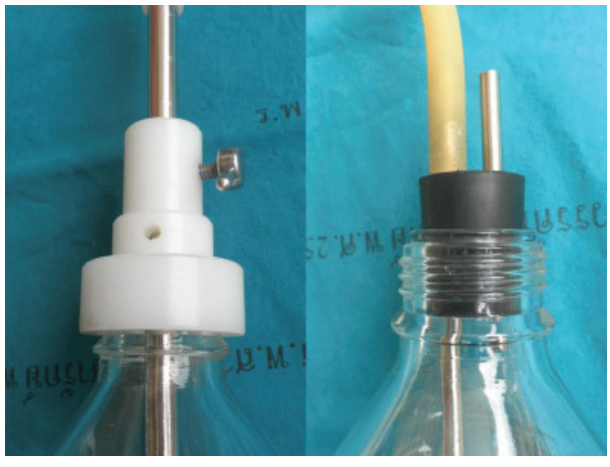

Figure 12 Secure locked and unsecure locked

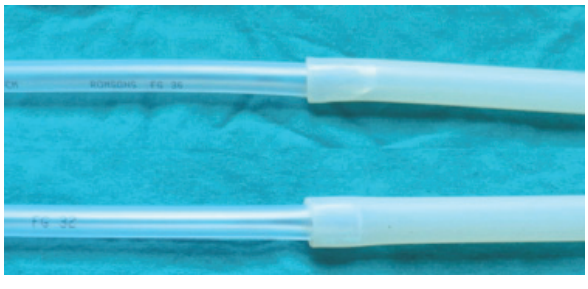

Figure 13 Chest tube Fr 36,32 and silicone tube

Results

Initially SPR connector had been applied to 10 patients with pneumohemothorax. Later it had been applied to patients with parapneumonic effusion. In hemothorax case, the large tube of the system could evacuate the blood rapidly by the gravity force, no tube stripping is required (Figure 11). In patients with parapneumonic effusion, although the content is thick but the large draining tube could remove the content conveniently and no clogging is found.

Discussion

The SPR connector had many advantages over the conventional connector. When compared to single bottle system, it could drain the content much more freely without concerning the water level. Although the connector was designed to use with one bottle but it could function as double bottles. The 'two in one bottle' could receive some amount of content and could prevent the siphon phenomenon at the same time. With one bottle, it is more comfortable to carry than double bottles. With adjustable tube, it can check the minimal air leakage while conventional connector cannot.

Another problem of conventional connector is the size of draining tube which was too small. When the large sized chest tube was inserted in the pleural cavity attached to the smaller tube adaptor and smaller draining tube, it would create multiple bottle neck junctions. The inadequate drainage may result in clotted hemothorax and later fibrothorax which was a serious complication and the patient may need a thoracotomy to remove the lesion. Chest tube stripping did not show any clear benefit in enhancing chest tube patency but may significantly increase negative intra-thoracic pressure that could cause harm (eg, tissue entrapment, increased bleeding) to the patient[3]. By merging the air vent tube and the draining of conventional connector into a (single) SPR tube, this extra-large tube helped improve the drainage considerably. SPR tube was designed to a comparable size of Fr 32, 36 chest tubes which were commonly used in surgical practice (Figure 13). With its single tube design, it could also prevent a misconnection between chest tube and air vent tube of conventional connector.

The locking system of SPR connector was designed as screw cap, differed from conventional connector which was designed as plug (Figure 12). More security when it is locked to the bottle and much easier to handle and carry.

Conclusion

The SPR connector is an innovation that could correct the problem of both conventional single and double bottle systems. For the patient, it is a safe instrument. For the practitioner, it is easy to apply, monitor, handle and care.

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Original Article

The Trainee's Operative Experiences for General Surgery in Thailand

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Abstract

Background: **In Thailand, each trainee in general surgery is requested to have experiences of 100 major operative procedures as an operator and 400 operative procedures as an assistant during 4 years. Many major procedures were recommended in the course syllabus, but some trainees seemed to select easier cases to operate, resulting in insufficient experiences as a general surgeon.**

Materials & Methods: **An electronic logbook program was implemented since the academic year 2006. In this study, only the data of trainees who started their training from the academic years 2008 and 2009 were analyzed, because they had just finished their training in the academic years 2011 and 2012.**

Results: **The electronic operative records of 162 trainees were analyzed. By average, each trainee operated 257 procedures as a chief operator (100 required), and assisted 482 procedures (400 required) during 4-year training. As an operator, the first procedure was appendectomy, followed by inguinal hernia operation, and upper GI endoscopy. As an assistant, the first procedure was laparoscopic cholecystectomy, followed by median sternotomy and inguinal hernia operation. Among 15 essential procedure groups, the average number of performance per trainee was over the minimal requirement for almost all procedures, except thyroidectomy and liver surgery.**

Conclusion: **The electronic logbook operative records program allowed a more accurate and easier analysis of the trainees' operative experiences than the written logbook system. All trainees had operative experiences more than the eligibility criteria.**

Keywords: **Electronic logbook, electronic operative record, essential procedure, resident's operative experience, trainee's operative experience**

Introduction

In Thailand, postgraduate training for general surgery is a 4-year program. An academic year starts from the beginning of June until the end of May of following year. Each trainee is required to have experiences of 100 major operative procedures as a chief surgeon and 400 operative procedures as an assistant to be eligible for the board examination. After implementation of electronic logbook program, the trainees' operative experiences were relatively easy to follow[1-2]. The Training and Examination Subcommittee (TES) of the Royal College of Surgeons of Thailand (RCST) has recommended many major procedures in the course syllabus for general surgeon training. However, examiners notice that some trainees intended to fulfill 100 major operative procedures by selecting relatively easier ones instead of completing all suitable procedures. On the other hand, the operative procedures available in each training institute vary among the institutes[1,3-4]. Some trainees may miss

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some essential procedures if there are not enough cases for particular procedures. It is important to complete all essential procedures during the elective period and avoid missing some essential procedure[5-6].

Materials & Methods

An electronic logbook program was first implemented in academic year 2006. All active trainees were encouraged to register and record their operative experience into this database. However, at that time each trainee can choose to record his experience either in electronic form or in paper-based logbook. Since the academic year 2008, all new trainees had to register and record their experiences via only electronic logbook, and then all active trainees had to do the same since the academic year 2009. Only data of trainees who started on the academic years 2008 and 2009 were analyzed, because they have finished their training on the academic years 2011 and 2012.

In the electronic logbook program database, operative procedures were categorized into 23 groups; skin & subcutaneous tissue, breast & endocrine, esophagus & diaphragm, stomach, small intestine, colorectal & anus, hepatobiliary & pancreas, spleen, abdominal wall, abdominal cavity, vascular, amputation, endoscopy, head & neck, appendix, laparoscopy, pediatric surgery, urology, plastic surgery, orthopaedics, neuro-surgery, thoracic surgery, and gynecology. The first 16 groups cover all procedures required to be a general surgeon.

In the academic year 2012, the TES selected 15 procedure groups as the essential procedure groups out of the 23 surgical procedure groups. As mentioned above, each trainee is required to accomplish 100 major operative procedures to be eligible for board examination, and among 100 major operative procedures, 55 procedures should be selected from the 15 essential procedure groups. For the 23 operative procedure groups, the frequency of experience of trainees as operators and as assistants was analyzed. For the 15 essential operative procedure groups, only the frequency of experience of trainees as chief operating surgeons was analyzed.

In the academic year 2012, many essential procedures were added into the list of procedures of electronic logbook program. In some previous procedure lists either name or group was changed. These changes limited data analysis of all 162 trainees, so only 90 trainees of year 2012 were selected. Some data was modified to fit the criteria of essential procedures. Data analyses were divided to 2 parts: 162 trainees' records of 23 operative groups including general surgery and affiliated fields, and 90 trainees' records of 15 essential procedure groups.

Data analyses included the number of incidence; percentage, average, median and standard deviation were calculated, using a program in the Microsoft Excel 2007. This study was approved by the Khon Kaen University ethic committee in human research, following Declaration of Helsinki and ICH GCP, on 1st June 2012.

Results

There were 82 and 94 trainees who completed the 4-year training course in the academic year 2011 and 2012, respectively. Among them, 10 trainees from the year 2011 and 4 from the year 2012 were excluded, due to incompleteness of data in their logbook. All records of the remaining 162 trainees (72 in the year 2011 and 90 in the year 2012) were extracted from the database, and each trainee's experience of the procedures as a chief operator or an assistant was analyzed. By average, each trainee experienced 257 (range 100-1252, median 202) procedures as an operator (minimal requirement = 100), and 482 (range 400-1097, median 445) procedures as an assistant (minimal requirement = 400) during the 4-year training course. The most common procedures among the 23 operative groups were identified. As an operator, the top three procedures were appendectomy, inguinal hernia operation, and upper GI scopy, respectively (Table 1). As an assistant, the top three procedures were laparoscopic cholecystectomy, median sternotomy and inguinal hernia operation, respectively (Table 2).

For the 15 essential operative procedure groups, only 90 trainees' data of the academic year 2012 were available. Except for thyroidectomy and liver surgery, the average number of 15 essential procedure groups per trainee was higher than the minimal requirement (Table 3). Among 14 training institutes, only 12th training institute (T12) had a sum of the average essential procedures less than 55, a sum of the minimal requirement of the essential procedures per trainee (Figure 1).

Table 1 The 23 common procedures of operative groups which trainees acted as chief surgeons.

Operative group	Procedure	Average
Abdominal cavity	Laparotomy for trauma	6.83
Abdominal wall	Inguinal hernia, operation	25.25
Amputation	Below knee (BK)	3.90
Appendix	Appendectomy	72.60
Breast & endocrine	Modified radical mastectomy	7.96
Colon, rectum, anus	Hemorrhoidectomy	5.01
Endoscopy	Upper GI scopy	19.92
Esophagus & diaphragm	Esophageal dilatation	1.41
Gynecology	Cystoscopy + proctoscopy	0.20
Head & neck	Tracheostomy	4.16
Hepatobiliary & pancreas	Cholecystectomy	8.21
Laparoscopy	Laparoscopic cholecystectomy	8.21
Neuro surgery	Burr hole craniotomy	1.50
Orthopaedics	Simple repair tendon injury	0.24
Pediatric surgery	Herniotomy	1.20
Plastic surgery	Skin graft	1.89
Skin and subcutaneous tissue	Excision skin / subcutaneous tumor	11.37
Small intestine	Small bowel resection	2.76
Spleen	Splenectomy	1.67
Stomach	Closure perforation	9.62
Thoracic surgery	Thoracotomy	0.74
Urology	Cystoscopy	2.15
Vascular	A-V fistula, operation	2.80

Table 2 The most common procedures of 23 operative groups which trainees acted as assistants.

Operative group	Procedure	Average
Abdominal cavity	Laparotomy for trauma	9.11
Abdominal wall	Inguinal hernia, operation	24.07
Amputation	Above knee (AK)	1.95
Appendix	Appendectomy	18.53
Breast & endocrine	Modified radical mastectomy	20.58
Colon, rectum, anus	Colectomy	13.73
Endoscopy	Colonoscopy	8.78
Esophagus & diaphragm	Esophagectomy	2.10
Gynecology	Hysterectomy	2.43
Head & neck	Thyroid lobectomy	7.16
Hepatobiliary & pancreas	Cholecystectomy	15.39
Laparoscopy	Laparoscopic cholecystectomy	33.92
Neuro surgery	Craniotomy with others	7.35
Orthopaedics	ORIF	1.37
Pediatric surgery	Herniotomy	3.18
Plastic surgery	ORIF	5.00
Skin and subcutaneous tissue	Excision skin / subcutaneous tumor	8.22
Small intestine	Lysis adhesion	2.99
Spleen	Splenectomy	2.70
Stomach	Gastrectomy	5.19
Thoracic surgery	Median sternotomy	25.44
Urology	TUR-P	3.21
Vascular	A-V fistula, operation	16.81

Table 3 Average number per trainee of 15 essential procedural groups.

Group	Procedure	Minimum	Average	SD
1	Inguinal hernia operation	10	17.94	9.86
2	Surgery of stomach (gastrectomy, simple suture, gastro-intestinal anastomosis)	5	12.06	7.45
3	Mastectomy (partial/total), axillary surgery (ALND/SLN)	5	7.62	5.25
4	Amputation of lower extremity (below/above knee)	5	5.41	3.75
5	Ostomy procedures (gastrostomy, jejunostomy, ileostomy, colostomy)	5	7.57	5.87
6	Anal surgery (fistula/fissure)	5	7.10	4.22
7	Laparoscopic cholecystectomy	5	6.26	4.02
8	Hemorrhoidectomy	3	3.45	2.92
9	Colectomy (partial/total)	3	5.10	4.14
10	Thyroidectomy (partial/total)	2	1.35	1.28
11	Small bowel resection	2	2.91	3.02
12	Open cholecystectomy	2	5.59	4.68
13	Resection of rectum (anterior/low anterior/A-P resection)	1	1.76	2.14
14	Liver surgery (lateral segmentectomy, wedge resection)	1	0.84	1.02
15	Vascular surgery (vascular anastomosis, varicose vein)	1	5.46	5.63

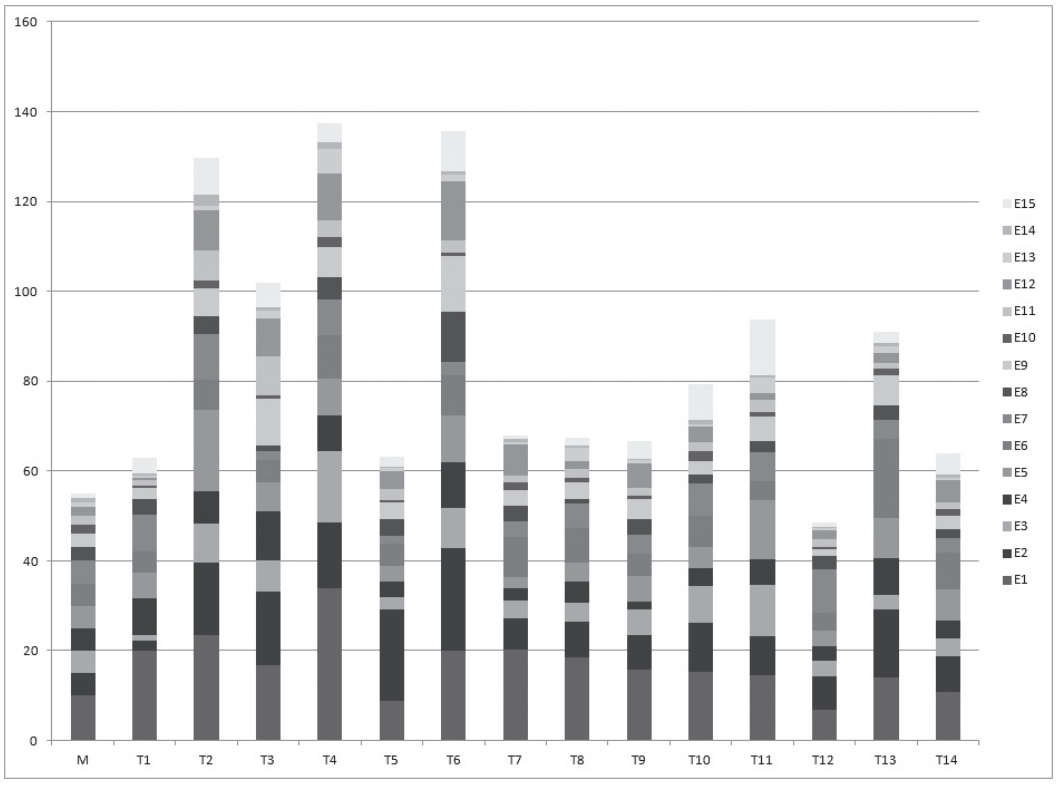

Figure 1 Distribution of 15 essential procedural groups (E1-E15) in the 14 training institutes (T1-T14) with reference to the minimal requirement (M) of 55 essential procedures.

Discussion

The TES recognized improper distribution of self-operated major procedures in some trainees' logbook, such as 60 appendectomies within 100 required operations, which cast some doubts on the ability of these trainees as well-trained general surgeons. In the academic year 2012, the TES proposed 15 essential procedure groups with minimal requirement in each group. The sum of the specified procedures was 55 cases. Each trainee was allowed to choose the remaining 45 cases by himself. This would improve the

quality of training, following the western standards[7-10].

Some training institutes should pay attention to their trainees who have an average number of some essential procedures below the minimal requirement. Availability of wide range of operative procedures in the training institutes is one of the most important factors in providing high quality training[1]. The TES determined 100 major operative procedures for an operator and 400 operative procedures for an assistant for board examination eligibility. This study showed 2.5 times of self-operated cases (257:100) and only 1.2 times of assisted-operated cases (482:400). The ratio of real assisted procedures VS recorded assisted procedures should be 2:1. Most trainees recorded a few numbers of assisted procedures over the minimal requirement, only 16 from 162 trainees (9.87%) experienced more than 800 assisted procedures. Missing data should be considered because excess records had no gain but wasted time.

There were 23 of 162 trainees (14.19%) recorded between 100 to 120 procedures (median 112) as chief surgeons, and 400 to 560 procedures (median 410) as assistants. By average, the percentage of appendectomy in these trainees was near the percentage of appendectomy in all trainees (26% VS 28%). However, there were 2 trainees who recorded appendectomy more than half of their self-operated procedures, 65 from 108 (60.18%) and 61 from 113 (53.98%). This deviated data was only a personal problem which each institute should consider individually.

In western countries, reduction of trainee's work hour was implemented to improve the trainee's quality of life. Several studies confirmed that the improvement of trainee's quality of life paralleled with compromised patient care and training quality[11-12]. In Thailand, trainee's work hour ranges from 80 to 136 hours per week, depending on training institute. Now, the TES recommends 100 hours per week or less.

Conclusion

The electronic logbook program makes analysis of trainees' operative experiences easier. All trainees had operative experiences more than the eligibility criteria, 257 operations as an operator and 482 operations as an assistant. Implementation of essential procedures will improve the quality of new surgeons.

Acknowledgements

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Case Report

Mitral and Tricuspid Valve Replacement in Uncommon Case of Situs Inversus with Dextrocardia

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Abstract

Background: **Incidence of congenital cardiac anomalies in dextrocardia with situs inversus combined with severe rheumatic mitral valve stenosis (MS) and tricuspid regurgitation is uncommon. Also, anatomic malposition can cause hindrance for surgeon while handling cannulation and diseased valves.**

Objective: **We reported a case of situs inversus and dextrocardia with rheumatic mitral stenosis and severe tricuspid regurgitation. Details of diagnosis, treatment and some technical operative techniques to cope with this condition were described and the literature review was performed.**

Case report: **The patient was a 48-year-old woman with a history of cardiomegaly, progressive dyspnea, easy fatigability, paroxysmal nocturnaldyspnea, anasarca, marked jaundice and had the New York Heart Association (NYHA) Class 3 with underlying hemoglobin H disease. She underwent mitral and tricuspid valve replacement due to severe rheumatic mitral stenosis and tricuspid regurgitation. She was improved to NYHA Class 1 within two months after the operation.**

Conclusions: **Based on this uncommon patient presenting with dextrocardia, the recommended primary operative approach is performed with the surgeon standing at the left side of the patient. A transeptal-atriotomy provided an excellent exposure without heart positioner.**

Keywords: **dextrocardia, hemoglobin H, rheumatic heart disease, situs inversus**

Introduction

Dextrocardia with situs inversus is an uncommon congenital heart defects, but the association of this condition with acquired valvular heart disease is even rarer. Herein, we reported a case of middle-aged Thai woman with dextrocardia, situs inversus, acquired rheumatic mitral stenosis and tricuspid valve regurgitation plus Hb H disease.

Case Report

A 48-year-old woman presented with a history of progressive dyspnea and palpitation on exertion, cardiomegaly, cardiac murmur, atrial fibrillation, jaundice, hepato-splenomegaly and pitting edema at both legs of 5 months. Physical examination revealed jaundice and edema with blood pressure of 110/70 mm Hg and atrial fibrillation at a rate of 78/min. The

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positive physical findings were marked jaundice, moderately pale conjunctiva and jugular venous distension. The point of maximal impulse was at the fifth right intercostal space one centimeter away from midclavicular line. The first heart sound was moderately accentuated as was the pulmonary component of the second heart sound. An opening snap was heard over the entire precordium plus a grade 3/6 diastolic rumbling murmur at the apex radiated to her axillar with grade 3/6 holosystolic murmur at the left parasternal border. The chest film revealed dextrocardia and situs inversus, cardiothoracic ratio of 0.81 and increased pulmonary vascular markings (Figure 1)

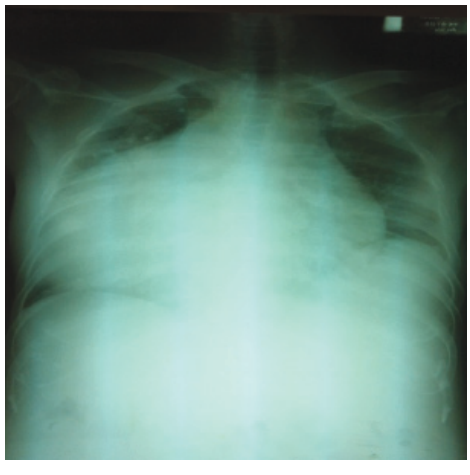

Figure 1 Noted dextrocardia, marked cardiomegaly with prominence of pulmonary vascularity

Routine laboratory studies showed mild to moderate degree of anemia from Hb H disease and cholestasis jaundice which was confirmed by abdominal ultrasonography. There were dextro position of abdominal organs, mild hepatomegaly with congestion of hepatic vein and inferior vena cava and no liver parenchymal disease. Biliary trees, spleen, pancreas and kidneys appeared normal and large amount of ascites was noted.

Two-D echocardiography showed dextrocardia, LAE, RAE, RVH and D-shape LV. Overall LV systolic functions were normal with an EF = 67%. The aortic valve was tri-leaflet and appeared structurally normal. MV mobility +2 valve thickening +3 subvalvular fusion +2 calcification+3 to +4 and sever MS MVA = 0.79 cm2by trace, MVA = 1.07cm2 by PHT , MPG = 6.11 mmHg. RAE, RVH with severe TR, RVSP = 40.02 mmHg. Pericardium was normal with minimal pericardial effusion.

The patient underwent open heart surgery through standard median sternotomy, cardiopulmonary bypass was established by cannulating ascending aorta and SVC/IVC, myocardial preservation using cold blood antegrade cardioplegia (Figure 3).

Mitral valve was replaced using C-E PERIMOUNT Plus Pericardial Bioprosth size 27 mm and tricuspid valve was replaced using C-E PERIMOUNT Plus Pericardial Bioprosth. Mitral size 25 mm subsequently. Rheumatic tricuspid valve was shown in Figure 4.

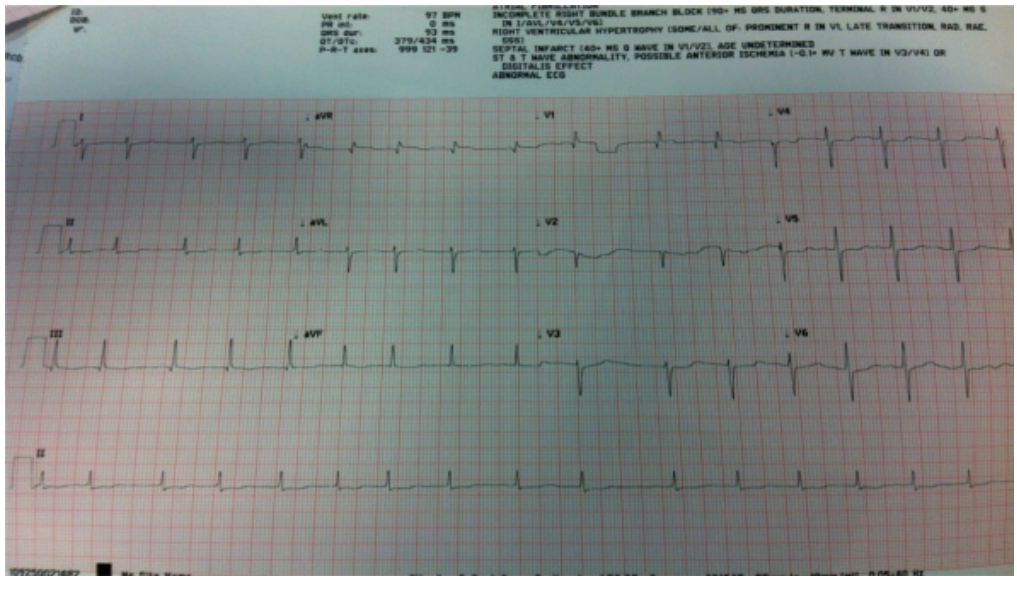

Figure 2 The electrocardiogram was consistent with dextrocardia and also showed atrial fibrillation, a mean QRS axis of +120 degree

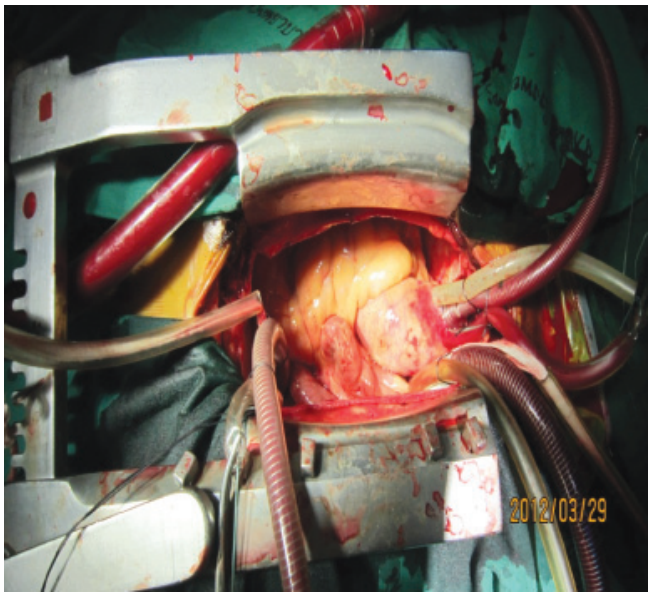

Figure 3 CPB Circuit was shown and the surgeon standing on the left sided

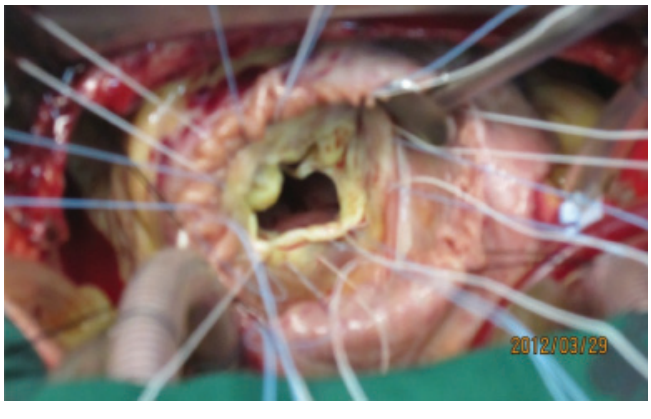

Figure 4 Severe rheumatic TR due to thickened, retracted all leaflets plus large cleft between anterior and posterior leaflet

The patient recovered uneventfully. She was extubated within 3 hours after the operation and stayed in ICU less than 24 hours. Her total hospital stay was 10 days. Until her last follow-up at 30 months, she was still leading her normal life.

Discussion

Dextrocardia is a cardiac positional anomaly in which the heart is located in the right hemithorax with its base-to-apex axis directed to the right and caudad. The malposition is intrinsic to the heart and not caused by extracardiac abnormalities. Dextrocardia should be differentiated from cardiac dextroposition, which is defined as displacement of the heart to the right secondary to extracardiac causes such as right lung hypoplasia, right pneumonectomy, or diaphragmatic hernia[1]. A number of congenital heart defects have been reported with dextrocardia, including ventricular septal defect, patent ductus arteriosus, atrial septal defect (secundum and primum), tetralogy of Fallot, pentalogy of Fallot, infundubular pulmonary stenosis, transposition and pseudotruncus, corbiloculare, atrial-ventricular canal with patent ductusarteriosus, and total anomalous pulmonary venous return[2,3]. Multiple skeletal defects have also been reported in association with dextrocardia, including multiple deformities of the spine and skull asymmetry[4].

Total situs inversus is uncommon, its incidence being one per 12,019 births[5], and the association of acquired valvular lesions with dextrocardia and situs inversus is unknown but must be very rare. The first case of dextrocardia and acquired valvular heart disease was reported by Owen in 1911; the electrocardiogram in this case was interpreted by Dr. Thomas Lewis[6]. Precise anatomical diagnosis is essential for successful surgery based on two-dimensional echocardiographic studies by using standard criteria for diagnosis of situs, while cardiac catheterization was used to confirm cardiac anatomy in few cases[7,8]. Open-heart in patients with a cardiac position anomaly is technically demanding, and surgeons are required to make certain modifications to their normal surgical techniques when operating on patients with dextrocardia. Some authors have recommended standing on the right side as usual while using a Starfish™ heart positioner to provide adequate exposure to the posteriorly placed right atrium, making venous cannulation relatively easy and safe[9]. In this case, we stood on the left side of the operating table, which provided excellent exposure and made the procedure relatively easy.

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NEUROSURGERY

THE ANATOMICAL RELATIONSHIP OF ASTERION AND TRANSVERSE-SIGMOID VENOUS JUNCTION FROM 100 CADAVERS

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Objective: To study the anatomical relationship of asterion and transverse-sigmoid venous junction.

Methods: One hundred adult formalin-prepared cadavers were dissected. Each skull was drilled at external landmark of asterion on both sides. Every skull entry was measured, from inside the skull, with special attention to its relationship to lower border of transverse sinus groove (as X-coordinate) and the line perpendicularly which passed the transverse-sigmoid junction (as Y-coordinate). The transverse sinus width was also recorded. The locations of drill bit's entry to skull were divided into five areas (posterior fossa, on transverse sinus, above transverse sinus, on transverse sigmoid complex, and above transverse sigmoid complex).

Results: On the right side, 39% of entries were in posterior fossa, 48% on and 2% above transverse sinus while 8% on and 3% above transverse sigmoid complex. On the left side, 35% of entries were in posterior fossa, 55% on and 3% above transverse sinus while 6% on and 1% above transverse sigmoid complex. The mean ±SD distance from drill bit's internal skull entry to transverse sigmoid junction were 5.57 ± 6.86 mm. on the right side and 7.66 ± 6.96 millimeters (mm.) on the left.

Conclusion: The asterion, for most, does not represent the transverse sigmoid venous junction. It was located most frequently directly over the transverse sinus or, less commonly, on posterior fossa. In addition, using asterion as external landmark, the entry is typically medial to transverse sigmoid sinus junction. For the majority, the width of right transverse sinus was significantly greater than left side.

OPERATING ROOMS AND EQUIPMENTS

NEW DESIGNED LED HEADLIGHT FOR SURGERY

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Background: Surgical lighting system is an important key factor of successful operation to achieve better patient outcomes due to clear visualization. One of the systems is surgical headlight offering convenience and portability as a standard device of light source in operating theater. However, the conventional headlight consists of a light source, mostly halogen or xenon light bulb, fiber optic cable and headset. It has many limitations for clinical uses for instance: cumbersome size, heavy weight, high cost of maintenance, causing a shadow and a blind spot. Therefore, the advanced technology of LED (Light Emitted Diode) with high power light source can provide the solution to

solve the problems of ordinary light bulbs for multiple applications including surgery.

Objectives: We have developed a prototype of the surgical headlight with multiple light sources of very bright LEDs assembled in four rows to use as a headset. The evaluation criteria or performance was based on the properties of illumination, avoiding the shadow and surgeons' feedback.

Materials & Methods: The LED headlight is composed of 38-high power LED beads, which provide white light of luminous flux 120 lumens (1 Watt) of each LED, a light weight aluminum frame, an adjustable headset, a 1.5-meter wire cable, and a 5-volt 1-Amp rechargeable battery. The 26 LED beads were mounted on horizontal rows and 12 beads on vertical sides of the rectangular frame (16 x 8 cm). This aperture frame can be adjusted according to the angle of light projection between 0 - 60 degrees. All LEDs were lined with stainless wires connected to the cable through the portable battery controlled by on/off switch. This trial was experienced by six surgeons and received their feedback with mocked up surgical procedures.

Results: This prototype of the LED headlight weights 250 grams that is half lighter than the ordinary fiber optic headlight. The rows of LEDs are powered by the rechargeable battery with 4-hour life per one charge. The properties of illumination were measured on the luminous flux of 4,500 lumens at focal distance of 1.0 foot away from the aperture with 30 degree of light projection on horizontal rows and 45 degree on vertical sides toward a point of focus. As a result, the LED spots projecting from the aperture provides an overlapped spot surrounding the eye field. Then if some LEDs are blocked by an obscured object, the focus spot is still illuminated. The surgeons were satisfied with the results of ease of use, low cost, light weight, comfort, convenience, low maintenance cost, less heat, low energy consumption and the benefit of the absent of shadow. However, most of them suggested some improvements for example: increasing the light intensity by adding LEDs, mounting a regulator to control multi-level of light intensity, developing the knobs for adjusting the angle of projection, and collaborating with a medical instrument company to modify a version for mass production.

Conclusions: This LED headlight for surgery has been developed by two neurosurgeons for better functions over the conventional version according to the advantages of high technology of LED. The prototype has been proved to have beneficial results of not having shadow and high potential to be developed for mass production. However, improvement and clinical testing are necessary for the future steps.

TOUCHLESS CONTROL SYSTEM FOR OPERATING ROOM: FIRST EXPERIENCE IN THAILAND

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Background: Most surgeries are reliant on medical images obtained from preoperative investigations. Surgeons require them as guiding maps for navigation and making decisions during the operation. Currently most of the hospitals in Thailand use computer systems to display all images for instance: X-rays, CTs, MRIs, etc. However, there are constraints to manipulate the interface devices, both computer mouse and touch screen in operating room. Maintaining sterility as well as instructing an assistant to control the devices are time consuming. As a solution to this problem, a touchless interactive technology has been recently developed as a commercial product "Leap Motion Controller" and introduced to the field of medical image technology of touch-free user interface.

Objectives: The objective of this study was to propose a recent application of touchless interface system to control medical images on the computer screen in operating room and to be first tested in Thailand.

Materials & Methods: The touchless interactive system (LEAP MOTION) is a small and light device ($0.5 \times 1.2 \times 3.0$ inches) which has infrared LEDs and 2 infrared cameras to detect and track user's hands and fingers as a motion-sensing controller. It has a USB cable connected to a computer including a download software and an application program to be installed. With the touchless program, the sensor produces a virtual touch screen of $2 \times 2 \times 2$ feet in the air for 3D space above the sensor. The user can use 1,2,3 and 10 fingers modes according to basic and advanced levels to display the image including clicking by the finger tip of the user, scrolling in horizontal and vertical directions as well as zooming in and out with one or two hands. Before getting started, there is a demo program to train the users how to implement and be familiar with the finger and hand motion control. This hardware and software are compatible with PACS (Picture Archiving and Communication System) program that has been used in the hospitals to display the patient records and all medical images as an additional user interface.

Results: The system was firstly demonstrated to the operative team consisting of surgeons, nurses and assistants in operating rooms at HRH Princess Maha Chakri Sirindhorn Medical Center. They had a trial by using 2-finger mode to control a set of functions: open an image, zoom in-out, pan, and change figures by 10 minutes of each set. The results have shown some constraints caused by the speed of finger motion and the depth perception of active click, although all the users have experience working with touch screen. However, more training resulted in faster and more precise control of the information they needed during surgery. The feedback from surgeons was positive, the environment in operating room was sterile without hand contact or needing to remove sterile gloves. Moreover, surgeons support the idea of working as an interdisciplinary team composed of surgeons, engineers and researchers to develop the smart operating room.

Conclusions: The touchless control, Leap Motion Controller is being tested in six hospitals and two medical research centers around the world. We acknowledge a research team from NECTEC who supports this technology and is the first to bring the new motion control technology to the hands of the surgeons in Thailand. We are working on improving the new touchless interfaces and gesture control systems that work in the operating theatre for clinical trials in the near future.

PEDIATRIC SURGERY

MINIMALLY INVASIVE SURGERY IN NEONATES AND INFANTS

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Background: Recently, several kinds of endoscopic surgery have been applied for neonates and infants. Endoscopic surgery for neonates and infants can expect an advantage to be able to expand the field of vision with minimum invasive procedure.

Objective: To evaluate the feasibility and safety of endoscopic surgery in neonates and infants.

Patients and Methods: Twenty eight neonates (8 type-C esophageal atresia (EA), 7 duodenal atresia (DA), 13 ovarian cyst) and 8 infants (2 type-A long-gap EA, 2 congenital esophageal stenosis, 2 CCAM, 1 congenital chylothorax, 1 congenital diaphragmatic hernia (CDH)) were included in this study. The CO_2 insufflation pressure was 8-10 mmHg for the laparoscopic procedure, and 5-6 mmHg for the thoracoscopic procedure.

Results: Eight neonates underwent thoracoscopic repair of type-C EA. There was no major anastomotic leakage. Seven neonates underwent laparoscopic repair of DA. The first two patients had major anastomotic leakage which required re-anastomosis. Thirteen neonates underwent laparoscopic fenestration of the ovarian cyst. Two infants with type-A long-gap EA underwent thoracoscopic esophagoesophagostomy after sequential extrathoracic esophageal elongation (Kimura's technique). Two infants with congenital esophageal stenosis underwent thoracoscopic esophageal resection and anastomosis. Two infants with CCAM underwent thoracoscopic lobectomy. One infant with CDH underwent thoracoscopic diaphragmatic repair. One infant with congenital chylothorax underwent thoracoscopic thoracic duct ligation. All procedures were completed without any surgical complications or open conversion.

Conclusion: In conclusion, endoscopic surgery for neonates and infants is safe and feasible under an expanded good field of vision.

SURGICAL INTESTINAL DISORDERS IN VERY-LOW-BIRTH-WEIGHT INFANTS

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Background/Aim: Very-low-birth-weight (VLBW) infants are at an increased risk for surgical intestinal disorders, including necrotizing enterocolitis (NEC), focal intestinal perforation (FIP) and meconium-related ileus (MRI). Although prematurity is one of the most important factors for developing these diseases, detailed information regarding the pathophysiology and the risk factors for each disease is lacking, and no effective prevention strategy has been established. The aim of this study was therefore to describe the definition of NEC/FIP/MRI and to identify risk factors for each disease in order to propose a prevention strategy.

Definition of surgical intestinal disorders in VLBW infants: NEC= an acquired condition of diffuse necrotic injury to the mucosal and submucosal layers of the bowel; FIP = intestinal perforation without mechanical obstruction or massive necrotic changes; MRI = intractable ileus indicated a microcolon or small-sized colon extending to

the distal ileum, as well as a gradual change in the caliber of the ileum with a dilated proximal ileum filled with sticky meconium.

Methods: A retrospective multicenter case-control study was conducted at 11 institutes in Japan. We included the VLBW infants who underwent laparotomy for NEC, FIP or MRI from 2003 through 2012. For every subject, two matched controls were chosen based on gestational age and birth weight. Using a conditional logistic regression model, ORs and 95%CIs were calculated.

Results: A total of 150 cases (NEC, 44; FIP, 47; MRI, 42; others, 17) and 293 controls were identified. Cases were comparable in terms of their gestational age and birth weight to controls. Twin pregnancy, RDS, surfactant administration and PDA were associated with the development of NEC. Outborn delivery was the only risk factor for FIP. PROM, maternal steroid and surfactant administration were associated with the development of MRI.

Conclusions: We identified different risk factors for surgical NEC, FIP and MRI. These results suggest that different pathogenesis exist for each disease and that different strategy is required to prevent these diseases.

BENEFIT OF RECTAL EXAMINATION IN CHILDREN WITH ACUTE ABDOMEN

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Acute abdomen is the condition that must be diagnosed and treated urgently. PR or DRE (per rectal examination, digital rectal examination) is a fundamental physical examination that doctors use to differentiate cause of acute abdomen. However, this is not a pleasant examination. Sometimes doctors have ignored this examination. This research study was designed to demonstrate the benefits of rectal examination for contribution to the diagnosis and reduction of unnecessary operation.

Of the total 116 children with acute abdomen, we found the most common 2 conditions, which are appendicitis accounting for 28% and constipation for 28%, followed by the GI diseases such as gastritis, diarrhea and food poisoning (9%) and diseases of reproductive system (7%). We found that rectal examination helping in differentiate diagnosis significantly in 38.8 % of total population. But also found no benefit after rectal examination in 19% of the total population.

In subgroup analysis of patients with suspected appendicitis, accounting for 69.8% of patients with acute abdomen, all of these found appendicitis which required surgery was 33/116 children or 28.4 %. After the rectal examination, the data can help in the diagnosis which reduced surgery for 26/81 (32%) of patients with suspected appendicitis. PR can differentiate diarrhea, constipation, gastritis, menstrual cramps and pelvic inflammatory disease. In the group of patients with suspected acute bowel obstruction (11/116), the rectal examination can aid in the diagnosis in 54% of patients. The researcher believes that this study recognizes the benefit of PR by aids in the diagnosis, reducing unnecessary investigation and surgery in children with acute abdomen.

CLINICAL OUTCOMES OF HEPATOBLASTOMA : AN EXPERIENCE OF 37 CASES

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Background: Hepatobalstoma is the most common malignant tumor occurring in young children. Results of the treatment have continuously improved with increased 5-year survivals in some patients.

Objective: The aim of this study was to review clinical outcomes of hepatoblastoma in a 10-year period.

Materials and Methods: A retrospective study was conducted of 37 patients with hepatoblastoma treated at Queen Sirikit National Institute of Child Health between 2004 and 2013. Their clinical data, pathological reports and results of the treatment were reviewed for descriptive study. Data were expressed as mean and standard deviation.

Results: Thirty-seven patients with hepatoblastoma, 20 males and 17 females, were treated during the study period. Mean age at the operation was 23.0 ± 28.2 months (ranged from 2 months to 12 years). Abdominal distension and asymptomatic mass were the principal complaints. Investigations by ultrasonography, plain abdomen and CT scan were performed in 14 (37.8%), 26(70.3%) and 31cases (83.8%), respectively. Alpha-fetoprotein level elevated ranging from 627 to 484,000 ng/ml before operation and it returned to normal after treatment with chemotherapy in 40.5% of the patients. Of the 37 patients, 10(27.0%) were noted to have distant metastasis at the diagnosis. Tumor masses located in the right, left and bilateral hepatic lobes in 21(56.8%), 11(29.7%) and 5 cases (13.5%), respectively. Primary tumor resection could be performed in 9 patients (24.3%). The 28 remainders underwent only

liver biopsies. After chemotherapy, the residual tumors were completely resected in 12 cases. Pathology revealed various types of hepatoblastoma, such as epithelial (19), mixed epithelial and mesenchymal (14) and undifferentiated small cell type (1). Serious postoperative complications occurred in five cases including massive intra-abdominal bleeding (tumor rupture), hepatic failure, tumor seedings outside the abdominal wall, subdiaphragmatic abscess and sepsis. Four patients (10.8%) died due to these serious complications. Of the 33 surviving patients, 17(51.5%) were alive over 2 years and 9 (27.3%) were doing well over five years after the first operation with the longest follow-up of 9 year period.

Conclusions: Hepatoblastoma was mostly found in children younger than three years of age. Only one-fourth of the patients could undergo primary tumor resections, while the residual tumors could be resected after chemotherapy in one-third of the remainders. The survival rates of 2 and 5 years were 51.5% and 27.3% respectively during the present study.

PREDICTIVE FACTORS FOR OUTCOME OF AIR ENEMA REDUCTION OF INTUSSUSCEPTION

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Background: Intussusception is the most common cause of intestinal obstruction in children under two years of age. Nonoperative reduction using air enema (AE) is an established treatment of childhood intussusception with the success rate of 70% at our institute.

Objective: The aim of this study was to evaluate predictive factors for the outcome of AE reduction of intussusception.

Materials and Methods: Medical records of patients with intussusception treated by AE reduction at Queen Sirikit National Institute of Child Health from January 2009 to December 2013 were reviewed. The study was stressed on the success and failure rates of AE reduction of intussusception including risk factors affecting outcome of AE reduction. The statistical differences were analyzed by the Chi-square test and relative risk (RR) with significance at p-value less than 0.05.

Results: Two hundreds and sixty-eight patients (173 males and 95 females) with 284 episodes of intussusception were treated by AE reduction. Of the total 284 attempted AE reduction, 196 (69.0%) were successful, while 88 (31.0%) were failure. The significant risk factors of failure AE reduction included body temperature over 37.8 $^{\circ}$C (RR = 3.62, p <0 .001), abdominal distension (RR = 2.23, p = 0.004), rectal bleeding (RR = 2.34, p = 0.003), lethargy (RR = 2.68, p = 0.001), palpable abdominal mass (RR = 2.72, p < 0.001), palpable rectal mass (RR = 19.93, p < 0.001), radiological imagings of complete intestinal obstruction (RR = 1.39, p = 0.001), presence of soft tissue mass in abdominal films (RR = 1.39, p< 0.001), and intussusceptum at the sigmoid and rectum (RR = 3.25, p < 0.001). The complication rate was increased in patients with failure AE reduction (RR = 25.55, p < 0.001).

Conclusions: Many factors from clinical presentations and radiological findings could be used to predict the outcome of AE reduction in childhood intussusception. Although these risk factors predicted poor outcome, AE reduction should be done in every case unless no contraindication.

THE ACCURACY OF "SILK GLOVE SIGN" COMPARED WITH "ULTRASONOGRAPHY" IN THE DIAGNOSIS OF INGUINAL HERNIA IN CHILDREN: SINGLE CENTER, PRELIMINARY RESEARCH

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Background & Purpose: History taking and physical examination (silk glove sign) were the useful steps to diagnose inguinal hernia in children. But "silk glove sign" was varied in accuracy due to physician's experience. Nowadays, ultrasound examination also plays a role in the diagnosis of inguinal hernia also. Therefore, the purpose of our study was to compare the accuracy between silk glove sign and ultrasound examination.

Patients and Methods: Thirty six patients (26 unilateral, 10 bilateral) with clinically diagnosed inguinal hernia were included into double-blind trial. Twenty five boys and 11 girls, whose mean age was 25.3 months. Silk glove sign was performed at both groins followed by ultrasonography of both groins. The author did not know which was the affected groin. Subsequently herniotomy was performed in the diagnosed groin only. The result of ultrasonography was then compared with silk glove sign.

Results: The sensitivity of SGS was 89.6% and specificity was 66.7%. The sensitivity of ultrasonography was 95.8% and specificity was 66.7%. Total accuracy of silk glove sign was 88.2% and the accuracy of ultrasound was 94.1%. Mean diameter of hernia sac from ultrasound after compressed at the abdomen was 2.7 mm. Mean diameter of

hernial sac from exploration was 3.7 mm. The important sign that suggested hernial sac from ultrasound was that the sac became wider when we applied positive pressure on the abdomen.

Conclusions: Ultrasonography of the groin was a useful technique in detecting of inguinal hernia. It is non-invasive and has a good accuracy.

RESULTS OF THE TREATMENT OF HIRSCHSPRUNG'S DISEASE: COMPARISON BETWEEN TRANSABDOMINAL AND TRANSANAL PULL-THROUGH OPERATIONS

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Background: Transabdominal pull-through operation has been established as the definitive treatment of Hirschsprung's disease (HD) since 1948. One-stage transanal pull-through procedure is the latest evolution in the management of HD.

Objective: The aim of this study was to review results of the treatment of HD by comparison between transabdomial and transanal pull-through operations.

Materials and Methods: Medical records of patients with HD definitely treated between January 2007 and December 2012 at Queen Sirikit National Institute of Child Health were retrospectively reviewed. Patients who underwent transabdominal and transanal pull-through operations were categorized into group A and group B, respectively. Results of the two groups were compared using the Chi-square test and a p-value less than 0.05 was considered significant.

Results: Of the 145 patients with HD, 87 (60%) were definitely treated by transbdominal pull-through operation (group A) and 58 (40%) received transanal pull-through treatment (group B). Age at operation ranged from 1.6 months to 12.7 years in group A and 21 days to 5.6 years in group B. One year after operation, normal defecation and continence were noted 67% in group A and 85% in group B ($p = 0.041$). Constipation was more common in group A than in group B (13% vs. 2%; $p = 0.028$). Anastomotic leakage (3%) and adhesive small bowel obstruction (3%) occurred in group A, but was not found in group B. Only anastomotic stricture which required anal dilatation was more common in group B than in group A, but not statistically significant (9% vs. 4%; $p = 0.267$). The incidences of postoperative enterocolitis were not different between group A (20%) and group B (21%). There was no immediate postoperative mortality in both groups.

Conclusions: Operative outcomes from the present study revealed that transanal pull-through operation was better than transabdominal procedure in normal defecation, low incidence of constipation, avoidance of anastomotic leakage and postoperative small bowel obstruction. The incidences of postoperative enterocolitis were not different between the two techniques.

LAPAROSCOPIC DUODENODUODENOSTOMY FOR DUODENAL ATRESIA: A CASE REPORT

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Background: As the benefits of the laparoscopic approach for children are readily recognized today. Laparoscopy is utilized for many common surgical conditions, such as appendectomy, cholecystectomy, fundoplication or for relatively less common problems, such as excision of choledochal cyst, high imperforate anus repair. However, the reports of laparoscopic approach in newborn are still limited in Thailand.

Purpose: To report a first case successfully performed in QSNICH with the laparoscopic duodenoduodenostomy for duodenal atresia.

Methods: A 38-week male infant was diagnosed with duodenal atresia with meconium aspiration syndrome and congenital pneumonia. After five days, the symtomps of pneumonia improved and he was extubated. He was operated on day 9 of life. His weight was 2,765 gm. Three 5 mm. ports and 3 mm. port were used for the procedure. Duodenodenostomy was performed using diamond shaped (Kimura's) technique.

Results: The operative time was 4 hours 50 minutes. There was no intraoperative complication. A nasogastric tube was removed on the post-op day 6. He was discharged after full feeding on the post-op day 17. He was doing well during a 4-month follow-up period with the weight of 6.1 kg.

Conclusion: Laparoscopic approach for duodenal atresia can be performed safely with great cosmetic results and a good short-term outcome.

PLASTIC & RECONSTRUCTIVE SURGERY

SURGICAL TREATMENT FOR HEMIFACIAL MICROSOMIA AFTER GROWTH SPURT

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Purpose: Hemifacial microsomia is a disease entity with hypoplastic development on one side of face resulting in prominent facial deformity. The treatment timing and method were controversial, especially during the growing period. However, the goal of treatment in the adulthood should focus on correcting dental malocclusion and facial asymmetry. This presentation reports our treatment experience.

Methods: Patients in this study received surgical treatment with lip repair for lateral facial cleft, excision of facial skin tags, mandibular distraction for severe deficiency, or conservative management without surgical intervention during the growing period. Treatment protocol for adult patients with hemifacial microsomia included stage I with orthognathic surgery and contouring surgery, and stage II with fat injection to the hypoplastic side for volume replacement. Each patient received individual consideration and possible modified treatment plan. Computer assisted orthognathic surgery has been applied in recent years.

Results: Satisfactory outcome was obtained after the two stages of surgical treatment. For minor deformity such as Pruzansky type I patients, a single stage of surgical intervention might obtain good results without further volume replacement surgery. For severe cases such as type III cases, a prior rib bone grafting was required, or this procedure could be included in the first stage of orthognathic surgery. Tissue volume reduction in the contralateral side during the first stage helped to increase facial symmetry. Computer assisted surgical simulation and navigation was helpful for planning and execution of the operation, as well as to improve treatment outcome.

Conclusion: The treatment protocol of two stages surgical intervention provided satisfactory results for adult patients with hemifacial microsomia. Computer assisted orthognathic surgery helps to improve treatment outcome.

A NOVEL DYNAMIC PULSATILE PLACENTA MODEL FOR MICROSURGERY TRAINING USING RAMA MICRO PUMP: RAMADPP MODEL

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Background: Microsurgery skill lab plays an important role in microsurgery training program, thus various kinds of models have been used. A model that is realistic, reliable, inexpensive and easy to obtain is needed.

Method: We developed a new model "Dynamic pulsatile placenta model (RamaDPP model)". The model was developed using fresh placenta connected to a newly invented 12-volt direct current water pump (Rama Micro Pump) at the umbilical artery. The model was tested and evaluated by two groups of users (Group1: plastic surgery resident, Group 2: plastic surgeon) using a questionnaire with numeric satisfaction scales (0-10).

Results: RamaDPP model was more realistic than the conventional placenta model in terms of patency test (mean score 8.57 ± 0.79, 5.57 ± 1.27 $p = 0.016$ in group1 and 9.20 ± 1.09, 2.60 ± 1.95 $p = 0.043$ in group2) and setting feeling (mean score 8.43 ± 0.79, 5.29 ± 1.38 $p = 0.017$ in group 1 and 8.80 ± 1.09, 3.60 ± 1.14 $p = 0.043$ in group 2), to a statistically significant degree.

Conclusion: We developed a new realistic model for microsurgery training. The dynamic pulsatile placenta model is realistic, reliable and easy to obtain for microsurgery training program with no life sacrifice is required.

COLD WATER FOR REDUCING PAIN IN NEGATIVE PRESSURE WOUND THERAPY DRESSING CHANGE: A RANDOMIZED CONTROLLED TRIAL

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Background: Negative pressure wound therapy (NPWT) is a technique using vacuum dressing to promote wound healing in complicated wound. The use of NPWT increased dramatically over the past 20 years due to its advantages such as stimulation of granulation tissue growth, reducing edema, and elimination of exudate. However, for many patients, the application and removal of the NPWT is source of procedural pain. Some techniques had been reported to reduce these pains such as administering topical lidocain or normal saline solution before the dressing change.

Objectives: The authors hypothesized that

administering cold water into the NPWT sponge would decrease pain during dressing changes.

Methods: A prospective randomized controlled trial was conducted on 27 patients who underwent 81 NPWT wound dressing changes (n= 81) at a single institution between October 2012 and September 2013. Each patient received three dressing changes. Cold water (5 °C), room temperature normal saline (26.89 °C), and nothing were randomized and administered in the NPWT tubing into the sponge 10 minutes before changing the dressing in each and every patient. Pain scores were assessed using a 0 to 10 numeric pain scale.

Results: Wound characteristics and patient's demographic data were recorded. Patient receiving cold water reported less pain than receiving room temperature normal saline during the dressing change (4 versus 5.67; p <0.03), and much less pain than receiving nothing before dressing change (4 versus 6.59; $p < 0.01$). There is no statistical significant difference in pain score between using the room temperature normal saline group and the control group that received nothing (5.67 versus 6.59; $p = 0.06$).

Conclusion: This study has shown that during the NPWT dressing change, cold water administered through the suction tubing had a better reduction in pain score than using room temperature normal saline and using nothing in the control group before the dressing change.

A NEW METHOD FOR BURN SURFACE AREA CALCULATION: A COMPARISON STUDY BETWEEN A NEW CALCULATING PROGRAM AND CONVENTIONAL METHODS

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Fluid resuscitation in burn patients has been established for more than 40 years. All of those formulas depend on total burn surface area (TBSA). Accuracy of the burn surface area calculation is crucial. Rule of Nine and Lund and Browder chart has been widely used in most of the burn centers. Anyway, those two methods were based on the anatomy of the western patients. Foreseeing this issue, the research team has come up with the new 3-dimenional computerized program called the "THAI 3D Burn" program to provide an easy, accurate and user-friendly program that can assist physicians in estimating the burn surface areas. Unlike other conventional methods, the THAI 3D Burn program has taken into account the real figures of Thai citizens, patients' ages, genders, heights, weights and their BMI into the calculation. From the validity or the accuracy tests, the THAI 3D Burn program produces the estimating results that are not different from the other 2 conventional methods, Rule of Nine and Lund and Browder. Anyway, major highlight of the THAI 3D Burn program is its relatively high reliability comparing to the other 2 methods. No matter who uses this program, experienced physicians or inexperienced general practitioners, the THAI 3D Burn program will consistently produce estimations close to one another for them. In other words, difference in burn surface area estimation between physicians can be minimized with the THAI 3D Burn program.

SKIN AND SOFT TISSUE

INCARCERATED MASSIVE PARAUMBILICAL HERNIA IN A MORBIDLY SUPER-SUPER-OBESE PATIENT

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Introduction: Abdominal wall hernias are more prevalent in the morbidly obese. Incarceration of external hernias is a relatively common process in adults and is associated with a high rate of complications and mortality. We present the case of a morbidly super-super-obese patient (body mass index of 39.45 kg/m^2) who underwent emergency surgery for an incarcerated paraumbilical hernia with segmental ileal resection, abdominoplasty and mesh hernia repair.

Case Presentation: A 60-year-old morbidly obese female presented to us with a massive paraumbilical hernia without features of obstruction of four years duration. She was a diagnosed patient with diabetes mellitus and hypertension for six year with satisfactory control. Initial plan of weight reduction with diet control, exercise failed On examination she was morbidly obese (BMI=39.45kg/m2). The abdominal examination revealed a lax abdomen

with huge paraumbilical hernia. Subsequently she underwent preoperative investigation to assess the fitness for surgery. She underwent paraumbilical herniotomy, segmental intestinal resection and abdominoplasty with mesh repair. During initial post-operative period she was given intensive care and recovery was uneventful.

Discussion: Paraumbilical hernia is one of the commonest surgical conditions affecting especially the female population. Surgical repair is the mainstay of treatment. As with any other surgical procedures, this is associated with possible complications. These include urinary retention, superficial wound hematoma, superficial wound infection, serous effusion, recurrence of hernia. Most of these complications are of mild to moderate degrees and can be treated by a conservative approach. Recent advances in different surgical techniques and equipment claim to have less complications but none are completely devoid of them.

TRANSPLANTATION

ELECTRONIC MEDICAL RECORDS (EMR) AIDING IN THE LOGISTICS OF ORGAN TRANSPLANT SURGERY

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Background: Due to scientific and technological advances in surgery organ transplants of hearts, livers, kidneys, lung, pancreas and eyes have increased over the past. But the challenge remains the procurement and matching of donors and recipients.

Objective: The objective of this study was to explore how Electronic Medical Records (EMR) can help to facilitate the logistics of the organ transplant surgery.

Methods: We analyzed the logistical issues surrounding organ donations and transplants in Thailand focusing on data from the Thai Red Cross Organ Donation Center as well as other sources such as Thai Transplantation Society.

Results: Over the past 21 years in Thai hospitals 142 intrathoracic organ transplantations including heart, heart-lung and lung transplantations were performed and 330 patients received livers from deceased donors. Twenty three (23) transplant centers implanted 4,202 kidneys of which 50% were from living related donors. Nowadays there are approximately 400 kidney transplants performed per year. The patient data is entered into the hospital information system (HIS) of the donor and the recipient, as well as a various organ donation databases.

Conclusion: Electronic Medical Records (EMR) can help to identify donors and recipients by interfacing the existing hospital information systems (HIS) and sharing real-time the EMR data.

TRAUMA, BURN, CRITICAL CARE

DISASTER AND MASS CASUALTY INCIDENT: PLANNING AND MANAGEMENT

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Drills for admitting mass casualties were developed in Israel over the last 30 years and each hospital is exercised every 2 years in various types of mass casualty incidents. Unannounced evacuations of large numbers of mock casualties, usually newly drafted military recruits, were brought within 1-3 hours to the entrance of the emergency department (ED). The hospital is expected to convert within minutes from its normal daily routine into a "mass casualty" management mode. The drill included phases of triage, initial management at the treatment sites (various temporary treatment sites should have been deployed to accommodate the masses that the ED could not provide space for), mobilization of the victims to appropriate evaluation facilities and, finally, transferring them to the entrance of the operating room (OR), intensive care unit (ICU) or hospital ward. Secondary distribution of victims is also tested, especially those requiring neurosurgery and other highly specialized medical facilities (burn units, specialized eye clinics, etc.). In the early 1990s, when terrorist activities became a real threat and increased the trauma burden in hospitals, it was realized that preparedness

protocols should be adjusted to different sizes of incidents. The new guidelines were required to provide new rational solutions for incidents of "limited" mass or multiple casualties. Guidelines that were theoretically sound for events with hundreds of casualties did not fit such a situation. Incidents of limited mass casualties with between 10 and 100 victims, including 2-10 who are severely injured, needed new guidelines and drills. As a result, the preparedness drills were modified and tiered to several levels:

Limited mass casualty incident (MCI) - Level I: Depending on the size of the hospital, this level will cover an incident with 10-20 casualties including 2-4 severely injured patients. The existing hospital staff will deal with this incident, using the standard facilities of the hospital, and calling only key personnel from their homes to assist.

Limited mass casualty incident (MCI) - Level II: Depending on the size of the hospital, this will cover an incident with 20-50 casualties (the full capacity of the ED) including 4-10 severely injured patients. This incident will be dealt by the existing staff reinforced by a limited number of surgical, anesthesia, critical care, and nursing staff using the standard on- call facilities of the hospital.

Large MCI: The number of total victims brought to the hospital outnumbers the full capacity of the ED gurneys and mandates opening temporary treatment sites within the hospital. To manage this kind of incident, the entire staff of the hospital is usually needed to mobilize all the evaluation and treatment capabilities of the institution.

Hospital Management: The initial assessment and management of multiple trauma victims arriving within a short time to an ED is a complicated task even for the very experienced. Moreover, in contrast to scheduled exercises and drills where all the staff and facilities are ready for the event, a real incident is always unexpected.

The methods and means of surgical care in these situations are not well defined. Effective triage is a paramount goal and a key to optimizing care, although less so for the Level I limited MCI, and more important for the Level II limited MCI and large events. One of the triage officers at the ambulance unloading point should be a surgeon experienced in triaging victims to urgent versus non-urgent casualties. This differs from our previous practice of classifying casualties as mild, moderate, or severely injured. Also, the decision to designate victims to the so-called expectant group, or the unsalvageable, is very difficult in real life, if possible at all. This status can be decided only after evaluation in the resuscitation bay unless the victim succumbs within minutes of arrival.

In a mass casualty scenario we should perhaps introduce a new term: "minimal acceptable care" even though it is alien to our usual striving for excellence. This care would be applied on a temporary basis only, until the mass casualty situation subsides. Within this concept we would concentrate our efforts on a maximal number of salvageable patients. Conservation of critical hospital resources is a key consideration because the eventual number of casualties is unknown. There should be two phases of surgical care:

The initial phase, during which there is an ongoing flow of casualties, when chaos is maximal and the eventual number of victims is still unknown. It is during this phase that we would practice "minimal acceptable care" in a maximum number of patients.

The definitive phase, when no new casualties are arriving, things are under control and optimal surgical care can be provided.

BLAST INJURY: THE ISRAELI EXPERIENCE

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Most of our experience with blast injuries stems from the difficult period of major urban suicide bombing (between 1994 and 2008). These incidents resulted in unusually severe and challenging patterns of injury, where up to one third of casualties admitted to hospital had an ISS higher than 15. This rate was three times higher than that seen in the typical civilian trauma practice. The overall number of casualties and rate of immediate on-scene mortality are determined by the size of the explosive charge, structural failure of the building, and indoor detonation, which results in a greatly amplified blast wave. Suicide bombers are particularly devastating weapons of urban terror because they specifically target crowded indoors locations or large open space gatherings to maximize the effect of the explosion.

Blast trauma is viewed by trauma surgeons as a multidimensional injury because it often combines blast, penetrating, blunt, and burn mechanisms in the same casualty. The results are injury patterns of higher severity and complexity and a greater burden on the trauma service of the hospital.

Primary Blast Injury: The most common clinical sign of blast injury is eardrum perforation. These perforations usually heal spontaneously but may result in various degrees of hearing loss in up to 25% of patients. Eardrum perforation is a useful marker of the proximity of the patient to the detonation but is not a reliable predictor of lung injury. The blast wave from the detonation disrupts the alveolar-capillary interface of the lung, resulting in a spectrum of

blast lung injury ranging in severity from mild pulmonary contusion with intra-alveolar hemorrhage to severe and rapidly evolving acute respiratory distress syndrome (ARDS). Severe blast lung injury is uncommon, occurring in only 5% to 8% of live casualties in urban bombings, but its severity is the key determinant of mortality among early survivors. Mild blast lung injury presents with localized infiltrates on chest x-ray. It is managed similarly to a mild lung contusion and has a good outcome. Patients with severe lung injury typically present with rapidly worsening hypoxia, develop bilateral diffuse infiltrates, and require early aggressive respiratory support along the lines of managing ARDS. Pneumothorax should be actively sought and immediately decompressed in these patients. Mortality is in excess of 60% in these severe cases.

Intestinal blast trauma varies in severity from subserosal hemorrhage to full-thickness perforation. Clinically important bowel blast injury is rare in urban bombings, occurring in less than 2% of live casualties, but is the most common form of trauma in an immersion blast from an underwater explosion.

Secondary Blast Injury: Penetrating trauma from fragments of the bomb casing or from metal projectiles added to an improvised explosive device (IED) can cause a wide array of injuries, ranging from superficial skin lacerations to lethal visceral wounds. From the perspective of the hospital trauma service, the key consideration is the need for extensive imaging to locate penetrating fragments and define their trajectories because a physical examination is a poor predictor of the depth of penetration. The most expedient method is to use a helical CT scan to locate multiple projectiles rapidly and delineate their trajectories. However, this makes the CT scanner a bottleneck to patient flow and requires setting priorities and rationing access to the scanner during the initial phase of the hospital response. Whereas classic management principles for traumatic wounds have called for debridement of each wound and removal of embedded foreign bodies, this is often not a realistic option in casualties with multiple (sometimes dozens) of asymptomatic penetrating wounds. A common sense approach is to address only symptomatic or infected projectiles and those in problematic locations (e.g., intra-articular).

Tertiary and Quaternary Blast Injuries: When casualties are propelled against stationary objects by the explosion, the results are standard patterns of blunt trauma. However, these tertiary blast injuries are typically combined with other types of trauma caused by the blast. This complicates the clinical picture and presents unusual dilemmas in terms of treatment priorities and resource allocation. Quaternary blast trauma refers mostly to burns and crush injuries. Superficial flash burns, typically involving large body areas, are caused by the explosion itself, and are markers of proximity to the blast. They are common among casualties found dead at the scene and have also been shown to be predictors of blast lung injury. The ignition of flammable materials and clothes causes deep burns of variable extent, sometimes in conjunction with inhalation injury.

HEMOSTASIS IN TRAUMA

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Hemorrhage remains a major cause of potentially preventable deaths. Traumatic injuries with devastating bleeding requiring massive transfusion are associated with coagulopathy secondary to tissue injury, hypoperfusion, dilution and consumption of clotting factors and platelets. The resulting coagulopathy, together with hypothermia and acidosis, forms well known "lethal" triad. In the last two decades there has been a major paradigm shift regarding optimal resuscitation of bleeding trauma patients before definitive hemorrhage control is achieved. We now believe that aggressive fluid resuscitation increases blood pressure, reverses vasoconstriction, dislodges early formed thrombus and causes dilutional coagulopathy and metabolic acidosis that cause further blood loss. Accordingly previous guidelines recommending that fresh frozen plasma (FFP) and platelets (PLT) should be administered only when a whole blood volume or more has been substituted is now considered obsolete. Instead, limiting fluid resuscitation and applying the concept of permissive hypotension with the goal of achieving a palpable radial pulse in the bleeding trauma patient, has been advocated. The only exception is the combined head and hypotensive trauma patient.

Current transfusion guidelines advocate the concept of hemostatic resuscitation, supplementing large transfusions of red blood cells with FFP and PLT to critically injured patients. The rationale for balanced administration of blood products is that it mimics the composition of circulating blood and, hence, transfusion of RBC, FFP and PLT in a unit-for-unit ratio (1:1:1) is likely to both prevent and treat coagulopathy due to massive hemorrhage.

The dilution of coagulation factors and platelets is an important cause of coagulopathy in massively transfused trauma patients. The Advanced Trauma Life Support guideline that recommends aggressive crystalloid resuscitation is losing its scientific basis. This promotes dilution of blood cells and coagulation factors, as well as

acidosis, interstitial edema, impairment of the microcirculation and, hence, compromised oxygenation. Furthermore, synthetic colloid resuscitation fluids influence coagulation competence more profoundly than crystalloids.

Early "endogenous" coagulopathy in trauma patients, not attributed to dilution and hypothermia with shock and hypo-perfusion, was suggested by Brohi and co-workers as a key driver of acute traumatic coagulopathy through widespread activation of the anticoagulant and fibrinolytic pathways. Tissue injury, secondary to trauma, induce immediate activation of the coagulation system through up-regulation of tissue factor expression and extensive thrombin generation, as part of the generalized "genomic storm".

Apart from the new concepts of combating trauma coagulopathy and blood loss by revising the philosophy of fluid and component resuscitation, we still widely use several conventional hemostatic techniques to minimize blood loss. Mechanical means include manual pressure, ligature and the application of a tourniquet. However, conventional methods are less effective in controlling bleeding from complex injuries and where access to the area of bleeding is difficult. Topical hemostatic agents may be particularly useful in such situations. Several topical hemostatic agents are currently available in a range of configurations. They exert their effect in a variety of ways. Some improve primary hemostasis, whereas others stimulate fibrin formation or inhibit fibrinolysis. Some are a preparation of a pro-coagulant substance in combination with a vehicle such as collagen matrix. Others use a matrix to provide a template for the endogenous coagulation cascade to achieve hemostasis. Factors affecting the selection of an appropriate topical hemostat include the type of injury, cost, severity of bleeding, and the personal experience and preference of the surgeons.

In conclusion, our understanding of the complex metabolic and physiologic changes, that develop during the initial phase of exsanguination, have brought about a major change in our management of the bleeding trauma patient. In the past, the only means to reduce bleeding was aggressive surgical control. Very little consideration was given to the developing coagulopathy and inflammatory storm. Today, we try to achieve hemostatic fluid resuscitation, use novel topical hemostatics and search for new agents that will blunt the harmful effects of the inflammatory process. In the future, we may find new topical hemostatics and other means that will arrest bleeding in the pre-hospital phase. Fluid resuscitation will be tailored to the specific needs of the individual and the inflammatory and immunological chaos will be solved by host response targeted new drug treatments.

DEVELOPMENT AND REVOLUTION OF BURN CARE AND TREATMENT IN THAILAND FOR THE PAST 40 YEARS (1970 - 2010)

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Introduction: Mortality rate of severe burns in the ancient time was extremely high reaching over 50%. It subsequently declined following the recognition and utilization of some topical agents later on with the collaboration of related professionals' basic and clinical research works. The mortality rate varied depending on the regions of the countries. For example, the mortality rate related to fire and burn injuries in South-east Asian countries was 53%, while only 4% and 9% in America and European countries respectively.

Materials, Methods and Results: Prior to 1960 doctors did not know how to treat severe burns due to the lack of knowledge in pathophysiologic changes in burns. In mid 1960ûs they discovered and recognized that silver compounds in the form of silver nitrate solution and silver sulfadiazine were able to kill some germs. Sixty percent of burn patients who were not treated with these topical agents died from wound sepsis while only 28% on treatment with topical agents died from persistent wound sepsis. The period 1970-1990 was called the period of rapid progress of burn care due to the collaboration between plastic surgeons, general surgeons, dietitians and researchers who had worked on both basic and clinical research studies in many aspects of body changes after burn injury, particularly pathophysiologic changes in burns. For management of severe burns, after primary survey immediate treatment of ABC systems was performed and if associated with smoke inhalation, in addition to giving high levels of oxygen, early intubation with endotracheal tube should be considered. Also for circumferential deep dermal or full thickness burn of trunk or torso at the chest and abdominal wall or at extremities, early decompression by Escharotomy should be performed. For patients who sustained high tension electric injury from a current passing through the limbs both escharotomy and fasciotomy should be performed early. At the time when I first started treating the burn patients there was still no burn unit in Thailand. Patients who required hospitalization were isolated from other trauma patients and put in a separate room. In 1978 the first burn unit in Thailand was opened at Siriraj Hospital. It could accommodate 12 to 15 burn patients. As Thailand was one of the developing countries in the Asian region and

our hospitals were not well equipped as the US hospitals, we had to innovate the essential topical medications for our patients such as the silver sulfadiazine cream, a topical agent for the burn wounds. Later on we switched to the silver zinc sulfadiazine cream which has the same antibacterial activity. The topical agents were prepared by our pharmacist. I had the opportunity to work and train with Professor William Monafo who was the pioneer in the use of hypertonic saline solution for initial fluid resuscitation in severe burn patients. However, our preparation was a little lower in sodium containing only 200mEq/L. and was to be given during the first 8 hours of burn injury followed by Ringer's lactate for the next 16 hours. I was the first person in Thailand who introduced the use of amnion to treat burn wounds as a biologic dressing and also created a medical tulle called Siriraj Medical Tulle for general surgical wounds and also the donor site skin grafting which was very efficacious and cost effective. In addition, we had prepared special formulas of diets for our burn and trauma patients. One was the blenderize diet composing of 8 eggs per one liter which was very good for burn and trauma patients and only 2 liters was required daily for adult burns patients, another was a special diet formula which promoted and supported patients' immunity. It was called the immune enhancing diet and was very efficacious for patients with severe burn, severe trauma and also for critically ill patients in the ICU. All research studies were clinically conducted before being allowed to use widely. Early eschar excision by tangential or deep excision by using free hand dermatome either belonging to Gulion or Watson skin graft knives and some small deep burn could be early performed with immediate skin grafting for the full thickness burn less than 20% of total burn surface area (TBSA) or an excision with immediate skin coverage for less than 20% of excised area for each operation in a big burn patient could be done. Skin substitute (Integra) was infrequently used. We had treated severe burn patients averaging 100 cases yearly with mortality rate of 10 %, plus or minus 5%. Using nano crystalline silver especially the Acticoat proved very satisfactory. Also the new eschar removal device using high water pressure called Versajet Hydrosurgery was a very good device and enabled us to remove eschar early with less trauma and less bleeding. In 2009 a new well-equipped burn unit was established. Taking care of burn patients seemed then very feasible for our burn team with less infectious complications and less mortality rate close to 5%.

Conclusion: After completing my residency training in General Surgery (1970), Fellowship in Vascular Surgery and Research (1971) and Fellowship in Burns & Surgery (1972) in the United States, I returned to Thailand in 1972 and started working with trauma and burn patients. My treatment styles of burn and trauma might be a little different from the traditional method applied by a group of plastic surgeons who had been taking care of the burn patients before me. I attempted to educate, encourage and promote our resident surgeons and medical students as well as surgeons working in the provincial hospitals to get more advanced knowledge and skills to keep up with the development of burn and trauma care. For them to achieve the same standards of burn treatment and trauma patient care I helped establish the Thai Society of Trauma Injury in 1973 following by the Society of Parenteral and Enteral Nutrition of Thailand (SPENT) in 1975. Then in 1989 I founded the Thai Society of Burn Injury (TSBI) and the Parenteral and Enteral Nutrition Society of Asia (PENSA) in 1995 and finally the Thai Society of Wound Healing (TSWH) in 2005. Due to the similarity of the TSBI and the TSWH, with almost the same group of surgical caregivers, I have put forward my suggestion to combine the TSBI into the TSWH, to decrease the time spent and reduce the expenses of pharmaceutical companies as well as to get more unity between related professionals. It remains our goal that, with appropriate care from related professionals and support from pharmacists and nutritionists, patients will be able to recover and return to their normal lives again.

LOW PRESSURE SUPPORT VERSUS T-PIECE METHOD FOR DISCONTINUATION FROM MECHANICAL VENTILATOR

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Background: Weaning off ventilator was impact factor in critical patients, low pressure support and T-piece method were two most common methods in weaning off ventilator in critical care units. Both outcomes are still controversy and depend on expertness of doctor in each institute. Previous fashion for weaning off ventilator was the use of low PSV then switched to T-piece method to wean off ventilator. We conducted prospective randomized controlled trial to demonstrate and compare outcome of both methods for weaning off ventilator.

Objective: The purpose of this research was to compare the outcome of discontinuation of mechanical ventilation (weaning off ventilator), between extubation after using low pressure support ventilation and T-piece ventilation method.

Patients and Methods: Randomized clinical trial and prospective study between June 2011 and November 2013 were performed. Five hundred and twenty patients who admitted in Sub-ICU and ICU of general surgery unit that uses intubation with ventilator and ready for ventilator weaning were randomized to low pressure support and T-piece mode. Primary endpoints were ventilator associated pneumonia (VAP) rate and reintubation rate in 48 hours. Secondary endpoints were length of Sub-ICU and ICU stay and length of hospital stay.

Results: Rate of re-intubation, infection of the respiratory system and length of intensive care unit were not different in two groups. Moreover hospital mortality was not difference in pressure support and T-piece method. It was remarkable that T-piece required less weaning time for weaning ventilator than pressure support method.

Conclusion: This study shows non-inferiority in outcome and morbidity as well as mortality rate of patients with weaning off ventilator mode both T-piece and low pressure support group. Therefore when patient can tolerate to breathing with low PSV mode, weaning off ventilator under PSV mode can be performed without switching to T-piece method as in previous fashion to decrease weaning time and reduce cost of instruments.

SITES FOR NEEDLE DECOMPRESSION OF TENSION PNEUMOTHORAX: LET THERE BE LIGHT

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Purpose: As per American College of Surgeons Committee's recommendation in Advanced Trauma Life Support, ninth edition, needle decompression in tension pneumothorax is suggested to be performed in the second intercostal space (ICS) in the mid-clavicular line (MCL). But clinical data showed that failure rate of needle decompression in this position is quite high and from recent data by Inaba and colleagues found that needle thoracostomy decompression in this position would be expected to fail in 42.5% of cases. Our study aimed to compare the utility of needle decompression and potential cardiovascular complications by radiologic evaluation of chest wall thickness between the second ICS in the MCL and the fifth ICS in the mid axillary line (MAL).

Methodology: We included a total 132 trauma patients from 2011 to 2013 who had chest CT performed into the study. We measured the thickness of the chest wall and the distance from skin to great vessels and skin to heart at 4 points, the second ICS in the MCL and the fifth ICS in the MAL both sides. Paired *t*-test or Wilcoxon signed rank were used for analysis.

Results: The mean of difference in chest wall thickness between the second ICS at the MCL and the fifth ICS at the MAL were 9 mm and 7 mm, on the right and the left respectively. The second ICS at the MCL was thinner than the fifth ICS at the MAL both sides. There was a stepwise increase in chest wall thickness across all BMI groups. The percentage of patients with chest wall thickness greater than the standard 5-cm decompression needle was 6.06 at the second ICS in the MCL and 31.82 at the fifth ICS in the MAL.

Conclusion: Chest wall thickness at the second ICS in the MCL was thinner than at the fifth ICS at the MAL based on radiologic measurement. This site should be preferred location for needle thoracostomy decompression as the standard recommendation but the potential cardiovascular complications should be concerned.

BLUNT AORTIC TRAUMATIC INJURY: OUTCOME OF OPEN REPAIR VERSUS ENDOVASCULAR REPAIR FROM 10 YEARS EXPERIENCE OF UNIVERSITY HOSPITAL

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Background: Traumatic aortic injury (TAI) remains a leading cause of death after blunt force. Before the endovascular era, the only treatment option was open repair, burdened by high morbidity and significant mortality. Thoracic endovascular aortic repair (TEVAR) offers a less invasive alternative to open chest surgery. New reliable and accurate stent grafts have widened the endovascular treatment options. The advantages of this method include avoiding a thoracotomy or aorta cross-clamping and their associated complications.

Objective: The study objective was to present our 10 years of experience and compare the outcome between open and endovascular repair of traumatic aortic injury.

Material and Methods: Thirty five patients (mean age 38.5 years) with an acute traumatic aortic injury were referred to King Chulalongkorn Memorial Hospital between January 2003 and December 2013. Sixteen patients underwent surgical repair. Since 2008, an endovascular

approach was deliberately chosen; 19 patients underwent endovascular repair. The two groups were statistically comparable. The data of outcome included number of PRC usage, day in ICU, complication and death rate were compared between the two groups.

Results: From 35 patients with traumatic aortic injury, 16 patients underwent open repair, 11 cases with clamp and sew technique and 5 cases were repair under cardiopulmonary bypass. Nineteen patients underwent thoracic endovascular aortic repair (TEVAR). Average usage of PRC was higher in open repair group (8.5 unit and 3 unit in average). Open repair cases spent longer time in ICU (mean 6.5 days and 3 days). There were four death cases in open repair group and one death case in TEVAR group.

Conclusion: Endovascular repair had less morbidity and mortality rate than open repair.

RE-EXPANSION PULMONARY SYNDROME AFTER HEMOTHORAX: A CASE REPORT OF CONTRALATERAL PULMONARY EDEMA

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Background: Re-expansion pulmonary syndrome is a rare complication that occurs after re-expansion of a collapsing lung. Most of the occurrences happen following drainage of a pleural effusion or pneumothorax. Contralateral re-expansion pulmonary syndrome is very rare and the incidence of re-expansion pulmonary syndrome after hemothorax is uncommon.

Case report: A 38-year-old man fell from the back of an elephant. The patient presented at the emergency department with right maxilla fracture and chest tightness. His initial chest radiograph showed 8th and 9th right rib fractures and widening of the mediastinum. A computed tomography (CT) was done and the results revealed occulted left pneumothorax, minimal lung contusion and minimal hemothorax. The patient was admitted for close observation and was sent to the operating room for open reduction and irrigation of the maxilla.

On the sixth day of the admission, the patient developed dyspnea and on the physical examination dullness on percussion was found. The chest radiograph showed a large homogenous opacity at the right hemithorax. The initial diagnosis was right hemothorax or right clotted hemothorax. The patient was sent for a CT scan and right pleural fluid with passive atelectasis was found. A percutaneous catheter drainage (PCD) tube was inserted by an interventionist. Initially, the fluid output was 1.1 liters of serosanguinous fluid. Then the PCD was clamped due to awareness of re-expansion pulmonary syndrome. Five hours later, he complained of right chest tightness, so 650 ml of fluid during 2 hours was allowed to drain. After that the patient developed progressive dyspnea. The physical examination revealed crepitation at the left lung. A repeat chest radiography found good expansion of the right lung and new patchy infiltration at the left lung which was compatible with unilateral pulmonary edema. The patient was put on high flow oxygen and 20mg of flurosemide was administrated. After eight hours of close monitoring, chest radiography was done again. The infiltration at this left lung had disappeared.

Conclusion: Re-expansion pulmonary syndrome is a rare complication but it can be prevented by a slow release of the effusion and allowing the lungs to re-expand slowly.

UPPER GASTROINTESTINAL SURGERY

GASTRIC MUCOSAL MORPHOLOGY AND CORRELATION WITH HISTOPATHOLOGICAL SEVERITY OF HELICOBACTER PYLORI RELATED GASTRITIS IN THE GASTRIC CORPUS USING CONVENTIONAL NARRO W-BAND IMAGING (C-NBI) ENDOSCOPY

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Background and Aim: To identify the gastric mucosal morphology and histopathological severity of Helicobacter pylori related gastritis in the gastric corpus using Conventional NBI (C-NBI) endoscopy.

Methods: A total of 200 consecutive patients underwent upper gastrointestinal endoscopy for symptoms of dyspepsia. The endoscopist classified the Conventional NBI (C-NBI) endoscopic findings into five morphologies. The gastric mucosal morphology of the gastric corpuses were categorized into 5 types. Type 1: regular arrangement of collecting venules, type 2: cone-shaped gastric pits, type 3: rod-shaped gastric pits with prominent sulci, type 4: ground glass-like morphology and type 5: dark brown patches with bluish margin and irregular border. Biopsies of all of the cases were evaluated by five pathologists

according to the Sydney classification, including chronic inflammation, atrophy, intestinal metaplasia, and activity as well as the presence of *Helicobacter pylori*.

Results: Type 1 and type 2 mucosal morphology were statistically significant in predicting Helicobacter pylori negative status as compared with other mucosal types (58/60, $P < 0.01$). Type 3, type 4 and type 5 gastric mucosal morphologies were statistically significant in predicting Helicobacter pylori positive status as compared with other mucosal types (132/140, $P < 0.01$). Furthermore, the sensitivity, specificity, positive and negative predictive values, likelihood ratio positive (LR+) and likelihood ratio negative (LR-) of type 3, type 4 and type 5 morphologies for predicting Helicobacter pylori positive were 94.28%,96.66%, 98.50%, 87.87%,97.53% and 5% respectively with good correlation with inflammation grading according to the Sydney classification ($p < 0.01$).

Conclusion: Our study suggests that gastric mucosal morphology in the Helicobacter pylori infected gastric mucosa can be reliably identified using Conventional Narrow band imaging (C-NBI) endoscopy in the gastric corpus with good correlation with inflammation grading.

RESECTION OF GASTRIC DUPLICATION WITH PYLORIC-PRESERVING TECHNIQUE: TWO-CASE REPORT AND LITERATURE REVIEW

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Intestinal duplication cyst in children, one of a rare disease, could be present along gastrointestinal tract. Only few reports mentioned pyloric duplication with atypical presentations. Complete resection of the cyst is worldwide accepted as a standard treatment. Due to sharing of the common wall, most surgeons prefer en bloc resection of main pyloric canal with duplication cyst rather than resection of the cyst only. Resection of pyloric canal might create adverse event in long term, for example, dumping syndrome, bile reflux disorder, marginal ulcer, gastritis etc. Hereby we presented the surgical technique to resect duplication cyst without interfering the pyloric canal in two newborns. Submucosal resection of the cyst and reconstruction of the pylorus were performed. The symptoms disappeared without any adverse event related to pyloric dysfunction. They have a good nutritional status at 8 and 16 months after the operation.

Conclusion: Resection of pyloric duplication with pyloric preserved technique is safe and feasible. Patients catch up with normal growth development without any adverse event related to pyloric dysfunction.

FACTORS PREDICTING OUTCOME OF BOUGIENAGE DILATATION IN COMPLEX CORROSIVE ESOPHAGEAL STRICTURES

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Background: Less was known of the factors predicting outcome of bougienage dilatation in complex corrosive esophageal strictures.

Objective: To determine the factors predicting outcome of bougienage dilation in complex corrosive esophageal strictures.

Materials & Methods: We reviewed the medical records of all patients who developed corrosive esophageal stricture (between 2007 and 2013).

Results: There were 34 patients diagnosed with corrosive esophageal stricture (100% suicidal intent). All patients received bougienage dilatation with Savary Gillard dilators. Because of previous corrosive related operations (total gastrectomy), history of post-dilatation esophageal perforation and complete esophageal luminal strictures, 16 patients underwent esophageal replacement procedures. Eighteen patients continued dilatation with conversion to esophageal replacement procedure in 10 patients. Perforation occurred in 3 sessions (4.2%) from 72 sessions. We found that conversion groups had more numbers of pharyngeal involvement, high level of stricture, long length of stricture (> 10 cm), more frequency of dilatation (> 6 times per year) and more sessions of stricture tightness (< 12 Fr) ($p = 0.043$, $p < 0.01$, $p < 0.01$, $p < 0.01$ and $p = 0.046$ respectively). We reported failure of dilatation in 76.5% and successful dilatation in 27.8% at a mean follow-up 19.4 months.

Conclusion: Corrosive esophageal strictures with suicidal intent are usually complex. Bougienage dilatation is only moderately effective in terms of relieving dysphagia symptom. Conversion to esophageal replacement procedures is failure of treatment in corrosive esophageal stricture. Factors predicting outcome of bougienage dilatation in complex corrosive esophageal strictures

including pharyngeal involvement, level of stricture, length of stricture, frequency of dilatation and stricture tightness.

TEN-YEAR OUTCOME OF TREATMENT IN ACHALASIA: PROSPECTIVE STUDY OF SURGICAL MYOTOMY AND PNEUMATIC DILATATION, SINGLE INSTITUTE IN THAILAND

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Introduction: Less was known regarding the effectiveness of surgical myotomy and pneumatic dilatation in the treatment of achalasia.

Objective: To compare the treatment outcome of surgical myotomy and pneumatic dilatation.

Methods: Medical records of 85 patients diagnosed as achalasia (2002-2012) were reviewed. Only patients underwent surgical myotomy or pneumatic dilatation were included. Patients lost to follow-up or had treatment other than surgical myotomy or pneumatic dilatation were excluded from the study. Standardized questionnaire of 4 symptoms were prospectively collected before and after treatment (August 2013). These symptoms included dysphagia, regurgitation, chest pain and weight loss. Each symptom was scored range from 0 to 3 depending on symptom severity. Patients who had symptom score more than 2 or underwent second intervention were considered as unfavorable outcome.

Results: There were 46 patients fit to the criteria. Twenty three patients underwent pneumatic dilatation and 23 patients had surgical myotomy. There was no treatment mortality. Ten-year favorable outcome was 80% for surgical myotomy and 43% for single pneumatic dilatation (p = 0.001). If repeated pneumatic dilatations were not considered as unfavorable outcome in pneumatic dilatation and symptom scores after last treatment were analyzed, ten-year favorable outcome of pneumatic dilatation was comparable to that of surgical myotomy (75% vs 80%, p = 0.51).

Conclusion: Surgical myotomy is more effective than single pneumatic dilatation in term of ten-year outcome for treatment of achalasia. However, if repeated pneumatic dilatation are included, ten-year outcome is comparable to that of surgical myotomy.

LAPAROSCOPIC GASTRECTOMY D2 DISSECTION FOR ELDERLY PATIENT WITH POST PERFORATED GASTRIC CANCER

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Background: Many studies have shown laparoscopic gastrectomy to have better early postoperative outcomes including less pain, a shorter hospital stay, better preserved lung function and improved cosmesis compared to conventional open gastrectomy. The role of laparoscopic gastrectomy in locally advanced gastric cancer remains controversial, however in experience hands as surgeon proficient in both management of gastric cancer and advanced minimally invasive techniques, adequate lymphadenectomy is possible and oncologic outcome can be comparable to open surgery.

Objectives: To clarify the safety and efficacy of laparoscopic gastrectomy (LG) for advanced gastric cancer (AGC) even post laparotomy for perforated gastric cancer if provided by surgeon proficient in both management of gastric cancer and advanced minimally invasive techniques.

Materials & Methods: Case report of male patient 79 year old, ASA2, with hypertension, BMI 19.14, was referring to NCI Thai after 2 weeks of laparotomy and simple suture and biopsy for perforated antral gastric cancer. After investigations and nutritional improvement, two weeks later the patient underwent total laparoscopic distal gastrectomy.

Results: Laparoscopic adhesiolysis and total laparoscopic subtotal gastrectomy with D2 node dissection, Roux En Y gastrojejunostomy were performed. No immediate perioperative complication occurred. Hospital stay was 9 days post operation. Pathological report was anterior wall gastric cancer 5.7 × 3 × 3 cm, free proximal and distal margins, moderately diff. adenocarcinoma, invading into perigastric fat, all 28 lymph nodes were negative for metastases.

Conclusions: For complicated case such as post perforated locally advanced gastric cancer and elderly patient, role of laparoscopic surgery should not be considered as contraindication but should depend on the patient's condition and the surgeon's familiar techniques.

SAFETY AND EFFICACY OF LAPAROSCOPIC SURGERY FOR SMALL BOWEL OBSTRUCTION IN GASTRO-INTESTINAL CANCER PATIENTS POST DEFINITE CANCER SURGERY: NCI EXPERIENCE

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Background: Terrible problems after the completion of definite cancer therapy for intra-abdominal malignancy were recurrence symptoms such as abdominal pain, indigestion, nausea, vomiting, abdominal bloating and weight loss. The possible causes of these symptoms are partial or complete small bowel obstruction due to adhesion band and recurrent cancer disease. Usually unfit health status of patients and difficulty of surgical procedures (if re-operation) are the reasons for delayed surgical treatment and hospitalization with nasogastric tube decompression and parenteral fluid through the end of life. Aim of surgery is to take the chance of dealing with correctable lesions and give the patients the chance to go home and tolerate oral diet.

Objectives: To share our experience in dealing with recurrent gastrointestinal symptoms in patients with intra-abdominal cancer, post definite cancer therapy with surgery and adjuvant therapy. All the patients had preoperative workup and showed patterns of small bowel obstruction and underwent laparoscopic adhesiolysis and bypass.

Materials & Methods: Retrospective review of six cases was performed as follows:

1. 54-year-old male with esophageal cancer post minimal invasive esophagectomy
2. 45-year-old female with left colonic cancer post laparoscopic left colectomy
3. 56-year-old female with gastric cancer post laparoscopic gastrectomy
4. 48-year-old male with synchronous left colonic cancer and low rectal cancer post extended abdomino-perineal resection
5. 54-year-old male with gastric cancer post subtotal gastrectomy
6. 57-year-old male with metachronous left colonic cancer and rectal cancer post 2 open surgery 10 years interval with pelvic radiation at 10 years ago.

Results: No immediate complications occurred postoperatively. Only two case (no.5 and no.6) were benign adhesive small bowel obstruction. The patient number 1, 2 and 4 developed advanced recurrent cancers and survived for 2, 4 months (death with chemo intoxication-2 cases, cancer death-1). The patient number 3 need re-laparoscopic adhesiolysis and bypass for recurrent small bowel obstruction and still survived with disease to date, 1 year from first laparoscopic surgery for small bowel obstruction and 3 years from laparoscopic gastrectomy.

Conclusions: We found that all patients had satisfactory outcome and benefit from the procedures and minimal invasive surgery offers faster recovery.

SURGICAL OUTCOMES AND ONCOLOGIC EFFICIENCY OF LAPAROSCOPIC GASTRECTOMY FOR ADVANCED GASTRIC CANCER PATIENTS AT NATIONAL CANCER INSTITUTE (NCI) IN THAILAND

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Aims: We presented the surgical outcomes and oncologic efficiency of laparoscopic gastrectomy with D2 lymphadenectomy for advanced gastric cancer patients at the National Cancer Institute as first series in Thailand.

Methods: The records of 15 patients who underwent laparoscopic gastrectomy with D2 lymphadenectomy for advanced gastric cancer between 2010 and 2013 at NCI were retrospective reviewed.

Results: The characteristics of the 15 Laparoscopic Gastrectomy patients were as follows: Sex (male/female) = 8/7; Age (year ± SD) = 56.7 ± 16; BMI (kg/m^2 ± SD) = 19.7 ± 2.6; History of recent abdominal surgery = 1; Tumor size (mm±SD) = 67 ± 73; Tumor invasion, depth T1 = 2, T2 = 0, T3 = 4, T4 = 9; Mean total number of harvested lymph nodes = 27 ± 11; Nodal metastasis status, N0 = 4, N1 = 1, N2 = 2, N3 = 8; Differentiations, Differentiated = 4, Undifferentiated = 11; Stage Grouping, IA = 1, IIB = 4, IIIA = 2, IIIB = 2, IIIC = 4, IV = 2; Type of Gastrectomy, Distal gastrectomy/Total gastrectomy = 7/8; Type of procedure, Laparoscopic assisted /Total laparoscopic = 1/14; Adjuvant chemoradiation therapy for all excepted 2 cases of stage IV by patients decision. We had no mortality in 30 days POD period. Follow up to May 2014, 8 patients survived and 6 in 8 patients were still disease free. For 7 death cases, 4 were cancer-related deaths.

Conclusion: Radical gastrectomy with regional lymph node dissection has long been the mainstay curative treatment for gastric cancer, but recently, minimal invasive therapies, such as endoscopic resection and laparoscopic

gastrectomy, have gained wide acceptance as treatment modality for early gastric cancer (EGC). Laparoscopic gastrectomy (LG) for advance gastric cancer (AGC) remains a challenging procedure because of its technical difficulties and possible complications. However, unfortunately, almost all gastric cancers diagnosed in Thai patients were advanced gastric cancer and only a few surgeons with much experience of laparoscopic surgery currently perform laparoscopic gastrectomy with D2 lymphadenectomy for treatment of gastric cancer. This study had shown the safety and technical feasibility of LG with D2 for advanced gastric cancer treatment. All the LG with D2 in this series were operated by a surgeon with experience of more than 300 cases in laparoscopic colorectal cancer surgery, and hence familiar with minimally invasive techniques enough to handle this more complicated procedure.

ESOPHAGEAL RECONSTRUCTION USING SUPERCHARGED INTERPOSITION COLON: THAMMASAT UNIVERSITY HOSPITAL EXPERIENCE

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Background: Total loss of esophagus and stomach are challenging problems for reconstructions. As a choice, pedicle interposition colons were used. Anastomotic leakage and late stricture were common post-operative complications. Ischemia was believed to contribute significantly to this complication. With the advent of vascular anastomosis, vascular augmentation (as called "supercharge") was adopted as a means of avoiding this problem.

Objective: Using supercharged interposition colon in adult esophageal reconstruction was beneficial in lowering the incidence of anastomotic leakage and late anastomotic stricture.

Materials & Methods: Fifteen esophageal reconstructions with interposition colon at Thammasat University hospital between 2000 and 2009 were performed.

Results: Ten severe suicide corrosive ingestion, one Boehave's injury, three esophageal cancers and one hypopharyngeal cancer were reviewed. Vascular enhancement (as called "supercharge") was done. Only one patient had micro-leakage at pharyngeal anastomosis healed by conservative treatment and no late anastomotic stricture. The procedures are time consuming when carried out by well trained surgeons.

Conclusion: Using supercharged interposition colon in adult esophageal reconstruction was beneficial in lowering the incidence of anastomotic leakage and late anastomotic stricture in spite of longer operative time and skillful vascular surgeons are needed.

HYPERTHERMIA WITH INTRAPERITONEAL CHEMOTHERAPY (HIPEC) IN THE TREATMENT OF CARCINOMATOSIS: SIRIRAJ EXPERIENCES

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In Thailand, many GI tract cancers, especially those with gastric origin, present with peritoneal seeding, the condition known as carcinomatosis. Frequently, the abdominal cavity is the only area involved. However, carcinomatosis is regarded as hopeless condition and most of the time surgery is not offered to the patients. Besides gastric cancer, carcinomatosis can also be seen in appendiceal cancer, pseudomyxoma peritonii, ovarian cancer and colorectal cancer. Systemic chemotherapy shows minimal benefit and survival for carcinomatosis is only a few months.

We have started the hyperthermia with intraperitoneal chemotherapy (HIPEC) at our division in the hope to extend survival to these patients. From March 2011 to March 2014, 33 HIPEC procedures were done at General Surgery Division, Department of Surgery, Siriraj Hospital. There were 4 men and 29 women. Eleven cases (33%) were gastric cancer, 18 cases (54%) were pseudomyxoma peritonei, 3 cases (9%) were ovarian cancer and 1 case (3%) was colon cancer. In all cases, the tumor were confined in the abdominal cavity with varying degree of peritoneal seedings. HIPEC procedures were done using open technique, with perfusion volume at 3 liters and run for 60 minutes at 42°C. HIPEC procedure started with radical tumor resection then total parietal peritonectomy (cytoreductive surgery: CRS) and extensive intraoperative peritoneal lavage (EIPL) using warm saline (10 litres) were performed. After that, HIPEC was started using Mitomycin-C (MMC) with the dose of 12.5 mg/m^2 for pseudomyxoma peritonei, appendiceal cancer and colorectal cancer while Cisplatin (CDDP) with the dose of 50 mg/m^2 was used in gastric cancer and ovarian cancer. No accident regarding chemotherapeutic agent or instrument occurred. There was no operative mortality. Morbidity was found in two cases, diaphragmatic injury in one case and anastomosis leakage in one case. Both cases were managed successfully with conservative treatment. HIPEC with complete

cytoreductive surgery (CRS) was done in 15 cases (45%) while in 9 cases (27%) only HIPEC was done and in 9 cases (27%) laparoscopic HIPEC (L-HIPEC) was performed. Good results could be achieved in cases which HIPEC and CRS were successfully performed with no recurrence in pseudomyxoma peritonei patients and median survival for gastric cancer patients was extended to 17.5 months. HIPEC could offer chance for extended survival in selected patients with carcinomatosis. However, the procedure is complex and co-operation between surgeons and other personnels are crucial to develop successful HIPEC program.

ROBOTIC ASSISTED MINIMALLY INVASIVE ESOPHAGECTOMY (RAMIE): SIRIRAJ EXPERIENCES

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Esophageal cancer is associated with massive lymph node metastasis. Surgery is complex and meticulous systematic lymph node dissection are the key in radical esophagectomy. Minimally invasive esophagectomy (MIE) was developed utilizing thoracoscopic and laparoscopic maneuver to achieve radical resection of the esophagus and lymph node dissection. However, dissection of the esophagus is done in mediastinum and sometimes it is difficult to dissect the lymph nodes thoracoscopically. Robotic assisted minimally invasive esophagectomy (RAMIE) offered better view and maneuverability than conventional thoracoscopic approach. With flexible robotic arms, dissection of the upper mediastinum, which usually is spatially small, can be achieved without difficulty. We have done RAMIE in three patients with thoracic esophageal cancer. All patients had squamous cell carcinoma. RAMIE was done in prone position. The operation started with the patient in prone position under one lung ventilation. Docking of the robot was accomplished using three robotic arms into the right chest. Dissection of the lymph nodes was done in paratracheal group, carina group, right and left recurrent nerve group, periesophageal group and diaphragmatic group. After thoracic phase, the patient was turned to supine position and anastomosis was done in the neck. Docking time for robotic arms was completed in 30 minutes and thoracic phase could be finished in 2 hours. There was no complication. We believe that RAMIE could offer equivalent radicality in terms of dissection of the esophagus and lymph nodes compared to open esophagectomy.

UROLOGY

PREVALENCE AND CURRENT TREATMENT OF RENAL CALCULI IN ASIA

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Factors affecting management of renal stones are stone factors, renal anatomic factors and clinical (patient) factors. The stone composition should be considered before treatment, which is based on patient's history, formal stone analysis or HU in unenhanced CT. Advances in endourologic surgery and ESWL lead to decrease in the indication for open stone surgery. ESWL is the treatment of choice for stone < 2 cm in any location except lower calix. Flexible URS is not recommended as the first choice especially for the stone > 1.5 cm which decreased the success rate.

Several new aspects of percutaneous nephrolithotomy (PCNL) technique such as anesthesia, position, puncture approach, miniperc, and tubeless PCNL are reported. Combined spinal-regional anesthesia is a feasible technique in PCNL operations because the efficacy and safety were not affected. Of supine position, simultaneous retrograde and antegrade endoscopic combined intrarenal surgery, and it is easier from the anesthetist point of view than the traditional prone approach.

The upper-pole approach provides a straight tract along the long axis of the kidney and ensures the ability to reach most of the collecting system while providing easier manipulation of rigid instrument. Tubeless PCNL in selected cases even history of previous surgery and/or supracostal approach is safe with the same outcome of standard PCNL.

Elderly patients are safe with PCNL compared with the young patients. Infectious complication is common following PCNL, the role of intraoperative cultures are very important in managing this complication. Postoperative

pain is the concern issue following this procedure, especially in patients with nephrostomy tube from local inflammation reaction along the nephrostomy tube. Our experiences demonstrate that the peritubal local anesthetic infiltration with 0.25% bupivacaine is effective in alleviating immediate postoperative pain after percutaneous nephrolithotomy. This effect leads to less early postoperative pain (less VAS score), less number of morphine usage and longer time of first analgesic requirement.

PERIOPERATIVE OUTCOMES IN ROBOTIC-ASSISTED LAPAROSCOPIC RADICAL PROSTATECTOMY: INITIAL EXPERIENCE FROM SINGLE-SURGEON AT KING CHULALONGKORN MEMORIAL HOSPITAL

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Objective: Robotic-assisted laparoscopic radical prostatectomy (RALP) is an evolving minimally invasive treatment for localized prostate cancer. We analyze the outcomes of RALP from our initial experience by single-surgeon.

Patients and Methods: Between May 2011 and February 2014, 56 consecutive patients with clinical localized prostate cancer underwent RALP by a single surgeon in our institution. All patient's demographic data, perioperative parameters and pathological results were analyzed.

Results: Mean age of the patients was 64.5 (45-80) years. Mean preoperative PSA was 12.3 ng/ml (2-41.7 ng/ml). Six patients had previous abdominal surgery. Mean operative time was 251 min (180-475). Mean estimated blood loss was 765 ml (150-2,500). The overall perioperative complication rate was 37.5% including26.8% of transfusion rate. Only one patient (1.8%) had major (Clavien grade 3a) complication (pelvic collection required percutaneous drainage). No mortality and conversion occurred in this study. There were 39 patients with pT2 and 17 patients with pT3 disease. Overall positive surgical margin rate was 51.8% (35.9% for pT2 and 88.2% for pT3). Only one patient (1.8%) had lymph node metastasis. Fifteen patients (26.8%) required adjuvant radiation or hormonal treatment. Mean catheterization time was 8.1 days and mean postoperative hospital stay was 8.6 days.

Conclusions: RALP is a safe procedure carrying a low risk of complications even during the initial learning curve. Complications are mostly minor and managed conservatively, confirming that RALP is a good choice for clinically localized prostate cancer.

OUTCOME OF ROBOTIC ASSISTED LAPAROSCOPIC RADICAL PROSTATECTOMY: INITIAL EXPERIENCE AT RAMATHIBODI HOSPITAL

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Background: Robotic Assisted Laparoscopic Prostatectomy (RALRP) has been shown to improve functional outcomes when compared to open or laparoscopic prostatectomy with similar oncologic results. It has become a famous procedure for treating patients with localized prostate cancer. The program of RALRP has just been started at Ramathibodi Hospital for about a year. The feasibility of this procedure in our institution has to be established.

Objective: To evaluate the feasibility of the RALRP that was performed early at Ramathibodi Hospital.

Materials and Methods: Medical records of 30 patients with clinically localized prostate cancer who underwent RALRP by two laparoscopic-experienced urologists at Ramathibodi Hospital from May 2013 to January 2014 were retrospectively reviewed including outcomes, complications, and cost per admission for RALRP.

Results: Mean operative time was 4.2 hours (range 2.0 to 7.3) and mean estimated blood loss was 527 ml (range 100 to 2200) without blood transfusion requirement in 80% of all patients. There were no intra-operative complications and no conversions to open surgery. Twenty-four patients (80%) had pT2 disease and 6 patients had pT3 disease. Positive surgical margin rate was 53%. There were 20% minor post-operative complications, and no major post-operative complications and mortalities. Mean length of hospital stay was 8 days (range 5 to 19) and mean duration of urethral catheter indwelling was 11 days (range 5 to 22). Mean post-operative serum PSA level was 0.08 ng/ml (range 0.00 to 1.12) with mean follow-up duration of 86 days. Total cost per admission for RALRP was 126875 baht (range 50968 to 343027).

Conclusion: RALRP for prostate cancer at Ramathibodi Hospital is safe but additional studies are needed to indicate the feasibility of this procedure.

VASCULAR SURGERY

ANATOMY AND PHYSIOLOGY OF NATIVE FISTULA (AVF)

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The AVF is a very different circuit from the Fistula Graft in its anatomy, physiology, pathology, creation, management and complications. An AVF can be formed and maintained in over 90% of patients requiring hemodialysis. To achieve this goal, a thorough knowledge is required of the patient's "venous real estate", the many different configurations of AVF that can be created, and the importance of assessing the donor artery as well as the prospective fistula vein.

AVF maturation is artery driven, and a diseased artery may lead to failure of maturation. Furthermore, AVF growth can be excessive and lead to a number of problems including cardiac "high output states". This excessive AVF growth (giant fistula) is common and needs to be anticipated and treated. Clinical steal syndromes are related to inadequate inflow arteries to the AVF circuit, and again need to be anticipated and treated. The "choke" procedure on the swing vein is the mainstay of treating both Giant Fistula and Clinical Steal.

The normal function of the AVF needs to be understood to understand the cause, diagnosis and management of the very common inflow and outflow stenotic problems seen in the AVF circuit. Furthermore, different AVF circuits have different physiology, anatomy and complications.

Ultrasound is the Gold Standard in the investigation of the AVF circuit, and ultrasound scanning at all stages of AVF management, from creation, to maturation, to needling to troubleshooting is essential to achieve good results. The definition of a fistula stenosis is an absolute diameter as determined on Duplex U/S imaging or angiography. Percentage stenosis and velocities are rather meaningless in the native fistula circuit as shown by our research*.

DUPLEX ULTRASOUND IN HEMODIALYSIS ACCESS

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Duplex ultrasound (U/S) is the Gold Standard imaging modality in the native fistula circuit (AVF). Its accuracy is comparable to that of fistulography as shown by our study comparing the two modalities*. In addition to anatomical information, U/S provides valuable physiological information about the AVF. A stenosis in the fistula circuit is defined in terms of absolute diameters rather than velocities and percentages, as defined in our Westmead Study**.

Fistula U/S is needed at all stages of access planning, formation, needling, maintenance, troubleshooting and surveillance. All members of the Hemodialysis Access Team should be familiar with the use of U/S. For the more accurate/sophisticated scans, specialised high end equipment and high frequency probes are required, as well as specialised U/S skills.

The measurement of AVF diameters is performed using colour duplex, power duplex and greyscale. AVF flow measurements (Qa) are also very useful, but less accurate than diameter assessment.

Modern Hemodialysis Access Surgery is not possible without the use of good duplex U/S at all stages of management.

CREATING THE NATIVE FISTULA

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An AVF can be formed and maintained in > 90% of patients requiring dialysis. This requires careful planning, specialisation and attention to detail at all stages. A "fistula planning scan" should be obtained whenever the possibility of future hemodialysis is entertained: this will allow the patient to protect his BEST veins and arteries (as opposed to the protecting the non-dominant side).

The Access Surgeon must then create the best possible fistula (in elective circumstances) OR the quickest possible fistula (in established renal failure/Vascath already in place), based on the planning duplex ultrasound (mandatory) and physical assessment of the patient.

The patient's medical status should be optimised pre-operatively, and he should be well hydrated. The procedure should not be done as an emergency; if the patient requires urgent dialysis, a vascath should be placed and the patient's physiology should be optimised prior to fistula creation.

The Surgeon must be familiar with the many different possible native fistula circuits, and how to create and

mature them: Radio-Cephalic, Brachio-Cephalic, Brachio-Basilic, Loop Cephalic Forearm fistulas, Long Saphenous Vein Fistulas, Superficial Femoral Vein fistulas, and others. Ultrasound should be performed in theatre immediately before surgery to review the proposed fistula circuit, and to choose optimal anastomotic sites.

Intraoperatively, the use of magnification (2x - 4x) is necessary to achieve the best results. Technique, especially the avoidance of twisting, is critical. Fistulas are best created under GA or arm block; local anaesthesia is suboptimal because of "water logging" of the tissues and because of vasospasm in the vein and artery. Vasodilators are helpful, including GTN, Papaverine and Verapamil. Careful post-operative care is essential, including arm elevation, hand exercises and hydration.

MATURATION OF THE AVF

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Failure of AVF maturation has several causes: inadequate planning, bad surgery and inadequate maturation - all must be addressed. Inadequate Planning: The patient's best veins and arteries need to be assessed and protected as soon as ESRF is anticipated as a possibility, by early duplex mapping scan. All fistula creation must be preceded by duplex assessment as well as clinical evaluation.

Surgery needs to be done by a Surgeon specialised in hemodialysis access, using magnification and careful technique. Twisting of the vein is the commonest surgical problem. Fistula maturation is not a passive "wait & see" process. It is an active process involving regular clinical and ultrasound assessment, looking for problems and correcting them with open and endovascular techniques.

Once created, the fistula must be nurtured to maturity, using duplex ultrasound assessment and open or endovascular revision as needed. Problems preventing maturation include excessive depth, tortuosity, inaccessibility and most commonly, fistula stenosis. The commonest site of stenosis is in the swing vein.

Treatment to correct the above problems include the open procedures of superficialisation, transposition, straightening and patch plasty. Endovascular techniques include angioplasty and bare Nitinol stenting. With careful planning and surgery, and aggressive maturation techniques, the great majority of native fistulas can be brought to hemodialysis.

STEAL IN THE NATIVE FISTULA

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"Steal" is a normal phenomenon in the hemodialysis access fistula. "Clinical Steal", where there is critical ischemia, is unusual in the native fistula circuit (as opposed to the fistula graft), and occurs most commonly in diabetics. The cause of steal is a failure of the fistula's inflow artery to enlarge as the fistula develops, usually due to Diabetic Runoff Atherosclerosis. Clinical presentation can be obvious when there is severe critical ischemia and tissue loss, but may be more subtle when the patient presents with rest pain. This rest pain can be confused with the many other causes of pain in the fistula arm, including diabetic neuropathy, carpal tunnel syndrome, nerve damage and Median Nerve Neuropathy.

Diagnosis is clinical - Berger's test is very useful - and can be supported with finger plethysmography and / or nerve conduction studies. Duplex ultrasound is essential in the management of steal syndrome as it determines whether the fistula can be salvaged with a "choke" or needs to be sacrificed. There is no place for the "DRIL" procedure.

A synthetic patch is placed around the swing vein, narrowing this down to 3 or 4 mm. This restricts the amount of blood going to the fistula, and increases the hand perfusion to supra-critical levels. If a patient loses their fistula from intractable steal, creating a new fistula is usually not indicated as a similar steal problem will develop in the new fistula. These patients generally have advanced arterial disease and a short life expectancy and are best managed with a vascath.

PITFALL IN MANAGEMENT IN PATIENTS WITH DIABETIC FOOT ULCER

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The diabetic foot tends to be numb, ischemic and deformed, which is likely to lead to sepsis and necrosis of the foot. At our hospital, during 2000 - 2004, ischemia and infection due to diabetes have been the causes of 55% of amputation. In three years, the mortality rate was 56% in patients with diabetic ischemic ulcer. All deaths were due to coronary artery disease. This lecture will cover various pitfalls including diagnosis, treatment and prevention. Diabetic foot infection will be also highlighted in practical problem.

Since our previous study showed high mortality in diabetic patients with peripheral artery disease (PAD), it is very important to identify such cases. This lecture will include our recent survey to identify the prevalence of PAD in June 2014 by using ankle brachial index. PAD was diagnosed when ABI < 0.9. There were 446 diabetic patients in this study of which 58.3% were females with the mean age 64.1 years. The percentage of hypertension, chronic kidney disease, dyslipidemia was 84.2, 20.6 and 86.9. ABI < 0.9 was15.2. All of these PAD cases will be followed up in three years focusing on the risk factors associated with cardiovascular morbidity and mortality. This will give a chance to modify these risk factors intensively and consequently reduce the mortality in such patients. We will present our update in the future RCST meeting.

RADIOFREQUENCY TREATMENT OF INCOMPETENT PERFORATING VEIN

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The purpose of this study was to report the short-term outcomes especially perioperative period associated with interruption of incompetent perforator veins (IPV) using radiofrequency ablation (RFA) as adjunctive therapies in the management of patients with chronic venous insufficiency (CVI). The study cohort included our initial experience with 5 patients with CVI stage C5 or C6 who underwent minimally invasive perforator interruption with RFA of IPV (RFA-IPV) as part of the management of their CVI. All patients were evaluated after having failed conservative treatment with compression dressings. Relevant patient characteristics and comorbidities were recorded. In this subset (n = 6 IPV) 5 patients with CVI who had adjunctive IPV treatment, underwent RFA-IPV along with ablation of the great saphenous vein for C5 or C6 disease. There were 3 midthigh IPV and 3 posterior tibial IPV. All IPVs were done by using pull technique except one posterior tibial IPV, which was performed by using focal technique. All patients were treated under local anesthesia together with tumerescent anesethesia. Procedural major complications were not found in this case series. No recanalisation was seen in this series during follow up by ultrasound except the IPV which was done by focal ablation technique. This study supports the premise that in patients with advanced venous disease, there may be a benefit directly attributable to perforator interruption with RFA-IPV. There was low perioperative complication rates in patients undergoing RFA-IPV which made this procedure more attractive in patients with multiple comorbidities. However, long term study is needed to evaluate the effectiveness and feasibility of RFA IPV in Thailand.

INCIDENCE AND RISK FACTORS OF SUBCLINICAL CENTRAL VEIN OR PROXIMAL VEIN STENOSIS IN ACUTE ARTERIOVENOUS GRAFT AND FISTULA THROMBOSIS IN DIALYSIS PATIENTS

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Background: The incidence and risk factor of proximal vein or central vein stenosis in Thailand has not been documented.

Objective: To evaluate incidence and risk factor of subclinical central vein or proximal vein stenosis in acute arteriovenous graft and fistula thrombosis in dialysis patients at Ramathibodi Hospital and to determine rethrombosis rate and risk factor of early rethrombosis after vascular access revision.

Methodology: Between April 2013 and December 2013, 62 out-patients who need revision of thrombosed hemodialysis access in Vascular and Transplantation Unit, Ramathibodi Hospital, were included in this study. Intraoperative venogram were performed in all patients who underwent AV graft or fistula revision to detect proximal vein and central vein stenosis by using criteria of 50% or more luminal narrowing. In this group additional treatment is balloon angioplasty. Demographics data, timing of access and dialysis, previous central catheter and rethrombosis rate after revision were analyzed.

Results: From 62 Pts., 1 Pts. was excluded due to contrast allergy. Eighteen patients have central or proximal vein stenosis (30%). Eleven (61%) patients have proximal vein stenosis and 7 (39%) patients have central vein stenosis. Those patients were treated by balloon angioplasty; technical success rate is 83% (15/18). Follow up period for a median time of 2.3 months (range; 0.38 month to 11 months), rethrombosis rate is 37.7% (23/61). Independent risk factors for rethrombosis consist of presence of central vein and proximal vein stenosis (hazard ratio 3.74), diabetic mellitus (DM) (hazard ratio 3.07).

Conclusion: The incidence of central vein or proximal vein stenosis in acute arterovenous graft and fistula is not low. In this study, there is no significant risk factor for development of central vein or proximal vein stenosis. After revision, early rethrombosis is associated with DM and central vein or proximal vein stenosis.

PATTERN OF INITIAL PERMANENT VASCULAR ACCESS IN NEW HEMODIALYSIS PATIENTS AT SONGKLANAGARIND HOSPITAL

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Background: Arteriovenous fistula (AVF) provides the best access for longevity and the lowest association with morbidity and mortality. The 2006 National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) clinical practice guidelines for vascular access strongly recommended AVF use, aiming that the AVF prevalence will be more than 65 percent and the use of permanent cuff catheters less than 10 percents, which impacts the surgeons' practice pattern on the type of vascular access created. The present practice should initiate AVF as much as possible and lower the use of central venous catheters.

Objective: To compare the types of vascular access initiated on hemodialysis patients at Songklanagarind Hospital, the practice pattern characteristics that may influence vascular access use and survival.

Materials and Methods: This retrospective descriptive study enrolled 470 new hemodialysis patients receiving an AVF and AVG in Vascular unit of PSU Hospital. Vascular access data were collected from each patient at study entry from 2008 to 2011. Practice pattern data were also analyzed.

Results: Total 846 operations for vascular access were performed from 2008 to 2011, 470 patients received the initial vascular access. AVF and AVG were planned for 336 (71.5%) and 134 (28.5%) patients, and at the operation time, AVF and AVG were performed on 337 (71.7%) and 133 (28.3%) patients, respectively. Two hundred and five (43.6%) patients had the catheter at first visit and increased to 231 (49.1%) on the operation time. The primary failure rates were 27.4 and 7.3 ($P < 0.01$), complication rates were 40.6 and 62.2 ($P < 0.01$) in AVF and AVG, respectively.

Conclusion: The AVF is the first initiated vascular access for suitable patient in PSU hospital which is compatible with the KDOQI guideline 2006, but still resulted in a high rate of catheter used. However, the primary failure rate of AVF is higher than AVG while the complication rate is lower significantly.

HYBRID PROCEDURE AND COMPLEX ARTERIAL BYPASS FOR CRITICAL LIMB ISCHEMIA: EXPERIENCE AT NAKORNPATHOM HOSPITAL

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Background: Endovascular treatment and surgical bypass usually are used to treat critical limb ischemia (CLI). However, multilevel arterial occlusive disease may be difficult to treat with endovascular treatment or surgical bypass alone. Hybrid procedure and complex arterial bypass are necessary for limb salvageability in this condition.

Objective: To report patients with CLI treated with hybrid procedure and complex arterial bypass at Nakornpathom hospital.

Materials and Methods: Seven patients treated by four hybrid procedures and three complex arterial bypass operations for CLI with multilevel arterial occlusion were enrolled in a retrospective study. Early and short-term outcomes were analyzed.

Results: During September 2012 and April 2013, 7 patients were treated with hybrid procedure and complex arterial bypass (6 males and 1 female); the mean age was 68.2 years (range, 46-83 years). All patients presented with CLI (Fontaine stage 4). Mean preoperative ankle-brachial index was 0.40 (range, 0.31-0.62). Hybrid procedures included (1) angioplasty of right iliac artery with femoropopliteal arterial bypass; (2) left femoral endarterectomy with angioplasty of superficial femoral and tibial arteries; (3) aorto-uni-iliac stent graft with femorofemoral crossover and femoro-anterior tibial arterial bypass. Complex arterial bypass included (1) aorto-bipopliteal arterial bypass; (2) left axillo-profunda femoris-popliteal arterial bypass; (3) left common femoral to right profunda femoris-popliteal arterial bypass; (4) left common femoral to right profunda femoris-popliteal arterial bypass. Mean operative time was 5.55 hours (range, 4.25 - 7.55 hours). Neither perioperative mortality nor serious perioperative complication was identified. There was no major amputation in all seven patients. The short-term graft patency rate was 100% (mean follow up 4 months, range 1-8 months).

Conclusion: Hybrid procedure and complex arterial bypass might be an appropriate and effective treatment for CLI with multilevel arterial occlusive disease.

FIVE YEARS EXPERIENCE OF CONVENTIONAL VENOUS STRIPPING FOR VARICOSE VEINS AT LAMPANG HOSPITAL, THAILAND: IT'S STILL WORKING

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Objective: To study the result of conventional venous stripping for varicose veins at Lampang Hospital; a new

cardiac center in the local hospital in the north of Thailand that had to deal with varicose disease without endovascular laser.

Methods: Data of venous stripping procedure by CVT unit at Lampang Hospital were collected from July 2009 to May 2014. All of 60 patients came with symptom of leg pain and result of retrograde (reversed) venous flow of GSV. Everyone was discharged in the morning after the day of surgery and was followed up at two weeks and one month.

Results: All 60 patients could be followed up in accordance with the protocol. The treatment was successful in all patients, no wound complication nor recurrence. The symptoms of all patients were improved completely.

Conclusion: Conventional venous stripping for varicose veins is still practical. Our results were promising and satisfactory for both surgeons and patients even with limited time and facility in an advance choice.

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