

# *A Prospective Clinical Trial Comparing Darn vs Bassini vs Lichtenstein Inguinal Herniorrhaphy*

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## **Abstract**

**Background:** Operative procedures for inguinal hernia are one of the most common surgical procedures, but the most effective surgical technique is relatively unknown due to the diversity of surgical techniques and implanted materials available.

**Aim:** In this study, we set out to determine whether Darn repair used for inguinal herniorrhaphy is as effective and safe as other methods.

**Patients and Methods:** One hundred and ninety seven patients diagnosed with inguinal hernia were prospectively included between January 1, 2006 - December 31, 2007. They underwent herniorrhaphy with three different methods as follows: 70 cases with Darn repair, 68 cases with Bassini repair and 59 cases with Lichtenstein repair. The primary outcome was recurrent rate of hernia at one year and secondary outcome included operative time, postoperative complication and hospital stay.

**Results:** No postoperative mortality was found in this study. One patient had a recurrence after Bassini repair. No recurrent hernia was found in other repair methods. Eight patients had hematoma formation (one in Darn repair, four in Bassini repair and three in Lichtenstein repair). Two patients had surgical site infection (one in Darn repair and one in Lichtenstein repair). Mean operative times were 46.1, 35.5 and 42.7 minutes for Darn, Bassini and Lichtenstein technique respectively. There was a significant difference in operative time ( $p = 0.0001$ ) but no significant difference in length of hospital stay or clinical outcome.

**Conclusion:** Darn technique is a safe, cost effective and relatively easy technique with lower recurrence rate compared to Bassini technique. However, the recurrence rates between Darn and Lichtenstein techniques are the same. Postoperative complication did not differ in all techniques.

**Key words:** Bassini repair, Darn repair, herniorrhaphy, inguinal hernia, Lichtenstein repair.

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## **INTRODUCTION**

It is generally accepted that surgical repair is the treatment of choice for inguinal hernia. In adult, inguinal hernia repair comprises of excision of hernial sac (herniotomy) and repair of fascia transversalis and deep inguinal ring.<sup>1-3</sup> At present, the most effective surgical technique is still debatable and the overall

number of recurrence varies between 1-10% at five years.<sup>4</sup> Several methods have been developed over the past to improve the outcome of traditional methods of hernia repair. During the last two decades mesh repairs have been popularized due to its tension free repair with a low recurrence rate.<sup>5</sup>

Lichtenstein repair, introduced in 1986, was

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performed by simply laying a mesh patch in front of transversalis fascia. It is a tension-free repair associated with negligible rate of recurrence<sup>6-8</sup> and has become a standard method of the treatment for inguinal hernia.<sup>9</sup> In 1984, Maloney et al. originally developed a new method of herniorrhaphy namely, Darn repair, by continuous suture with monofilament nylon. It was a tension-free suture adapted from Bassini technique. It also showed recurrence rate of less than 1%.<sup>10-12</sup> However, it was not widely performed due to its difficulty.

Prior to year 2006, the commonly used hernia repair method at the Department of Surgery, Maharat Nakhon Ratchasima Hospital was the Bassini type. The present study set out to determine whether the Darn repair is as effective and safe as other methods of herniorrhaphy. The primary outcome was recurrence rate of hernia at one year and the secondary outcome included operative time, postoperative complications and length of hospital stay.

#### PATIENTS AND METHODS

A prospective clinical trial was carried out between January 1, 2006 - December 31, 2007 to recruit all inguinal hernia patients who were operated in the Department of Surgery, Maharat Nakhon Ratchasima Hospital. The inclusion criteria were patients aged > 15 years old, primary diagnosis of inguinal hernia (direct, indirect or combined type), elective cases and no concomitant procedure. The exclusion criteria were recurrent inguinal hernia, previous lower abdominal surgery and serious medical illnesses e.g. uncontrolled diabetes, unstable angina, cirrhosis with ascites, refusal to participate or unable to follow-up. All inguinal hernia patients were allocated to each procedure by randomization. Procedures were carried out by experienced surgeons. All patients are followed postoperatively at one week, and every six months at least two years or until recurrence.

#### *Surgical techniques*

**Bassini repair:** The inguinal canal was opened and inspected. An indirect sac was dissected off the spermatic cord, ligated and transected at the level of the internal ring. The conjoint tendon (internal oblique muscle, transversus abdominis aponeurosis and transversalis fascia) was sutured to the inguinal



**Figure 1** Bassini repair

ligament using interrupted silk no. 1 suture as seen in Figure 1 and the external oblique fascia was closed over the cord.

**Lichtenstein repair:** After the sac was dissected, ligated and transected, polypropylene mesh was trimmed to match the size of the inguinal floor and secured with prolene 2-0 suture as seen in Figure 2 and external oblique fascia was closed over the cord.

**Darn repair:** After the sac was dissected, ligated and transected, double nylon no. 1 was sutured to the pubic tubercle. Then a network of nylon was made between the inguinal ligament and the conjoint tendon as seen in Figure 3 and the external oblique fascia was closed over the cord.

#### *Outcome measurement*

The aim of this study was to examine the safety and efficacy of Darn repair compared with other procedures. Outcome measure included the duration of surgery, hospital stay, rate of complication and recurrence rate. Statistical analysis was performed using chi-square or Fischer's exact test in comparative nonparametric data and F-test was used in parametric data ( $P < 0.05$ ).

#### RESULTS

Between January 1, 2006 - December 31, 2007, 197 patients were included in this study. Inguinal hernias were found in all age groups predominantly in older ages (60-79 years old) (Table 1). Patients were distributed into three groups, 70 patients in Darn

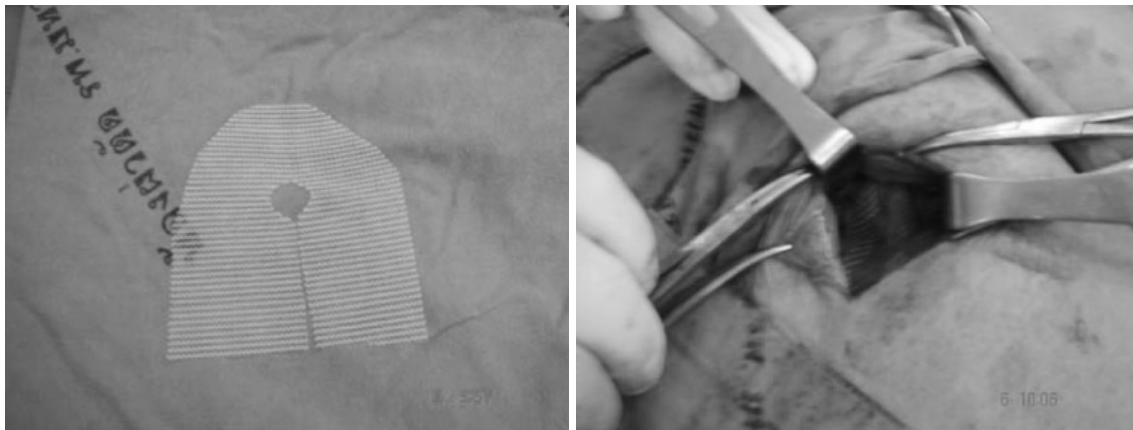


Figure 2 Lichtenstein repair



Figure 3 Darn repair

Table 1 Age distribution of patients with inguinal hernia

Age	Number (%)
15-19	3 (1.5)
20-29	7 (3.6)
30-39	16 (8.1)
40-49	22 (11.2)
50-59	38 (19.3)
60-69	51 (25.9)
70-79	48 (24.4)
80-89	12 (6.1)
<b>Total</b>	<b>197 (100)</b>

Table 2 Average age and site of inguinal hernia

	Darn repair (n = 70)	Bassini repair (n = 68)	Lichtenstein mesh repair (n = 59)
Age (year) (mean ± SD)	56.4 ± 17.11	59.5 ± 15.58	62.1 ± 14.28
Unilateral	70	67	58
Bilateral	0	1	1

repair group with mean age of 56.4 years, 68 patients in Bassini repair group with mean age of 59 years and 59 patients in Lichtenstein mesh repair group with mean age of 62.1 years. Ninety nine patients (45.2%) had right sided inguinal hernia, 108 patients had left sided hernia (54.8%) and both sides in two patients (1%) (Table 2).

The length of operative time (Table 3) for Darn repair was 10-90 minutes (mean = 46.1 ± 14.43), for Bassini repair was 10-70 minutes (mean = 35.5 ± 12.37) and for Lichtenstein repair was 15-105 minutes (mean = 42.7 ± 16.63) (P=0.0001). The length of hospital stay is of great importance economically and socially. In this study, the average hospital stay of each repair types showed no difference (P = 0.50).

Among all 197 patients who were operated, no postoperative mortality was found. Surgical site infection was observed in 1 out of 70 patients (1.4%) in Darn repair group, in 1 out of 68 patients (1.5%) in Bassini repair group and none in Lichtenstein repair group (Table 4). In cases with Darn and Lichtenstein repair, none had hernia recurrence during follow-up (2 years) while 1 patient (1.5%) developed recurrence after Bassini repair at the 8th month of follow-up and subsequently was repaired by Lichtenstein mesh repair. Hematoma formation was observed in 1 out of 70 patients operated by Darn repair (1.4%), 4 out of 68

**Table 3** Comparing operative time and hospital stay

	Darn repair (n = 70)	Bassini repair (n = 68)	Lichtenstein mesh repair (n = 59)	
Operative time (min) (mean ± SD; 95% CI)	46.1 ± 14.4; 42.7-49.5	35.5 ± 12.4; 32.6-38.4	42.7 ± 16.6; 38.5-46.9	P = 0.0001*
Hospital stay (day) (mean ± SD)	2.3 ± 0.5	2.3 ± 0.7	2.2 ± 0.4	P = 0.50

**Table 4** Postoperative early complications and recurrence

Complication	Darn repair (n = 70)	Bassini repair (n = 68)	Lichtenstein mesh repair (n = 59)	P-value
Death (%)	0 (0)	0 (0)	0 (0)	1
Hematoma formation (%)	1 (1.4)	4 (5.9)	3 (5.1)	0.37
SSI* (%)	1 (1.4)	0 (0)	1 (1.5)	0.98
Recurrence (%)	0 (0)	1 (1.5)	0 (0)	0.8

\*SSI = surgical site infection

patients operated by Bassini repair (5.9%) and 3 out of 59 patients operated by Lichtenstein repair (5.1%). Overall there was no statistical significant difference among each group in term of complications and recurrent rate.

## DISCUSSION

In the present study, almost half of the patients were in the 6th and 7th decades (42%), with predominantly right inguinal hernia (54.8%) comparable to other studies.<sup>13,14</sup> In this study, there was a significant difference in three groups with respect to operative time (P = 0.0001) but no significant difference in the length of hospital stay.

In this study, there was no difference in early postoperative complications including surgical site infection, hematoma formation and recurrence between each group. Herniorrhaphy with prosthetic mesh (Lichtenstein) and Darn repair technique are both tension-free and may give better outcome in term of hernia recurrence.<sup>5-19</sup> This is supported by the present results that showed no recurrence on follow-up in both groups as seen in other studies.<sup>20</sup> One patient had recurrent inguinal hernia in case of Bassini repair at the 8th month follow-up. The incidence of infection and hematoma formation did not differ significantly between groups similar to the result of randomized control trials comparing mesh and non mesh.<sup>13,21</sup>

In conclusion, Darn technique is a safe, cost effective and relatively easy technique with low recurrence rate equivalent to the tension-free repair with mesh (Lichtenstein technique). All hernia repair techniques had low incidence of postoperative complications.

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