

The Usage of Two Umbrella Made-Mesh Plugs in Herniorrhaphy: Comparative Study with Bassini and Lichtenstein Method

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Background: Operation to cure groin hernia remains a clinical problem. The most effective technique for hernia repairs is unknown and the presented recurrence rate varies between 1% and 10% at five years. Although surgeries with improved techniques with implanted materials are performed worldwide, they are limited because of the cost associated with hernia repair.

Objective: To determine the results of the presented two umbrella made-mesh plugs for inguinal hernia repair compared to other methods of herniorrhaphy.

Material and Method: The 194 patients, aged 16-86 years who had primary diagnosis of indirect inguinal hernia were prospectively selected into two periods of elective surgery. The first period included, 58 cases operated with Bassini repair and 11 cases needed relaxing incision, 42 in Bassini repair with umbrella made-mesh plug from polypropylene mesh and six cases that needed relaxing incision. The second period included 40 cases of Lichtenstein repair, 54 cases using umbrella made-mesh plug with patching tail. The outcomes for study were postoperative complications, hospital staying time, and recurrence rate of hernia within two years.

Results: All these patients had no mortality. Mean operative time was 31.8 minutes (25-50) of Bassini repair, 47.7 minutes (30-60) of Bassini repair with umbrella made-mesh plug, 53.2 minutes (38-60) of Lichtenstein repair, and 54.8 minutes (40-65) for usage of umbrella made-mesh plug with patching tail. Overall duration of hospital stay was one to seven days (mean 3.5 days). Some complications were ecchymosis or seroma three in Bassini repair, three in Bassini repair with umbrella made-mesh plug, and one in Lichtenstein repair. Wound infections were found with one case of Bassini repair and two of Bassini repair with umbrella made-mesh plug. Within two years of follow-up time, eight of 58 (13.8%) had recurrence by Bassini repair while three of 42 (7.1%) in Bassini repair with umbrella made-mesh plug, but no recurrence in Lichtenstein repair or umbrella made-mesh plug with patching tail.

Conclusion: The usage of both umbrella made-mesh plugs were safe for 94/96 cases of groin herniorrhaphy with only two infected meshes. The used mesh material (polypropylene) was easily made with an umbrella like shape during operation and lowered the cost. The mesh plug with patching tail had a suitable use for patching at wide hernia floor, so relaxing incisions were unnecessarily done. For cases with small or no space of floor defect, repaired by mesh plug without patching may be adequate. Their two-year recurrence rates were lower than Bassini repair alone whereas the repair by using umbrella made-mesh plug with patching tail and Lichtenstein repair had no recurrence. There was no difference in postoperative complications among all operations.

Keywords: Umbrella made-mesh plug, Herniorrhaphy, Complication, Recurrence

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Inguinal hernia is a common disease that needs surgical operation among the other common procedures. There are various technical methods of

inguinal hernia repair. However, no current data support the recommendation of any available procedures as a gold standard and the presented rate of hernia recurrence varies between 1% and 10% at five years⁽¹⁾. Bassini repair has been a popular classical operation since 1884⁽²⁾ with its recurrence rate of 0.8-8.7%⁽³⁾. To improve the outcome of surgery, several methods have been developed over the years. The usage of

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prosthetic mesh has been more accepted and increased use for reduction their recurrence rates⁽⁴⁾. The mesh plug was promoted as a simple, rapid, and uncomplicated technique used for management of inguinal hernia⁽⁵⁾. In the concept of decreasing suture tension line, Lichtenstein repair uses synthetic mesh to patch for strengthening the floor (transversalis fascia) as a tension-free technique⁽⁶⁾. Shulman et al suggested adding a layer of the mesh plug for supporting the defect especially in the recurrent hernia⁽⁷⁾. The present study aimed to determine the outcome of using the authors' two umbrella made-mesh plugs, which are made from polypropylene mesh for herniorrhaphy, including in the effectiveness or safety compared with other methods of herniorrhaphy.

Material and Method

Between January 2003 and December 2008 at the department of surgery in Uthaithani hospital, the male patients primary diagnosed with indirect inguinal hernia were selected for the present study. The criteria were age > 15 years, direct or combined inguinal hernia, no recurrent or incarcerated cases, no concomitant conditions included abnormal blood coagulopathy, ascites, ASA class 3 or 4 and ability to come for follow-up or availability to connections by telephone. All selected patients were operated by only one surgeon and repaired only one site at that time. The prosthetic material was applied with polypropylene mesh making umbrella like plugs. The present study was divided into two periods. The first period (2003-2005), there were 100 cases, 58 patients operated with Bassini repair and 42 Bassini with umbrella made-mesh repair. If they had the floor defect > 4 cm, relaxing incision was done. Ninety-four cases in the second period (2006-2008), 40 used Lichtenstein repair, 54 used umbrella made mesh with patching tail. The follow-up time within postoperative range, two-weeks, six-months, one-year, and two-year. The subjects of the present study included operative time, post-operative complications or pain, hospital stay, and recurrence rate. The data were analyzed by descriptive statistics of number, percentage, means, and standard deviation (SD). Chi-square test, Fishers' extract test, or student T-test were used for comparison between two methods of trial according to data distribution. P-value < 0.05 was set for statically significant.

Surgical technique

In Bassini operation with umbrella made-mesh plug which was made within intra-operation for

7-10 minutes (Fig. 1). The three-principle methods for application of the plugs are position, insertion, and stabilization. In the general procedure, the inguinal canal was opened and inspected. An indirect sac was dissected from the spermatic cord then ligated and transected at the level of the inguinal ring. The upper tip of umbrella mesh was inserted into the inguinal canal and sutured with the end of the transected sac by using the nylon 2-0. The rim of the umbrella was sutured and fixed to the surrounding sheath or fascia. The transverse abdominis aponeurosis arch was sutured to the inguinal ligament. For the umbrella made-mesh plug with patching tail (Fig. 2), the inguinal ring inserted by umbrella mesh with its tip was sutured to the remaining ligated hernia sac and umbrella rim was sutured with surrounding tissue. The hernia floor was patched by the patching tail, which was sutured to the aponeurosis arch with nylon 2-0



Fig. 1 Umbrella made-mesh plug

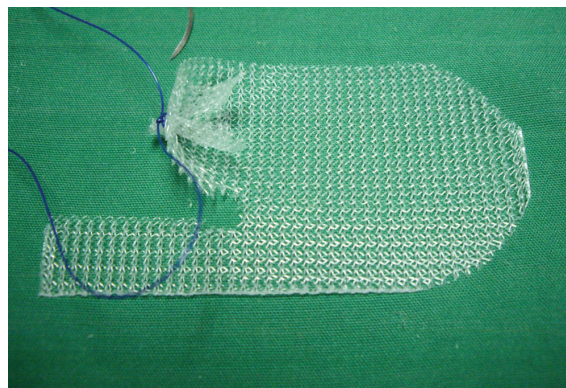


Fig. 2 Umbrella made-mesh plug with patching tail

(Fig. 3). In preoperative preparation, most patients emptied their bladders immediately before operation. Postoperative care medications were acetaminophen tablets for pain or pethidine injection for patients who could not tolerate more pain.

Results

In the six-year period of the present study between January 2003 and December 2008, 214 patients underwent repair of indirect inguinal hernia by the selected methods. After two years of follow-up, there was one death from stroke and one from a traffic accident, and 18 cases could not be connected. This left 194 cases in the present study. By dividing into two periods of study, the first period a comparative study between Bassini repair only or with umbrella made-mesh plug. The data shows the results in Table 1. The second period had comparative data between Lichtenstein repair and using umbrella made-mesh with patching tail shown in Table 2. Sixty-eight patients completed the two-year follow-up. There was no migration of mesh plugs. Two umbrella made-mesh plugs with infected fistula tracts were removed.

The multivariate analysis showed that whenever the operating times were adjusted, the result was at least one method from our four procedures affected hospital staying times, recovery times to work, and numbers of analgesic injection

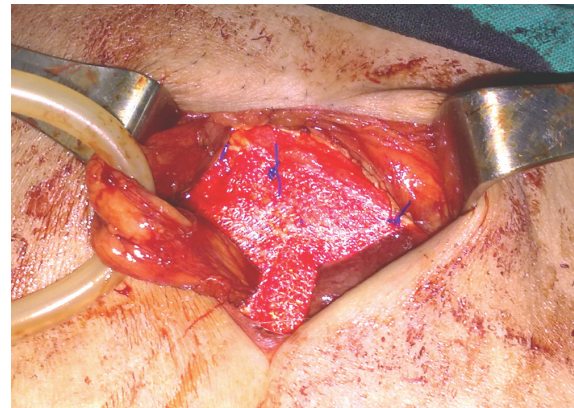


Fig. 3 Procedure of umbrella made-mesh plug with patching

with the significant p-value of 0.032, 0.001, and 0.001 respectively. If patient-ages were adjusted, at least one method of procedures had no effect to those factors as above except numbers of analgesic injections by p-value of 0.69, 0.64, and 0.0001 (no data present).

Discussion

Herniorrhaphy has various procedures that the general surgeons can select to treat the patients with groin hernia. The considered factors for choosing

Table 1. First period (2003-2005) comparative study between Bassini repair group and Bassini + made-mesh plug group (n = 100)

Data	Bassini n = 58	Bassini + made-mesh plug n = 42	p-value
Age (year; mean $\pm$ SD)	54.7 $\pm$ 14.9	58.9 $\pm$ 15.9	0.21 ^T
Sites	Rt 33 Lt 25	Rt 24 Lt 18	0.98
Anesthetic type	GA 39 LA 19	GA 22 LA 20	0.13
Relaxing incision	11	6	0.41 ^F
Operation time (min)*	31.0 $\pm$ 5.1	47.7 $\pm$ 9.2	0.001 ^T
No. of analgesic injection	0.93 $\pm$ 0.9	0.9 $\pm$ 0.8	0.88 ^T
Hospital stay (day)	3.8 $\pm$ 0.9	3.7 $\pm$ 0.2	0.82 ^T
Recovery to work (day)	3.3 $\pm$ 0.5	3.2 $\pm$ 0.6	0.76 ^T
Hematoma or seroma	3	3	0.69 ^F
Wound infection	1	2	1.00 ^F
Urine retention	4	3	0.45 ^F
Scrotal swelling	2	1	0.57 ^F
Recurrence*	8	3	0.026 ^F

* = significant, ^T = student t-test, ^F = Fisher's exact test

Table 2. Second period (2006-2008) comparative study between Lichtenstein repair group and made-mesh plug + patching tail group (n = 94)

Data	Lichtenstein n = 40	Made-mesh plug + patching tail n = 54	p-value
Age (year; mean $\pm$ SD)	60.5 $\pm$ 13.3	58.6 $\pm$ 15.4	0.52 ^T
Sites	Rt 22 Lt 18	Rt 32 Lt 22	0.97
Anesthetic type	GA 14 LA 26	GA 16 LA 38	0.58
Operation time (min)	53.0 $\pm$ 6.9	54.0 $\pm$ 7.6	0.29 ^T
No. of analgesic injection	0.4 $\pm$ 0.5	0.6 $\pm$ 0.48	0.49 ^T
Hospital stay (day)	3.55 $\pm$ 0.9	3.6 $\pm$ 0.86	0.48 ^T
Recovery to work (day)	3.6 $\pm$ 0.5	3.1 $\pm$ 0.4	0.57 ^T
Hematoma or seroma	1	0	1.00 ^F
Wound infection	0	0	-
Urine retention	3	4	0.45 ^F
Scrotal swelling	1	2	0.83 ^F
Recurrence	0	0	-

* = significant, ^T = student t-test, ^F = Fisher's exact test

a hernia repairing method are technical difficulty, complicated event, recovery time, cost, and recurrence rate. The development of these operations progressed for two decades. The Bassini is done by high ligation of hernia sac and repair of the floor by suturing Bassini triple layers to the edge of the internal ligament and femoral sheath, but the unsatisfied condition is the tension of the floor-repair. Therefore, open relaxing incision is advised. This reduces the tension by over 50%⁽⁸⁾. Lichtenstein repair is designed to use the mesh for patching the floor defect as tension-free hernioplasty. During a 25-year period, investigators used Lichtenstein procedures to repair bilateral hernia. It shows that postoperative pain is mild and the recovery period short⁽⁹⁾. The mesh plug has also evolved utilization for herniorrhaphy. As published in a previous report, mesh plug has been used for open hernioplasty as ambulatory surgery by plugging mesh into the canal defect in outpatients under local anesthesia⁽¹⁰⁾. Gilbert has used the umbrella plug passing through the inguinal ring by the shutter mechanism to its canal and repaired the hernia through a revolutionary but ingeniously simple new sutureless and tension-free method⁽¹¹⁾. Mesh plug and patch hernioplasty was reported by Rutkow and Robbins⁽¹²⁾. This method has the advantage to overlap the defect with tension-free repair, and cover the pectineal orifice. Therefore, laparoscopic hernia repair was adopted with widespread enthusiasm. The results corresponded to the experience of surgeons. A report showed that

patients recovered more rapidly and had fewer recurrences when using this method as compared with an open repair⁽¹³⁾. The objective of the different methods in herniorrhaphy is to reduce the recurrence that commonly occurred within five years, with highest incidence within two years⁽¹⁴⁾. In general, correlated factors to recurrence rate are types of hernia, types of operation, recurrent hernia, surgeon experience, material, medical region, and duration of follow-up time. However, recurrence rate after mesh hernia repair is related to inadequate dissection, insufficient prosthesis size and fixation, and surgeon experience. In the present report, the authors used polypropylene mesh that was cheap. A sheet, size 8 x 12-cm, could make six (4x4 cm)-umbrella mesh plugs or two (4 x 12 cm) umbrella mesh plugs with patching tail. Polypropylene mesh was found to be easier to position than the more flexible Mersilene⁽¹⁵⁾. The authors had no difficulty in making umbrella like plugs during operation. A report has been published about the tailor-made mesh plug being made before operation. It revealed no recurrence rate at two years and similar complications compared to Lichtenstein or Bassini herniorrhaphy⁽¹⁶⁾. Concerning mesh-induced infection, a previous study has reported that using the mesh had more incidence of infection. This corresponded with the co-morbid condition of patients, as well as the types, and sizes of mesh⁽¹⁷⁾.

The data of Table 1 and 2 show that there were no differences in the age, sites of hernia, duration

of hospital stay, complications, pain, and recovery time to normal activities. However, the age of patients and operating times were also analyzed as co-variances. It was noted that the operation time in the patients using the authors' meshes had taken more time to make the designed meshes and suturing time. There were more recurrence rates of Bassini repairs than the other three procedures. Recurrence following inguinal hernia repair could not be analyzed properly because of the significant period of follow-up time to evaluate those patients. The purpose of having all patients return to the hospital for physical examination is difficult and may be a waste for long healthcare management. The two-year follow-up time in the present study is relatively short and only 35% (68/194) of patients had visits within two years. The authors called the patients through the primary care system and still had a 9.5% (20/214) loss to follow-up. A previous report has shown that using a questionnaire for long-term follow-up has a good benefit compared to clinical visits⁽¹⁸⁾. The factor pushing us to design the two tailor-made meshes was the expensive cost of standard mesh used for herniorrhaphy. The authors designed the simple umbrella made-mesh plug at first and later, the umbrella made-mesh plug with patching tail for inguinal hernia repairs. Evaluation of the outcome with both design mesh plugs as compared with the standard procedures was performed.

Conclusion

The authors' umbrella made-mesh plugs were safe and gave effective utilization for inguinal herniorrhaphy. The present study used the anterior approach-procedures, which are routinely practiced by most surgeons. The comparison between their complications including pain, recovery time, and hospital stay were not significantly different. The operative time when using meshes was greater because of the preparation time for making the designed meshes and suturing time. Bassini repair had a higher early recurrence rate than other repairs. In cases with large floor of hernia, using the umbrella made-mesh plug with patching tail had more advantage than the usage of the umbrella made-mesh only in the reason of the tension-free technique. The authors' designed umbrella made-mesh plugs with or without patching tail did not cause difficulty when applied for inguinal hernia repair and had lower cost than manufactured-meshes. However, to determine the better recurrence outcome, long-term follow-up is needed in the authors' study.

Potential conflicts of interest

None.

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การผ่าตัดใส่ลิ้นบริเวนขาหนีบโดยใช้เยื่อตาข่ายรูปร่ม 2 แบบที่ทำเอง: ศึกษาเปรียบเทียบกับวิธีผ่าตัดของ Bassini และ Lichtenstein

เชาว์ สุระดม, จรุงใจ ปาลพันธ์

ภูมิหลัง: การผ่าตัดเพื่อรักษาใส่ลิ้นบริเวนขาหนีบให้หายนั้นยังเป็นปัญหาที่เหลืออยู่ทางคลินิก โดยยังไม่ทราบถึงวิธีการผ่าตัดซ่อมแซมที่มีประสิทธิผลมากที่สุดและพบว่ามีอัตราการเกิดโรคซ้ำในช่วงระยะเวลา 5 ปีได้ตั้งแต่ร้อยละ 1 ถึง 10 ได้มีการพัฒนาเทคนิคการผ่าตัดอย่างแพร่หลายโดยการฝังใส่วัสดุเข้าไป แต่ยังมีข้อจำกัดในด้านค่าใช้จ่ายของการผ่าตัด

วัตถุประสงค์: เพื่อค้นหาผลของการใช้เยื่อตาข่ายที่ทำเองเป็นรูปร่มสำหรับนำมาใช้ผ่าตัดใส่ลิ้นบริเวนขาหนีบ 2 รูปแบบโดยเปรียบเทียบผลที่ได้รับกับการผ่าตัดชนิดอื่น ๆ

วัสดุและวิธีการ: ผู้ป่วยจำนวน 194 ราย อายุระหว่าง 16-86 ปี ซึ่งได้รับการวินิจฉัยตั้งแต่แรกว่าเป็นใส่ลิ้นบริเวนขาหนีบชนิด indirect ด้วยการคัดเลือกผู้ป่วยไปข้างหน้า โดยการผ่าตัดแบ่งเป็น 2 ระยะเวลา ระยะแรก ใช้การผ่าตัดวิธี Bassini จำนวน 58 รายและต้องกรีดลดความตึงแผล 11 ราย ผ่าตัดวิธี Bassini ร่วมกับการใช้เยื่อตาข่าย (polypropylene) รูปร่ม จำนวน 42 รายและกรีดลดความตึงแผล 6 ราย ระยะที่สองแบ่งเป็นการผ่าตัดวิธี Lichtenstein จำนวน 40 ราย และผ่าตัดใส่เยื่อตาข่ายรูปร่มแบบมีหางจำนวน 54 ราย โดยศึกษาถึงผลลัพธ์ได้แก่ ภาวะแทรกซ้อนหลังผ่าตัด ระยะเวลานอนในโรงพยาบาลการเกิดโรคซ้ำภายใน 2 ปี

ผลการศึกษา: ผู้ป่วยทุกรายไม่พบว่ามีอัตราตาย การผ่าตัดด้วยวิธีของ Bassini ใช้เวลาเฉลี่ย 31.8 นาที (35-50) และใช้เวลา 47.7 นาที (30-60) เมื่อผ่าตัดรวมกับการใช้เยื่อตาข่ายรูปร่มโดยวิธี Lichtenstein ใช้เวลา 53.2 นาที (38-60) และใช้เยื่อตาข่ายรูปร่มแบบมีหางในการผ่าตัดใช้เวลา 54.8 นาที (40-60) ระยะเวลาอนรรักษาในโรงพยาบาลโดยรวม 1-7 วัน (เฉลี่ย 3.5 วัน) ภาวะแทรกซ้อนที่พบคือมีเลือดคั่งหรือน้ำเหลืองขังที่บาดแผล 3 ราย จากวิธี Bassini ร่วมกับการใช้ตาข่ายรูปร่มพบ 3 ราย และวิธี Lichtenstein 1 ราย แผลผ่าตัดติดเชื่อในวิธี Bassini 1 ราย และร่วมกับการใช้เยื่อตาข่ายรูปร่ม 2 ราย ในการติดตามผลในระยะเวลา 2 ปีมีการเกิดโรคซ้ำ 8 ราย (ร้อยละ 13.8) ด้วยวิธี Bassini ร่วมกับการใช้เยื่อตาข่ายรูปร่มเกิดโรคซ้ำ 3 ราย (ร้อยละ 7.1) ซึ่งไม่พบจากการผ่าตัดวิธี Lichtenstein หรือ วิธีใส่เยื่อตาข่ายรูปร่มแบบมีหาง

สรุป: การใช้เยื่อตาข่ายรูปร่มที่ทำเองทั้งสองแบบในผู้ป่วยที่ผ่าตัดใส่ลิ้นบริเวนขาหนีบพบว่ามีความปลอดภัยจำนวน 94 จาก 96 ราย ยกเว้นมีการติดเชื้อที่เยื่อตาข่าย 2 ราย ส่วนวัสดุตาข่าย (polypropylene) ที่ใช้ได้นำมาทำเป็นรูปคล้ายร่มได้ง่ายในขณะผ่าตัด และยังเป็นทางเลือกประหยัดค่าใช้จ่ายร่วมด้วย เยื่อตาข่ายแบบมีหางนั้นเหมาะสมที่จะใช้แปะที่ฐานของใส่ลิ้นที่กว้างดังนั้นการกรีดลดการตึงของแผลจึงไม่มีความจำเป็นที่จะกระทำ ในรายที่มีฐานของใส่ลิ้นขนาดเล็กหรือไม่เน้นการใช้จุลเยื่อตาข่ายอย่างเดียวโดยไม่ต้องซ่อมแปะอาจจะเพียงพอ โดยมีอัตราการเกิดโรคซ้ำในระยะเวลา 2 ปีต่ำกว่าการผ่าตัดด้วยวิธี Bassini เพียงวิธีเดียวในขณะที่การผ่าตัดโดยใช้เยื่อตาข่ายรูปร่มแบบมีหางและวิธี Lichtenstein ไม่มีการเกิดโรคซ้ำส่วนภาวะแทรกซ้อนหลังผ่าตัดของแต่ละวิธีของการผ่าตัดในรายงานนี้ไม่พบว่ามีผลแตกต่างกัน