

Original article

Results of Different Surgical Techniques in Inguinal Hernia Repair

Bülent KAYA ¹, Mehmet VELİDEDEOĞLU ², A. Rahmi HATİPOĞLU ³
Mehmet Kamil YILDIZ¹

¹ Haydarpasa Numune Training and Research Hospital Department of General Surgery, ISTANBUL

² Şişli Etfal Training and Research Hospital Department of General Surgery, ISTANBUL

³ Trakya University Medical Faculty Department Of General Surgery, EDİRNE

ÖZET

İnguinal herni tamirinde değişik cerrahi tekniklerin sonuçları

Amaç: İnguinal herni, cerrahi pratiğinde en sık karşılaşılan problemlerden biridir. Çeşitli teknikler tamirde kullanılmaktadır. Son yıllarda Lichtenstein herniorafi gerilimsiz bir yöntem olarak popüler hale gelmiştir. Bu çalışmada inguinal herni tamirinde değişik cerrahi tekniklerin sonuçlarını incelemeyi amaçladık.

Materyal ve Metot: Şubat 2002 ile Ocak 2010 tarihleri arasında inguinal herni tanısı ile opere edilen 189 hasta retrospektif olarak incelendi. Beş değişik cerrahi teknik (Bassini, Shouldice, Ağ örme, Lichtenstein ve Laparoskopik herniorafi) inguinal herni tamirinde kullanıldı. Hastaların yaşı, cinsiyeti, operasyon bilgileri, erken ve geç komplikasyonlar, visual analog skorları, hastanede kalış süresi, kronik ağrı ve nüks gelişimi incelendi.

Bulgular: Bu çalışmada 179 erkek ve 10 kadın hasta mevcuttu. Ortalama yaş 29,2 (14-79 arası). Uygulanan cerrahi teknikler Bassini (74 hasta), Shouldice (14 hasta), Ağ örme (15 hasta), Lichtenstein (77 hasta), laparoskopik herniorafi (9 hasta). En kısa operasyon süresi ağ örme grubundaydı. Yine bu grupta en düşük visual analog skala skoru ve en erken işe geri dönme tespit edildi. En sık görülen komplikasyon skrotal ödemdi. Lichtenstein grubunda bir hastada iatrojenik ileum yaralanması görüldü. Bassini grubunda 3 (%4), Lichtenstein grubunda 2 (%2,6) hastada nüks tespit edildi.

Sonuç: Lichtenstein ameliyatı ve ağ örme tekniği postoperatif ağrı, işe erken geri dönme ve nüks açısından diğer tekniklere üstün görünmektedir.

Anahtar Kelimeler: İnguinal herni; cerrahi teknik; nüks

ABSTRACT

Objective: Inguinal hernia is one of the most commonly encountered problem in surgical practice. The different repair techniques were performed for a long time. The Lichtenstein herniorrhaphy as a tension-free method, has gained popularity in last years. We aimed to demonstrate the results of our experience with different surgical techniques in inguinal hernia repair.

Material and Methods: A series of 189 patients operated with inguinal hernia in between February 2002 to January 2010 were studied retrospectively. Five different surgical techniques (Bassini, Shouldice, Plication darn, Lichtenstein and Laparoscopic herniorrhaphy) were performed for inguinal hernia. The patient's age, sex, operation details, early and late complications, visual analog scores, duration of hospital stay, occurrence of chronic pain and recurrence rates were collected.

Results: There were 179 men and 10 women in this study. The mean age was 29.2 (range 14-79) years. The performed surgical techniques were Bassini (74 patients), Shouldice repair (14 patients), plication darn (15 patients), Lichtenstein technique (77 patients) and laparoscopic herniography (9 patients). The shortest operation time was detected in Plication darn group. It is also associated with lower visual analog scale scores and early return to work. The most common early complication was scrotal edema. There was an iatrogenic ileum perforation in Lichtenstein repair. There were 3 (4%) recurrence in Bassini repair and 2 recurrence (2.6%) in Lichtenstein technique.

Conclusion: Lichtenstein repair and plication darn seem to have better results in terms of postoperative pain, early return to work and recurrences rates in inguinal hernia repair.

Key Words: Inguinal hernia; surgical technique; recurrence

INTRODUCTION

Inguinal hernia repair is one of the most commonly performed operation worldwide. Many different surgical techniques have been used to treat inguinal hernias in the past.

Shouldice, Bassini, plication darn, Lichtenstein's tension free hernioplasty and laparoscopic herniorrhaphy are generally preferred methods in various centers. Every technique has well-known advantages and disadvantages respectively.

Tension on suture lines is main factor for recurrence. Tension free hernioplasty, (Lichtenstein repair) has gained popularity in last years.

Minimal postoperative complications with early return to work are important benefits. The recurrence rate with this technique is very low,

Correspondence:

Dr Bulent KAYA
Haydarpasa Numune Training and Research Hospital Department of General Surgery, Istanbul
e-mail: drbkaya@yahoo.com
Arrival date : 27.02.2012
Acceptance date : 05.03.2012

reported approximately 0-2% in different series¹⁻⁴. It has also some disadvantages peculiar to prosthetic material such as mesh reaction, mesh migration and chronic inguinal pain.

Plication darn repair is easily performed hernioplasty. It is also tension free, cost-effective technique with low recurrence rates. It can be easily performed without serious experience. The results of plication darn repair are encouraging. We conducted this study to analyse the results of different surgical techniques in inguinal hernia repair in terms of postoperative pain, early and late complications and recurrence rates.

MATERIAL AND METHODS

The study was based on a series of 189 patients, operated due to inguinal hernia from February 2002 to January 2010. The operation type was determined randomly according to surgeon's preference. There were 179 male and 10 female patients. The mean age was 29.2 (14 to 79) years.

The operations were performed under general, spinal, epidural or local anesthesia. For obtaining standart surgical technique, same three surgeons were performed all surgical interventions. Patients were operated with one of the five surgical techniques with surgeon's preference. Cefazolin sodium 1 gr was given intravenously to patients at the time of initiation of anesthesia. All patients were informed before surgery about surgical technique that will be performed

The patient's age, sex, operation details, early and late complications, Visual analog scale (VAS) scores, duration of hospital stay, occurrence of chronic pain and recurrence rates in different surgical techniques were analyzed. The controls for recurrence and chronic pain were performed at 6 and 12 months after surgery.

Operative Technique

Bassini and Shouldice

Bassini and Shouldice operations were performed with classical techniques. After skin incision, the inguinal canal was explored. The indirect hernia sac was prepared and ligated. Direct hernias originated from posterior wall were not opened and plicated with 2/0 prolene suture. Floor of the posterior abdominal wall was prepared in every case. The prolene sutures passing from inguinal ligament to conjoint tendon were taken in Bassini technique. The layers of posterior inguinal canal was meticulously repaired in Shouldice as described before⁵.

Plication Darn (Moloney's Darn)

After inguinal exploration, the posterior wall darning was started from pubic tubercle with 0 polypropylene suture. Darning was extended to about 2-3 cm lateral to internal ring. The sutures were passed in between conjoint tendon and inguinal ligament. The distance between each suture was about 0.5 cm.

Lichtenstein

Lichtenstein operation was performed with using 6x11 cm average sized polypropylene mesh. The mesh was placed into the floor of the inguinal canal and sutured with 3/0 propylene sutures to iliopubic tractus and conjoint tendon respectively.

Laparoscopic herniorrhaphy

Laparoscopic herniorrhaphy was performed with transabdominal extraperitoneal (TEP) technique.

Pain assesment after surgery

Pain after surgery was evaluated with (VAS) scores that 0-31 mm signifying mild, 31-60 mm moderate, 61-90 mm severe and 91-100 excruciating pain. The evaluation of pain could be done successfully in 107 patients. The pain scores were asked at 0, 2, 6 and 12 hours after surgery. Patients were given analgesia with Tramadol 1 mgr/kg intravenously according to VAS scores.

Statistics

For statistical analysis, the statistical software package SPSS (Statistical Package for the Social Science) 17.0 for Windows (SPSS Inc., Chicago, IL) was used. Comparison of parameters were performed with Two-Sample Kolmogorov-Smirnov test.

RESULTS

A total of 189 patients were operated with five different surgical techniques. The ninety-six patients operated under general anesthesia, 83 with spinal, 8 with epidural and 2 with local anesthesia. Two laparoscopic hernia repair could not be finished due to technical difficulties. The surgical techniques were showed in (Table 1).

Table 1. Types of Surgery With Number of Cases

Surgical tehchnique	number of cases	(%)
Bassini	74	(39.1%)
Shouldice	14	(7.4%)
Plication Darn	15	(7.9)
Lichtenstein	77	(40.7%)
Laparoscopic repair	9	(4.7%)
Total	189	

The most common surgical complication was scrotal edema. There was an ileum injury during dissection of hernia sac in Lichtenstein repair.

Table 2. Early Complications With Different Techniques

Complication	Bassini (n=74)	Shouldice (n=14)	Plication Darn (n=15)	Lichtenstein (n=77)	Laparoscopic repair (n=9)
Echymosis	1	-	-	4	1
Scrotal edema	6	2	-	4	-
Hematoma	1	-	-	1	-
Seroma	-	-	-	-	-
Wound infection	2	-	-	3	-
Intestinal injury	-	-	-	1	-

Primary intestinal repair was successful in this patient. The all complications were showed in (Table 2). There were 3 recurrences in Bassini and 2 recurrences in Lichtenstein repair (Table 3).

Table 3. Recurrence Rates

Operation recurrence	(n)	%
Bassini	74/3	4
Shouldice	14/0	0
Plication Darn	15/0	0
Lichtenstein	77/2	2.6
Laparoscopic repair (TEP)	9/0	0

The mean hospitalization time was 2.1 days (1-5 days). All patients with plication darn repair were discharged within 24 hours after surgery. The mean time to return to work was showed in (Figure 1). The average VAS scores were showed in (Table 4). The VAS scores could be evaluated in 107 patients. The difference in VAS 2 scores were statistically significant between groups ($p=0.03$).

The patients operated with plication darn repair had minimal VAS scores after surgery. There were 3 patients with chronic pain after hernioplasty.

Two patients in Bassini and one in Lichtenstein group (Figure 2). Patients were successfully treated with anti-inflammatory agents.

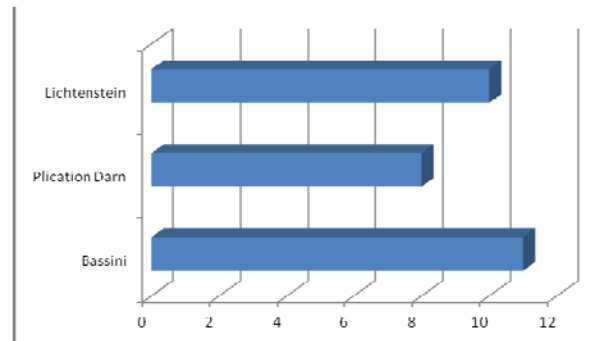


Figure 1. Median time to return to normal activities in three different techniques
Lichtenstein: 9.8 days, Plication Darn:7.8 days, Bassini:10.2 days

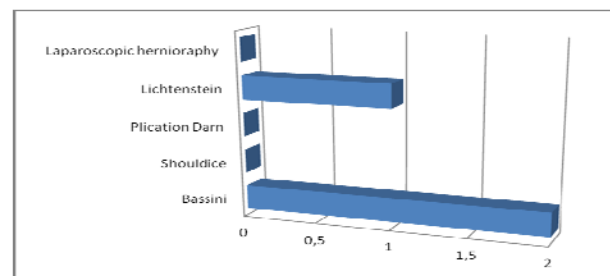


Figure 2. Number of patients with chronic inguinal pain after surgery

Table 4. VAS scores in 0, 2,6,12 Hours After Surgery

VAS Scores	Bassini	Shouldice	Plication Darn	Lichtenstein	Laparoscopic Repair	P values
VAS 1 (0 hour)	3.2 (0-10)	1.2 (0-8)	2.3 (0-10)	1.9 (0-10)	4.1 ((0-8)	0,118
VAS 2 (2 hours)	5.6 (0-10)	4.2 (0-8)	1.5 (0-8)	3.1 (0-9)	3 (0-8)	0,03**
VAS 3 (6 hours)	2.8 (0-8)	3 (0-8)	1.25 (0-8)	4.8 (0-9)	3.4 (0-6)	0,177
VAS 4 (12 hours)	1.7 (0-8)	1.6 (0-6)	0.5 (0-2)	1 (0-10)	2.5 (0-8)	0,54

DISCUSSION

The inguinal hernia repair is still a challenging problem for surgeons. Wound infection, mesh reaction, chronic postoperative pain are main complications that are usually struggled⁶⁻⁸. The primary goal of the inguinal hernia repair is lowest possible recurrence rate with minimum complications. The ideal technique should also

secure the shorter hospitalization time with early return to work. Approximately 80 different surgical techniques have been described for inguinal hernia repair since Bassini's report in 1887⁹. To build up an excellent herniorrhaphy technique is still most important goal in this field.

Bassini, in 1889, was achieved successful repair of posterior inguinal wall with strong sutures

passing in between conjoint tendon and inguinal ligament. Although it is an easily learned surgical method with cost effectivity, it has some disadvantages including postoperative pain, scrotal edema and ecchymosis, prolonged hospitalization time and relatively higher rates of recurrence. Operation time was also found longer for Bassini repair¹⁰. In a study that has been analyzed the Bassini repair and mesh-plug concluded that patients with Bassini technique were needed more analgesia postoperatively. The sutures that causing tension in inguinal region is probably the mechanism for postoperative pain¹¹. Zsolt B et al.¹² were reported 9.6% recurrence rate with 5 years follow-up with this technique.

The VAS scores were higher in patients treated with Bassini. One patient was followed-up for chronic intractable pain. Non-steroid anti-inflammatory drug was sufficient in long term. Six patients were suffered from serious scrotal edema and hemorrhage. They were treated with analgesics and scrotal elevation. These complications were effected patient's quality of life in postoperative period. There were 3 recurrences (4%) in Bassini repair in our serial.

Polypropylene mesh (Lichtenstein technique) is currently the preferred treatment method for most of the inguinal hernias. The mesh is used in all patients except pediatric population and young adults diagnosed as indirect inguinal hernia with normal posterior inguinal wall. The repair is tension free with successful outcomes. It is an easily learned and practised technique which can be done under local anesthesia. It has also other advantages like less postoperative pain and discomfort, more rapid return to normal activities. EU Hernia Trialists Collaboration analyzed 15 clinical trials that compare mesh and nonmesh techniques in inguinal hernia repair¹³. The incidence of postoperative complications were similar in between two groups including pain and infection. But mesh group had lower recurrence rates.

The recurrence rate with polypropylene mesh was reported as around 1 per cent in literature⁹. The recurrence rate in our serial was approximately 2.6 per cent. Koukourou A et al.⁹ were compared polypropylene mesh with plication darn on one hundred patients. They have reported that plication darn and Lichtenstein technique had same postoperative results in terms of postoperative pain, analgesia requirement, return to normal activities and recurrence. Zeybek N et al.¹⁴ reported that plication darn seems to be more advantageous than Lichtenstein repair considering the postoperative complications. Mesh repair was not found superior in respect to postoperative

pain, complications and early recurrence rates over plication darn in our serial.

Plication darn repair for inguinal hernia had been originally described by Moloney¹⁵. It is a simple technique with many advantages. First, to avoid using synthetic graft (being a foreign material) decreases the risk of inflammatory wound problems like infection and mesh rejection which can be disastrous problem after surgery. It was considered that nonabsorbable, monofilament prolene sutures are relatively more resistant to infection used in darn repair. Lifthutz et al reported 2.6% wound infection rate after darn herniorrhaphy¹⁶. Other studies are also support the low infection rates with darn repair. Wound complications including hematoma and seroma formations are also rarely seen after darn repair. We could not observe any of these complications in our patients. Darn repair was associated with shorter operation time, decrease need for analgesia, low VAS scores and early return to normal activities. It had shortest operation time in this serial. The mean operation time was 35 minute. It is also simple method without need for meticulous dissection of the inguinal region as in Shouldice repair. Minimal tissue dissection in darning results with decrease in wound complications and postoperative pain.

Recurrence rate is most important criteria in hernia surgery. As a tension free herniorrhaphy technique, plication darn has acceptable recurrence rates in general. El Bakry AA¹⁷ reported only one recurrence after 619 darn repair. Ali N et al.¹⁸ were reported 3.15 % recurrence rate with darning. The recurrence rate was found about 7.5 % after 10 years follow-up in same study. We didn't observed any recurrence in our serial with plication darn.

Laparoscopic herniorrhaphy could not be finished in two patients due to occurrence of technical difficulties and vascular complication during surgery. We think that additional trial is needed for laparoscopic hernia repair for our surgical team. Shouldice repair was associated detailed dissection of posterior abdominal wall obligating serious experience. It is not found a superior technique over Lichtenstein repair and plication darn. In conclusion, Lichtenstein herniorrhaphy became a most commonly preferred technique in hernia repair after 1989. It is an excellent method with minimal postoperative complications and low recurrence rates. As an alternative method, plication darn has same surgical results with cost effectivity. These two techniques can be used in inguinal hernia repair safely.

REFERENCES

1. Kurzer M, Belsham PA, Kark AE. The Lichtenstein repair. *Surg Clin North Am* 1998;78(6):1025-1046
2. Amid PK, Shulman AG, Lichtenstein IL. Open "Tension-Free" repair of inguinal hernias; The Lichtenstein technique. *Eur J Surg* 1996;162(6):447-53.
3. Goldstein HS. Selecting the right mesh. *Hernia* 1999;3:23-26
4. Kark AE, Kurzer M, Waters KJ. Tension-free mesh hernia repair: review of 1098 cases using local anaesthesia in a day unit. *Ann R Coll Surg Engl* 1995;77(4):299-304.
5. Shouldice EE. Surgical treatment of hernia. *Ontario Med Rev* 1953;20:670-684
6. Kark AE, Kurzer MN, Belsham PA. Three thousand one hundred seventy five primary inguinal hernia repairs: advantages of ambulatory open mesh repair using local anesthesia. *J Am Coll Surg* 1998;186(4):447-55.
7. Bay-Nielsen M, Nordin P, Nilsson E, Kehlet H. Danish Hernia Data Base and the Swedish Hernia Data Base. Operative findings in recurrent hernia after a Lichtenstein procedure. *Am J Surg* 2001;182(2):134-6.
8. Stephenson BM. Complications of open groin hernia repairs. *Surg Clin North Am* 2003;83(5):1255-78.
9. Koukourou A, Lyon W, Rice J, Wattchow DA. Prospective randomized trial of polypropylene mesh compared with nylon darn in inguinal hernia repair. *Br J Surg* 2001;88(7):931-4.
10. Papaziogas B, Lazaridis Ch, Makris J, Koutelidakis A, Patsas M, Grigoriou, et al. Tension-free repair versus modified Bassini technique (Andrews technique) for strangulated inguinal hernia: a comparative study. *Hernia* 2005;9(2):156-9.
11. Miyazaki K, Nakamura F, Narita Y, Dohke M, Kashimura N, Matsunami O, et al. Comparison of Bassini repair and mesh-plug repair for primary inguinal hernia: a retrospective study. *Surg Today* 2001;31(7):610-4.
12. Zsolt B, Csiky M. Recurrences rate in Bassini operation after five years. *Magy Seb* 2001;54(5):307-8.
13. EU Hernia Trialists Collaboration. Mesh compared with non-mesh methods of open groin hernia repair: systematic review of randomized controlled trials. *Br J Surg* 2000;87(7):854-9.
14. Zeybek N, Tas H, Peker Y, Yildiz F, Akdeniz A, Tufan T. Comparison of modified darn repair and Lichtenstein repair of primary inguinal hernias. *J Surg Res* 2008;146(2):225-9
15. Moloney GE. Results of nylon-darn repairs of hernia. *Lancet* 1958;1(7015):45-8.
16. Lifschutz H, Juler GL. The inguinal darn. *Arch Surg* 1986;121(6):717-9.
17. El-Bakry AA. Plication darn for the repair of inguinal hernia. A university hospital experience. *Saudi Med J* 2002;23(11):1347-9.
18. Ali N, Israr M, Isman M. Recurrence after primary inguinal hernia repair: mesh versus darn. *Pak J Surg* 2008;24(3):153-5.
19. Shouldice EB. The Shouldice natural tissue repair for inguinal hernia. *BJU Int* 2010;105(3):428-39.
20. Amato B, Moja L, Panico S, Persico G, Rispoli C, Rocco N, et al. Shouldice technique versus other open techniques for inguinal hernia repair. *Cochrane Database Syst Rev* 2009;7(4):CD001543.
21. Butters M, Redecke J, Königer J. Long-term results of a randomized clinical trial of Shouldice, Lichtenstein and transabdominal preperitoneal hernia repairs. *Br J Surg* 2007;94(5):562-5.
22. Berndsen FH, Petersson U, Arvidsson D, Leijonmarck CE, Rudberg C, Smedberg S, Montgomery A. SMIL Study Group. Discomfort five years after laparoscopic and Shouldice inguinal hernia repair: a randomised trial with 867 patients. A report from the SMIL study group. *Hernia* 2007;11(4):307-13.