

MESH-PLUG VERSUS MESH-PATCH IN THE REPAIR OF RECURRENT INGUINAL HERNIA

By

Tarek I Ouf MD, FRCS, Ayman A. Talaat MD, Emad Abd El Aziz Hussein Aly MD, FRCS

Department of General Surgery, Faculty of Medicine, Ain Shams University, Egypt

Background: Repair of recurrent inguinal hernia carries a considerable risk of developing further recurrences. Despite a large number of studies in recent years, there is no consensus has been achieved on the best surgical technique of recurrent hernia repair. Few surgeons would disagree on using mesh for repair of recurrent inguinal hernia, but confusion exists on which is better: to plug or to patch recurrent inguinal hernia.

Aim: The aim of this study was to compare the outcome of repair of recurrent inguinal hernia with mesh patch vs. mesh plug to find out which technique could be more suitable for use in recurrent cases.

Patients & Methods: This study was done on 45 patients with recurrent inguinal hernia, divided into two groups. Group I included 22 patients (20 males and 2 females) that had mesh-plug repair. Group II included 23 patients (22 males and 1 female) had mesh patch repair. Patients were followed up at three weeks, six months a year and two year after the operation. Comparison between the two groups was made in terms of hospital stay, postoperative pain, return to daily activities and early & late postoperative complications. $P < 0.05$ was considered significant.

Results: Mesh-plug repair was superior to mesh patch as patients who had mesh plug had less requirement for postoperative analgesics ($P < 0.05$), shorter hospital stay ($P < 0.05$), earlier return to daily activities ($P < 0.05$), less early postoperative complications ($P < 0.05$) and less late postoperative complications ($P < 0.05$). There was no difference between the two groups on hernia recurrence on mean follow of 17 months and 19 months for group I and group II respectively ($P > 0.05$).

Conclusion: Patch and mesh-plug repairs are equally effective in the repair of recurrent inguinal hernia. However, mesh plug is superior to mesh patch as patients who had mesh plug had less requirement for postoperative analgesics, shorter hospital stay, earlier return to daily activities, and less postoperative complications.

Key words: Recurrent inguinal hernia, Lichtenstein tension free Repair, Mesh-plug repair.

INTRODUCTION

About 180 000 inguinal hernias are diagnosed each year in Germany.⁽¹⁾ In the USA, approximately 700 000 groin hernioplasties are carried out annually with an overall recurrence rate of 10-15%, the cost being greater than \$28 billion.⁽²⁾ The high incidence of this disease makes inguinal hernia repair the most frequent procedure in general surgery, accounting for 10-15% of all operations.⁽³⁾ These data demonstrate the huge impact of hernia repair on health-care expenditure and working disability.

Although Bassini's classic articles on a successful

method of repair⁽⁴⁾ were published more than a hundred years ago, opinions still differ about the best technique for hernia repair. It is even more difficult to reach an agreement on how to repair a recurrent inguinal hernia. The addition of mesh procedures and the recent introduction of laparoscopic surgery have not solved the problem but provoked more discussion about the procedure of choice. Such discussion often seems to be based more on personal belief than on a rational scientific approach.⁽¹⁾

Repair of recurrent inguinal hernia carries a

considerable risk of developing further recurrences. Despite a large number of studies in recent years, there is no consensus has been achieved on the best surgical technique of recurrent hernia repair.⁽⁵⁾ It defies logic to correct recurrent inguinal hernias by incising and reconstructing the entire canal floor to remedy a small defect. Furthermore, reconstruction by using those same tissues which have already failed one or more times previously is unsound. Such tissues are scarred, less vascular and indurated. The high failure rate of recurrent inguinal hernia repair argue convincingly against using these less desirable tissues repairs.⁽⁶⁾ Therefore most surgeons would agree on the use of a prosthetic mesh for the surgical treatment of recurrent groin hernia, but the technique is still debated, largely in terms of the approach to be adopted and the placement site of the mesh.⁽⁷⁾

In 1986, Lichtenstein used the term 'tension-free' for his repair technique, in which a sheet of polypropylene mesh is used to strengthen the fascia transversalis. It is the most favoured technique in the UK as it offers an effective repair and is easy to perform.⁽⁸⁾ Mesh plug hernioplasty was first introduced in the 1970s for repair of femoral hernia but was only recently promoted as a repair for all varieties of inguinal hernia. During the 1990s the safety and efficacy of mesh plug hernioplasty was reported by Rutkow & Robbins.⁽⁹⁾ Lately, mesh plug hernioplasty has started gaining attention. In the US, this technique has been used extensively in some centres with good results. It is a much simpler technique than that of Lichtenstein, where a polypropylene mesh plug is inserted at the defect site like a cork stopper at the bottle mouth.⁽⁸⁾

Judging from the large number of publications in the management of recurrent inguinal hernia, confusion exists among many surgeons as whether it is best to use a patch or a plug in the repair of recurrent inguinal hernias.⁽⁹⁾

The aim of this study was to compare the outcome of repair of recurrent inguinal hernia with mesh patch vs. mesh plug to find out which technique could be more suitable for use in recurrent cases.

PATIENTS AND METHODS

This study was done between February 1999 and December 2002 at Ain Shams University Hospitals, Cairo, Egypt, Halton General Hospital, Cheshire, UK. It included two groups of patients:

Group I: Twenty two patients with clinical diagnosis of recurrent inguinal hernia treated by mesh patch (Lichtenstein) repair.

Group II: Twenty three patients with clinical diagnosis of recurrent inguinal hernia treated by mesh plug repair.

Exclusion Criteria: Patients with a large defect in the posterior wall of the canal that was not suitable for mesh plug repair were excluded from the study i.e. all patients in the study had a defect that was suitable to be repaired by either mesh patch or mesh plug.

Preoperative Assessment:

All patients had the following:

1. Full history and clinical examination.
2. Underlying possible causes of recurrence (e.g. senile enlargement of the prostate) were identified and dealt with before attempting repair of the recurrent hernia.
3. Complete blood count, Urea & creatinine.
4. Other investigations as indicated by medical condition and age of the patient e.g. ECG, chest X-Ray, etc.

Anaesthesia:

All cases were repaired under general anaesthetic.

Surgical Technique

Lichtenstein Repair: Through a groin incision, the inguinal canal was opened by splitting of the external oblique aponeurosis. The spermatic cord was dissected free from the posterior wall of the inguinal canal. After the recurrent hernia sac had been dealt with, the posterior wall was covered by an appropriate size and shape of polypropylene mesh. One or two sutures were used where the tails of the mesh cross lateral to the cord and were placed to ensure a snug fit around the cord (Fig. 1).

Mesh plug repair: Through a groin incision, the inguinal canal was opened by splitting of the external oblique aponeurosis. The spermatic cord was not routinely mobilised free from the posterior wall of the inguinal canal. The recurrent hernia sac was dealt with. The mesh plug used was either a pre-shaped mesh plug (PerFix, C.R. Brad, New Jersey, USA) or a strip of polypropylene mesh (Marlex®, manufactured by Bard Vascular Systems Division, C R Bard Inc.) 2 cm x 20 cm was coiled into a loose plug (Fig. 2). The mesh plug was then inserted in the deep ring; in cases of hernia recurrence through a patulous internal ring (Fig. 3), or through the defect in the posterior wall of the canal; in cases of recurrence medial to the internal ring. The mesh plug was secured into position with prolene 2/0 interrupted stitches in 3-4 places (Fig. 4).

Postoperative instructions

Patients were encouraged to return to daily life activity when comfortable.

Follow-up

Patients were followed up at three weeks, six months a year and two year after the operation.

Statistical Analysis:

Chi-square test was used to test for relationship between the two groups multiple variables. The two sample z-test module was used to estimate the statistical significance of the incidence of the individual postoperative complications between the two groups. Student t-test was used to calculate the differences between means. $P < 0.05$ was considered significant.

RESULTS

Patients' Characteristics

Descriptive statistics for the patients in the two groups are summarised in (Table 1). Group I of patients (mesh-plug repair group) included 22 patients (20 males and 2 females) with median age of 54 years (range 26-81 years). Patients in Group II (mesh patch repair) were 23 patients (22 males and 1 female) with median age 56 years (range 23-79 years).

Co-existing medical problems

Co-existing medical problems are shown in (Table 2). There was no statistical difference between the incidence of co-existing medical problems between the two groups ($P > 0.05$).

Physical Activity

In group I: Ten patients were manual labourer, 7 had

sedentary life and five were retired or jobless. In group II: Twelve patients were manual labourer, 5 had sedentary life and 6 were retired or jobless. ($P > 0.05$; not significant, Table 3).

Hernia Characteristics

Hernia Characteristics of the two groups is shown in (Table 4). There was no significant statistical difference between the two groups regarding the type of previous surgery ($P > 0.05$), mean size of the defect ($P > 0.05$) or site of recurrence ($P > 0.05$).

Length of hospital stay

Hospital stay for the two groups is shown in (Table 5). Group II patients had longer hospital stay ($P < 0.05$, significant).

Early Postoperative pain & return to work

Group I patients had less requirements for postoperative pain relief ($P < 0.05$) and quicker return to work ($P < 0.05$) when compared to group II patients (Table 6).

Postoperative Follow up & Complications

Mean follow up in group I was 17 months (range 6-24) and 19 months (range 5-24) in group II. Two patients (9%) were lost on follow up in Group I compared to three patients (13%) in Group II.

Early & late postoperative complications are listed in (Tables 7 & 8). Group II patients had higher incidence of early ($P < 0.05$) and late ($P < 0.05$) complications compared to group I patients.

Table (1): Patients' Characteristics

	Group I	Group II	P Value
Age			
Mean (years)	54	56	$P > 0.05$
Range (years)	26-81	23-79	
Sex			
Male	20	22	
Female	2	1	

Table(2): Co-existing Medical Problems

Cardiovascular	4	5	
Respiratory	2	1	
Diabetes	2	3	$P > 0.05$
None	12	14	

Table (3): Distribution According to the Physical Activity

	<i>Group I</i>	<i>Group II</i>	<i>P Value</i>
Manual labourers	10	12	
Sedentary life	7	5	P>0.05
Retired / Jobless	5	6	

Table (4): Hernia Characteristics

<i>Characteristic</i>	<i>Group I</i>	<i>Group II</i>	<i>P Value</i>
Unilateral	20	19	
Bilateral	2	4	
Type of previous repair (s)			
Bassini / Modified Bassini	14	17	
Schouldice	6	3	
Mesh repair	1	3	P>0.05
Laparoscopic	1	0	
Mean defect size (range)	1.4 cm (0.8-2.8)	1.2 (0.7-2.6)	P>0.05
Site of Recurrence			
Through patulous internal ring	7	10	
Through posterior wall defect	15	13	P>0.05

Table (5): Length of Hospital Stay

	<i>Group I</i>	<i>Group II</i>	<i>P value</i>
Day case	3	2	
One Day	16	10	P<0.05
Two days	3	11	

Table (6): Early Postoperative Pain and Return to Work

	<i>Group I</i>	<i>Group II</i>	<i>P value</i>
Pain - Occasional analgesics needed	10	4	P<0.05
Pain - regular analgesics needed	12	19	
Return to work			
Mean	21	28	
Range	(8-33)	(10-42)	P<0.05

Table (7): Early Postoperative Complications

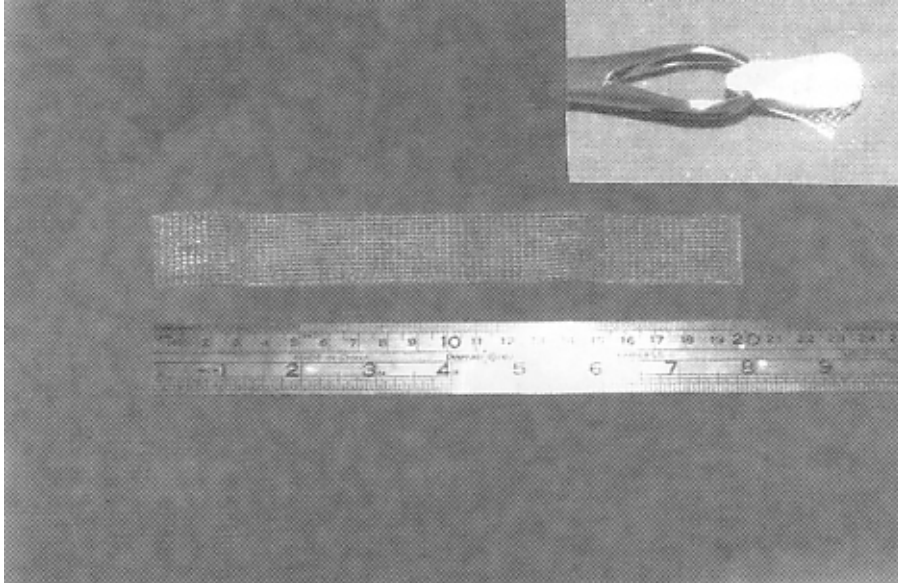
	<i>Group I</i>	<i>Group II</i>	<i>P value</i>
Seroma / Haematoma	1	6	
Superficial wound infection	1	1	
Deep infection	0	0	
Urinary retention	1	2	
Total	3 (13%)	9(39%)	P<0.05

Table (8): Late Postoperative Complications

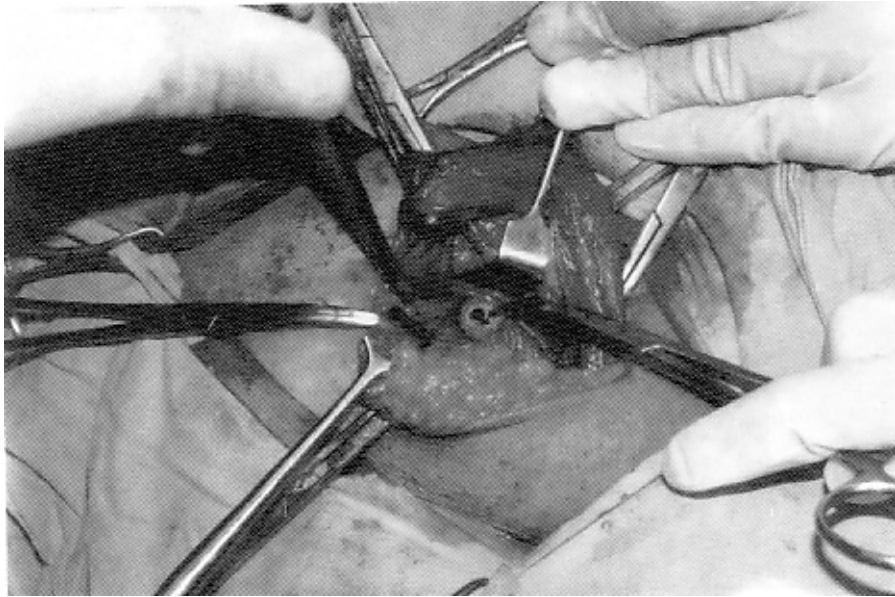
	<i>Group I</i>	<i>Group II</i>	<i>P value</i>
Recurrence	0	0	
Testicular atrophy	0	1	
Persistent groin pain	0	3	
Total	0 (0%)	4 (17%)	P<0.05



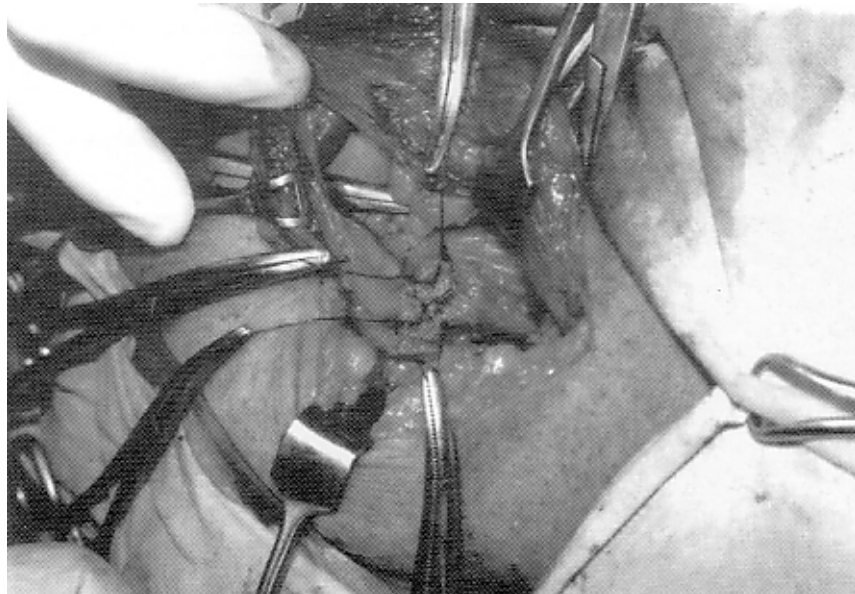
(Fig. 1): Mesh patch in position (Lichtenstein Repair).



(Fig. 2): Preparation of the mesh plug (strip of polypropylene mesh 2x20 cm).



(Fig. 3): Placement of the mesh plug into the defect.



(Fig. 4): Fixation of the mesh plug in the defect with stitches.

DISCUSSION

The causes of inguinal hernia are multifactoral.⁽¹⁰⁾ Altered collagen metabolism plays an important role in hernia formation. Male inguinal hernia is associated with a metabolic disorder of collagen in the fibroconnective tissue of the groin. This leads to weakness of transversalis fascia.⁽¹¹⁾ The use of synthetic materials that stimulate normal collagen production is an effective approach to deal with inguinal hernia repair.⁽¹²⁾ Therefore, very few surgeons would disagree on using mesh for repair of recurrent inguinal hernia, but confusion exists on which is better: to plug or to patch recurrent inguinal hernia? This study attempted to answer this question.⁽⁸⁾

The incidence of recurrent hernia after primary repair of a groin hernia varies from 1% in specialized centres to 30% in general surveys.⁽¹⁰⁾ The recurrence rate increases with the number of attempts at repair of the hernia. Most recurrences appear within ⁽²⁾ to ⁽³⁾ years of the primary repair.¹ The rate of recurrence following the widespread use of mesh in the repair of inguinal hernia seems to have decreased.⁽¹³⁾ In this study, there were no reported recurrences in both group I and group II on a mean follow up of ⁽¹⁷⁾ months and ⁽¹⁹⁾ months respectively. Although this is a relatively limited period of postoperative follow up but it demonstrates that both techniques are equally effective in the repair of recurrent inguinal hernia in terms of low recurrence rate.⁽¹⁴⁾

However, this study showed that mesh plug was superior to mesh patch as patients who had mesh plug had less requirement for postoperative analgesics ($P<0.05$), shorter hospital stay ($P<0.05$), and earlier return to daily activities ($P<0.05$). Similarly, Zieren et al ⁽¹⁵⁾ reported that plug repair offers a high degree of comfort in patients with recurrent hernia. The explanation for this could be that less dissection is required to place a mesh plug when compared to the dissection needed to place a mesh patch. In mesh-plug technique no dissection was done for the adherent scarred area on different tissue planes; instead, a much simpler technique of dissection of sac without dissecting the various anatomical layers and cord was performed. After dealing with the hernia sac a mesh plug was placed over the defect. This led to excellent postoperative rehabilitation. The mesh plug induces an intense inflammatory response and enhances fibroblastic growth and collagen synthesis and forms a firm barrier against further herniation.⁽⁸⁾

This study, as well as other studies ^(14, 16), shows that mesh plug repair has less early and late postoperative complications compared to mesh patch repair ($P<0.05$). This is also can be attributed to the amount of dissection required to place a mesh plug compared to mesh patch. We feel, as many surgeons do, that it defies logic to correct recurrent

inguinal hernias by reconstructing or patching the entire canal floor to remedy a small defect.⁽⁶⁾

One of the complaints with the use of mesh in recurrent inguinal hernia repair is postoperative persistent groin pain. It has been suggested that the nerve injury occurs when the mesh patch is sewed in, especially lateral to the cord structure.⁽¹⁷⁾ In mesh-plug technique; the plug is placed in the preperitoneal space and is fixed to the edges of the defect. This avoids involving the nerves in the stitches or in the inflammatory process secondary to the mesh. In this study, persistent groin pain was observed only following mesh patch repair. None of the patients who had mesh plug repair developed such complication.

The preperitoneal ⁽¹⁸⁾ and laparoscopic ⁽¹⁹⁾ approaches have been recommended for repair of recurrent inguinal hernia repair to avoid testicular atrophy. However, mesh-plug repair produces equally low incidence of testicular atrophy as dissection of the cord from the posterior wall of the canal is not routinely done.⁽¹⁷⁾ In this study we had no cases of testicular atrophy following mesh-plug repair.

It has also been argued that laparoscopic or preperitoneal repairs are superior to anterior inguinal repair in cases of recurrent inguinal hernia as they will avoid dissection on the scarred inguinal canal.⁽²⁰⁾ This may be true where a mesh patch repair is attempted in a recurrent hernia. However, because the mesh plug hernioplasty is performed through an anterior approach most surgeons would be comfortable using it. Unlike laparoscopic and open preperitoneal repairs special instruments or the ability to navigate through the preperitoneal space is not necessary to perform mesh plug hernioplasty. Mesh plug repair is more cost effective compared to laparoscopic hernia repair and requires less surgical expertise.⁽²¹⁾

Other repair systems ^(22, 23) have been promoted that use minimal access to preperitoneal space e.g. Kugel patch. However, these techniques leave the surgeon with a blind placement of the mesh. We found mesh-plug repair in recurrent inguinal hernia allowed repair of the hernia defect under direct vision with minimal dissection and equally low recurrence rate.

CONCLUSION

Patch and mesh-plug repairs are equally effective in the repair of recurrent inguinal hernia. However, mesh plug is superior to mesh patch as patients who had mesh plug had less requirement for postoperative analgesics, shorter hospital stay, earlier return to daily activities, and less postoperative complications.

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