INGUINAL HERNIORRHAPHY WITH AN UNDETACHED STRIP OF EXTERNAL OBLIQUE APONEUROSIS: A NEW APROACH USED IN 400 PATIENTS

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Structured abstract

Objective
To describe my experience with a technique of hernia repair in which the posterior wall of the inguinal canal is strengthened with an undetached strip of the external oblique aponeurosis to give physiologically active and strong posterior wall.
Design
Retrospective open study.
Setting
Medical college and district hospital, India.
Subjects
400 patients operated on 1983-99, 106 of whom have been followed up for more than 10 years.
Intervention
After the sac has been excised, a strip of external oblique aponeurosis is partly separated from its medial leaf, keeping its continuity intact at either end. This is sutured to the inguinal ligament below, and the arch of the muscle above, behind the cord, to form a new posterior wall.
Main outcome measures
Morbidity and hospital stay.
Results
No patient has severe pain postoperatively and nearly all patients (n=396) were free of pain and discomfort after the second postoperative day. 340 patients (85%) were discharged by the 4th postoperative day, and most returned to normal activities within two weeks. There was one early haematocoele, and 1 recurrence at 2 years.
Conclusions
The operation is easy to do, does not require mesh, and gives results equivalent to those reported for mesh. It is therefore a good option for repair of an inguinal hernia. KEY WORDS: Hernia, Inguinal hernia, Herniorrhaphy, Strip of External Oblique Aponeurosis

Introduction

Repair of inguinal hernia is the most common operation done by junior surgeons. These surgeons, who practice all over India and countries like India in less than ideal conditions, have all been doing modified Bassini or modified Shouldice or mesh repairs in recent

years. Recently, mesh repair has become popular, but mesh is not available in many parts of the world and it is expensive.

Classic operations such as those described by Bassini, McVay, Shouldice and others require expertise to do the complicated and risky dissection of the inguinal floor and to identify and suture Cooper's ligament or the iliopubic tract. The recurrence rate after hernia repair done by expert hernia surgeons or done in centres with a special interest in such repairs is less than 2 %, but in the hands of average or junior surgeons, the reported rate is as high as 25 %. (3,4,9,10,12,13).

The demand of this mass of surgeons is not to find an operation that converts recurrence rates from 2 % to 1 % in the hands of experts but to find an operation which is simple, easy to do, does not require extensive dissection or use of a foreign body such as mesh, and also gives a recurrence rate that is less than 2 % without any major complications during or after operation, because they are all operating in less than ideal conditions.
This series of hernia repairs is based on the concept of providing a strong, mobile and physiologically active posterior wall. An undetached strip of the external oblique aponeurosis gives replacement to the absent aponeurotic element in the posterior wall and the additional muscle strength is given by the external oblique muscle to keep it physiologically active. Mobility is not affected because there is minimal or no fibrosis.

Patients and methods

400 patients with inguinal hernias, between 18 to 90 years of age, were operated on between February 1983 and July 1999 (Table I). The types of hernia in these patients are listed in Table I1. 361 patients were operated on under spinal anaesthesia, 35 under local anaesthesias and four had a general anesthetic. Patients were not selected in any way and those with bilateral hernias had both sides repaired at the same time. Additional surgical problems such as hydrocoele, haemorhoids, enlarged prostate, and varicocoele were also dealt with at the same time if required. Patients were encouraged to walk about from the day of operation and could resume normal activity after a week. Most patients (n=340,85 %) were kept in the hospital for 3 - 4 days so that we could closely observe the results. The remainder needed to spend more time in hospital because of coexisting diseases or social problems. Sutures were removed on the eighth day. Ampiclox (ampicillin and cloxacillin) and diclofanac were given for a week as a prophylaxis because of the probable unhygienic conditions at home. I followed up all patients personally at 15 days, 1, 2, and 3 months, and later every year. Physical examination was preferred but we had to follow up some through the mail.

Operative technique

Skin and fascia are incised through a regular oblique inguinal incision to expose the external oblique aponeurosis. The thin, filmy fascial layer covering it is kept undisturbed as far as possible and an assessment made about the strength of it and its thinned-out portion. The thinned out portion is usually seen at the top of the hernia swelling, extending and fanning out to the lower crux of the superficial ring. The external oblique is cut in line with the upper crux of the superficial ring, which leaves the thinned out portion in the lower leaf so a good strip can be taken from the upper leaf. The external oblique, which is thinned out as a result of aging or long standing large hernias, can also be used for repair if it is able to hold the interrupted sutures.

The medial leaf of the external oblique aponeurosis is sutured with the inguinal ligament from the pubic tubercle to the abdominal ring using 1/0 monofilament polyamide (Ethilon) or polypropylene (Prolene) interrupted sutures. The first two sutures are taken in the

anterior rectus sheath where it joins the external oblique aponeurosis. The last suture is taken so as to narrow the abdominal ring sufficiently without constricting the spermatic cord (Fig.1). Each suture is passed first through the inguinal ligament, then the transversalis fascia and then the external oblique. The index finger of the left hand is used to protect the femoral vessels and retract the cord structures laterally while taking lateral sutures.

A splitting incision is made in this sutured medial leaf, partially separating a strip with a width equivalent to the gap between the muscle arch and the inguinal ligament. This splitting incision is extended medially up to the pubic symphisis and laterally 1-2 cms beyond the abdominal ring. The medial insertion and lateral continuation of this strip is kept intact. A strip of the external oblique, is now available, the lower border of which is already sutured to the inguinal ligament. The upper free border of the strip is now sutured to the internal oblique or conjoined muscle lying close to it with 1/0 monofilament polyamide or polypropylene interrupted sutures throughout its length (Fig.2). The aponeurotic portion of the internal oblique muscle is used for suturing to this strip wherever and whenever possible to avoid tension, otherwise, it is not a must for the success of the operation. This will result in the strip of the external oblique being placed behind the cord to form a new posterior wall of the inguinal canal. At this stage the patient is asked to cough and the increased tension on the strip exerted by the external oblique to support the weakened internal oblique and transversus abdominis is clearly visible. The increased tension exerted by the external oblique muscle is the essence of this operation. The spermatic cord is placed in the inguinal canal and the lateral leaf of the external oblique is sutured to the newly-formed medial leaf of the external oblique in front of the cord, as usual, again using 1/0 monofilament polyamide or polypropylene interrupted sutures. Undermining of the newly formed medial leaf on both of its surfaces facilitate its approximation to the lateral leaf. The first stitch is taken between the lateral corner of the splitting incision and lateral leaf of the external oblique. This is followed by closure of the superficial fascia and the skin as usual.

Results

Six patients had swelling around the repair during the postoperative period, which subsided on its own within a couple of weeks without any treatment. This was possibly the result of the venous congestion caused by extra narrowing of the internal ring during the operation. Four patients had mild skin infections, which subsided within a week. One patient developed a haematocoele, which was drained (Table III). There were no other serious complications. Table IV shows duration of hospital stay, Table V time to return to normal activities, and Table VI duration of postoperative pain and discomfort.

A total of 396 (99%) returned for a follow up visit after 15 days, and 342 (86%) after 1, 2, and 3 months; 245 (61%) patients came for follow up for 1 year, 233 (58%) after 2 years, 214 (54%) after 3 years, 162 (41%) after 5 years, 142 (36%) for 7 years, and 106 patients (27%) came for follow up for more than 10 years. The rest of the patients who did not come for follow up or did not respond to letters were presumed to have no problem because, as is usual in India, they would have contacted the operating surgeon.

Appearance of a bulge in the groin on coughing was treated as a recurrence, which was confirmed by clinical examination. Only one patient (operated on in 1984) developed recurrence, after two years, and reoperation showed a normal healthy strip of external oblique without the fibrous reaction that would be seen in a mesh repair. There were no other recurrences or late complications.

Discussion

Strength of the posterior wall of inguinal canal is an important factor that prevents herniation process. But, if the aponeurotic element in posterior wall is absent then the transversalis fascia alone cannot withstand the repeated internal blows (raised intra-

abdominal pressure) for a longer period. Strong musculo-aponeurotic structures around the inguinal canal still gives protection to prevent the herniation in such individuals. But if the muscles are weak then it fails to give such protection. The weak and physiologically inactive posterior wall of inguinal canal in such individuals leads to hernia formation. Therefore, the aim of hernia repair should be to provide a strong, mobile and physiologically active posterior wall of the inguinal canal.

Since its original description in 1887(5) Bassini's operation has become a standard for inguinal hernia repair. Since then there have been many modifications to this repair, predominantly those described by Halsted and McVay, and that developed at the Shouldice hospital. These techniques share the same principle of pulling down the internal oblique and transversus abdominis muscle to suture with either the inguinal or Cooper's ligament or the iliopubic tract. Three objections to these open operations have been raised. Halsted (7) and others warned of the danger of tension on the suture line and stated that 'no tension' as one of the great principles of surgery (4). All those authors advised incision or excision of the transversalis fascia requiring extensive dissection (13). Amid et al (2) reported that to use already weakened muscles and transversalis fascia, particularly under tension, is a violation of the most basic principles of surgery. Hay et al (8) compared the Shouldice to the Bassini and Cooper's ligament repair and found in a study of 1578 hernias with a mean follow up of 8.5 years, a recurrence rate of 6 % compared with Bassini 8.6 %, and Cooper's ligament repair
11 %. Panos et al (12) and Kingsnorth et al (9) stated that the reported recurrence rates from smaller hospitals and ordinary general surgeons seem to be worse than those from specialist centres such as the Shouldice or Lichtenstein clinics. Obviously, those open hernia operations described by original authors do not satisfy all the criteria of modern hernia surgery and modifications of those operations failed to give the desired results particularly in the hands of junior or average practicing general surgeons who were not experts in hernia repair. The posterior wall provided in those operations, is mobile and physiologically active. But recurrence takes place if muscles are weak and it fails to give strong posterior wall.

More recently, therefore, the use of mesh prosthesis for inguinal hernia repair has increased in popularity among general surgeons worldwide. The operation described by Lichtenstein is simple and safe and achieves all the goals of modern hernia surgery. But the mesh prosthesis has its drawbacks. Firstly, it is not available all over the world. Secondly, it is quite expensive. Thirdly, the groin being a mobile area, there is a tendency for the mesh to fold, wrinkle, or curl. Mesh prosthesis lose roughly 20% of their size through shrinkage. The slightest movement of the mesh from the sutured area is a leading cause of failure of mesh repair of inguinal hernias (1). Further, chronic groin sepsis after mesh repair is more common than previously reported and complete removal of mesh is required to treat it (15). This operation provides a mechanical barrier in the form of a mesh. It does not give mobile and physiologically active posterior wall because of strong fibrous reaction.
Several authors (6) have suggested that alterations in collagen synthesis may be
responsible for the development of inguinal herniation. Read (14) published a review of the role of protease-antiprotease imbalance in the pathogenesis of herniation along with aging process of the tissues. This is true in the hernia repairs such as the Bassini, McVay, and Shouldice that use weakened internal oblique and transversus abdominis muscles for repair. Supporters of mesh prostheses claim that the Lichtenstein mesh repair is superior to other operations in this aspect. The theory of mesh repair is also based on fibroblasts proliferation in the mesh and the degree and magnitude of fibroblast proliferation is also affected by the aging process. This aging process is least in the tendons and aponeurosis, so a strip of the external oblique, which is tendo-aponeurotic, is the best alternative to the mesh or Shouldice repairs. I have also used the thinned out portion of the external oblique with good results. This eliminates all the drawbacks and complications of using a foreign body like a mesh, and also avoids extensive, complicated dissections as required

in the Shouldice or similar operations. Nyhus (11) has emphasised that proper recognition of the quality of the transversalis fascia when deciding the approach to hernia repair is essential, and failure to recognise this has recently been implicated in recurrence of the hernia.

The external oblique technique satisfies all the criteria of modern hernia surgery. It is simple and easy to do and learn. Even a junior resident can easily do it. It does not require complicated and risky dissection or suturing. There is no tension on the suture line. It does not require any foreign material and does not use weakened muscles or transversalis fascia for repair. The suture materials used can be replaced by any other suitable suture material.

The results of this series have shown that 90% of patients have a minimum hospital stay. The stay of 3-5 days in this series was not for any medical reason, but because I wanted to watch the results closely. Now most patients are discharged after one night in hospital. All the patients were walking on second day, 96% of them had a comfortable postoperative period with minimal pain, and 99% of patients recovered rapidly and were back to work in 1 - 2 weeks` time. The operation is cost effective and early or late complications are well below 1% - 2%. I realise that a 27% follow up for more than 10 years is not enough but that is no reason to ignore the results of this series. Publication of these data may encourage others to conduct more trials to prove or disprove my results. Some trials are being conducted in India with excellent results.

Suturing of the external oblique aponeurosis behind the cord and use of a detached strip of it or fascia lata for darning purposes has previously been described. Double breasting of it was described by Zimmerman for repairs of inguinal hernias (16). In Andrew's imbrication operation (Wyllys Andrews operation, Chicago Med. Rec. N Y 9:67,1895), the entire medial leaf of the external oblique together with the internal oblique and transversus abdominis muscle is sutured to the inguinal ligament behind the cord and the lateral leaf of the external oblique is used to cover the spermatic cord in front. My operation differs from the Andrew's technique because the procedure of strengthening the posterior wall of the inguinal canal is different and the mechanism of action involved to prevent reherniation is also different. To my knowledge this technique has not been described before.

Mechanism of action

Contraction of the external oblique muscle creates lateral tension in this strip while contraction of the internal oblique / conjoined muscle pulls this strip upwards and laterally creating tension above and laterally, making the strip a shield to prevent any herniation. This additional strength given by the external oblique muscle to the weakened conjoined muscle to create tension in the strip and prevent reherniation, is the essence of this operation. Tension created in this strip is graded as per the force of muscle contractions. Stronger intra-abdominal blows result in stronger abdominal muscle contractions and stronger muscle contractions result in increased tension in this strip to give graded protection. Thus, a strong and physiologically active posterior wall is prepared in this operation. The transversalis fascia acts as a barrier to prevent hernia simply because it is supported in the posterior wall of the inguinal canal by aponeurotic extensions from the muscle arch. If those aponeurotic extensions are absent and the transversalis fascia is weak then use of such transversalis fascia in any stage of repair should be redundant. In this operation, the weakened transversalis fascia is supported by the shielding action of this strip of the external oblique on the posterior wall of the inguinal canal in place of absent aponeurotic extensions. Moreover, there is minimal or no fibrosis and posterior wall remains mobile.

References

1. Amid PK, Lichtenstein IL. Lichtenstein open tension free hernioplasty. In: Maddern GJ, Hiatt JR, Philips EH, eds. Hernia repair (open vs. laparoscopic approaches). Edinburgh : Churchill Livingstone, 1997: 117-122.
2. Amid PK, Shulman AG, Lichtenstein L. Femoral hernia resulting from inguinal herniorrhaphy - the 'plug' repair. Contemp Surg 1991; 39: 19-24.
3. Belanger J, Flament JP, Goldstein M. Bilan de 14 annees de oures de hernies. Acta Chir Belg 1975; 60:37-39..
4. Berliner S, Burson L, Katz P, Wise L. An anterior transversalis repair for adult inguinal hernias. Am J Surg 1978; 135: 633-636.
5. Brown RK, Galleti G, Tumm KS. New technique for the cure of inguinal hernia : by Edoardo Bassini in 1887 to 1890. J Hist Med Allied Sci 1966; 21:401-407.
6.Friedman DW, Boyd CD, Narton P et al. Increases in type III collagen gene expression and protein synthesis
in patients with inguinal hernias. Ann Surg 1993; 218: 754-760.
7.Halsted WS. The radical cure of inguinal hernia in the male. Bulletin of Johns Hopkins Hospital.1893 ; 4 : 17-28
8.Hay JM, Boudet MJ, Fingerhut A et al. Shouldice inguinal hernia repair in the male adult:the gold standard? A multicentre controlled trial in 1578 patients. Ann Surg 1995; 222: 719-727.
9.Kingsnorth AN, Gray MR, Nott DM. Prospective randomized trial comparing the Shouldice technique and plication darn for inguinal hernia. Br J Surg 1992; 79: 1068 - 1070.
10. Kux M, Fuchsjager N, Schemper M. Shouldice is superior to Bassini inguinal herniorrhaphy. Am J Surg 1994; 168: 15-18.
11.Nyhus LM. Individualization of hernia repair: a new era. Surgery 1993; 114: 1-2.
12.Panos RG, Beck DE, Maresh JN, Harford FJ. Preliminary results of a prospective randomized study of Cooper's ligament vs Shouldice herniorrhaphy technique Surg Gynecol Obstet 1992; 175: 315-319.
13.Piper J V. A comparison between whole thickness skin graft and Bassini methods of repair of inguinal hernias in men. Br J Surg 1969; 56:345-348.
14.Read RC. A review: the role of protease - antiprotease imbalance in the pathogenesis of herniation and abdominal aortic aneurysm in certain smokers. Postgraduate General Surgery 1992; 4: 161 -165.
15.Taylor SG, O'Dwyer PJ.Chronic groin sepsis following tension-free inguinal hernioplasty.Br J Surg 1999; 86 : 562 - 565.
16. Zimmerman LM. Recent advances in surgery of inguinal hernia. Surg Clin North Am 1952; 32: 135-154.

Table I. Distribution by age group

Age group (years)	No. of patients
18 - 20	11
21 - 30	48
31 - 40	71
41 - 50	71
51 - 60	56
61 - 70	75
71 - 80	58
81 - 90	10

Table II. Number (%) of inguinal hernia by type, complication, and site

Type of hernia:	
Direct	115 (25)
Indirect	341(74)
Pantaloon hernia	3(1)
Complication :	
Obstructed	15(4)
Recurrent	16(4)
Site :	
Right	216(54)
Left	125(31)
Bilateral	59(15)

400 patients – 59 bilateral hernias. So 459 hernias by types.

Table III. Complications

Complication	No (%)
Early :	
(1) Haematocoele	1 (0.3)
(2) Wound Oedema	6 (2)
(3) Mild skin infection	4 (1)
Late :	
(1) Recurrence at 2 years	1 (0.3)

Table IV. Duration of hospital stay (days)

No. of days	No. of patients (%)
3	103 (26)
4	237 (59)
5	14 (4)
6	12 (3)
7	18 (5)
7+	16 (4)

Table V. Return to normal activities and work

Movements	Period after operation (days)	No. of patients (%)
Walking with limited movements	2	400
Free movements	4	356(89)
	7	44(11)
Normal routine work	7	292(73)
	15	104(26)
	15+	4(1)

Table VI . Postoperative pain and discomfort

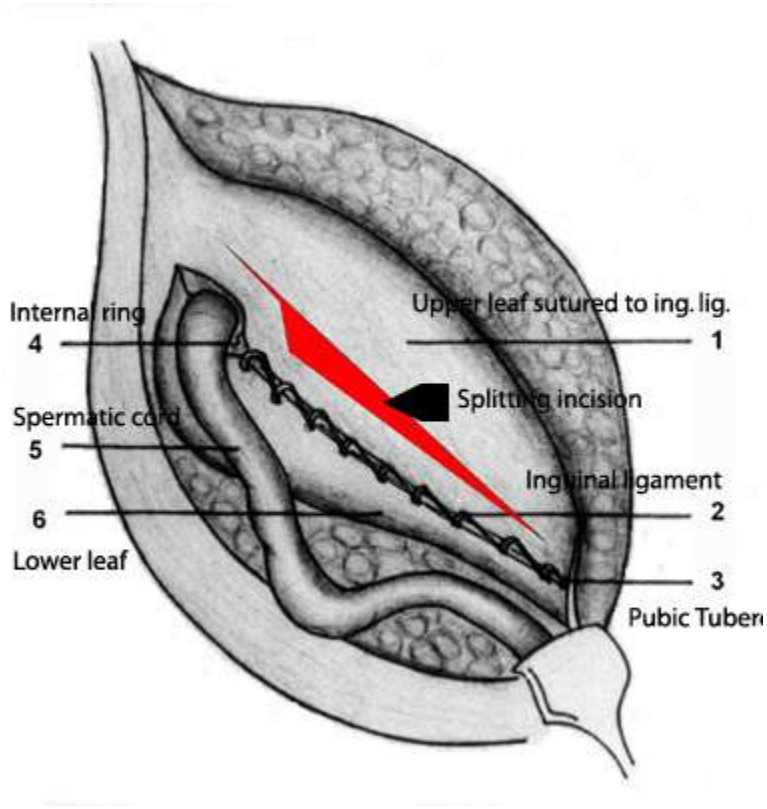
Mild pain (days)	No. of patients (%)

2	288(72)
4	96(24)
7	12(3)
7 +	4(1)

No patient had severe pain.

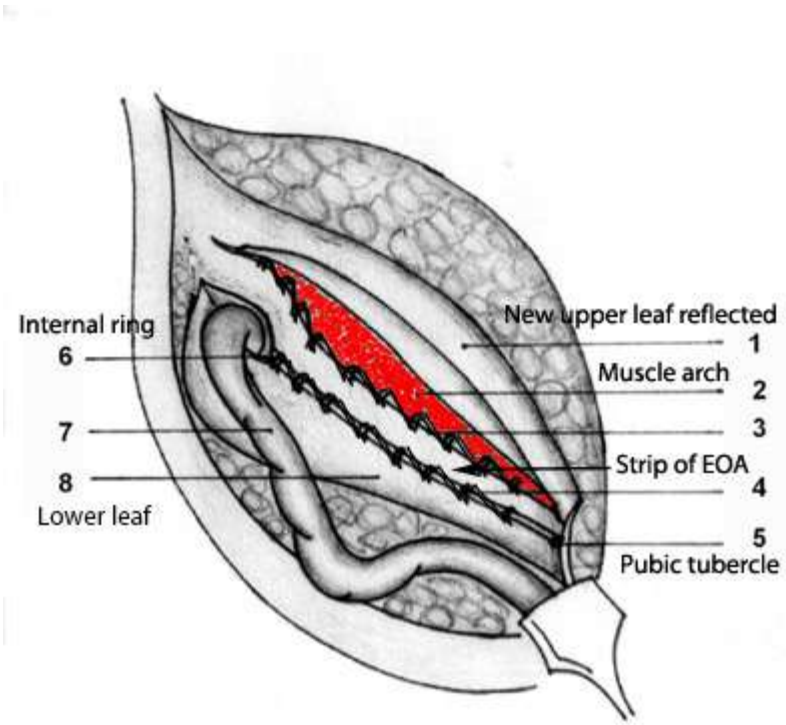
LEGENDS

FIG. 1. The medial leaf of the external oblique aponeurosis is sutured to the inguinal ligament.



1=Medial leaf; 2= Interrupted sutures taken to suture the medial leaf to the inguinal ligament; 3= Pubic tubercle; 4= Abdominal ring; 5=Spermatic cord; and 6= Lateral leaf.

FIG. 2. Undetached strip of external oblique aponeurosis forming the posterior wall



1=Reflected medial leaf after a strip has been separated; 2= Internal oblique muscle seen through the splitting incision made in the medial leaf; 3= Interrupted sutures between the upper border of the strip and conjoined muscle and internal oblique muscle; 4= Interrupted sutures between the lower border of the strip and the inguinal ligament; 5=Pubic tubercle; 6= Abdominal ring; 7=Spermatic cord; and 8= Lateral leaf.