

New Method of Herniorrhaphy Without Mesh

New method of inguinal hernia repair: A new solution

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[\(Live operation on direct, indirect & recurrent groin hernia operations in a CD for \\$ 20\)](#)

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Background

A new technique to strengthen the posterior wall of the inguinal canal in all types of inguinal hernias is described. This method of repair is done without mesh and has been developed because mesh is not easily available in rural or remote parts of many countries.

Method

After excision of the sac, a strip of the external oblique aponeurosis (EOA) is partially separated from its medial leaf, keeping its continuity intact at either end. This undetached strip of EOA is sutured to the inguinal ligament below and the arch of muscle above, behind the cord, to form a new posterior wall. This strip is put under tension by muscular contraction and works as a shield to prevent recurrence so that the external oblique muscle gives additional strength to the weakened internal oblique and transverse abdominis muscles.

Results

A total of 400 patients have been operated on from 1983 to 1999 and follow up by physical examination was carried out. (Eighty patients have been followed up for more than 10 years.) The postoperative period was comfortable with a hospital stay of 2–3 days and a return to work within 1–2 weeks. Recurrence was seen in only one case and haematocoele in one case.

Conclusion

These results are comparable with operations performed with mesh. This operation is simple to perform, does not require mesh or extensive dissection and has produced excellent results. Therefore it is a good alternative to mesh or other open or laparoscopic repairs. Key words: hernia, herniorrhaphy, inguinal hernia, strip of external oblique aponeurosis.

Introduction

Classical operations described by Bassini, McVay, Shouldice or others require expertise in hernia surgery to carry out the complicated and risky dissection of the inguinal floor and to identify and suture Cooper's ligament or the iliopubic tract. The recurrence rate in inguinal hernia surgery performed by expert hernia surgeons or carried out in centres with a special interest in such repairs is < 2%; but in the hands of average or junior surgeons the reported recurrence rate is as high as 25%.¹⁻⁶ This is probably because the majority of them perform a modified Bassini or modified Shouldice procedure in order to avoid the complicated and risky dissections, instead of the classical operations described by the original authors. The requirement of this group 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 that is simple, easy to perform, does not require extensive dissection or use of a foreign body such as a mesh, and which also gives a recurrence rate of < 2% without any major complications during or after surgery, especially because they are all operating in less than ideal conditions. The present series of hernia operations, using a strip of external oblique aponeurosis (EOA) in place of a mesh prosthesis, assumes importance because the technique can be performed by any general surgeon without expertise in hernia surgery and it reduces the cost incurred in the use of a mesh. The availability of mesh prostheses in smaller towns in underdeveloped countries is also a major problem. Further, this operation technique is very simple and safe; it is easy to understand and at the same time it has shown excellent results with a virtually zero recurrence rate.

Methods

Four hundred cases of inguinal hernia were operated on in the period between February 1983 and July 1999. All patients were between the ages of 18 and 90 years and 82% of patients were in the 30–80-year age group. The types of hernia in these patients are listed in Table 1. A total of 371 patients received spinal anaesthesia, 26 received local anaesthesia and three patients received general anaesthesia. No patient selection was used for the surgical procedure and cases with bilateral hernia were operated on both sides at the same sitting. Additional surgical problems such as hydrocele, piles, enlarged prostate and varicocele were also dealt with at the same time whenever required. Ambulation was permitted from the day of surgery and normal activity was permitted after a week. The majority of patients (85%) required a hospital stay of 3–4 days only. Eleven per cent of patients required a stay of 5–7 days and 4% required a stay of more than 7 days. Sutures were removed on the 8th day. Ampicillin and Cloxacillin and diclofenac were given for a week as prophylaxis because of the possibility of poor hygienic conditions at the residence. Follow up of operated cases was done after 15 days, 1, 2, 3 months and then every year. Physical examination was insisted upon but a correspondence option was also used. Ninety-nine per cent of patients returned for a follow-up visit after 15 days, 85.6% returned after 1, 2 and 3 months; 61.2% of patients presented at the 1-year follow up, 58.3% presented at the 2-year follow up, 53.5% presented after 3 years, 40.5% presented after 5 years, 35.6% presented at the 7-year follow up and 26.6% patients came for follow up for more than 10 years. The author is aware that a 10-year follow up of 26.6% is not enough, but this is not a

sufficient reason for ignoring the results of the present series. Publication of these data may encourage others to conduct more trials to prove or disprove these results.

Operative technique

Skin and fascia are incised through a regular oblique inguinal incision to expose the EOA. The thin and glistening, filmy fascial layer covering the EOA is kept undisturbed as far as possible and an assessment made about the strength of the EOA 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 EOA is cut in line with the upper crux of the superficial ring. This leaves the thinned-out portion in the lower leaf and a good strip can be taken from the upper leaf. The EOA, which is thinned out due to ageing or longstanding large hernias, can also be used for repair if it is able to hold the interrupted sutures. The cremasteric muscle is incised for the herniotomy, and the spermatic cord along with the cremasteric muscle is separated from the inguinal floor. Excision of the sac is done in all cases except in small direct hernias where it is inverted. The medial leaf of the EOA is sutured with the inguinal ligament from the pubic tubercle to the abdominal ring using 1-0 Ethilon or Prolene interrupted sutures. The first two sutures are taken in the anterior rectus sheath where the EOA is fused with it. The last suture is taken so as to sufficiently narrow the abdominal ring without constricting the spermatic cord (Fig. 1). Each suture is passed first through the inguinal ligament, then the transversalis fascia and then the EOA. 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 taken in this sutured medial leaf of the EOA, 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 symphysis and laterally 1-2 cm beyond the abdominal ring. The medial insertion and lateral continuation of this strip is kept intact. A strip of the EOA is now available, the lower border of which is already sutured with the inguinal ligament. The upper free border of the strip of the EOA is now sutured to the internal oblique or conjoined muscle lying close to it with 1-0 Ethilon or Prolene 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 it is possible, avoiding tension, but it is not important to the success of the operation. This will result in the strip of EOA 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 transverse abdominis is clearly visible. This 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 EOA is sutured to the newly formed medial leaf of the EOA in front of the cord, as usual, again using 1-0 Ethilon or Prolene interrupted sutures. Undermining of the newly formed medial leaf of the EOA on both of its surfaces facilitates its approximation to the lateral leaf. The first stitch is taken between the lateral corner of the splitting incision and lateral leaf of the EOA. This is followed by closure of the superficial fascia and the skin as usual.

Results

Six patients exhibited swelling in the operated area during the postoperative period; this subsided on its own without any treatment within a couple of weeks. This was possibly due to the venous congestion caused by extra narrowing of the internal ring during surgery. Four patients had mild skin infection that subsided within 1 week. One patient developed a haematocele, which was drained. No other complications (such as severe postoperative pain, major infection, testicular atrophy etc.) were seen. Only one patient who was operated on in 1984 suffered from recurrence of hernia after 2 years. There was no other case of recurrence or late complications reported. Reoperation on this patient revealed a healthy strip of EOA without any necrosis, and fusion with the inguinal ligament and the muscle arch was good without any fibrous adhesions to surrounding structures. All patients were ambulatory with limited movement from the second day, and 89% were ambulatory with free movement in 4 days. Eighty-five per cent of patients were discharged on the 3rd or 4th day and the median hospital stay was 3.5 days. No patient had severe pain that restrained movement during the hospital stay or later. Ninety-six per cent of patients had mild pain for 2–4 days that did not restrict free movement. All patients were able to return to their routine work within 1–2 weeks.

Hospital stay and anaesthesia

Ninety per cent of patients in this series were kept in the hospital from 3 to 5 days for observation following operation. The author, encouraged by the results, is confident about converting this procedure to day-stay surgery. Similarly, the majority of patients were given spinal anaesthesia only to perform the technique smoothly and watch for further improvements if any. Now the majority of patients are operated on under local anaesthesia only.

Discussion

Since its original description in 1887⁷ Bassini's operation has become a standard for inguinal hernia repair. Since then there have been many modifications to this repair, predominant being those described by Halsted, McVay and Shouldice. These techniques share the same principle of pulling down the internal oblique and transverse abdominis muscle to suture with either the inguinal or Cooper's ligament or the iliopubic tract. There were three objections raised regarding these open operations: (i) Halsted was one of many authors who criticized and warned of the danger of tension on the suture line and stated 'no tension' as one of the great principles of surgery;⁸ (ii) these authors advised incision/excision of the transversalis fascia requiring extensive dissection; and (iii) Amid *et al.* reported that the use of already weakened muscles and transversalis fascia, especially under tension, is a violation of the most basic principles of surgery.⁹ Hay *et al.* compared Shouldice to Bassini and Cooper's ligament repair and found that, in a study of 1578 hernias at an average of 8.5 years follow up, the recurrence rate was 6% compared to a recurrence rate of 8.6% using Bassini and a recurrence rate of 11% using Cooper's ligament repair.¹⁰ Panos *et al.* and Kingsnorth *et al.* have stated that the recurrence rates from smaller institutions and general ordinary surgeons seem, in the

literature, to be worse than those from specialist centres such as Shouldice or Lichtenstein clinics.^{5,6} Obviously those open hernia operations described by the original authors do not satisfy all the criteria of modern hernia surgery, and modifications of those operations failed to give the desired results especially in the hands of junior surgeons. Therefore, more recently, the use of a mesh prosthesis for inguinal hernia repair has been quite popular among general surgeons worldwide. The operation described by Lichtenstein is simple and safe and achieves all the goals of modern hernia surgery.¹¹ But the mesh prosthesis has its own drawbacks. First, it is not available in every part of the world. Second, it increases the cost of the operation. Third, because the groin is a mobile area there is a tendency for the mesh to fold, wrinkle or curl. Mesh prostheses lose approximately 20% of their size, *in vivo*, through shrinkage. The slightest movement of the mesh from the sutured area, due to the aforementioned factors, is a leading cause of failure of mesh repair of inguinal hernias.¹² Further, chronic groin sepsis following mesh repair is more frequent than reported previously and complete removal of mesh is required to treat this condition.¹³ The ageing process is minimal in the tendons and aponeurosis. Therefore the use of a strip of EOA, which is tendo-aponeurotic in nature, is the best alternative to a mesh or Shouldice. The thinned out portion of the EOA was also used by the author with good results. This eliminates all the drawbacks and complications of using a foreign body such as a mesh, and also avoids extensive, complicated dissections. The author's technique satisfies all the criteria of modern hernia surgery. It is simple and easy to perform and learn. Even a junior resident can easily operate by this technique. 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 such as mesh nor does it use weakened muscles or transversalis fascia for repair. Even suture material like prolene or ethilon, used by the author, can be replaced by any other suitable suture material. The results of the present series have demonstrated a minimum hospital stay in 90% of patients. All patients were ambulatory on the second day. A total of 96% of patients had a very comfortable postoperative period with minimal pain. Ninety-nine per cent of patients had a rapid recovery and they were able to return to work in 1–2 weeks. This operation is cost-effective and early or late complications are well below 1–2%. Suturing of the EOA behind the cord and the use of a detached strip of EOA or fascia lata for darning purposes has been described. Double breasting of the EOA was done by Zimmerman for repairs of inguinal hernias.¹⁴ In Andrew's imbrication operation¹⁵ the entire medial leaf of the EOA along with the internal oblique and transverse abdominis muscle is sutured to the inguinal ligament behind the cord, and the lateral leaf of the EOA is used to cover the spermatic cord in front. The author's operation differs from the Andrews 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. The author did not find any technique in the medical literature similar to the one described here.

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 against the inguinal ligament, creating tension above and laterally and turning the strip into a shield to prevent any herniation. This additional strength given by the

external oblique muscle to the weakened muscle arch to create tension in the strip and prevent reherniation is the essence of this operation. The shielding action of the strip of EOA can be elegantly demonstrated on the operating table by asking the patient to cough. The much publicized shutter mechanism, to prevent herniation, is already lost once a hernia is formed. It is the shielding action of the abdominal muscles, or their aponeurotic extensions, that is the main factor in preventing the herniation. The transversalis fascia acts as a barrier to prevent hernia 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 the use of the transversalis fascia at 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 EOA on the posterior wall of the inguinal canal, in place of absent aponeurotic extensions, and therefore the possibility of herniation behind this strip, through the transversalis fascia, is also removed.

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Fig. 1. The medial leaf of the external oblique aponeurosis (EOA) is sutured to the inguinal ligament. 1, medial leaf of EOA; 2, interrupted sutures taken to suture the medial leaf of the EOA to the inguinal ligament; 3, pubic tubercle; 4, abdominal ring; 5, spermatic cord; 6, lateral leaf of the EOA.

Fig. 2. Undetached strip of external oblique aponeurosis (EOA) forming the posterior wall of the inguinal canal. 1, reflected medial leaf of the EOA after a strip is separated; 2, internal oblique muscle seen through the splitting incision taken in the medial leaf of the EOA; 3, interrupted sutures between the upper border of the strip and conjoined muscle/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; 8, lateral leaf of the EOA.

Table 1. Inguinal hernia types

Hernia type	No. cases (%)
Direct	100 (25.00)
Indirect	297 (74.25)
Pantaloon hernia	3 (0.75)
Obstructed	15 (3.75)
Recurrent	16 (4.00)
Right side hernia	216 (54.00)
Left side hernia	125 (31.25)
Bilateral	59 (14.75)

LEGENDS

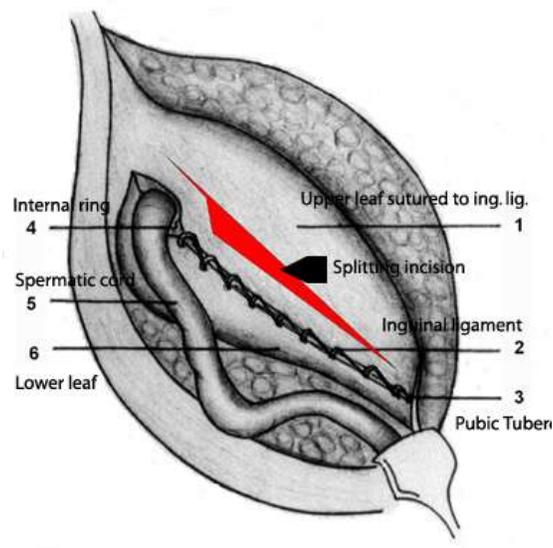


FIG.1. Medial leaf of EOA is sutured to the inguinal ligament with splitting incision taken 1=Medial leaf; 2=Continuous absorbable sutures taken to suture the medial leaf to the inguinal ligament; 3=Pubic tubercle; 4=Abdominal ring; 5=Spermatic cord; 6= Lateral leaf.

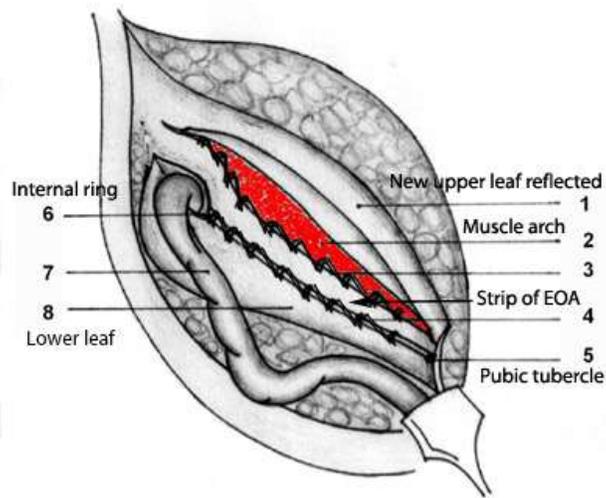


FIG.2. Undetached strip of external oblique aponeurosis forming the posterior wall of inguinal canal.1=Reflected medial leaf after a strip has been separated; 2= Internal oblique muscle seen through the splitting incision made in the medial leaf; 3= Continuous absorbable sutures between the upper border of the strip and conjoined muscle or internal oblique muscle; 4= Continuous absorbable 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.