Original Article

No-mesh Inguinal Hernia Repair with Continuous Absorbable Sutures: A Dream or Reality? (A Study of 229 Patients)

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ABSTRACT

Background/Aim: The author has published results from two series based on his new technique of inguinal hernia repair. Interrupted sutures with a nonabsorbable material were used for repairs in both theses series. The author now describes the results of repairs done with continuous absorbable sutures. **Materials and Methods:** This is a prospective study of 229 patients having 256 hernias operated from December 2003 to December 2006. An undetached strip of the external oblique aponeurosis was sutured between the inguinal ligament and the muscle arch to form the new posterior wall. Continuous sutures were taken with absorbable suture material (Monofilament Polydioxanone Violet). Data of hospital stay, complications, ambulation, recurrences, and pain were recorded. Follow-up was done until June 2007. **Results:** A total of 224 (97.8%) patients were ambulatory within 6-8 h (mean: 6.42 h) and they attained free ambulation within 18-24 h (mean: 19.26 h). A total of 222 (96.4%) patients returned to work within 6-14 days (mean: 8.62 days) and 209 (91.26%) patients had one-night stays in the hospital. A total of 216 (94.3%) patients had mild pain for 2 days. There were four minor complications, but no recurrence or incidence of chronic groin pain. Patients were followed up for a mean period of 24.28 months (range: 6-42 months). **Conclusions:** The results of this study correlate well with the author's previous publications. Continuous suturing saves operative time and one packet of suture material. The dream of every surgeon to give recurrence-free inguinal hernia repair without leaving any foreign body inside the patient may well become a reality in future.

Key Words: Absorbable sutures, inguinal hernia, no-mesh, open repair, new method

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Inguinal hernia repair is one of the most common surgical procedures performed worldwide. Improved surgical techniques and a better understanding of the anatomy and physiology of the inguinal canal have significantly improved outcomes for many patients. These improvements have occurred most notably in centers specializing in hernia surgery, with some institutions reporting failure rates of <1%.[1,2] In contrast, failure rates for general surgeons without expertise in hernia surgery, who perform most hernia repairs in secondary or tertiary level general hospitals, remain significantly higher (up to 10% for primary hernias and 5-35% for recurrent hernias).[3] This has important socioeconomic implications, adding an enormous cost of treating the condition, which runs into billions of dollars.

The recurrence rate of the operation, complications including chronic groin pain, cost, and time taken to return to normal activities are the benchmarks against which the success of any hernia surgery is evaluated. The search for a method that accomplishes all the above goals perfectly, preferably without the insertion of any foreign body such as mesh, continues. It is this quest for better surgery without any foreign body and which will give excellent results even when performed by a novice general surgeon that led the author to conduct trials for his no-mesh, open hernia repair technique. The author has already published the results of two series based on his new technique of inguinal hernia repair.[4,5] Interrupted sutures made of a nonabsorbable material were used for repairs in both these series. In this report, the author describes the results of repairs done with continuous absorbable sutures.

The present study reports the author's experience with his new method of inguinal hernia repair with continuous absorbable sutures in 229 patients having 256 hernias, operated over the period from December 2003 to December 2006. Patients were followed up until June 2007.

MATERIALS AND METHODS

This is a prospective study of 229 consecutive patients with 256 inguinal hernias repaired using this new technique with continuous absorbable sutures from December 2003 to December 2006. An intravenous antibiotic was administered intraoperatively in all cases; no further antibiotic doses were given. Oral analgesics (Tab. Diclofenac 50 mg twice a day) were given to all the patients for 2 days after which oral or parenteral analgesics were given only on demand. Patients were encouraged to ambulate after 5-6 h of surgery and were permitted to go home after they were able to go to

the bathroom on their own. All patients who were doing nonstrenuous office work, were advised to start routine work from the third postoperative day.

The patients were evaluated daily during their stay in the hospital. Data collected included duration of hospital stay, pain, ambulation and complications recorded during the operations or the hospital stay. Pain was measured using the visual analog scale (VAS) with 0-30 mm signifying mild pain, 31-60 mm moderate pain, 61-90 severe pain and 91–100 excruciating pain. "Limited ambulation" indicated movements inside the room, "free movements" were movements outside the room, and "no movements" meant that bed rest was advised. The follow-up schedule was explained to the patient at the time of discharge and was scheduled after 8 days for suture removal, then, after 1 month, 6 months, and then, yearly. The patients were evaluated in detail and the data recorded at each assessment. The entire data were collated and analyzed at the end of the study. Patients were followed up for a mean period of 24.28 months (range: 6-42 months). The appearance of a bulge accompanying a cough impulse was treated as recurrence of the hernia.

Operation technique

Skin and fascia are incised using a regular, oblique inguinal incision to expose the external oblique aponeurosis (EOA) [Figure 1]. As far as possible, the thin, filmy fascial layer covering the EOA is kept undisturbed. The EOA is cut in line with the upper crux of the superficial ring. The sac is excised in indirect hernias and it is inverted in direct hernias. The upper leaf of the EOA is sutured with the inguinal ligament from the pubic tubercle to the abdominal ring using number 1 Monofilament Polydioxanone Violet continuous sutures [Figure 2]. The first two sutures were taken through the anterior rectus sheath and the last suture is taken so as to narrow the abdominal ring sufficiently [Linear diagram 1].

Figure 1: External oblique aponeurosis is exposed. View of indirect hernia sac going to scrotum

A splitting incision is made in this sutured medial leaf, partially separating a strip 1.5-2 cm wide. This splitting incision is extended medially up to the pubic symphisis and 1-2 cm beyond the abdominal ring laterally [Figure 3]. The medial insertion and lateral continuation of this strip is kept intact [Figure 4]. The upper free border of the strip is now sutured to the internal oblique with number 1 Monofilament Polydioxanone Violet continuous sutures all along its length [Figure 5]. This will result in the strip of the EOA being placed behind the cord to form a new posterior wall of the inguinal canal [Figure 6 and Linear diagram 2].

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 before,

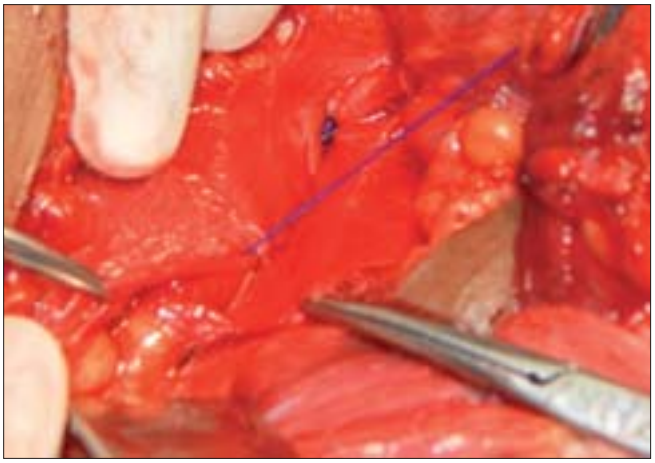
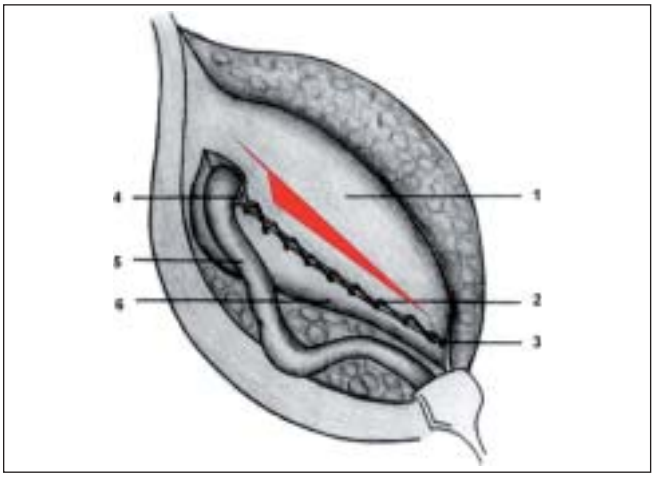


Figure 2: The medial leaf of the EOA is sutured to the inguinal ligament from the pubic tubercle to the abdominal ring using number 1 Monofilament Polydioxanone Violet continuous sutures. Artery forceps is holding lateral leaf



Linear diagram 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

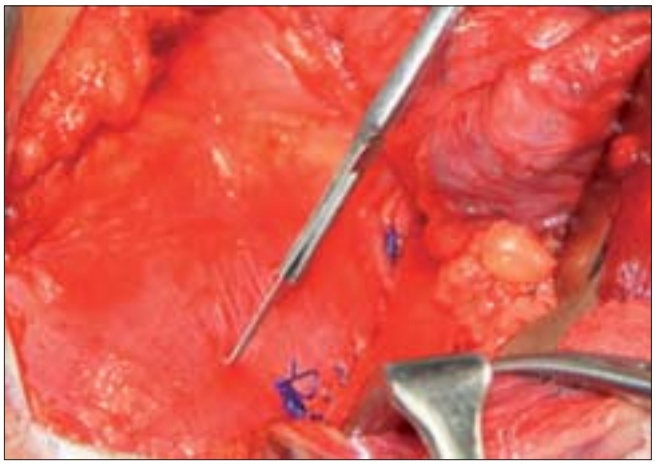


Figure 3: Incision is being taken in the sutured medial leaf parallel to the inguinal ligament

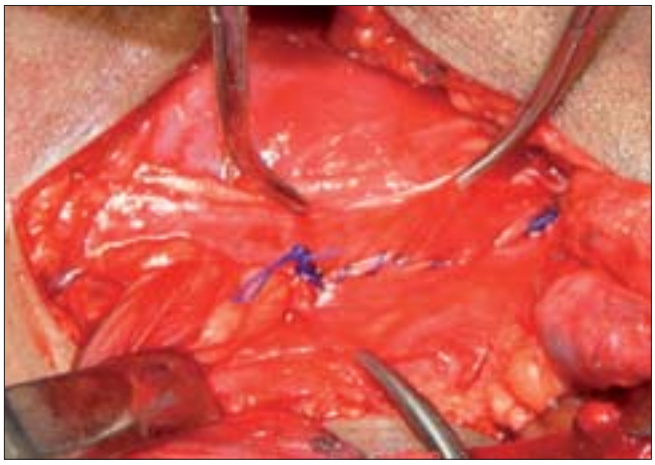


Figure 4: Medial insertion and lateral continuation of the strip is kept intact

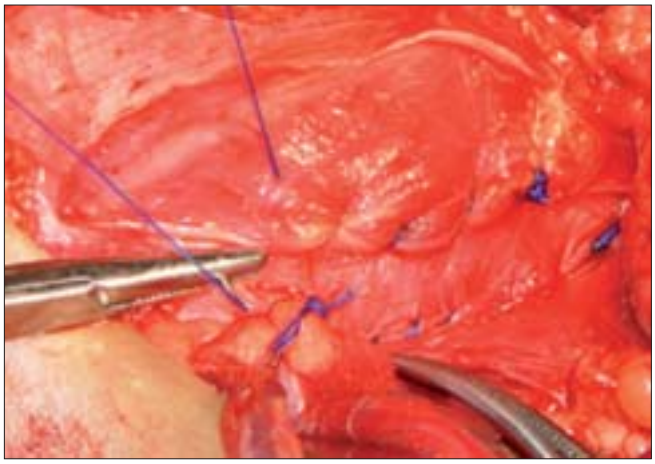


Figure 5: Upper free border of the strip is now sutured to the internal oblique with number 1 Monofilament Polydioxanone Violet continuous sutures

number 1 Monofilament Polydioxanone Violet (PDSII NO. 1, Ethicon) continuous sutures [Figures 7 and 8] were used. Undermining of the newly formed medial leaf on both its surfaces and excision of the bulky cremasteric muscle

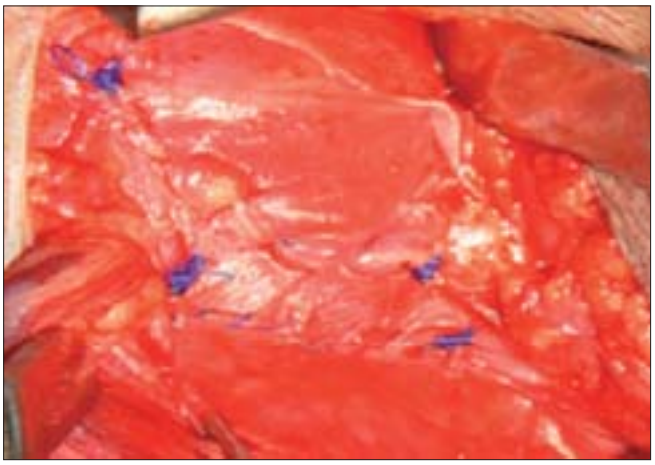
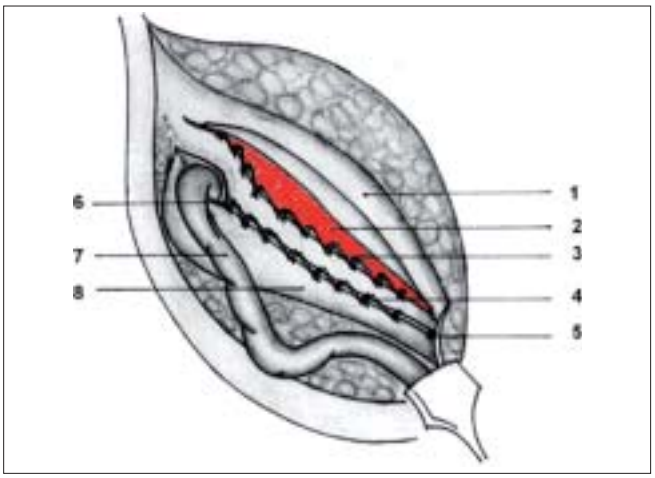


Figure 6: Strip is seen sutured between inguinal ligament and internal oblique muscle. Artery forceps is holding lateral leaf of EOA and the cord is retracted by the left retractor



Linear diagram 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

(if required) facilitate its approximation to the lateral leaf. This is followed by routine closure of the superficial fascia and the skin.

RESULTS

The break-up of the 256 hernias observed in the 229 male patients was as follows: 64 were direct, 103 were indirect, 27 were bilateral, 16 were recurrent, 3 were obstructed, and 16 were pantaloons. The mean age of the patients was 52.54 years (range: 18-93 years). A total of 194 patients were operated under spinal, 34 under local, and one under general anesthesia. There were no intraoperative complications.

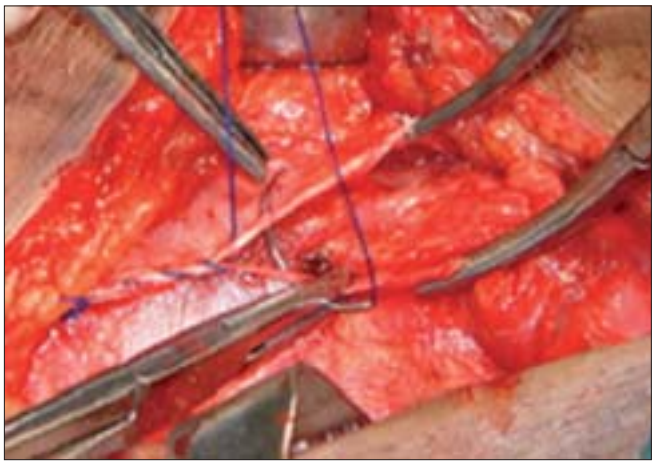


Figure 7: Lateral leaf of the external oblique is sutured to the newly formed medial leaf of the external oblique in front of the cord as usual using number 1 Monofilament Polydioxanone Violet continuous suture

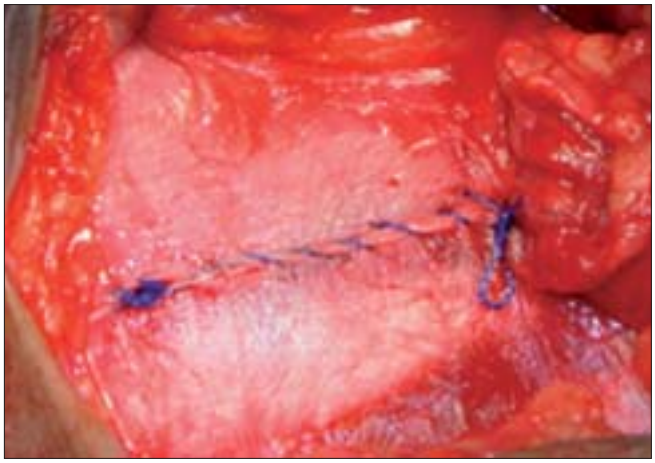


Figure 8: External oblique aponeurosis (EOA) closure in front of the cord completed

A total of 224 (97.8%) patients were ambulatory within 6-8 h (mean: 6.42 h) and were freely mobile within 18-24 h after surgery (mean: 19.26 h). A total of 222 (96.4%) patients returned to work within 6-14 days (mean: 8.62 days). A total of 209 (91.26%) patients were allowed to go home on the same day, but they preferred to stay overnight in the hospital and were discharged on the following morning; the mean hospital stay duration of the patients was 1.11 days. Postoperative pain on movement out of bed was described as mild and tolerable by 212 (92.6%) patients on day 1. The quantum of pain reduced significantly and those patients complained of a slight discomfort rather than any pain by day 3. No patient had discomfort for more than 15 days after this repair. There were no long-term complications or recurrence of the hernias. Two patients had transient wound edema that subsided on its own. Two patients had superficial wound infections that needed treatment. One was treated with antibiotics and another needed drainage of pus. There were no patients with chronic groin pain.

DISCUSSION

The Lichtenstein technique and its modifications have become some of the most popular and frequently performed surgeries, but complications and recurrence of the hernias continue to plague this repair technique. There is a high incidence of chronic groin pain following hernia repair, reportedly in the range of 28.7[6]-43.3%.[7] The slightest movement of the mesh from the sutured area is a leading cause of failure of mesh repair of inguinal hernias.[8] Chronic groin sepsis after mesh repair requires complete removal of mesh to treat the sepsis.[9] Possible damage to the spermatic cord and nerve entrapment following mesh repair due to extensive fibrosis are also concerns raised by this technique.[10]

Laparoscopic hernia repairs increase the cost,[11] are technically complex and have a long-learning curve.[12] Open no-mesh techniques also have their own limitations. The Shouldice technique, which is considered the gold standard in open no-mesh techniques, has recurrence rates of 1-4% in specialized centers.[13,14] However, the long-learning curve, the risky dissection of the inguinal floor and a lack of experience make these figures unattainable for the general surgeon practicing outside these specialized centers.[15]

All open no-mesh repairs are done by using interrupted sutures made from nonabsorbable material. Interrupted sutures are used in open repairs to distribute the tension equally on all the sutures to avoid recurrence of the hernia due to splitting of the tissue by the pull of the displaced muscles. Nonabsorbable material is used to keep those structures together for unlimited lengths of time to make them blend properly and gain full strength.

In the author's technique, there is no displacement of the internal oblique or transversus abdominis muscles. Displacement of the strip of EOA is minimal because EOA and internal oblique are adjacent structures. Sutures have no tension during contraction of the muscles because fibers of the EOA strip and internal oblique muscle run parallel to each other in this region of the inguinal canal. This observation led the author to take this trial of repairs with absorbable and continuous sutures. No recurrence seen in this trial for a mean follow-up period of 24.28 months is sufficient to draw conclusions because this is a much longer period than what is required for sutured tissues or for the suture line to blend and gain full strength.

The author postulates that it is the aponeurotic extensions given from the transversus abdominis aponeurotic arch, which make the posterior wall strong and prevent herniations.[16] These aponeurotic extensions are absent or deficient in 53% of the population.[17] Strong musculo-aponeurotic structures around the inguinal canal still give protection to prevent

herniation in such individuals. This protection is lost if those muscles are weak.

The strip of EOA in this new technique provides the aponeurotic element to the transversalis fascia of the posterior wall. Contractions of the abdominal muscles pull this strip upward and laterally, creating tension (increased tone) in it and making it a shield to prevent any herniation. The strip provides a new insertion to the weak internal oblique and transversus abdominis muscles. This helps to improve the contractile strength of the internal oblique and transversus muscles. The additional strength given by the external oblique muscle to the weakened muscles of the muscle arch, to create increased tone in the strip and prevent reherniation, is the essence of this operation. The increased tone created in this strip is graded according to the force of muscle contractions. Stronger intraabdominal blows result in stronger abdominal muscle contractions and stronger muscle contractions result in increased tone in this strip to give graded protection. The strip or the suture line lacks tension at rest. Thus, a strong and physiologically dynamic posterior wall is prepared in this operation.

As the steps in this surgery are fixed, there is very little scope for modification by individual surgeons. Hence, this technique will prove to be very effective even in the hand of junior surgeons. The uniformly excellent results seen with this repair technique in centers in other countries all over the world confirm its efficacy.[5]

Cost-saving

Losses of millions of dollars are incurred and millions of working hours are lost every year affecting the national productivity in treating recurrences or requiring re-exploration for complications in current inguinal hernia operations.

Recurrence

The recurrence rate in long-term follow-ups and outside specialized centers is nearly 7-8%[18-21] (Hospital Episode Statistics (HES) data 1995-96). This translates into a loss of approximately £5-6 million every year in the UK against 80,000 groin hernia operations (6000 recurrent hernias).

Cost of mesh

National expenditure on mesh comes to £2-2.5 million every year in the UK, assuming £25-30 as the cost of a standard mesh.

Losses due to waiting time for surgery (HES data 95-96)

People in manual occupations may be on sick leave for prolonged periods of time waiting for a hernia repair, with considerable cost to the individuals, their employers, and the welfare state. If 1% of all the people waiting for surgery are unable to work while waiting for an average period of 133 days, approximately 295 years of productivity per annum can be considered to be lost in the UK.

Median time to resume 'normal' activities[22,23]

In the UK, patients are routinely given sick notes for 4-6 weeks. While sick leave does not affect healthcare spending, it does have an effect on overall public spending.

In this author's technique of repair, there is no recurrence,or mesh, continuous absorbable suturing saves a packet of suture material and time, and leaves no foreign body inside the patient. No costly equipments are involved and the technique can be easily done on an outpatient basis saving hospital beds. It can routinely be done under local or regional anesthesia and the patients are back to their routine work in 1-2 weeks, thereby reducing sick leave from 4-6 weeks to 1-2 weeks. This makes this repair highly cost-effective. This surgery can be safely delegated to nonconsultant staff to reduce the rush to the consultants, and thus reduce losses to the nation due to sick leave taken by the patients on waiting lists. The author believes that significant savings can be effected every year if this repair technique is evaluated and adopted.

CONCLUSIONS

The results of this new repair technique using continuous absorbable sutures appear promising. This technique does not use any foreign body and has minimal complications with no recurrence of hernia or chronic groin pain. The continuous suturing saves time and one packet of suture material. The dream of every surgeon to give recurrence-free, inguinal hernia repair without leaving any foreign body inside the patient may well become a reality in future.

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