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Research Article

A study of outcome of repair of ventral abdominal hernia by shoelace darn method

Vijay Kumar Jain*, Pallab Ghosh, Puskar Shyam Chowdhury, Sudeshna Das

Department of Surgery, K.P.C. Medical College and Hospital, Jadavpur, Kolkata, India

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***Correspondence:**
Dr. Vijay Kumar Jain,
E-mail: drvijaysurgjain@yahoo.co.in

ABSTRACT

Background: Ventral abdominal of hernia is very common pathology in general surgical practise. Numerous surgical procedures have been described to repair them, with varying degree of success. This study aims to find the place of shoelace darn in the repair of ventral abdominal hernia.
Methods: The retrospective study of 36 cases of ventral abdominal hernia and prospective study of 26 cases of postoperative ventral abdominal hernias repaired by the shoelace darn technique was carried out over a period from July 2008 to 2011 and from July 2011 to 2014 respectively in the department of general surgery K.P.C. Medical College and Hospital, Kolkata, India.
Results: Shoelace darn repair of ventral abdominal of hernia was relatively easy procedure associated with fewer complications. There were rare true recurrences noted.
Conclusions: From the present study we can conclude that, Shoelace darn repair still remains an excellent technique in the management of ventral abdominal of hernia, despite advent of mesh and laparoscopic repair.

Keywords: Ventral abdominal hernia, Shoelace repair, Mesh, Laparoscopic

INTRODUCTION

Ventral hernia is a protrusion of an abdominal viscus or part of a viscus through the anterior abdominal wall occurring at any site other than the groin. It includes incisional hernias, para-umbilical hernias; umbilical hernia, epigastric hernias, and spigelian hernias, respectively. Occurrence of ventral abdominal of hernia is very common.[1]

The formation of ventral hernias is a multifactorial and complex process. Three types of ventral hernias are recognized: Spontaneous, congenital, and incisional hernias. In 90% of patients, it is an acquired defect that is a direct result of increased abdominal pressure. Causes of this increase in abdominal pressure include multiparous status, obesity, and cirrhosis with ascites.[2,3]

Operative management of ventral hernias

For many years, the repair of incisional hernia was associated with a high recurrence rate. In more recent years, the introduction of synthetic prosthetic materials has provided the opportunity to perform a tension free repair, thereby reducing the rate of recurrence.

With the development of modern synthetic non absorbable materials, three basic operative methods have emerged for repair of ventral abdominal hernia;

- Re-suture[7]

- Shoelace darn repair[4,6]
- Synthetic non-absorbable mesh repair[8]

The method chosen depends on the size of the hernial defect. The size of hernia can be assessed with the patient standing and coughing. The size of the defect and its behavior can be examined with the patient supine. The surgeon's hand with fingers straightened is inserted into the defect, and the patient is requested to raise his head and shoulders forward without the aid of his hands. If necessary, he is asked to raise his straightened legs at the same time.

The repair of narrow hernias is by shoelace technique. This is a quick, easy, and extra peritoneal method that simply returns the unopened hernial sac and its contents to the abdominal cavity and then avoids the tedious and perhaps risky dissection of the adherent loops of bowel on the inner surface of the sac and abdomen. Since the defect is narrow, the lateral cut edges of the rectus sheath come together in the midline and are anchored to the new linea alba. Hernias with a wider defect also can be conveniently repaired by the shoelace darn technique. The third method for these hernias involves the use of sheets of woven or knitted mesh of synthetic non-absorbable materials such as polypropylene, polyester or sheets of expanded poly tetra fluoro ethylene (PTFE) place.

The most common and most favored material today is knitted polypropylene. This method of repair of large postoperative ventral abdominal hernias is a good one and has undoubtedly become popular. It may involve the resection of the hernial sac and the dissection of the adherent loops of bowel with the risk of fistula formation. A large foreign body is used, and the procedure is time-consuming and requires prolonged anaesthesia, whereas shoelace technique is simple, quick, and entirely extra peritoneal.

Prosthetic mesh repair

The user sheets of non-absorbable synthetic mesh prostheses placed across the defect and stitched to the abdominal wall has revolutionized the repair of the abdominal wall defects. It is an excellent method of repair of large postoperative ventral abdominal hernias with Apo neurotic defects than 10 cm various methods are available for repair like polypropylene mesh, (Marlex, Prolene, Surgipro), polyesters fiber mesh (Marselene), Polyamide and the new poly tetra fluoro ethylene (PTRE OR Teflon, Gortex).[9]

The prosthesis made of polypropylene and polyester incites a prompt fibroblastic reaction fibro vascular tissue grows through the pores and invades the mesh which is eventually incorporated into the body in a strong and pliable collagen sheet. Gortex is inert and does not incite fibroplasias or inflammation. Consequently, fixation and integration is delayed. Mesh may be placed the peritoneum and abdominal muscles or deep to the peritoneum as an onlay graft. A piece of mesh about the size of the defect may be sutured to the edge of the defect as an inlay graft.

Various techniques of prosthetic mesh implantation;

- Onlay technique
- Inlay mesh repair
- Intraperitoneal underlay mesh repair

Laparoscopic repair of ventral hernia

The laparoscopic approach involves entering the abdomen away from the hernia defect, lysing adhesion to remove structures from the hernial sac, and adjacent abdominal wall. The mesh is inserted through a trocar site and fixed to the abdominal wall with partial thickness tacks or full thickness abdominal muscular or facial wall suture. The latter is more technically challenging but also more closely duplicates the open approach. The laparoscopic approach has been noted to have a significant seroma rate of approximately 10-15%. The recurrence rates have generally been <5%.[10]

The aim and objectives of the study was to assess shoe lace darning with respect to early postoperative morbidity, to ascertain whether a single method of repair is applicable to all cases of ventral abdominal hernia and to study factors which causes recurrences of hernia after repair.

METHODS

The retrospective study of 36 cases of ventral abdominal hernia and prospective study of 26 cases of postoperative ventral abdominal hernias repaired by the shoelace Darn technique was carried out over a period from July 2008 to 2011 and from July 2011 to 2014 respectively in the department of General Surgery K.P.C. Medical College and Hospital, Kolkata, India.

A detailed history was taken about the time it was first seen, exact site, pain only aggravating or relieving factors, any predisposing factors like cough, respiratory distress, constipation, dysuria, diabetes, tuberculosis etc.

History was taken for any steroid therapy especially steroid or hormones and also regarding addiction to smoking & alcohol and previous operation which caused herniation was noted.

All the patients underwent preoperative investigations for fitness including complete blood count, random blood sugar, renal and liver function tests, coagulation profile, X-ray chest, electrocardiogram, ultrasonography of the abdomen.

Systemic examination of gastrointestinal system including digital rectal examination, cardiovascular

system, neurological and genitourinary system including examination of the external genitalia was done.

Operative procedure

All the patients were admitted and operated under general anaesthesia, it is to be emphasized that for adequate mobilization of the muscles in shoelace darn repair, general anaesthesia with proper muscle relaxation is imperative. All the cases repaired with the Shoelace Darn repair were done under general anaesthesia with adequate muscle relaxation. The previous scar and the unhealthy tissue were excised. The sac with the adherent gum and the omentum were exposed. Preoperatively the length and breadth (actual gap) were measured by scale. The number and the type of suture material used for the shoelace darn repair were recorded.

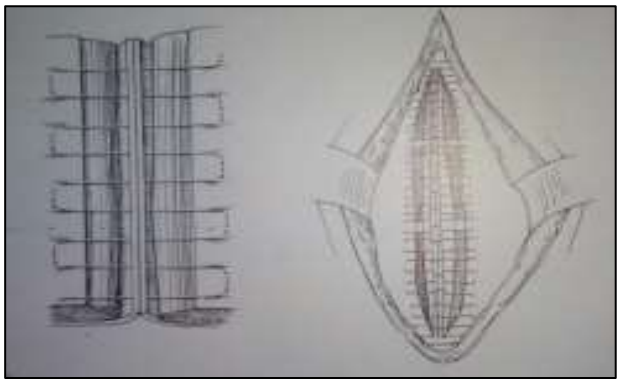

Figure 1: Shoelace suture and completed repair.

During the post-operative period, a close observation was made regarding a difficult or smooth extubation, pulse rate, rate of respiration, blood pressure, and appearance of peristaltic sounds, postoperative abdominal distension, and post-operative cough or any respiratory distress, passage of flatus and also the degree of analgesia.

In the general survey, the patient's build, nutrition, pallor, cyanosis, jaundice, clubbing, neck glands were looked. The patients' pulse and blood pressure were recorded during local examination; the patients were examined in the standing and lying down position. The hernial gaps were also palpated during the leg rising test and the head up tests. The site and size of the swelling, condition of the skin and scar over it, visible peristalsis, presence or absence of impulse on coughing and reducibility were noted. When reduced, the myoaponeurotic defect was measured both in relaxed position as well during increase intra-abdominal tension by Valsalva maneuver.

RESULTS

For retrospective study 36 cases here evaluated and for prospective 26 cases followed up at regular intervals of one month approximately.

Table 1: Distributing of sex among ventral hernia cases.

Sex	No. of cases: Retrospective/Prospective	%
Male	8/4	22.2/18.2
Female	28/22	77.8/81.8

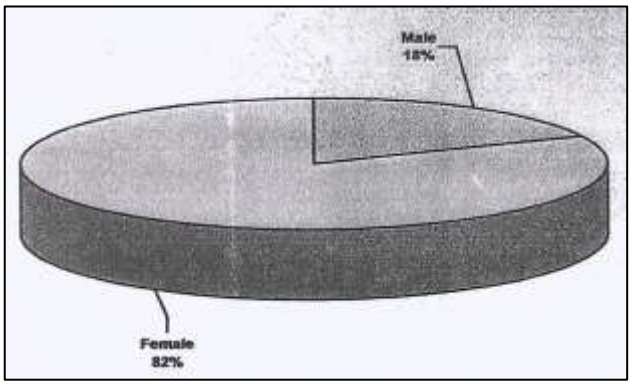

Figure 2: Distributing of sex among ventral hernia cases.

Table 1 shows large number of patients was female contributing about 80%.

Table 2: Distribution of post-operative ventral hernias in different age groups.

Age group	No. of cases	%
0-10	0/0	0/0
11-20	0/0	0/0
21-30	4/3	11.1/11.5
31-40	12/9	33.3/34.5
41-50	12/8	33.3/33.5
51-60	4/4	11.1/15.3
Above 60	4/2	11.1/6.9

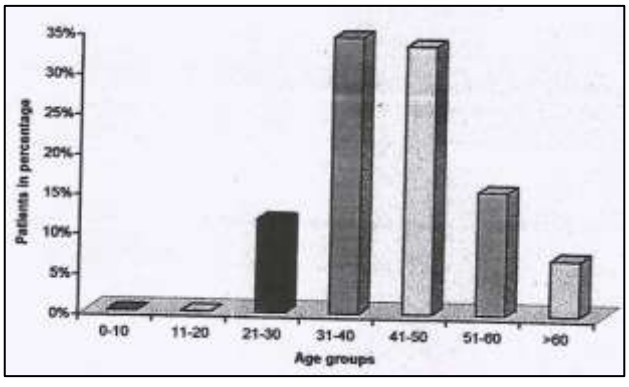

Figure 3: Distribution of post-operative ventral hernias in different age groups.

Table 2 shows that most number of patient (both in retrospective & prospective) in study were in age group 31-40 and 41-50 cases below 20 years of age were nil.

Table 3: Type of operation preceding hernia.

Type of operations	No. of cases	%
Lucs exploratory	16/11	44.4/42.31
Laparatory	8/4	22.21 / 18.2
Abdominal Hysterectomy	3/6	8.3 / 23.1
Cholecystectomy	6/3	16.6 / 11.5
Vagotomy and Gastrojejunostomy	1/1	2.77 / 3.84
Rt hemicolectomy	1/1	2.77 / 3.84
Pyelolithtomy	1/0	2.77 / 0

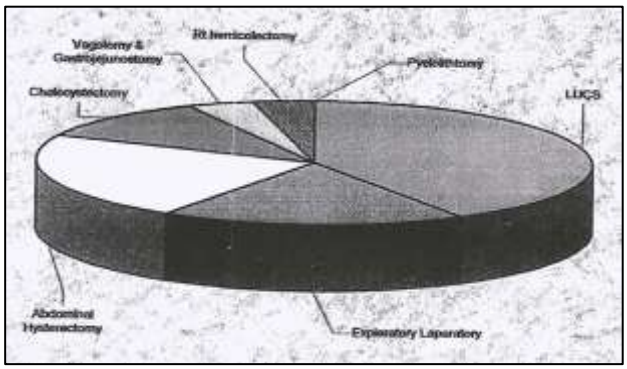

Figure 4: Type of operation preceding hernia.

Table 3 shows that commonest operation that precedes hernia is lower uterine caesarean section.

Table 4: Type of incision leading to incisional hernia.

Type of incisional	No. of cases	%
Infra umbilical vertical	19	73.07
Midline supraumblical	4	15.3
Subcostal	2	7.69
Para median	1	3.84

Table 4 shows that maximum no. of cases of post-operative ventral hernia occurred through infra-umbilical vertical midline incision.

Table 5: Time of appearance of ventral hernia after original operation.

Time	No of cases	%
<3month	1	3.84
3-6 months	14	53.8
6 months-1 year	7	26.9
1-3 years	3	11.5
3-5 years	1	3.84
5-10 years	0	0

Table 5 shows that most hernia occurred within 6 months of primary surgery. Size of the hernia defect repaired by shoe lace darn method.

Table 6: Post-operative complication of ventral hernia (before discharge).

Complication	No	%
Wound infection	6	23.1
Seroma	3	11.5
Wound gaping	1	3.84
Discharge sinus	1	3.84
L.V.H.	2	3.84
Retention urine	2	7.8
Cough	2	7.8

Table 6 shows the wound infection (23.1%) in major complication following repair of incisional hernia in the immediate post-operative period.

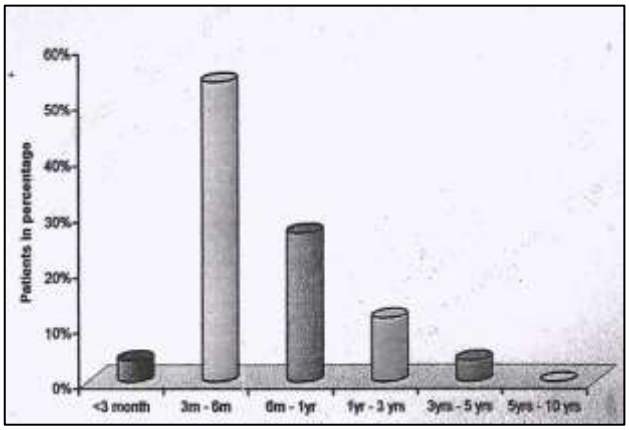

Figure 5: Time of appearance of ventral hernia after original operation.

Table 7: Timing of giving liquid diet following operations.

Hours after operation	No.	%
<12 hours	4	15.5
12-24 hours	22	84.5
24-36 hours	-	-

Table 7 shows that majority of patients were giving liquid diet in 24 hours.

Table 8: Timing of giving normal diet following operations.

Hours after operation	No.	%
<12 hours	-	-
12-24 hours	-	-
24-36 hours	3	11.5
36-48 hours	20	77
48-60 hours	3	11.5

Table 8 shows that about majority (about 90%) of patients taken normal diet within 48 hours.

Table 9: Number of suture length used for shoe lace darn repair.

No. of suture used	No.	%
One	22	84.5
Two	4	15.5

Table 9 shows that out of 26 patients only 4 patients needed more than one length to repair the defect.

Table 10: True versus False Recurrence.

Duration of follow up	No. of patients attended	Recurrence T/F
0-6 month	10	1/1
6-12 month	7	1/2
1-2 years	1	-

True recurrence defined as hernia recurring through the original shoe lace repair site.

False recurrence defined as hernias/bulge occurring through any other site than original shoe lace darn repair.

Table 10 shows that out of total 26 patient only 18 patients returned for follow up, 8 patients were lost in follow up also it is evident only 2 true recurrence occurred during study. They presented with 12 months after operation. Rest of the occurrence were false.

DISCUSSION

Ventral abdominal hernia is quite common. They can be surgically cured by insertion of prosthetic mesh via onlay (subcutaneous) repair, Inlay (under rectus muscles), combined insertion method (two meshes, one onlay and one inlay), laproscopically, by direct tissue repair or by shoelace repair. We have performed shoe-lace repair over the years and have found it an excellent method in preventing recurrence.

The shoelace darn repair is superior to the other two methods for the following reasons;

- Quick, easy, extra-peritoneal method that simply returns the unopened hernial sac and its contents to the abdominal cavity, and thus avoids the tedious and perhaps risky dissection of the adherent loops of the bowel on the inner surface of the sac required in the re-suture and in the mesh repair.
- The repair restores the functional anatomy of the abdominal wall. It reconstructs a strong new linea Alba and allows the rectus muscles to straighten and lie alongside each other at the midline. It also reconstructs the anterior rectus sheaths and fixes them to the new linea Alba.
- Tension free repair
- Minimal suture material requirement[4-6]

Jack Abrahamson in his series of 300 cases published that he has no deaths and 2% recurrence. He concluded that since the operation is entirely extra peritoneal, technically relatively simple and quick, it is eminently suitable for elderly patients with other general medical problems.[5]

Comparison with distribution of sex among ventral hernia, Akman reported that most of their patients were post appendectomy cases, whereas Ponka observed that majority of the incisional hernias developed followings hysterectomy and female pelvic organ operation (34%). Parekh JN et al are also of the opinion that gynaecological obstetrical operations precede most of the incisional hernia cases.[11-13]

The incidence of incisional hernia in both sexes varies in different series. Akman found male preponderances whereas Masson, Parekh JN et al noticed a female predominance in their series.[11,13]

Incisional hernias are common in post middle age as experienced by most of the surgeons. Comparison with different age groups, Kozoll reported that it is due to a greater number of operations performed in that age group; Bhutia et al noticed the mean age of occurrence of post-operative ventral hernia was 39.8 years; Pollock and Evans found one case below forty years of age in their study; Parekh et al noticed twenty years in the youngest age in their series.[13-16]

Most of the observers are of the opinion that midline infra-umbilical incisions are prone to develop incisional hernias. Akman, Shah and Pollock and Vans noted most of the herniations occurred through midline infra umbilical incisional Parekh JN reported a 76% incidence of incisional hernia from midline incisions.[11,13,16,17]

Most incisional hernias develop within one year primary surgery. Akman reported 52.2 percent cases develop incisional hernia within 6 months, 67.8% within one year and 88.4% within three years. Read and Yoder documented 56.1% develop hernia within one year and 86 percent at the end of five years. Bhutia et al reported a 65.5%incidence one year 86.9% within five years.[11,15,18]

Obney found a recurrence rate to be 1 per cent and post-operative wound infection rate to be 22 per cent in his series of 192 cases repaired by anatomical layer by layer.[19]

Obesity, diabetes, wound infection, flap necrosis, and postoperative coughing were the obvious factors contributing to recurrence in our four patients. Many other factors might contribute to recurrence. The true incidence of recurrence in our practice is rarely noted.[20,21]

CONCLUSION

We conclude that Shoelace darn repair have got a good place in managing abdominal incisional hernias.

The reason for the recurrence after shoelace repair in our study was because of a poor choice of the suture material, a difficult extubation, a turbulent postoperative period including recurrent bouts of dry cough with urinary retention, a primarily large size of the hernia defect and associated obesity. If the principles of shoelace darn repair as advocated by Abrahamson are strictly adhered to, the shoelace darn repair is a near fool proof method of repair of ventral abdominal hernias especially in difficult and morbidly obese case. The method is cost effective, in according to anatomical and physiological principal of the anterior abdominal wall muscles, avoids using a costly mesh being kept in situ with its associated complications and gives the patients a much postoperative recovery with earlier return to normal activity instead of repairing a defect, this method tries to restore the normal anatomy of the anterior abdominal wall in a stronger and more strengthened fashion. Considering all the facts, especially anatomical aspects, technique of repair and early and late follow up, it appears that shoelace repair is most suitable operation in post-operative ventral abdominal hernias, because the underlying mechanism is the techniques of repair, which is entirely an extra peritoneal approach.

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