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Original Research Article

A comparative study of on-lay and sub-lay mesh repair of ventral wall hernias in a tertiary health care centre

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ABSTRACT

Background: Ventral hernia is a common occurrence in abdominal surgeries and an important source of morbidity. A wide spectrum of surgical techniques have been developed, ranging from suturing techniques to various types of prosthetic mesh repair. Use of mesh repair technique showed a reduced number of postoperative complications and recurrence compared with other techniques. The exact technique of mesh repair is still debated. The purpose of this study was to compare the traditional on-lay mesh and sublay mesh placement in ventral hernia repairs in terms of time taken for surgery, duration of drainage after surgery, early complication and delayed complications.
Methods: This is a prospective study which was conducted in the surgical department of our hospital. A total of 50 cases were included in this study. Of these cases, 25 cases were operated by the on-lay mesh method and 25 by sublay mesh placement.
Results: The operative time for sublay mesh placement was significantly higher than that of on-lay mesh repair, whereas, the duration of post-operative suction drainage was significantly lower in case of the sublay group. Occurrence of complications like superficial surgical site infection and seroma formation were statistically insignificant in both the study groups, although frequency of complications was lesser in the sublay group. The recurrence rate was found to be 12% in on-lay mesh repair and 8%in sublay(retro-rectus) mesh repair.
Conclusions: Sublay mesh repair is a better method than onlay repair with respect to the duration of the post-operative suction drainage. A lower rate of complications and a lower rate of recurrence was seen in the sublay mesh repair group.

Keywords: On lay, Mesh repair, Sub lay

INTRODUCTION

Hernias are among the oldest known afflictions of humankind, and surgical repair of the inguinal hernia is the most common general surgery procedure performed today. Despite the high incidence, the technical aspects of hernia repair continue to evolve.[1]

The term ventral hernia is used to describe any protrusion of abdominal viscera through the anterior abdominal wall. There are two categories of ventral hernia: spontaneous or primary hernias and incisional hernias. Ventral hernias can also be subdivided by location into epigastric/umbilical/paraumbilical/hypogastric/spigelian/suprapubic/paraileal hernias.[2]

These hernias mainly present as a swelling and they rarely go for complications like obstruction, incarceration or strangulation. Commonly hernias do not require any special investigations to diagnose them. Treatment of

ventral hernias has evolved over the years with surgeons improving upon existing guidelines for the better outcome to the patient. From simple suture repair to prosthetic repair (open or laparoscopic), ventral hernia repair has come along a great way. Today, mesh repair stands out as an undisputed technique for ventral hernia surgery.[1,2]

This research work is intended to compare the operative technique of onlay and sublay hernioplasty with respect to duration and to study the early and late post-operative complications.

METHODS

Patients presenting to hospital and diagnosed with ventral hernia from November 2015 to May 2017.

Data will be collected by meticulous history taking, careful examination, and appropriate radiological and haematological investigations and collection of post-operative data with respect to post-operative pain, wound infection, complications, operative time and recurrence.

It is a randomnized control trial with prevalence p=0.024, level of significance (α) being 5% and absolute error being 5%, using estimation techniques the sample size will be at least 40.

Inclusion criteria

- Patients between 18 to 70 years admitted to the Department of General Surgery and diagnosed to have ventral hernia clinically
- Both congenital and acquired ventral wall hernias will be considered as a part of the study.

Exclusion criteria

- Inguinal, femoral, obturator, parastomal and lumbar hernias are not included in the study
- Patients with peritonitis. Inflamed, obstructed or strangulated ventral wall hernias will be excluded from the study
- Large ventral wall hernias (defect greater than 10 cm)
- Patients with known bleeding disorders and collagen vascular disorders are excluded from the study.

Methodology

The study will be carried out in patients getting admitted to surgical wards of hospital with either primary or secondary ventral wall hernia from November 2015 to May 2017. Patients will be divided into two groups.

One group will undergo onlay mesh repair and the other group will undergo sublay mesh repair. Once the patient gets admitted, a written informed consent having been obtained, he or she will be subjected to clinical examination, preoperative investigations and specific investigations in the form of ultrasound abdomen to know the location, number and size of the defect and its contents and to rule out obstruction or strangulation. Once the patient is fit for surgery he or she will undergo either onlay or sublay mesh repair depending on the group they belong to. In both the cases prolene mesh will be used.

The patients will be divided randomly by means of the closed envelope method into two groups according to the surgical technique used for the treatment of the uncomplicated ventral hernia: Group A and Group B. Group A patients (onlay mesh repair, 20 patients) will be operated upon by placing the mesh superficial to the anterior rectus sheath and the external oblique muscle. Group B patients (sublay mesh repair, 20 patients) will be operated upon by placing the mesh in the retromuscular space.

All operations will be carried out under general anesthesia or spinal anesthesia in both groups, with a prophylactic dose of antibiotic, cefotaxime sodium 1 g intravenous, given at the time of induction of anesthesia. The follow-up data will be obtained weekly once in the first month and then monthly in the next three months and then once in six months for a period of one year.

Primary outcome variables studied

- Mean operative time of each technique of surgery
- Recurrence rate within a time frame of 1 year
- Number of drains put
- Number of days taken for drain volume to come down to less than 30 ml/day.

Secondary outcome variables studied

- Post-operative duration of hospital stay till discharge
- Complications after hernia surgery within a time frame of 1 year.

RESULTS

The age of patients undergoing onlay and sublay mesh repair for ventral hernias was compared. The age group of patients undergoing onlay mesh repair (Group A) ranged from 23 years to 75 years, with mean age being 43.56±11.30 years. Patients undergoing sublay mesh repair (Group B) ranged from 28 years to 75 years, with mean age being 48.48±13.55 years (Table 3). No statistically significant difference was found between the two groups with respect to age group

The patients diagnosed with ventral hernia presented to us with either of the two complaints- pain in abdomen or abdominal swelling. 96% patients in Group A and 92% patients in Group B presented to us with complaints of

abdominal swelling whereas the remaining patients presented to us with pain in abdomen.

Table 1: Comparison of operative time between sublay and onlay mesh repair.

Parameter		Mean	Standard deviation	P value
Operative time (hrs)	Group A (n=25)	62.6	10.1	0.010
	Group B (n=25)	70.8	10.5	

The average time taken for onlay mesh repair in Group A was found to be 62.6±10.11 minutes whereas the average time taken for sublay mesh repair was found to 70.8±10.57 minutes.

A statistically significant difference was obtained when comparing the results of the two methods with the above variable (p value = 0.010) (Table1).

Table 2: Duration of post-operative suction drainage for both sublay and onlay mesh repair.

Parameter		Mean	Standard deviation	P value
Duration of suction drainage (days)	Group A (n=25)	4.12	1.05	0.019
	Group B (n=25)	3.4	1.15	

Both the groups were compared with respect to the duration for which a suction drain was kept in-situ after the surgery. The average number of days of drainage in case of Group A was 4.12±1.05 days whereas the average number of days of drainage in Group B was found to be 3.4±1.15 days (Table 2).

Statistical analysis revealed a significant difference between the two methods of repair with respect to the duration of drainage (p value = 0.019).

Table 3: Duration of post-operative hospital stay in patients with sublay and onlay mesh repair for ventral hernia.

Parameter		Mean	Standard deviation	P value
Duration of hospital stay (days)	Group A (n=25)	5.84	1.57	0.086
	Group B (n=25)	5.04	1.81	

The duration of hospital stay in patients in Group A was 5.84 ± 1.57 days whereas the patients in Group B stayed in the hospital for 5.04±1.81 days, after surgery. There was no statistical significant difference between the two values (p value = 0.086).

Post-operative complications

Group A saw 7 out of 25 patients (28%) developing seroma whereas Group B saw 4 out of 25 patients (16%) developing seroma post-operatively. These figures were not statistically significant as evaluated (p value = 0.327).

Group A saw 5 out of 25 patients (20%) developing superficial whereas Group B saw 5 out of 25 patients (20%) developing wound infection post-operatively. These figures were not statistically significant as evaluated (p value = 1.000).

There were no cases of deep surgical site infections in our study in either of the two groups. There were no cases of post-operative haematoma in our study in either of the two groups.

Recurrence of hernia was seen in 3 out of 25 patients (12%) in Group A whereas recurrence of hernia was seen in 2 out of 25 patients (8%) in Group B. These figures were not statistically significant as evaluated (p value = 0.664).

DISCUSSION

Ventral hernia remains one of the most frequent complications after abdominal surgery. Hernias are associated with reduced quality of life and high socioeconomic costs. Relevantly the treatment of this disease tends to be one of the major issues of current surgery. Despite the fact that various surgical techniques for repair of a ventral hernia are available, the best method to provide a durable repair of such hernias has not been determined.

The techniques used for repairing ventral hernias have generally developed in a practical, experiential way. In techniques for the repair of ventral hernias in which sutures are used, the edges of the defect are brought together, which may lead to excessive tension and subsequent wound dehiscence or incisional herniation as a result of tissue ischemia and the cutting of sutures through the tissues. With prosthetic mesh, defects of any size can be repaired without tension. Many clinical studies consider that the mesh reinforcement during ventral hernia repair has been demonstrated to improve long-term outcomes and high rate of recurrences (12 to 54%), associated with suture repair. Due to this the current treatment of choice is mesh repair.

Mesh repair can be proceeded by both, open and laparoscopic methods. By the usage of a mesh the most widely spread open methods are: sublay retromuscular repair and onlay repair. Nowadays no consensus has been reached as to which technique is preferable. The types of mesh repair, and possible locations of mesh placement speak to the uncertainty and lack of evidence to support any one repair.

The anatomic position of the mesh placement has an impact on tissue reaction, tissue incorporation, and tensile strength of the abdominal wall. The above-mentioned factors are important during hernia recurrence and postsurgery complications development

The purpose of the present clinical study was to evaluate the outcomes of two surgical approaches (retromuscular mesh repair and onlay technique) and to compare them to the results of analogous international researches.

The most common ventral hernias studied in this work were incisional hernias, umbilical hernias and epigastric hernias. Distribution of patients of the ventral hernia in each of the study groups in our work showed a pre-ponderance towards female. However, there was no statistically significant difference between the two groups of study with regards to either age or sex.

The most common clinical presentations of patients with ventral hernias are pain abdomen, abdominal swelling or the initial presentation being either of the complications of ventral hernia- obstruction, incarceration or strangulation. The latter was not taken into account in my study as acute complications tend to produce results which are strikingly different from what is seen with elective ventral hernia repairs. All our patients presented to us with either pain in abdomen or an abdominal swelling.

Operative time is an important factor in any surgical procedure. It is an indirect evaluation of morbidity inflicted to the patient, as a long operative time in any surgery has its own set of complications, including anaesthesia related or surgery related issues. Most studies comparing onlay and sublay prosthetic repair of ventral hernia repair have shown significant results with respect to the operative time for either of the techniques. Venclauscas et al, Demetrashvili et al, Godara et al all have shown, in their respective studies, that the mean operative time for sublay mesh repair is greater than that in case of onlay mesh repair. These authors have found notable differences between the two.[3-6]

Surgery for ventral hernias using prosthetics involves a lot of dissection in order to create appropriate anatomical planes for mesh placement. This involves a possibility of post-operative serous or haematogenous collection, thereby advocating, albeit not compulsorily, drain placement for a certain period post-operatively. We routinely placed drains in all of our cases under the study. The average number of days after which the drain was removed was found to be 3.4±1.15 days for the sublay group and 4.12±1.05 days for the onlay group. In each case, the drain was removed after the output was quantified to be less than 30 ml.

The duration of post-operative hospital stay is an important component for comparing efficacy of procedures as it is a strong indicator of the morbidity on part of the patient and an indirect evidence of presence or absence of post-operative complications. The mean duration of hospital stay for our sublay group was 5.04 days and that of onlay group was 5.84 days, with results being statistically insignificant (p value = 0.086)

The duration of hospital stay post ventral hernia mesh repair has also been a matter of contention in the preceding years. Conflicting reports have arisen in existing surgical literature, with regard to the period of stay in hospital, as a tool for comparison of sublay and onlay mesh repair techniques. Jat MA et al and Leithy et al, amongst other international authors have found the period of post-operative hospital stay to be lower in the sublay group than in the onlay group.[7,8] However, Godara et al claim the contrary, with the duration of hospital stay, in their study being 6.8±1.5 days for the sublay group and 4.6±1.30 for the onlay group.[6]

Wound complications are a common problem in ventral hernia prosthetic repair. Some authors designate development of these complications to be more after onlay techniques as compared to the retromuscular method. Exisiting literature also has deliberations which do not indicate any significant difference.

Seroma and wound infection are the main problems encountered after mesh repair of ventral hernias. According to several scientific publications, seroma is a more frequent complication of onlay technique than in retromuscular method. More frequent development of seroma in cases of onlay mesh repair may be attributed to two reasons-increased dissection of subcutaneous tissueduring surgery and tight contact of foreign body (mesh) to the subcutaneous tissue.

Controversial hypotheses also exist concerning wound infection- superficial or deep surgical site infections: a group of researchers indicate increased prevalence of infections in case of onlay mesh repair when compared to retromuscular repair. A higher incidence of wound infection with the onlay method may be explained by superficial localization of mesh which facilitates colonization of bacteria.

Scientific data show a higher rate of hernia recurrence after suture repair compared to mesh repair. Therefore, mesh repair needs to be the treatment of choice in ventral hernia treatment. Which method - retromuscular or onlay is better, considering hernia recurrence, is a debatable question.

The scientific conceptions are heterogeneous some of the research specify less frequency rate of hernia recurrence after retromuscular method, on the other hand, some scientists designate no difference between the results of these two methods. As an exception, Weber et al indicates that there is less frequency of hernia recurrence after onlay method than after retromuscular method.[9] Our data indicate rate of hernia recurrence in the

retromuscular (Group B) to be 8% and onlay (Group A) group to be 12%. However, the data was not statistically significant (p value = 0.664).

CONCLUSION

Ventral hernias are a common occurrence in surgical practice. Mesh repair of ventral hernia has widely taken over the conventional suture and other historical repairs, in present day surgery. Laparoscopy is becoming an important tool in the repair of ventral hernias, although open hernia repair has not completely taken a back seat. The technique of mesh repair holds importance with regard to the success of the surgery for ventral hernias. Sublay mesh repair has an upper hand over onlay mesh repair as it has a shorter duration of post-operative suction drainage thereby reducing patient morbidity. The duration of surgery, however is less in case of onlay mesh repair. Sublay mesh repair has a lower rate of post-operative complications than onlay mesh repair, although larger studies are required to choose the better of the two procedures.

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