A comparative study of onlay & sublay mesh repair of ventral wall hernias in a tertiary care research centre

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Abstract
Introduction: Ventral hernia is common in abdominal surgeries and is an important source of morbidity and mortality. Range of surgical techniques has been developed, from suturing techniques to various types of mesh repair. Mesh repair technique has shown a less number of postoperative complications and recurrence compared with other techniques. The bed on which mesh is placed is still debated. Among which one type being onlay and other being sublay are widely used but outcome of both is still controversial and do depend on surgeon's choice of procedure. 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 post-operative drainage, early and delayed complications.
Materials and Methods: This is a prospective study which was conducted in the surgical department Navodaya Medical college hospital and research centre. A total of 50 cases in 1 years of duration were studied. Of these cases, 25 cases were managed by the on-lay mesh method and 25 by sublay mesh placement.
Results: Operative time for sublay mesh placement was significantly higher than on-lay mesh repair, whereas, the duration of post-operative suction drainage was significantly lower in case of the sublay group. Superficial surgical site infection and seroma formation were statistically insignificant in both the study groups, although lesser in the sublay group. The recurrence rate was found to be 11% in on-lay mesh repair and 7% in sublay (retro rectus) mesh repair.
Conclusions: Sublay mesh repair seems to be better method than onlay repair in duration of the post-operative suction drainage. In the sublay mesh repair group lower rate of complications and recurrence were seen.

Keywords: Onlay, Sublay, Mesh Repair, Ventral hernias.

Introduction
Hernia is among the oldest known surgical condition 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] Ventral hernias can also be subdivided by location into epigastric, umbilical, paraumbilical, hypogastric, spigelian, suprapubic, paraileal hernias.[2] It mainly presents as a swelling and may go for complications like obstruction, incarceration or strangulation. Treatment has evolved over the years. Now, mesh repair stands out as an undisputed technique for ventral hernia surgery.[1,2] Ventral hernias are 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. 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. 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 post-surgery complications development. The purpose of the present clinical study was to evaluate the outcomes of two surgical approaches (retro muscular mesh repair and onlay technique) and to compare them to the results of analogous international researches.

Materials and Methods
Patients diagnosed with ventral hernia from July 2017 to August 2018.

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

This is a randomized control trial with prevalence p=0.030, level of significance (α) being 5% and absolute error being 5%, using estimation techniques and the sample size will 50.

Inclusion Criteria

1. Patients between 18 to 65 years admitted to the department of General Surgery and diagnosed to have ventral hernia clinically.
2. Congenital and acquired ventral hernias were considered as a part of the study.

Exclusion Criteria

1. Inguinal, femoral, obturator, parastomal and lumbar hernias are not included in the study.
2. Patients with peritonitis & Inflamed, Obstructed or Strangulated ventral wall hernias was excluded from the study.
3. Large (defect greater than 10 cm) ventral wall hernias.
4. Patients with known bleeding disorders and collagen vascular disorders are excluded from the study.

Methodology

The study was carried out in patients getting admitted to surgical wards of NMCH&RC with ventral wall hernia from July 2017 to April 2019. Patients were divided into two groups.

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

The patients were divided randomly by means of the closed envelope method into two groups- Group A and Group B according to the surgical technique used for the treatment of the uncomplicated ventral hernia. Group A patients (onlay mesh repair, 25 patients) were operated upon by placing the mesh superficial to the anterior rectus sheath and the external oblique muscle. Group B patients (sublay mesh repair, 25 patients) were operated upon by placing the mesh in the retro muscular space.

All operations were carried out under spinal anesthesia or general anesthesia in both groups, with a prophylactic dose of antibiotic, given at the time of induction of anesthesia. The follow-up data was obtained weekly once in the first three months and then monthly in the remaining months.

Primary Variables Studied in Patients

1. Mean operative time of each group
2. Recurrence rate
3. Number of days drains put
4. Number of days taken for drain volume to come down to less than 10 ml/day.

Secondary Variables Studied in Patients

1. Post-operative duration of hospital stay till discharge
2. Complications after hernia surgery.

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 20 years to 75 years, with mean age being 40.76±8.30 years. Patients undergoing sublay mesh repair (Group B) ranged from 22 years to 75 years, with mean age being 42.88±11.22 years. No statistically significant difference was found between the two groups with respect to age group.

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

The average time taken for onlay mesh repair in Group A was found to be 66.6±12.11 minutes whereas the average time taken for sublay mesh repair was found to 74.8±14.57 minutes.

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

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 5.35±1.15 days whereas the average number of days of drainage in Group B was found to be 4.2±1.32 days. Statistical analysis revealed a significant difference between the two methods of repair with respect to the duration of drainage (p value = 0.018).

The duration of hospital stay in patients in Group A was 6.94 ± 2.49 days whereas the patients in Group B stayed in the hospital for 6.14±2.79 days, after surgery. There was no statistical significant difference between the two values (p value = 0.084).

Table 1: The duration of surgery and post operative stay

Type of repair	Duration of surgery in minutes	Duration of post operative stay in days
Onlay	66.6	6.94
Sublay	74.8	6.14

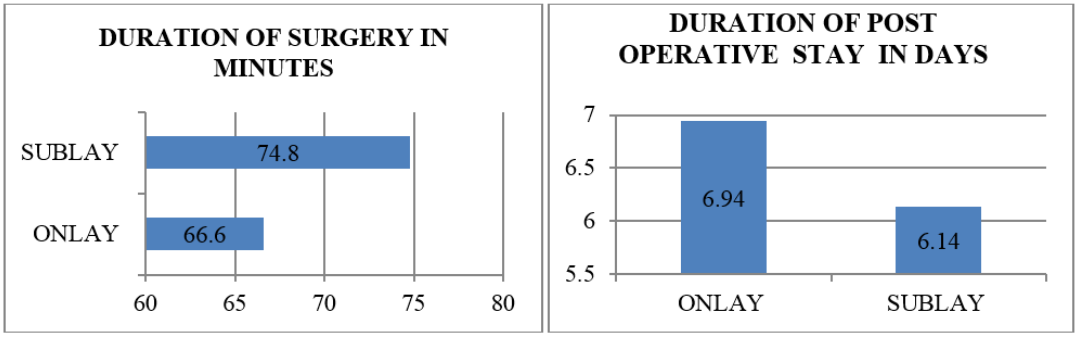

Fig. 1: The duration of surgery and post operative stay

Group A saw 5 out of 25 patients (20%) developing seroma whereas Group B saw 6 out of 25 patients (24%) developing seroma post-operatively. These figures were not statistically significant as evaluated (p value = 0.833).

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 hematoma in our study in either of the two groups. Recurrence of hernia was seen in 2 out of 25 patients (8%) in Group A whereas recurrence of hernia was seen in 3 out of 25 patients (12%) in Group B. These figures were not statistically significant as evaluated (p value = 0.666).

Discussion

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 preponderance 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 the study as acute complications tend to produce results which are strikingly different from what is seen with elective ventral hernia repairs. All patients presented 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 anesthesia 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 5.35±1.15 days for the onlay group and 4.2±1.32 days for the sublay 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 6.14 days and that of onlay group was 6.94 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. Existing 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 tissue during 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 12% and onlay (Group A) group to be 8%. However, the data was not statistically significant (p value = 0.666).

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.

Funding: No funding sources

Conflict of Interest: None.

Ethical Approval: The study was approved by the Institutional Ethics Committee

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How to cite this article: Md. Shakeel, Sudani R, Kashyap V. A comparative study of onlay & sublay mesh repair of ventral wall hernias in a tertiary care research centre. *Indian J Anat Surg Head Neck Brain* 2019;5(2):55-8.