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Anterior component separation with sublay polypropylene mesh placement: An ideal way to deal with large ventral abdominal hernias.

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ABSTRACT… Objectives: To study the effectiveness of open anterior component separation technique for repair of large incisional abdominal hernias. To study the effect of addition of polypropylene mesh with open anterior CST in sublay position. **Study Design:** Experimental study. **Setting:** Department of Surgery, DHQ Hospital Rawalpindi. **Period:** January 2016 to November 2016. **Material & Methods:** Patients (n=19) were admitted through OPD electively by purposive non- probability sampling in accordance with the inclusion/exclusion criteria. Patients were operated under general anaesthesia. Anterior CST was done by standard Ramirez technique. Polypropylene mesh was placed in sublay (retrorectus) position. Data obtained was analysed by SPSS-20 software to calculate SSI and Recurrence rate. **Results:** A total of 19 (n=19) patients were included in the study and operated upon. There were 61% males with average age of 42 years and 39% females of average 31 years age. Average defect size was 10.11 cm with SD of 1.899 cm. Recurrence rate was 5.26%. SSI rate was 10.50%. Patients were followed up for one year for Recurrence of hernia. **Conclusion:** Anterior component separation is an effective technique for repair of otherwise inoperable large ventral abdominal hernias especially when combined with polypropylene mesh in sublay position. Addition of mesh in sublay position with CST signifantly reduces both recurrence and SSI rate.

Key words: CST, Incisional, Mesh, Retrorectus, Sublay, Ventral Hernia.

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INTRODUCTION

Incisional hernia is one of the difficult challenges faced by the general surgeon. Upto 10% of laparotomies are complicated by the development of ventral abdominal hernia. usually these incisional hernias are so huge and complex that routine techniques of hernia repair cannot be used to close the defect without tissue tension. Common surgical practice is to use prosthetic mesh only to cover the defect. As the defects are not closed anatomically they are only bridged these repairs do not restore dynamic integrity of the abdominal wall and there are physiological derangements. Solution to this problem is a technique of anterior component separation (CST)[1] which can be anterior component separation first described by Ramirez in 1990s[2] or posterior component separation which was first described by Rives-Stoppa in1970s. There are many adjuncts and modifications of CST being used world over[3] e.g PCS with TAR (Transverse abdominis release). Recently CST is also being done Laparoscopically with sparing of periumbilical perforators.

As the patients with ventral abdominal hernias are usually weak with superadded wound infection and have comorbid factors so even with CST alone there may be recurrence especially in complex cases however addition of prosthetic mesh with it may eliminate It because this technique utilizes local vascularized tissue for repair of hernia and mesh provides extra strength to abdominal wall. Mesh can be placed in onlay, sublay or inlay position. Present research work focuses on benefits of Anterior CST with polypropylene mesh placed in sublay position for the management of ventral abdominal hernias[4] as this improves both post operative quality of life and rates of Recurrence and SSI. This technique can be

learnt easily by the general surgeons and applied accordingly to achieve the functional abdominal wall after hernia repair.

OBJECTIVES

1. To study the effectiveness of open anterior component separation technique for repair of large incisional abdominal hernias.
2. To study the effect of addition of polypropylene mesh with open anterior CST in sublay position.

SETTING

This experimental study was carried out in surgery department of District Headquarter Hospital Rawalpindi.

This study was carried out from January 2016 to November 2016 over a period of 11 months.

Nineteen patients (n=19) with large ventra incisional hernias (>5cm diameter) were included in the study.

Sampling technique was Purposive non-randomized sampling.

INCLUSION CRITERIA

All male and female patients of adult age group with large (>5cm diameter) ventral incisional hernia were included in the study.

EXCLUSION CRITERIA

Patients of paediatric age group and patients with active primary pathology of abdomen e.g Tuberculous enterocutaneous fistula, were excluded from the study.

Patients were admitted through OPD electively by purposive non- probability sampling in accordance with the inclusion/exclusion criteria. After completion of baseline workup to evaluate for fitness for surgery patients were operated under general anaesthesia.

Abdomen was opened by midline incision through a Virgin area. contents of sac separated from it by sharp dissection and returned back and size of the defect was measured. Sac was not excised but repaired in midline as a separate layer. Anterior CST was done by standard Ramirez technique br raising skin flaps upto 5cm from midline and giving release incision in external oblique aponeurosis 2cm lateral to linea semilunaris. While raising the skin flaps some of the peri-umbilical perforators were saved. Polypropylene mesh was placed in sublay (retrorectus) position without fixing as it sits itself in the closed space when anterior layers are closed. Whole block of rectus abdominis muscle along with the sheath from both sides was moved medially and stitched in front of the mesh in midline with non-absorbable prolene suture. Closed suction drain was placed in retromuscular and subcutaneous plane under the skin flaps. Patients were followed for a period of one year postoperatively for Recurrence of hernia. Main outcomes SSI (Surgical Site Infection) and Recurrence were noted and data was recorded on pre-designed proforma.

Data obtained was analysed by SPSS-20 software to calculate SSI and Recurrence rate.

RESULTS

A total of 19 (n=19) patients were included in the study and operated upon. There were 61% males with average age of 42 years and 39% females of average 31 years age. Average defect size was 10.11 cm with SD of 1.899 cm. Recurrence rate was 5.26%. This recurrence was noted in a male patient who had a recurrent hernia with defect size of 11cm. SSI rate was 10.50%. According to South Ampton Scoring System this was SSI grade I for both cases. As regarding other complications there was no seroma formation but one case of minor skin necrosis was seen may be due to periumbilical perforator disruption during skin flap raising for release incision of external oblique aponeurosis. Patients were followed up for one year for Recurrence of hernia.

Recurrence Rate	SSI Rate	Follow Up
5.30%	10.50%	12 mmonths

Table-I. Main outcomes (n = 19)
SSI – Surgical Site Infection.

Mean Size	Range	SD
10.11 cm	7.00 cm	1.899 cm

Table-II. Hernia defect size
SD – Standard Deviation

Figure-1. Incisional ventral abdominal hernia.

Figure-2. Peroperative picture of ventral abdominal hernia contents of sac are seen reduced.

Figure-3. Posterior rectus sheath separated with preserved blood supply to rectus abdominis muscle near linea semilunaris.

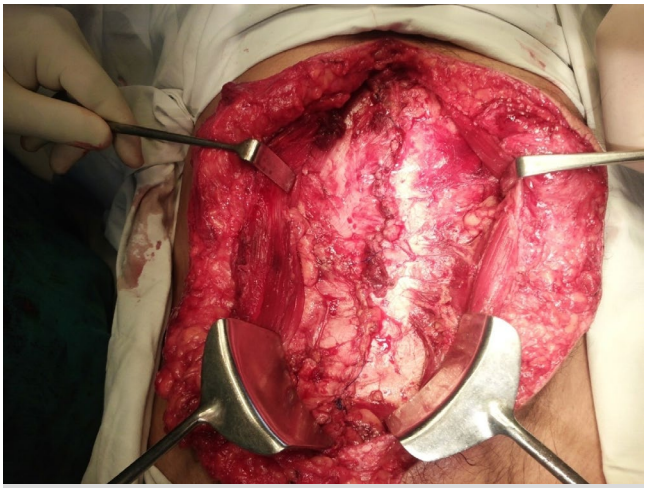

Figure-4. Closure of separated posterior rectus sheath in midline exposed rectus abdominis muscle can be seen.

Figure-5. Polypropylene mesh in sublay (retrorectus) position.

Figure-6. Released external oblique aponeurosis along with underlying rectus abdominis muscle medialized and repaired in midline. Raised skin flaps can be seen.

Figure-7. Skin closed with closed suction drain in position.

DISCUSSION

Being attractive and important technique in the armamentarium of a surgeon there have been efforts to reduce the morbidity associated with its invasiveness by sparing periumbilical perforators, using endoscopic technique and limiting subcutaneous dissection. Prosthetic mesh can be used for reinforcement of the fascia and this reduces recurrence rate associated with CST alone. This technique uses vertical fasciotomies of external oblique aponeurosis and sliding of blocks of tissue towards midline to close the midline defect upto 20 cm at the level of waistline 10 cm from each side as described by Heller Loir et al in his study.[5] According to him it is important to know the position of the recti muscles bilaterally (Linea semilunaris) preoperatively which can be done initially by clinical examination and aid of imaging modalities e.g ultrasound and CT Scan, can be taken to ascertain the size of the defect and defects of 15x25 can be easily closed by this technique. Ramirez originally developed this technique by dissecting bodies of ten cadavers. In the original technique posterior rectus sheath was first released and then after raising skin flaps longitudinal release of external oblique aponeurosis at its medial border was done and whole block of tissue was slided medially to be closed at linea alba with non absorbable sutures since then CST is continuously evolving into more and more less invasive and effective technique. Rintaro Fukuda in his study also supports the results of this technique although he stresses the use of prosthetic mesh along with CST to reduce recurrence rate as is the result of present study. Abulezz Tarek[6] used CST to reconstruct abdominal wall defects in twenty patients and declared it a reliable and easy technique to be used especially in post laparotomy ventral abdominal hernias. In order to decrease the invasiveness of CST he used direct incision on skin over external oblique aponeurosis lateral to the rectus muscle to release it instead of raising skin flaps from medial to lateral side. Periumbilical perforators are saved in this way and well perfused skin is closed in the midline. Similarly in obese patients he used abdominoplasty incision for the same purpose. He concludes that component separation technique can be used in debilitated patients who cannot afford time consuming free flaps. Similarly pedicled flaps cannot be brought to midline for usage in repair work making CST best choice again. John cone[7] also in his article stated that component separation being rectus abdominis advancement flap is a valuable, functional abdominal wall reconstructing technique with good aesthetic results. Ramesh Punjani et al[8] in his research work has termed anterior component separation technique as effective method of repairing midline hernias. He used classical Ramirez technique and has also used prosthetic mesh in onlay position as well as in sublay position in different patients with minimal complications and recurrence thus supporting the results of this study.

Naran Sanjay et al[9] in his work with 311 cases operated by a single surgeon terms component separation as a mainstay for repair of midline compilated abdominal defects. They also identified factors affecting recurrence of hernia. Thoma A. Santora[10] has also reviewed factors contributing to hernia predisposition and has also described techniques available for their repair. According to his work new innovative techniques can be used to reduce hernia recurrence. Another benefit of component separation technique is that multiple defects can be detected and repaired by its use as missing defect can lead to recurrence. Sherif Albalkiny[11] also worked on CST and termed it a durable way of dealing with ventral hernias

with low morbidity and recurrence rate. Although he prefers posterior component separation with transverses abdominis release rather than ACS. Hubert Scheuerlein et al[12] in his study on CST says that it was developed to reconstruct complex hernias although he also prefers posterior CST. According to his work CST alone without mesh must not be used because of high recurrence rate. This is the reason that present study recommends anterior CST with sublay mesh as in superficial positions mesh produces more complications like SSI and fistula formation.

John J. Como et al[13] also recommends use of mesh in sublay position (Retromuscular) similar to this study but he uses posterior CST contrary to present study. Micheal J. Rosen[14] in his research work also supported the use of mesh in sublay position with maximum overlap for repair of abdominal hernias. Bram Cornette et al[15] in his work states that CST has become popular among general surgeons for the treatment of large abdominal incisional hernias. They performed a systemic review including 36 studies and compared different modifications of CST and according to their data analysis all varieties have no difference as far as SSI is concerned but anterior CST alone without mesh has higher recurrence rate (11.9%). E.B. Deerenberg[16] in his article states that incisional hernia is a most common post operative complication and usually these hernias are large he performed a different systematic review of studies on surgical treatment of large incisional hernias. He included 55 studies (n=55) with patients having abdominal hernias more than 10 cm diameter. According to his data analysis surgical techniques (CST varieties and others) with use of mesh especially in sublay position have best recurrence rates (<3.6%). Rhemtullah et al[17] in their recent study published in August 2018 report that placement of mesh in sublay position has the lowest hernia recurrence rate of upto 5% and also has lowest SSI rate of 16% as compared to other mesh positions. It can be used in combination with improved component separation technique for the benefit of those patients who were usually refused ventral hernia surgery due to inoperability. So with this immense potential of this combination it is necessary to have clear concept of the technique for obtaining full benefit from it. A. Erikson et al[18] also carried out a qualitative systematic review of present techniques being used for repair of giant incisional hernias with defect size of at least 15 cm. (Total of 14 studies with 1198 patients were included in study). His findings support the present study. He concludes in his study that "Sublay positioning of the mesh perhaps with component separation technique may be advantageous compared with other surgical techniques for giant hernia repair."

CONCLUSION

Anterior component separation is an effective technique for repair of otherwise inoperable large ventral abdominal hernias especially when combined with polypropylene mesh in sublay position. This is a versatile technique which can be easily modified according to the situation being faced by the surgeon. Addition of mesh in sublay position with CST signifantly reduces both recurrence and SSI rate. Special advantages of anterior CST are, firstly as its workhorse is a local vascularized tissue it obviates the need of tissue transfer for repair work and secondly it restores physiologic dynamic integrity of abdominal wall musculature.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Sajid Rashid	Principal investigator, Wrote all parts of article including data collection and analysis.