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Original Artical

Repair of Incisional Hernia by Component Separation Technique & Pre-peritoneal Mesh Placement- Initial Outcome

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Abstract

Background: There are several techniques and approaches for incisional hernia repair but no single method was proved as gold standard. This study was taken to determine the initial outcome of repair of abdominal incisional hernia with component separation technique (CST) also known as abdominal wall reconstruction, reinforced by pre peritoneal mesh placement.

Method: This prospective observational study was conducted in Dhaka Medical College Hospital, Dhaka & Bangladesh Medical College Hospital, Dhaka over 6 months between 12th august 2014 to 11 February 2015.Based on predefined enrollment criteria, a total of 20 cases of incisional hernia were consecutively included in this study. The outcome variables were wound infection, seroma or hematoma formation, abdominal discomfort, gut obstruction.

Result: The study showed that mean age of the patients was 42.3 years (range: 19_59 years). Females were more likely to be affected than males (3:1). Overweight or obesity was found in 25 % cases. Bulging at the site of scar was the main sign of incisional hernia (90 %). One-third (35%) of the patients gave the history of constipation and (20%) had surgical site infection (SSI) after previous operation. Some (10%) had chronic obstructive pulmonary diseases (COPD). All the cases were primary. Over one –third of the patients (35%) complained of pain after operation. About two third (65%) patients had no pain. Other reported complication was seroma.

Conclusion: The study concluded that the CST reinforced by pre-peritoneal mesh placement provides good initial outcome in the repair of large midline incisional hernia.

Key words : Incisional hernia, Component Separation Technique (Abdominal wall reconstruction), Pre-peritoneal Mesh Placement, Initial outcome.

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Introduction:

Large and complex defects of the anterior abdominal wall occur most commonly due to herniation following abdominal surgery.

An incisional hernia is a gap within the abdominal wall which may or may not be associated with a bulge in the postoperative scar which can be examined clinically by inspection or palpation or can be seen by imaging.[1] Incidence of incisional hernia may vary from 3 – 60% (average 25%).[2] Fifty percent are detected usually within one year of

initial operation with 2% increase per year thereafter. Factors increasing the risk of incisional hernia are, **Patient factors:**1) Obesity, 2) General poor wound healing due to malnutrition,3) Immunosuppression or steroid therapy,4) Chronic cough,5) Cancer. **Wound factors:** 1) Poor tissue quality, 2) wound infection.

Surgical factors: 1) Inappropriate choice of suture material, 2) Incorrect placement of suture material.[3]

Reported incidence of incisional hernia is 10%-50% for laparotomy incisions whereas incidence is less in case of laparoscopic port site incision ranging from 1%-5%.[3] This is a problem of immense magnitude to the surgeon, the patient and the healthcare socio-economics.

Incisional hernia can be repaired by different techniques & prosthetic mesh may be used to close the defect by bridging the gap and reinforcing anatomical tissue plane.[4] High recurrence rates associated with primary suture repair have lead to an increased application of prosthetic mesh for the repair of incisional hernias.

The components separation technique (CST) is a procedure for tensionless closure of large and full thickness ventral hernia by autologous tissue.[5] Though it was originally described without using prosthetic material, where recurrence rate ranges from 0-30%.[1,6] After some modifications of the CST, with the use of prosthetic materials, shows consequent reduction in recurrence rates.[7]

Surgical Technique:

Component separation technique (CST) used to reconstruct a large defect without a free transposition flap.[1] The technique involves separation of external oblique muscle from internal oblique & transversus abdominis after giving incision about 1cm lateral to the rectus abdominis muscle. This separation of the external oblique muscle causes gliding of the internal oblique along with transversus abdominis medially towards rectus abdominis. These two muscles (internal oblique & transversus abdominis) act as a muscle flaps that can cover up to 20 cm defect of abdominal wall hernia. In this study, placement of prosthetic mesh (polypropylene) is done in a pre-peritoneal plane. After incising the subcutaneous tissue, the sac is dissected and delineated. The defect is opened. A plane is created between the posterior rectus sheath and the rectus muscle for the placement of the mesh above the arcuate line & between rectus and peritoneum below the arcuate line.

The advantages of CST are:

1) It restores structural support of the abdominal wall,
2) Provides stable soft tissue coverage,
3) Optimizes asthetic appearance of complex abdominal wall defects and giant ventral hernias.[8]

The prosthetic mesh can be placed between the subcutaneous tissue of the abdominal wall and the anterior rectus sheath (onlay) as well as in the pre-peritoneal plane. The later technique has several advantages; most imoortant is not transmitting superficial infection from subcutaneous level down to the prosthetic mesh as it lies quite deep in the pre-peritoneal tissue plane.[9]

Moreover the mesh implanted in the pre-peritoneal space unites and consolidates the anterior abdominal wall. When prosthetic mesh adhares with posterior rectus sheath it become inextensible which prevent further herniation. The pre-peritoneal mesh hernia repair was first described by Stoppa (1989), Rives (1987) and Wantz (1991).[10,11,12] This technique is considered by many surgeons to be the gold standard for the open repair of abdominal incisional hernia[13,14,15,16.] The present study is undertaken to evaluate the technique of CST with pre-peritoneal mesh repair of incisional hernia with regards to early post-operative complications.

Fascial component separation, initially described by Ramirez et al.5 offers theoretical physiological advantages for repair of abdominal wall defects like, reduced rate of infection and better maintenance of abdominal domain by reducing intra –abdominal pressure & by restoring diaphragmatic function. Outcome after this operation may not be same for all, which may vary according to patient's characteristics and different surgical techniques.

Recent trend is to repair small & medium sized incisional hernia by mesh only.[17,18] However, if the defect is too large for mesh repair, the components-separation technique should be used. With component separation technique it is possible to advance the retracted rectus abdominis muscle 6–7 cm toward the midline on each side. Important disadvantage of the components-separation technique itself (without prosthesis), is relatively high recurrence rate of 18–30%.[19-21] A large mesh placement in the pre-peritoneal space leads to an even distribution of forces along the surface of the

mesh, thus reduce recurrence rate by strengthening the repair. Principles of pre peritoneal mesh placement based on the physics of Pascal's Principles of hydrostatics where the force that create hernia used to holds the mesh in right place.[22,23,24]

The most widespread technique in onlay approach involves fixation of mesh with tacks and trans abdominal permanent sutures. Some surgeons usually try to reduce the per-operative and post-operative discomfort by reducing or avoiding the use of sutures.[25,26] The physics of mesh fixation do not support the sole placement of tacks. Thickness of most of the prosthetic mesh is 1 mm. A perfectly placed tack is expected to penetrate up to 2 mm beyond the mesh so tacks can't give similar holding strength that a full thickness ventral wall suture can.[27,28,29,30] Moreover, after placing the mesh against the peritoneum, any ingrowth is most likely to be into the peritoneum.[22,23]

The advantage of placing the mesh in pre peritoneal plane is as follows:

- This plane is highly vascular, hence it prevents infection.
- Subcutaneous infection might not affect the mesh as it is in the deeper plane.
- The prosthesis adheres to the posterior rectus sheath and renders it inextensible, permitting no further herniation.
- Prosthetic mesh usually consolidates with anterior abdominal wall preventing recurrence
- The prosthesis in this plane cannot be dislodged or ruptured by intra-abdominal pressure, but instead is held in place by the very force that caused the hernia.
- Usually a virgin plane for recurrent incisional hernia repairs.
- Tension free repair.[31]

Material & Method:

This study was a cross sectional observational study conducted in Dhaka Medical College, Dhaka & Bangladesh Medical College, Dhaka. Study period was six months with a sample size 20. Sample unit was individual patient selected by simple random sampling.

Inclusion criteria: Clinically diagnosed cases of large abdominal incisionl hernia (3cm – 15 cm).

Exclusion criteria:

- Patients who refused mesh repair.
- Extreme age group
- Patients with re- recurrent incisional henia
- BMI > 40 kg / m2
- Patients unfit for anaesthesia
- Larger size hernia > 15 cm

Data were collected on variables of interest by interview and clinical examination of preoperative and postoperative variables of interest (like complications).

Statistical analysis:

Data processing and analysis were done Manually, in a descriptive way. The descriptive statistics were frequency and corresponding percentage for categorical data and mean standard deviation and range for continuous data.

Results:

The present study was intended to see the initial outcome of repair of incisional hernia by component separation and pre-peritoneal mesh placement included a total of 20 patients of incisional hernia. Only one-third (35%) of the patients complained of pain after operation. Wound infection, skin necrosis, bowel obstruction were not found. No recurrence was noted during the hospital stay. Results of data analysis are given below:

Preoperative variables	Post-operative complications:
Mean age (Range)……(21-59) yrs Sex distribution ……3:1 BMI….Normal (75%), Obese (25%) Clinical feature…… Bulging (90%) Pain scar (5%) Risk factors Smoking…….25% Constipation ……35% SSI ……..20% COPD ……10% Obesity…….5% Distribution by the type of surgery Emergency……..25% Elective……75% Area of distribution Upper midline…….5% Lower midline……..95% Average size of the lesion Largest……..(8 x 5)cm…..40% Smallest …..(5 x 3) cm …10% Presentation after 1st operation One year ….90% Comorbidity……..30% (DM, HTN ,Asthma , Obesity)	Distribution by the type of surgery Emergency……..25% Elective……75% Area of distribution Upper midline…….5% Lower midline……..95% Average size of the lesion Largest……..(8 x 5)cm…..40% Smallest …..(5 x 3) cm …10% Presentation after 1st operation One year ….90% Comorbidity……..30% (DM, HTN ,Asthma , Obesity)

Discussion:

Surgical techniques for the repair of incisional hernias continue to evolve with advances in prosthetic materials and minimally invasive technology. The optimal technique for mesh placement has not been established and remains controversial. Laparoscopic repair shows numerous benefits, that includes reduced recurrence rates, decreased hospital stay, less post-operative pain, and early recovery.[32] The modified Rives-Stoppa technique allows for cosmetically pleasing result, in that redundant skin is removed en bloc with the underlying hernial sac.

The components separation technique is used to lower tissue tension in the wound and to achieve tension-free closure of the skin. Furthermore, it has been shown that the abdominal domain is maintained better in terms of bulging and functional perspective when mesh is applied in combination with the component-separation technique as compared to the use of mesh augmentation only.[33] In the present study the percentage of wound infections was nil, Seroma was 5% . No other complications were reported. In similar study, Moreno-Egea et al[34] reported only 2% wound infections, 4% wound dehiscence, and 10% subcutaneous seroma which needed aspiration. However, a study by van Geffen HJ et al[33] in which all patients had contaminated wounds prior to surgery, showed a wound infection rate of 19% in previous surgery, which compares well with our study.

As studies reporting results of the component technique without mesh show considerable wound complication rates[35] (as high as 35%) and morbidity rates36 (18–24%), the findings of the present study are justified.

Conclusion:

From the findings of the study and discussion thereof, it can be concluded that the component separation technique reinforced by repair with pre peritoneal mesh placement provides good initial outcome. However, there is commendable incidence of postoperative pain with discomfort & seroma , all of which could be managed with local care and antibiotic therapy.

This study has some limitations as sample size is small & long term outcome such as SSI & recurrence etc. could not be seen here as study period is short.

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