STUDY OF OUTCOME OF MODIFIED SHOELACE REPAIR DONE FOR DIVARICATION OF RECTI

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ABSTRACT

BACKGROUND
Divarication of recti is characterised by thinning and widening of linea alba combined with laxity of the ventral abdominal musculature. It is often misclassified as a primary ventral hernia. But the musculofascial continuity of the midline and subsequent absence of a true hernia sets divarication apart from a ventral hernia. We wanted to evaluate the efficacy of surgical technique of rectus sheath repair and mesh placement in a series of 12 cases of divarication of recti.

MATERIALS AND METHODS
Patients underwent modified shoelace repair which involves reconstruction of linea alba along with use of polypropylene mesh to reinforce fascial layer. All the patients were followed up for a minimum of 24 months. A proforma was maintained for each patient, documenting patient details, complications and postoperative course.

RESULTS
All the 12 patients studied were females who had normal delivery at least 3 years prior to period of study. The age group of the patients varied between 26-36 years. About 33% of patients had pain beyond postoperative day 2, which needed parenteral analgesics for another 2 more days. None of the patients complained of pain on follow up in the OPD.

CONCLUSION
Modified Shoelace repair with mesh placement is a safe and effective procedure that can be used for surgical correction of divarication of recti.

KEYWORDS
Divarication of Recti, Modified Shoelace Repair, Linea Alba, Polypropylene Mesh, Surgical Correction.

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BACKGROUND
Divarication of recti is the condition wherein linea alba stretches laterally and the two recti muscle separate. It generally occurs in upper abdomen in middle aged overweight men and in women in lower abdomen because of birth trauma.

The aetiology of the condition is unknown. Any separation larger than two cm or two finger breadth is considered significant.¹ It appears to be less common in women with good abdominal tone before pregnancy and excessive breath holding during second stage of pregnancy has been attributed as a cause for development of divarication. It may produce musculoskeletal complaints like back pain, probably as a result of decreased ability of abdominal musculature to stabilize pelvis and lumbar spine.²

The other important reason is for divarication patient to seek medical opinion is cosmetic impairment which they experience. Physiotherapy and exercises may not lead to satisfying functional and cosmetic results, but it can be an alternative in those who are reluctant or unable to undergo surgery.³

Functional anatomy: flat muscles of abdominal wall are normally in a state of tonic contraction which tends to shorten them. However, since they are fixed to each other in the midline at linea alba, they are not able to shorten, but pull against each other in a balanced fashion so that they act as a dynamic girdle, flattening the abdominal wall.⁴ The tonic contraction in divarication causes the rectus abdominis muscle to be pulled laterally and the gap between the recti widens. The shoelace repair described by Abrahamson⁵ has 2 basic steps.

1. Reconstitution of a new midline anchor for flat muscles of abdominal wall. This is made by suturing together a strip of fascia from the medial edge of each anterior rectus sheath.
2. Restore the recti muscle back to original position, by drawing together lateral cut edges of anterior rectus sheath by continuous sutures of heavy monofilament nylon.
It has been suggested by Loh et al, that combining fascia and mesh repair has impressive results, and carries the advantage of avoiding excessive tension. In our study, the fascial defect formed between the cut edges of rectus sheath is repaired using a polypropylene mesh, sutured closely to the edges of the defect with multiple stitches using non absorbable polypropylene. This prevents any tension, which is created by closely approximating the edges of shoelace repair. All the cases in our study underwent some form of abdominoplasty also, which took care of the excessive skin and subcutaneous fat.

**Aim of the Study**
To study the efficacy and sequelae of modified shoelace repair for divarication of recti.

**MATERIALS AND METHODS**
A prospective non randomised study of 12 cases of divarication recti has done in a rural medical college hospital between Jan 2015 to Jan 2016. The outcome of modified shoelace repair for divarication was studied in all the 12 cases with respect to efficacy of repair and sequelae. Institutional ethics committee approval was taken for the study.

**Inclusion Criteria**
Divarication recti patients in age group 26-36 years who had childbirth at least 3 years back and who were not having satisfactory functional results with physiotherapy exercises were chosen for the study. All the patients selected for surgery had significant cosmetic impairment.

**Exclusion Criteria**
1. Major abdominal surgery in the past.
2. Defects other than in the midline.

Every patient underwent detailed history taking, clinical evaluation and investigations. The size of the defect of divarication was measured with a tape. The length and width of the defect was recorded. In all the patients, umbilicus was excised because of laxity of skin and the large vertical length of the defect. A vertical incision encircling the entire length of the defect was employed, rectus sheath was identified by dissecting the subcutaneous fat, a linear incision was put on the rectus sheath (after placating the lax and stretched out linea in the midline). The medial edges of the cut fascia was sutured together in the midline with interrupted sutures of No. 1 polypropylene. An appropriate sized polypropylene mesh was placed over the bare muscle, which had got approximated in the midline, and it was sutured to the lateral cut edge of anterior rectus sheath with 2-0 polypropylene stitches. Excess of skin and subcutaneous fat was excised and a suction drain was placed over the mesh in all cases.

The postoperative course was monitored with respect to-
1. Significant pain beyond post op day 2
2. Fever

**Results**
All the 12 patients studied were females who had normal delivery at least 3 years prior to period of study. The age group of the patients varied between 26-36. About 33% of patients had pain beyond postoperative day 2, which needed parenteral analgesics for another 2 more days. None of the patients complained of pain on follow up in the OPD.

The probable cause for pain could be the close approximation of mesh to the lateral cut edge of rectus sheath to provide a strong framework for reinforcing the abdominal wall. Suction drain was removed on post op day 5 in 66.6% of patients. The post op stay in the hospital ranged from 7-10 days. There was no incidence of gapping of the wound in our study. One patient had fever in the post op period and one had a minor surgical site infection. We had zero incidence at a minimum of 2 years follow up in the cases studied.

**Discussion**
Based on published literature, surgical techniques available for divarication repair are either plication based or hernia repair based. Prosthetic mesh repair in divarication correction is also well established. Loh et al in the literature preview, suggested better results with mesh placement. There are other modes of treatment like plication alone, or hybrid plication of anterior or posterior rectal fascia. Musculofascial continuity of ventral abdominal wall in an important anatomical structure to be considered during divarication repair. Hernia based techniques for divarication repair are often modifications of original Chivrel or Rives-Stoppa technique. In our study 1 patient developed complications of seroma, 1 patient had superficial wound infection and 4 patients had prolonged postoperative pain for more than 2 days, which necessitated parenteral analgesic therapy. We had zero incidence of recurrence at a minimum period of 2 years follow up.

Limitation of the study was small sample size.

**Conclusion**
The modified shoelace repair is an anatomically sound surgical technique for divarication of recti. It is a simple and easy operative procedure, in which dissection is extra peritoneal which prevents chances of injury to the bowel during dissection. It reconstitutes the new linea alba in the midline and is further reinforced by the mesh in a tension free manner. It carried minimal immediate postoperative complications rate and no recurrence was noted in the cases studied.
Table 1

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Table 2

REFERENCES
