

# Reconstructive laparoscopic prolapse surgery to avoid mesh erosions

## Rekonstruktive laparoskopische Descensus-Chirurgie zur Vermeidung von Mesh-Erosionen

### Abstract

**Introduction:** The objective of the study is to examine the efficacy of the purely laparoscopic reconstructive management of cystocele and rectocele with mesh, to avoid the risk of erosion by the graft material, a well known complication in vaginal mesh surgery.

**Material and methods:** We performed a prospective, single-case, non-randomized study in 325 patients who received laparoscopic reconstructive management of pelvic organ prolapses with mesh. The study was conducted between January 2004 and December 2012 in a private clinic in India. The most common prolapse symptoms were reducible vaginal lump, urinary stress incontinence, constipation and flatus incontinence, sexual dysfunction and dyspareunia. The degree of the prolapse was staged according to POPQ system. The approach was purely laparoscopic and involved the use of polypropylene (Prolene) or polyurethane with activated regenerated cellulose coating (Parietex) mesh.

**Results:** The mean age was 55 (30–80) years and the most of the patients were multiparous (272/325). The patients received a plastic correction of the rectocele only (138 cases), a cystocele and rectocele (187 cases) with mesh. 132 patients had a concomitant total hysterectomy; in 2 cases a laparoscopic supracervical hysterectomy was performed and 190 patients had a laparoscopic colposuspension. The mean operation time was 82.2 (60–210) minutes. The mean follow up was 3.4 (3–5) years. Urinary retention developed in 1 case, which required a new laparoscopic intervention. Bladder injury, observed in the same case was in one session closed with absorbable suture. There were four recurrences of the rectocele, receiving a posterior vaginal colporrhaphy. Erosions of the mesh were not reported or documented.

**Conclusion:** The pure laparoscopic reconstructive management of the cystocele and rectocele with mesh seems to be a safe and effective surgical procedure potentially avoiding the risk of mesh erosions.

**Keywords:** reconstructive prolapse repair, mesh surgery, minimally invasive access

### Zusammenfassung

**Einleitung:** Das Studienziel ist die Überprüfung der Sicherheit und Effizienz der rein laparoskopisch-rekonstruktiven Operation der Cysto- und Rectocele mittels Netz, um das Risiko der Mesh-Erosion, einer bekannten Komplikation bei der vaginalen Chirurgie, zu vermeiden.

**Material und Methodik:** Wir führten eine prospektive, nicht randomisierte Single-Case-Studie mit 325 Patientinnen durch, die einen laparoskopisch-rekonstruktiven Eingriff bei einem Beckenorgan-Vorfall mittels Netzeinlage erhielten. Die Studie wurde zwischen Januar 2004 und Dezember 2012 in einer Privatklinik in Indien durchgeführt. Die möglichen klinischen Symptome bei Prolaps sind reponierbare vaginale Vorwölbung, Stressharninkontinenz, Stuhl- und Windinkontinenz sowie Dyspareunie. Der Grad des Prolapses wurde mittels POPQ-System ein-

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gestuft. Die Technik war rein laparoskopisch und beinhaltete den Gebrauch von Polypropylene- oder Polyurethane-Mesh mit aktivierter regenerierter Cellulose-Oberfläche.

**Ergebnisse:** Der Altersdurchschnitt betrug 55 (30–80) Jahre und die meisten Patientinnen waren multipara (275/325). In 138 Fällen erhielten die Patientinnen eine plastische Korrektur der Rektocele und in 187 Fällen einer Korrektur von Cysto- und Rektocele mittels Netzeinlage. 132 Patientinnen hatten eine gleichzeitige totale Hysterektomie, in 2 Fällen wurde eine laparoskopische supracervikale Hysterektomie durchgeführt und 190 Patientinnen erhielten eine laparoskopische Kolposuspension. Die durchschnittliche Operationsdauer betrug 82,2 (60–210) Min. Die durchschnittliche Dauer des Follow-up betrug 3,4 (3–5) Jahre. 1 Fall mit Harnverhalt wurde postoperativ identifiziert und erneut laparoskopisch behandelt. Eine Blasenläsion, die im gleichen Fall auffiel, wurde in der gleichen Sitzung mit resorbierbarem Nahtmaterial geschlossen. Es zeigten sich vier Rezidive der Rektocele, die durch eine hintere vaginale Kolporrhaphie behandelt wurden. Es wurden keinerlei Mesh-Erosionen berichtet oder dokumentiert.

**Schlussfolgerung:** Die reine laparoskopisch-rekonstruktive Operation der Cysto- und Rektocele mittels Netz erscheint als eine sichere und effiziente chirurgische Methode, um das potenzielle Risiko von Mesh-Erosionen bei der vaginalen Chirurgie zu vermeiden. Weitere randomisierte Studien sollten durchgeführt werden, um diese Ergebnisse zu bestätigen.

**Schlüsselwörter:** rekonstruktive Descensus-Korrektur, Mesh-Chirurgie, minimal invasive Chirurgie

## Introduction

The pelvic organ prolaps (POP) is a common disease, affecting up to 40–50% of the women over the age of 40 years [1]. POP results from weakening of the pelvic floor support, the muscles, the ligaments that support pelvic organs occurring after child-birth, after hysterectomy or due to aging [1].

The impact of the disease both on individual and on the society level is considerable and therefore remains a challenge to the surgeon. Ideally, the goals of the treatment should be accomplished at four levels: anatomical reconstruction of the pelvic floor, regaining normal functionality, avoiding surgical complications and achieving the patients' satisfaction [2]. Over time there were several open and vaginal mesh reconstructive procedures for the correction of POP described. The risk of complications such as erosions and infections of the mesh observed in the vaginal surgery could be potentially successfully avoided using the laparoscopic approach but only a few clinics perform the laparoscopic approach although it could offer several advantages compared to open or vaginal surgery [3].

## Material and methods

### Patients

The study was conducted between January 2004 and December 2012 and included a number of 325 patients

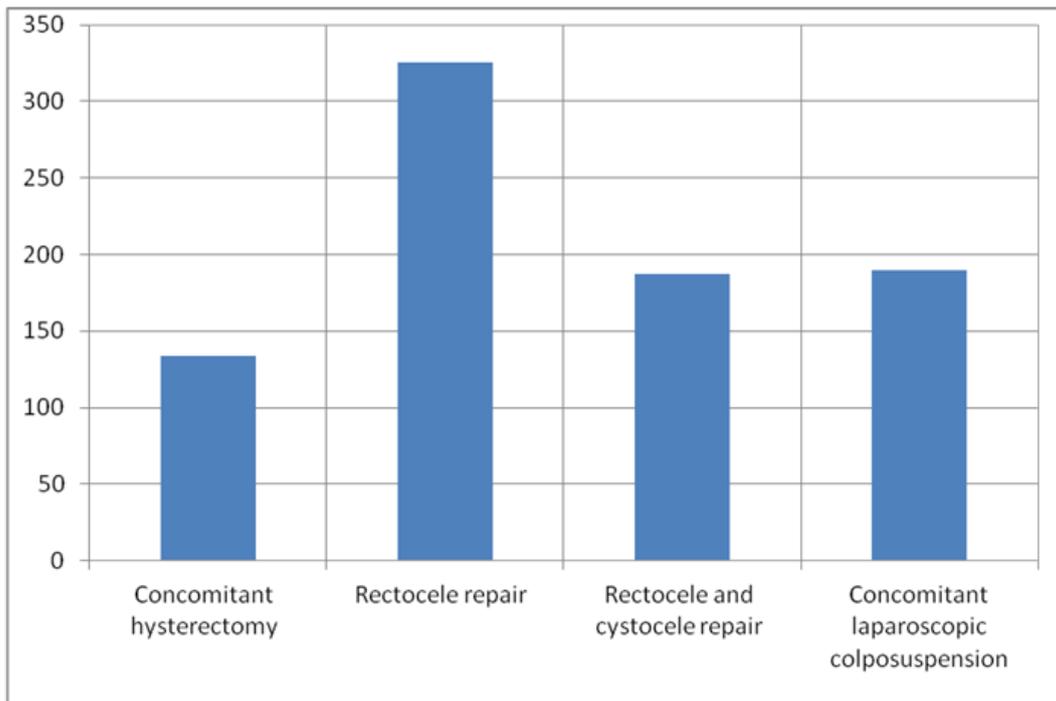
diagnosed with rectocele and a cystocele and treated in a private clinic in India. All patients received a physical examination. In stress urinary incontinence the clinical diagnosis was confirmed by urodynamic evaluation. The staging of prolapse was made according to the POPQ system [4]:

- Stage 0 – no prolapse is demonstrated
- Stage 1 – the most distal part of the prolaps is more than 1 cm above the level of the hymen
- Stage 2 – the most distal part of the prolapse is 1 cm or less proximal or distal to the hymenal plane
- Stage 3 – the most distal part of the prolapse protrudes more than 1 cm below the hymen but protrudes no further than 2 cm less than the total vaginal length (for example, not all the vagina has prolapsed)
- Stage 4 – vaginal eversion is essentially complete

In our series, 134 (41.2%) of the women had undergone a prior hysterectomy (total 132 and supracervical 2), 325 (100%) had a repair of rectocele, 187 (57.53%) had a repair of cystocele and 190 (58.46%) had colposuspension (Figure 1).

### Surgical technique

During the laparoscopic plastic procedure, the bladder is dissected down to the urethrovesical junction and laterally to the lateral pelvic margins. Hemostasis is ensured by electrocautery during the dissection, avoiding the lesions of presacral vessels and nerves. The posterior dis-



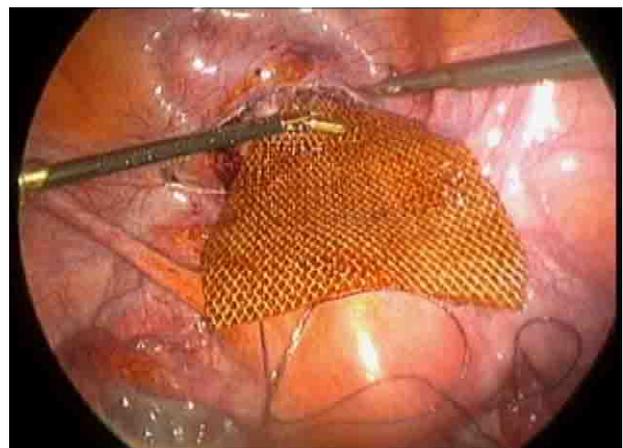
**Figure 1: The surgical procedure (concomitant hysterectomy, rectocele repair, rectocele and cystocele repair, concomitant laparoscopic colposuspension) in laparoscopic mesh surgery**

section frees the rectum from the vaginal wall and surrounding tissues.

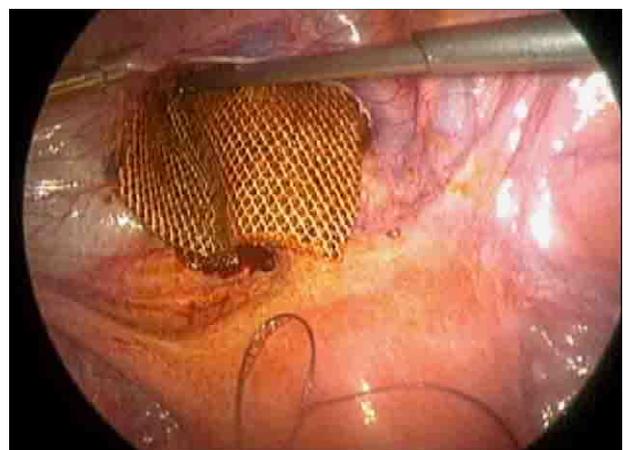
A preconstructed wide shaped synthetic polypropylene or polyurethane mesh of 10 x 12 cm is introduced into the abdomen through the trocar. The meshes cover the entire defect at the vagina, one at the anterior and eventually one at the posterior wall, depending on the vaginal defect. The operation area is then reperitonealised (No 0 Vicryl) avoiding injury of the ureters along the lateral pelvic side wall or injury to the bladder during closure (Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8).



**Figure 2: Laparoscopic bladder dissecting from the anterior vaginal wall exposing the cystocele**



**Figure 3: Tailored mesh put in the prepared pocket in laparoscopic cystocele repair**



**Figure 4: Mesh lying in the pocket during laparoscopic cystocele repair**

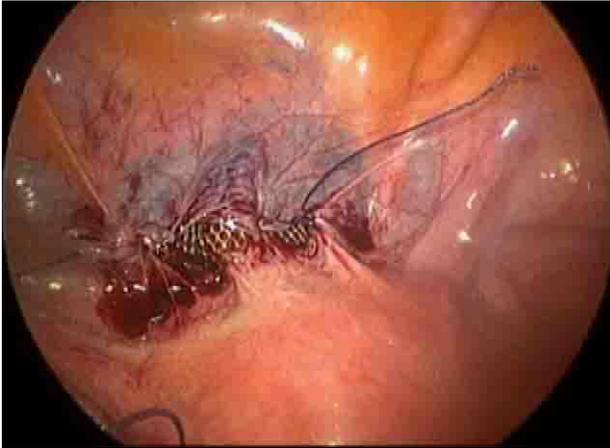


Figure 5: Reperitonealising during laparoscopic cystocele repair

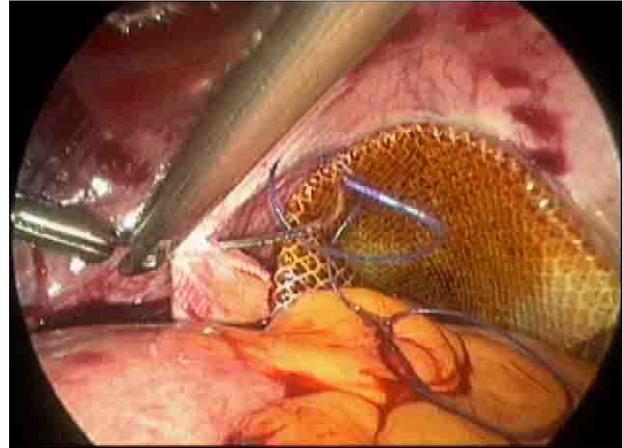


Figure 8: Reperitonealisation after laparoscopic rectocele mesh repair



Figure 6: Laparoscopic rectum dissection from posterior vaginal wall exposing the rectocele

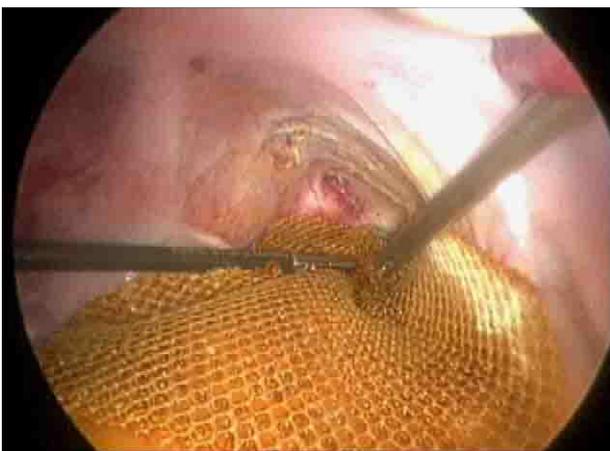


Figure 7: Tailored prepared mesh laparoscopically placed during rectocele repair

## Results

The demographic findings of our study are scheduled in Figure 9. The mean age was 55 (30–80) years and most of the patients were multiparous (272/325).

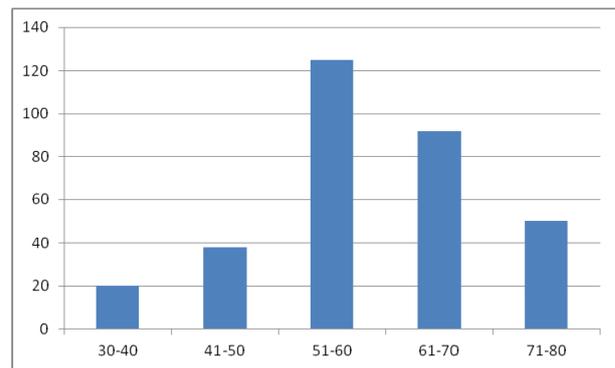


Figure 9: Age distribution of the patients in laparoscopic prolapse mesh repair

At clinical examination, all the patients presented with a reducible vaginal lump. Clinical urinary incontinence, confirmed by urodynamic investigation, was observed in 111 cases (34.15%). Other symptoms were constipation and flatus incontinence (19 cases, 5.8%), sexual dysfunction (197 patients, 60.61%) and dyspareunia (136 patients, 41.84%). The mean follow up was 3.4 (3–5) years. We performed the repair of cystocele and rectocele using a polypropylene or polyurethane mesh in all the cases. The complication rate in our series was 1%: one case of bladder injury, one case of persistent urinary retention and 4 cases with recurrence of the pelvic prolaps. The bladder lesion was corrected using absorbable suture and the patient received postoperative antibiotic prophylaxe as well as a protective transurethral catheter. The patient with urinary retention required a laparoscopic re-intervention with repositioning of the mesh, avoiding the urethra. The patients with recurrence of the disease complained of necessary digital voiding and sexual dysfunction: These patients underwent a secondary vaginal

**Table 1: The surgical outcomes of the different synthetic mesh used in vaginal surgery**

Material (size in cm)	Author	Number of the patients	Recurrence rate (%)	Site of attachment	Follow-up (months)	Complications
Marlex trapezoid	Julian 1996 [8]	12 with 12 without	0 vs. 33, respectively	Arcus tendineus fascia pelvis	24	3 vaginal erosions
Mixed-fiber mesh (polyglactin 910 and polyester 5x5)	Migliari and Usai 1999 [15]	12	25	Pubourethral and cardinal ligaments	20	None
Prolene (Atrium)	Dwyer and O'Reily 2004 [16]	64 anterior 50 posterior	6 grade II	Tension-free	29	8% vaginal erosion 1 rectovaginal fistula
Gynemesh 6x15	de Tayrac et al. 2005 [17]	87	7 stage II 2 stage III	Tension-free	24	8% vaginal erosion
Prolene mesh patch	Milani et al. 2005 [18]	32 anterior 31 posterior	6 stage II	Fixed to endopelvic connective tissue	17	20% anterior, 63% posterior dyspareunia; 13% vaginal erosion (anterior); 1 pelvic abscess (posterior)
Prolene mesh (double-wing shape)	Natale et al. 2000 [19]	138	3	Tension-free	18	9% vaginal erosion

colporrhaphy. Complications such as erosion or infection of the mesh were not reported in our series.

## Discussion

Traditionally the surgical reconstructive prolapse repair was performed by an anterior and posterior plastic colporrhaphy. The recurrence rate of these conventional surgical procedures (20–50%) [5], [6], [7] has led to the use of mesh in pelvic organ prolapse. In 1996 the use of synthetic graft materials in vaginal surgery was described [8]. The synthetic nonabsorbable prosthesis can be divided into [9]:

- Type I, totally macroporous prosthesis (polypropylene): the large diameter of these prosthesis (>75  $\mu\text{m}$ ) [9] allows the macrophages and fibroblasts to enter the space between the pores and to build the connective tissue, which contributes to the mesh integration to the organism. The macropores enable also the access of the immunological cells, which warrant the resistance against infections [9]. These type of mesh has a risk of adhesions and can induce the development of erosions and fistula [10], [11].
- Type II, totally microporous prosthesis (expanded polytetrafluoroethylene, Gore-Tex): the pores are smaller than 10  $\mu\text{m}$ . These meshes are smooth and flexible and not very adherent. The micropores allow

the entry of fibroblasts, but not of the macrophages and neutrophils which are too voluminous for the pores and therefore cannot protect against infections [12].

- Type III: Macroporous prosthesis with multifilament or microporous components (Mersilene, Parietex): the pores are larger than 75  $\mu\text{m}$ , organized in multifilamentary threads and the space between the threads are less than 10  $\mu\text{m}$  [9], [13]. The disadvantage of this type of mesh is the risk of infection [13].

Many prospective and retrospective nonrandomized studies [14] have reported good outcomes of vaginal surgery with synthetic grafts (Table 1) [8], [15], [16], [17], [18], [19], [20], but the risk of major complications such as erosions and infections of the mesh remains an important problem both for the patient and the surgeon [21].

The application of mesh techniques in pelvic organ prolapse repair and stress incontinence is steadily growing, despite of the relative lack of evidence-base information to document their safety and long-term efficacy [20]. Compared to the vaginal surgery, the laparoscopic closed insertion of graft material showed a significantly lower risk of mesh-related complications: in our study there were no mesh erosions reported.

The laparoscopical reconstructive approach enables superior visualization with accurate dissection and hemostasis. The retrovaginal technique itself without cutting the vaginal wall maintains the normal vaginal integrity, providing natural functionality and sexuality.

This technique also has the advantages of the minimally invasive surgery such as smaller incisions, less pain and morbidity, shorter hospital stay with a faster recovery, quicker return to daily activities and to a normal sexual life.

## Conclusion

The laparoscopic reconstructive management of cystocele and rectocele with mesh is a safe and efficient method, which offers the advantages of minimally invasive access and avoids mesh erosions known in vaginal surgery using graft materials. Further studies will be required to determine the long-term efficacy and safety of the proposed laparoscopic reconstructive method.

## Notes

### Competing interests

The authors declare that they have no competing interests.

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