

## Personal evolution of surgical technique using mesh for severe prolapse - a prospective audit of outcomes in 172 cases

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**Abstract:** A series of patients who underwent surgery for POPQ Stage 3 or 4 prolapse between 1999 and 2006 using multifilament polypropylene sling, autologous vaginal grafts or monofilament polypropylene mesh are presented. The change of mesh from Surgipro to Gynemesh resulted in a reduction of mesh erosion from 44 to 9%. Ongoing audit of results has brought about alterations in surgical technique and utilization of technologies.

**Key words:** Prolapse; Surgery; Mesh; Audit.

### INTRODUCTION

This paper is a clinical audit of the pelvic reconstructive surgery of a consultant gynaecologist since commencement of private specialist practice in 1995. Initial techniques for management of utero-vaginal prolapse were vaginal hysterectomy<sup>1</sup> anterior and posterior repair<sup>2</sup> and sacrospinous colpopexy.<sup>3</sup> These techniques frequently failed to adequately deal with major degrees of prolapse (POPQ Ordinal Stages 3 & 4). Either the apex of the prolapse failed to be adequately reattached (failure of Level 1 supports) or, over weeks to months, the vaginal epithelium sagged and collapsed to create a recurrent prolapse (failure of level 2 supports). A chance meeting with Professor Peter Petros in 1999 led to training in the use of the IVS Tunneller (Tyco, USA) to produce neo-ligaments in the anterior and the Posterior IVS operations, and the adoption of the Bridge Repair technique where the recycling of vascularised islands of vaginal epithelium provided new Level 2 and 3 supports. Subsequently, a standardised technique using mesh in conjunction with the Posterior IVS was developed and this clinical audit relates to the outcomes of this technique.

### METHODS

A prospective audit of clinical outcomes enabled ongoing evaluation of surgical results and modification of surgical technique. All cases involved women with POPQ Ordinal Stage 3 or 4 prolapse who were treated with mesh. Cure of prolapse was defined as achievement of POPQ ordinal stage 0 or 1. Improvement of prolapse was defined as achievement of POPQ ordinal stage 2. Failure of prolapse repair was defined as either unchanged physical findings post operatively. From 1999 to 2001 a standardised operative dissection technique was used. This technique remained unaltered for the entire study period. The only changes which occurred during the study period were in the use of different mesh prostheses.

### OPERATIVE PROCEDURE

Pararectal and paravesical spaces were opened trans vaginally using sharp dissection after development with hydrodissection using dilute 30-50 mls of Bupivacaine and adrenaline (Astra).

1. A full thickness midline anterior vaginal wall incision was made down to the bladder. The vagina was dissected free from the bladder on each side, utilizing Gyrus bipolar forceps, laterally to the subpubic arch. The paravesical space on each side was entered at the level of the bladder neck by holding the tips of Metzenbaum scissors against the subpubic arch and advancing them through the urogenital diaphragm with a "push-open" technique. Entry to this space was confirmed by the appearance of perivesical fat. The

space was developed by inserting the index finger and sweeping away (in an anterior to posterior direction) any fibrous attachments of the bladder to the obturator fascia.

A full thickness midline posterior vaginal incision was made down to the rectum. The vagina was dissected from the rectum along the full length from perineal body to uterus, utilizing Gyrus bipolar forceps. The avascular plane of perirectal fat was utilized to dissect down to the ischial spines. The peritoneum was elevated from the levator ani using Navratil retractors, thus exposing the sacrospinous ligament and freeing the rectum of any lateral attachments.

2. Identify visually the sacrospinous ligaments and the Arcus Tendineus Fascia Pelvis (ATFP).

3. Develop neo-uterosacral ligaments – using prostheses. Posterior Intravaginal Sling – using the technique previously described by Farnsworth.<sup>4</sup>

4. Develop neo vesico & rectovaginal fascia – securing repair tissue to the ATFP & levator ani.

a. Bridge repairs – as described by Farnsworth.<sup>5</sup>

b. Polypropylene Mesh – Mesh was placed anteriorly in the paravesical and cervico-vaginal spaces and sutured to the ATFP and uterus using Maxon (Tyco Healthcare, USA) sutures. Mesh was placed posteriorly in the pararectal and rectovaginal spaces and sutured to the sacrospinous ligaments and the perineal body using Maxon sutures. The vagina was closed with continuous Vicryl (Johnson & Johnson, USA) sutures.

c. Prolift Mesh – in the last year of the study, isolated pieces of mesh were replaced with Prolift Mesh (Johnson & Johnson, USA). This was inserted into the anterior and posterior spaces previously developed by the above mentioned dissection and was secured by utilizing transobturator wings perforating the obturator fascia and the posterior wings perforating the sacrospinous ligaments.

### RESULTS

#### Posterior IVS and Bridge Repairs

During 1999-2000 a Posterior IVS tape as a "level one" support and isolated islands of vaginal epithelium as level 2 supports. These islands were sutured to the ATFP and levator ani. Table 1 shows the result obtained. In short, one third of patients were cured, one third improved and one third failed. The tape problems were those of infection and erosion through the overlying vagina. On analysing the failures, they appeared to occur because of poor longevity of the level 2 supports.

#### Posterior IVS + Surgipro Mesh (Tyco Healthcare, USA)

In order to improve the quality of Level 2 supports, Surgipro Mesh (Tyco Healthcare, USA) was substituted for

TABLE 1. – PIVS + Bridge.

All	35
Cure	13
Improve	13
Fail	9
Tape Problems	5

TABLE 2. – PIVS + Surgipro mesh.

All	45
Cure	39
Improve	4
Fail	2
Mesh erosion	20

Vaginal epithelial bridge repairs. Table 2 summarises the experience.

This resulted in a dramatic improvement in cure rate. The two failures which occurred were due to Level 1 support failures in woman who had undergone a previous hysterectomy. Disturbingly, mesh erosions occurred in half the patients. These produced a foul smelling blood stained discharge. All patients so affected, requested treatment. This problem was resolved by surgically removing the exposed part of the mesh. Interestingly, there didn't appear to be any worsening of prolapse repair results following partial mesh excision.

#### Posterior IVS + Gynemesh (Gynecare, USA)

In 2004, Johnson & Johnson began marketing in Australia a new macroporous mesh specifically designed for vaginal repairs – Gynemesh. The expectation was that because of its monofilament, macroporous design, that there should be a reduction in infection related extrusions of this mesh. Table 3 summarises experience with this mesh.

TABLE 3. – PIVS + Gynemesh.

All	45
Cure	40
Improve	5
Fail	0
Erosion	4

The same excellent anatomical results achieved with the Surgipro mesh (Tyco Healthcare, USA) were repeated with Gynemesh (Johnson & Johnson, USA) and there was a dramatic reduction in the number of mesh erosions. Moreover, these erosions were frequently asymptomatic.

#### Prolift Mesh

In June 2005 the Prolift kit (Ethicon Women's Health and Urology, USA) for vaginal repair became available. This kit consisted of a unique preformed piece of Gynemesh with six extensions for placement through pelvic ligaments and purpose built instrumentation. This combined the insertion of Gynemesh, an equivalent to the posterior IVS procedure and a novel way of fixing the anterior wall mesh in position – fixation by perforation of the obturator fascia with lateral extensions of the mesh. During the time of this review the Johnson & Johnson approved technique was followed in which a

TABLE 4. – Prolift.

All	47
Total Reconstruction	29
Anterior	8
Posterior	7
Abdo/Vag	2
Abandoned	1
TVT-O	10
Fascial Sling	2
Hysterectomy	2
Anal sphincter repair	1

trocac is used to perforate the sacrospinous ligament with the mesh extension analogous to the Posterior IVS procedure.

Table 4 summarises the number and types of procedures and additional procedures performed on patients whose operations occurred between August 2005 and April 2006. All patients had been followed for a minimum of 3 months.

One procedure was abandoned following inadvertent cystotomy during the anterior dissection. In two combined abdomino-vaginal procedures the mesh was inserted transvaginally and then the abdomen was opened and the mesh was attached to the sacral periosteum. Both patients had previous POPQ Ordinal stage 4 prolapse and both had technical failure of an earlier transvaginal mesh procedure. Two hysterectomies were performed for patients who had both Grade 3 prolapse and dysfunctional uterine bleeding. An anal sphincter repair was performed on a patient with a grade 4 prolapse and faecal incontinence secondary to an incompletely repaired external anal sphincter tear.

Table 5 summarises the results of Prolift repairs.

TABLE 5.

Cure	43
Improve	2
Fail	0

One patient was lost to follow up. Two cases of improvement occurred in women with grade 4 prolapse and a previous hysterectomy – the lack of cure was due to less than ideal repair of the apical prolapse. In retrospect, this is possibly due to loosening of the apical portion of the mesh graft prior to complete healing. This might have been prevented by securing the apical portion of the graft to the sacrospinous ligament with permanent sutures.

Table 6 describes the complications experienced in the Prolift repairs.

TABLE 6.

Mesh erosion	7
Urinary Retention	1
Deep Venous Thrombosis	1

Of the seven erosions, only 2 patients requested active treatment by excision of the exposed mesh.

#### DISCUSSION

Over a six year period there has been a constant refinement of surgical technique in the management of POPQ Stage 3 and 4 prolapse. This constant refinement has been

directed by a prospective review of the results of treatment and identifying weaknesses in technique and technology.

Using autologous grafts for level 2 supports quickly proved to lack any longevity. However, as soon as polypropylene meshes were introduced for this purpose, there was an obvious and major improvement in durability and quality of the anatomical repair. The downside of this technology has been the occurrence of mesh erosion. This was worst with a multifilament mesh, Surgipro Tyco Healthcare, USA) and least with a macroporous monofilament polypropylene mesh, Gynemesh & Prolift (Ethicon Women's Health and Urology, USA). The vagina is a relatively thin walled structure making it a less suitable site for mesh enhancement than the anterior abdominal wall.

Second generation polypropylene meshes such as Prolift (Ethicon Women's Health and Urology, USA) and Apogee/Perigee (American Medical Systems, USA) use a transobturator passage of the mesh with integrated mesh extensions and purpose built instrumentation. This has improved the quality of repair of the anterior vaginal wall and better recreates the anterior sulci of the vagina compared to the previous technique of suturing the mesh to the AAFP.

The posterior IVS and procedures derived from it are best used as level 2 supports<sup>4</sup> and level one support should be provided using an independent suspension, such as a permanent suture from the apex of the mesh to the sacrospinous ligaments. This has since been introduced into surgical technique following analysis of these audit results.

## CONCLUSIONS

Experience with a standardized dissection technique for surgical treatment of utero-vaginal prolapse has shown that the Posterior IVS procedure is ineffective as a focal apical support and that the use of autologous vaginal grafts were

ineffective for vaginal wall fascial support (De Lancey Level 2). The use of polypropylene mesh has been shown to provide a highly effective Level 2 support.

Mesh extrusion remains a diminished but continuing problem in spite of the use of monofilament, macroporous meshes. Transobturator suspension of the anterior arm of Prolift mesh has been shown to be highly effective in supporting the anterior vaginal wall.

Ongoing use of a prospective audit has made it possible to easily assess the effectiveness of one surgeon's techniques and the rate of success of new technologies as they become available.

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**Neural pain after uterosacral ligament vaginal suspension.** Lowenstein L, Dooley Y, Kenton K, Mueller E, Brubaker L. *Int Urogynecol J Pelvic Floor Dysfunct.* 2007;18:109. This case report describes the possibility of neural compromise after transvaginal uterosacral ligament suspension. Two women presented shortly after surgery with a unilateral, shooting groin pain with radiation along the ipsilateral lumbosacral nerve distribution. Surgical removal of the permanent stitch and physical therapy provided prompt and near-complete relief.

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## 8 – FISTULAE

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