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Posterior intravaginal slingplasty for vault and uterovaginal prolapse: an initial experience

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Abstract Genital prolapse surgeries are traditionally time-consuming and can be complex with significant morbidity. Most of the techniques described have incorporated removal of the prolapsed uterus prior to the repair, thus increasing morbidity and hospital stay. Recently, interest has been focused on minimally invasive day-case techniques, which have similar success rates but relatively lower morbidity than the conventional surgeries. We report an initial experience of 14 cases of vault and uterovaginal prolapse treated with the intravaginal slingplasty procedure. This study involved retrospective analyses of the case notes as well as evaluation by contemporary patient questionnaire. In our series we used a modified technique to correct uterovaginal prolapse without performing a hysterectomy. The cure rates in vault and uterovaginal prolapses were statistically significant, and the complication rates were minimal, facilitating a short hospital stay. Hence, the procedure was equally successful in women who had undergone hysterectomy and women with an intact uterus. We conclude that intravaginal slingplasty is minimally invasive and safe, with a high cure rate and high patient satisfaction.

Keywords Intravaginal slingplasty · Prolapse surgery

Introduction

The lifetime risk of genital prolapse has been reported as approximately 30–50% in parous women [1]. An important cause of uterovaginal prolapse is generally thought to be weakness in the uterosacral/cardinal ligament complex. A variety of techniques have been described for treating uterovaginal prolapse, ranging from sacrospinous colpo-

pexy and McCall culdoplasty to open abdominal procedures such as transabdominal sacropepy or complex abdominopelvic procedures as described by Zacharin. These procedures can be time-consuming and are complex with significant morbidity. Although laparoscopic pelvic floor repair, or laparoscopic sacrocolpopexy, has recently achieved more popularity, laparoscopic procedures require a high degree of skill and extensive training with specialised equipment. Most of the above techniques have been described as incorporating removal of the prolapsed uterus prior to the repair, thus increasing morbidity and hospital stay.

Recently, interest has been focused on minimally invasive day-case techniques, which have similar success rates but relatively lower morbidity than the conventional surgeries. The infracoccygeal sacropepy, also known as the intravaginal slingplasty (IVS), is a new minimally invasive procedure introduced by Petros in 1997 to correct vault prolapses [2].

In our series we used a modified IVS technique to correct uterovaginal prolapses, thereby negating the need to remove the uterus prior to the repair. To our knowledge, this is the first series reporting the results of a minimal-access procedure: IVS to correct uterovaginal prolapse without a concomitant hysterectomy. We also analyse and compare the results with vault prolapses in which the prolapse had occurred after a previous hysterectomy. Thus, the aim of this study is to report our initial experience and short-term results with IVS in vault prolapses as well as in uterovaginal prolapses.

Methods

Subjects

A total of 14 posterior IVS procedures were performed between June 2004 and May 2005. All were done by a single surgeon. This study involved retrospective analyses of the indications, intraoperative and postoperative complications, and early postoperative results as documented in

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the case notes. The retrospective analyses were combined with a questionnaire survey to evaluate postoperative symptomatology and quality of life after surgery. The standardised questionnaire related to prolapse symptoms and urinary, bowel, and sexual functions. The cure rates of all the patients for each presenting complaint were determined by evaluation with the questionnaire. Patients were considered cured based on a subjective evaluation that was in turn based on the patients' perception of complete remission of their symptoms. The quality-of-life questionnaire was based on the SF-36 proforma [3].

Of the total 14 patients, seven presented with vault prolapse occurring after hysterectomy. Of these, five had third-degree vault prolapse, and two had second-degree vault prolapse. Additionally, five of these patients presented with cystocele and rectocele of at least moderate degree. Of the seven patients who presented with uterovaginal prolapse with the uterus in situ, five had third-degree uterovaginal prolapse, and two had second-degree uterovaginal prolapse. The degree of prolapse was assessed intraoperatively, second degree being prolapse at the level of the introitus, and third-degree prolapse everting beyond the introitus. Six patients out of the seven who presented with uterovaginal prolapse presented with moderate cystocele and rectocele.

The main symptom for the surgery and the associated symptoms of pain and urinary and bowel symptoms were recorded in the notes preoperatively (Table 1). All patients were investigated preoperatively to rule out a uterine malignancy or a coincidental cause of prolapse (such as abdominal mass).

Operative technique

All procedures were performed under general anaesthesia. Effective pain relief being the cardinal determinant of short-stay surgery, we infiltrate the operative site with local anaesthetic. We also give a single dose of intraoperative antibiotic prophylactically.

The aim of the technique is to repair the three levels of vaginal support described by De Lancey [4].

Table 1 Patient symptomatology

Symptom	Number of patients, <i>n</i> =14
Feeling of a lump	14 (100%)
Pelvic pain	11 (78.5%)
Urgency	10 (71.4%)
Nocturia	10 (71.4%)
Difficulty in voiding	6 (42.8%)
Stress incontinence	8 (57.1%)
Urge incontinence	6 (42.8%)
Difficulty in defaecation	6 (42.8%)
Dyspareunia	4 (28.5%)

Vault prolapse

The technique (Figs. 1, 2) reinforces the uterosacral ligament by the placement of a polypropylene tape between the perineum and vaginal vault.

A vertical incision is made in the vault with the cranial end of the incision 2 cm inferior to the hysterectomy incision scar. The incision is positioned 2 cm inferior to avoid potential damage to the ureters. The incision is opened further, and the rectocele, if present, is dissected out and reduced. The IVS Tunneller (Tyco Healthcare USA) is used to place a polypropylene tape as an inverted "U" around the rectum and attach it behind the posterior vaginal wall. Bilateral incisions of 0.5 cm are made on the perineal skin at 4 o'clock and 8 o'clock 2 cm below and lateral to the external anal sphincter. The tunneller is initially inserted subdermally to the 3 o'clock and 9 o'clock positions to prevent the tape from slipping through the levator ani muscle. The tip of the tunneller is elevated and inserted into the ischioanal fossa and through the rectovaginal fascia and into the vaginal incision. The tip of the tunnelling device is guided by a finger positioned in the vaginal incision. Vaginal and rectal examinations are performed before and after the insertion to ensure correct placement of the tape and to exclude damage to the rectum. The procedure is repeated on the other side. The apical portion of the tape is anchored to each corner of the vault at the estimated insertion site of the uterosacral ligament. The rectovaginal fascia and the perineal body are reconstituted and the vaginal incision closed. The tape is gently stretched and the excess trimmed. The perineal skin incisions are sutured without suturing the tape.

Uterovaginal prolapse

A vertical incision is made in the posterior fornix, and the vaginal wall is opened up to 1 cm proximal to the external os. The incision is opened further, and the rectocele, if present, is dissected out and reduced. The IVS Tunneller (Tyco Healthcare USA) is used to place a polypropylene tape as described above. After the first insertion on the right side, the tip of the tape is threaded through a Mayo needle and inserted through the pericervical ring posteriorly at the apex of the vaginal wall dissection. The insertion of the tape is then completed on the left side. Vaginal and rectal examinations are performed before and after the insertion to ensure correct placement of the tape and to exclude damage to the rectum. The apical portion of the tape passes through the cervix and restores the uterus to its anatomical position, acting as a neo-uterosacral ligament. The remainder of the procedure is as described above.

Statistical analysis

Statistical analysis was performed using the SigmaStat 3.0 software programme (SPSS). The different groups were analysed using *t*-tests to satisfy the test of normality. Where

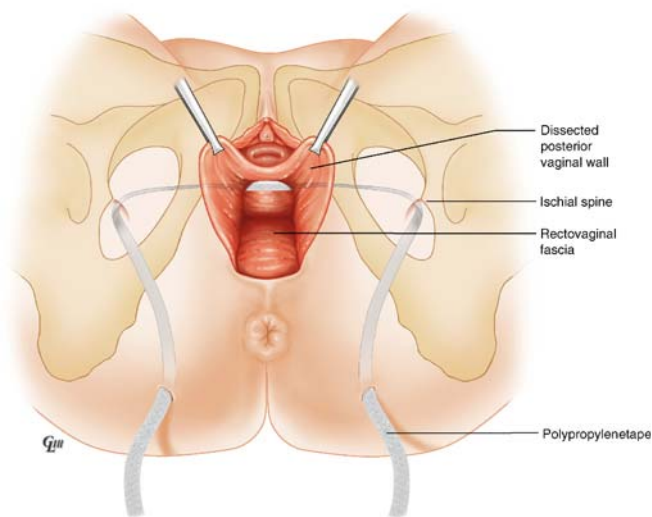


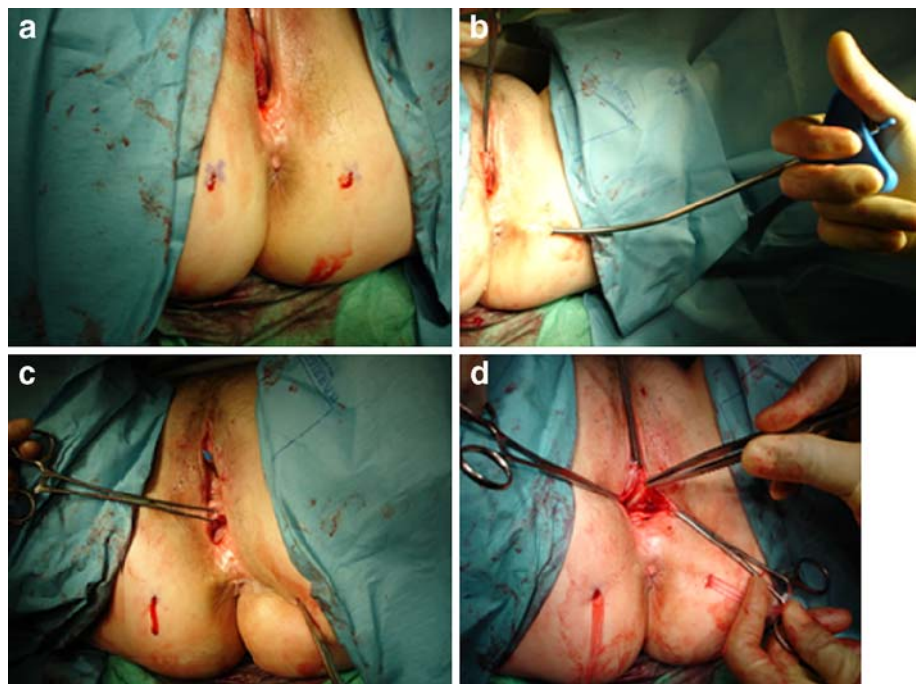
Fig. 1 Schematic diagram of the intravaginal slingplasty tape passed as an inverted “U” around the rectum and anchored to the rectovaginal fascia at the apex of the vagina

they failed the test of normality, nonparametric tests were used, namely the Mann-Whitney rank sum test. A probability (p) value of <0.05 was considered statistically significant.

Results

The mean patient age was 72.5 years, mean patient weight 75.6 kg, and mean parity 2 (Table 2.) The mean operating time was 50.5 ± 8 min, and mean estimated blood loss was 182 ± 12 ml. The mean hospital stay was 2 days.

Fig. 2 **a** Bilateral perineal skin incisions. **b** Skin insertion of the IVS Tunneller. **c** Tunneller passed through ischioanal fossa, rectovaginal fascia, and into the vaginal incision. **d** Tape passed through both sides



The mean time interval of the first postoperative follow-up was 6 weeks and that of the questionnaire was 5.10 months (range 2–11 months).

Additional procedures

All patients had the IVS tape inserted as described above. Additionally, three of the patients in the group presenting with uterovaginal prolapse had hysterectomy done prior to the IVS insertion. During assessment under anaesthesia, it was felt that the uterovaginal prolapse in these patients was of such a degree as to potentially compromise the repair's success. Cystocele and rectocele repair was performed simultaneously.

Complications

The rate of intraoperative complications was 0%. There was no incidence of rectal perforation. Postoperative pain was mild and responded to nonsteroidal antiinflammatory drugs. No patients required blood transfusion, and no haematomas were noted.

There were two cases of early postoperative complications. One patient who had a transvaginal tape inserted at the same time had postoperative urine retention. Cystoscopy confirmed no problems with the tape insertion, and she was treated by suprapubic catheterisation for three weeks. Follow-up 6 months later revealed her to be asymptomatic, and on examination no prolapse was seen. The second patient had urinary tract infection 1 week postoperatively, which was treated with oral antibiotics.

Table 2 Patient demographics (*SD* standard deviation)

Variable	<i>n</i> =14
Mean age	72.5 years (<i>SD</i> =17.67)
Menopausal status	14 (100%)
Mean weight	75.6 kg (<i>SD</i> =21.77)
Mean parity	2
Previous hysterectomy	7 (50%; 5 vaginal, 2 abdominal)

Postoperative evaluation

Total cure rates (vault and uterovaginal prolapses)

The cure rates of all the patients for all the presenting complaints were compared with an ideal 100% cure rate for statistical significance. The median cure rate was 83.3% (Table 3). The Mann-Whitney rank sum test was used as the test of significance because the distribution was nonparametric. Results showed statistical significance ($p<0.001$).

Vault prolapse cure rates

The cure rates of all the patients in the vault prolapse group for all the presenting complaints were compared with an ideal 100% cure rate for statistical significance. The median cure rate was 80% (Table 4). The Mann-Whitney rank sum test was used as the test of significance because the distribution was nonparametric. Results showed statistical significance ($p=0.018$).

Uterovaginal prolapse cure rates

The cure rates of all the patients in the uterovaginal prolapse group for all the presenting complaints were compared with an ideal 100% cure rate for statistical significance. The median cure rate was 80% (Table 4). The

Table 3 Results of postoperative evaluation

Symptoms	Number of patients cured (<i>n</i> =patients with symptoms)	Percentage cured
Cure of prolapse	13 (<i>n</i> =14)	92.8%
Cure of pelvic pain	10 (<i>n</i> =11)	90.9%
Cure of urgency	8 (<i>n</i> =10)	80%
Cure of nocturia	7 (<i>n</i> =10)	70%
Cure of voiding difficulty	5 (<i>n</i> =6)	83.3%
Stress incontinence	6 (<i>n</i> =8)	75%
Urge incontinence	5 (<i>n</i> =6)	83.3%
Cure of defaecation difficulty	5 (<i>n</i> =6)	83.3%
Dyspareunia	3 (<i>n</i> =4)	75%

Mann-Whitney rank sum test was used as the test of significance because the distribution was nonparametric. Results showed statistical significance ($p=0.018$).

Quality-of-life assessment

All patients reported improved physical activity, sexual activity, social activity, vitality (energy and fatigue), and general mental health following the procedure, as assessed by the SF-36 questionnaire [3].

Discussion

The three levels of connective tissue structures that provide vaginal support are generally acknowledged to be the cardinal/uterosacral ligament complex (superior attachment), the superolateral insertion points of the anterior vaginal wall, the rectovaginal fascia (lateral attachment), the perineal body, and the perineal membrane (distal attachment) [4]. This procedure provides reconstruction at the three levels of connective tissue support [2]. The tape, by anchoring the apex of the prolapsed vault, supports and restores the cardinal/uterosacral ligament complex.

The minimally invasive technique of IVS insertion obviates the increased morbidity of abdominal or open procedures. The vagina has a visceral nerve supply, and procedures involving tightening and suturing of structures cause pain and lead to lengthy hospital stays. The “tension-free” insertion techniques prevent tightening of tissues; thus, patients are relatively pain free, facilitating day-case surgery.

The complication rate for this procedure is low compared with similar procedures. Sacrospinous colpopexy and transabdominal sacropexy may require transfusion in 4.3% of cases and have febrile morbidity in 10% of cases [5]. There was no transfusion or febrile morbidity in our series. Unlike laparoscopic sacropexy, multiple abdominal operations are not a contraindication for IVS. The only important structures present in the insertion path are inferior rectal vessels and nerves. The rounded blunt head of the tunneller minimises the risk of perforation and significant bleeding from these vessels. The two different groups of patients with vault and uterovaginal prolapses did not show a different incidence of complications.

The efficacy of this procedure was very high in our initial experience. Both groups, analysed together and separately, showed statistically significant success rates for all the presenting complaints (Tables 3 and 4). Pelvic muscles play an important part in bladder symptoms; pelvic muscle support of the bladder base and the stretch receptors control symptoms of frequency, urgency, and nocturia. Previous studies have reported a high concomitant cure rate for bladder symptoms [2]. This study confirms previous reports of high rates of improvement in symptoms of prolapse, urgency, nocturia, pelvic pain, and difficulty voiding [6]. In our case series, the cure rates were

Table 4 Cure rates: vault prolapse and uterovaginal prolapse

Symptoms	Total number of patients Number of patients cured (<i>n</i> =patients with symptoms); percentage cured	Vault prolapse Number of patients cured (<i>n</i> =patients with symptoms); percentage cured	Uterovaginal prolapse Number of patients cured (<i>n</i> =patients with symptoms); percentage cured
Cure of prolapse	13 (<i>n</i> =14); 92.8%	10 (<i>n</i> =10); 100%	3 (<i>n</i> =4); 75%
Cure of pelvic pain	10 (<i>n</i> =11); 90.9%	6 (<i>n</i> =7); 85.7%	4 (<i>n</i> =4); 100%
Cure of urgency	8 (<i>n</i> =10); 80%	5 (<i>n</i> =6); 83.33%	3 (<i>n</i> =4); 75%
Cure of nocturia	7 (<i>n</i> =10); 70%	4 (<i>n</i> =6); 66.6%	3 (<i>n</i> =4); 75%
Cure of voiding difficulty	5 (<i>n</i> =6); 83.3%	2 (<i>n</i> =3); 66.6%	3 (<i>n</i> =3); 100%
Stress incontinence	6 (<i>n</i> =8); 75%	3 (<i>n</i> =4); 75%	3 (<i>n</i> =4); 75%
Urge incontinence	5 (<i>n</i> =6); 83.3%	3 (<i>n</i> =3); 100%	2 (<i>n</i> =3); 66.6%
Cure of defaecation difficulty	5 (<i>n</i> =6); 83.3%	2 (<i>n</i> =3); 66.6%	3 (<i>n</i> =3); 100%
Dyspareunia	3 (<i>n</i> =4); 75%	1 (<i>n</i> =2); 50%	2 (<i>n</i> =2); 100%

statistically significant, with a cure rate of 80% for urgency, 70% for nocturia, 83.3% for voiding difficulty, 75% for stress incontinence, and 83.3% for urge incontinence.

We also compared the cure rates between the two groups of vault and uterovaginal prolapse (Table 4). The difference in the median values between the two groups is not great enough to exclude the possibility that the difference is due to random sampling variability; there was not a statistically significant difference ($p=0.309$). The statistical test also concluded that the power was below that desired. Hence, further larger studies are necessary to clarify whether hysterectomy affects the success of the surgery.

The quality-of-life assessment by the questionnaire showed 100% improvement in all the aspects questioned: physical activity, sexual activity, social activity, vitality (energy and fatigue), and general mental health.

Conclusion

The drawbacks of conventional prolapse surgery necessitate a more thorough understanding of the anatomical mechanisms of prolapse with a view to developing the least invasive procedure to restore the natural anatomy. The complication rate of such a procedure should be minimal to facilitate a short hospital stay and minimise patient morbidity. The posterior IVS technique fulfils the above criteria. The surgical method used in IVS is simple, minimally invasive, and fairly safe, and it has a relatively short learning curve. Most of the studies so far have concluded that the procedure has a high cure rate, as was the conclusion in our series in the short term. Interestingly,

both groups appeared to have a 100% improvement in quality of life, and the cure rates were high in both groups. The power of the study was not high enough to warrant statistical significance in the comparison between the two groups. Larger randomised controlled trials are necessary to clarify whether a hysterectomy is necessary for the procedure's success and to determine its effect on cure rates.

We conclude that posterior IVS is an effective technique with a short hospital recovery time and minimal morbidity. However, larger trials and randomised trials with other surgical procedures for vaginal prolapse are required to fully evaluate the long-term efficacy and safety of this procedure.

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