THE SURGICAL MANAGEMENT OF VAULT PROLAPSE

A REAPPRAISAL WITH AN ASSESSMENT OF THE SACROSPINOUS COLPOPEXY AND SACROSPINOUS CERVICOPEXY

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THE SURGICAL MANAGEMENT OF GENITAL PROLAPSE

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Signed

10/11/93

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ABSTRACT

The study was undertaken to assess the results of the sacrospinous colpopexy procedure for the treatment of vault prolapse following hysterectomy. It was also to assess the results of the procedure in the treatment of marked uterovaginal prolapse and to compare its role in a group undergoing hysterectomy with a group in whom the uterus was conserved.

A prospective study was undertaken between December 1991 and December 1992.

Forty women with vault prolapse following hysterectomy were included in one group. All these patients underwent posterior vaginal repair, enterocele sac obliteration and sacrospinous colpopexy. In 25 patients an anterior vaginal repair with suburethral buttressing sutures was also performed. A long-needle bladder neck suspension operation was included for three women with coexistent stress incontinence.

The mean follow-up period was six months. The success rate was 92%. Of the three failures one underwent a successful repeat sacrospinous colpopexy and repair. The main long term complication was cystocele formation.

A further 24 women with marked uterovaginal prolapse were also included. All women

underwent anterior and posterior vaginal repairs, enterocele sac obliteration and sacrospinous ligament fixation. In 13 patients a vaginal hysterectomy was performed and in 11 the uterus was conserved. In the hysterectomy group the follow-up was four months. Although there have been no failures, one woman had developed a small asymptomatic cystocele. Follow-up in the group with uterine preservation was three and a half months. Again, no failures were seen but three women had developed small asymptomatic cystoceles. There were no differences between the groups apart from a significantly shorter operating time in the patients who did not undergo hysterectomy.

The sacrospinous colpopexy is effective in the treatment of vault prolapse. It avoids major abdominal surgery and allows the surgeon to correct coexistent cystocele and rectocele.

The procedure is a useful adjuvent to vaginal repair for marked degrees of uterovaginal prolapse, resulting in a well-supported vagina in the correct anatomical position.

INTRODUCTION

Vault prolapse and major uterovaginal prolapse are distressing conditions for those afflicted. One rarely encounters more appreciative patients than those with these conditions who have been successfully treated.

With the dramatic increase in life expectancy a gynaecologist can expect to see increasing numbers of women with these conditions. These women will have a greater expectation of effective therapy, and especially the maintenance of coital function and body image.

Many operations have been described to treat vault prolapse but most fall short of being effective in relieving symptoms and restoring anatomy and function. The standard vaginal colporrhaphy may be adequate in the treatment of cystocele, rectocele and enterocele in the absence of vault prolapse. However it is naive to expect colporrhaphy to be effective in restoring vault support when vaginal eversion is present.

Effective and sustained vault support can be achieved by both the transvaginal sacrospinous colpopexy and the transabdominal sacrocolpopexy. The former procedure is particularly suitable for the elderly or obese patient where the avoidance of major abdominal surgery is desirable.

However, with the greater morbidity associated with abdominal repairs the experienced vaginal surgeon will reserve this procedure for cases where there is a coexistent need for abdominal surgery.

The sacrospinous colpopexy can also be used for the management of marked uterovaginal prolapse. This can be done at the time of hysterectomy or as a primary procedure with conservation of the uterus.

When maintenance of fertility is required sacrospinous ligament fixation may be an alternative to the Manchester-Fothergill operation, the sacrouteropexy or ventral fixation of the uterus. This would avoid the problems of infertility and pregnancy wastage associated with the Manchester repair and prevent the risk of tubal damage with the abdominal approaches.

LITERATURE REVIEW

HISTORICAL PERSPECTIVE.

The history of genital prolapse can be traced to records in Egyptian papyrus in 1550 BC. Reports describing the condition are also noted in ancient Hindu writings and in the work of Hippocrates.

Many fanciful, bizarre and mutilating procedures were described to manage the condition. From the time of Hippocrates to the mid-fourteenth century, obliteration of the vaginal canal by mechanical means was the most popular method of treatment. A host of different substances were employed to achieve this aim. Until the sixteenth century these were mainly foodstuffs but by 1559 brass and waxed cork pessaries were being employed.

It was not until the seventeenth century that procidentia was recognised as genital prolapse, and not until the mid-eighteenth century that a clear differential diagnosis was made of the actual problems related to prolapse and the organs concerned[15].

By the nineteenth century an anatomical classification of various pelvic relaxation defects had been established. It was at this stage that the first substantive descriptions of operations

for the treatment of the condition were made.

Various operations using vaginal epithelial denudation for vaginal obliteration were used before the vaginal hysterectomy was perfected. The LeFort procedure, originally described in 1877, remains in use today. At this time various vaginofixation and interposition operations were employed with limited success[15].

Although vaginal hysterectomy was described by Langenbeck in 1813[34], it was not until 1861 that it became an established procedure.

The twentieth century, with its explosion of medical literature, has brought with it many descriptions of new operative procedures. Most have not stood the test of time but some are still in common use today.

In 1900 Gilliam described the uterine suspension operation using the round ligaments. Successful treatment of uterovaginal prolapse with uterine preservation was achieved by Donald in England in 1888. Following modification by Fothergill it became formalised as the Manchester-Fothergill operation in 1908. Kelly in 1912 added the insertion of suburethral plication sutures for the treatment of coexistent urinary incontinence[30,31].

In 1934 Victor Bonney defined the principles associated with operative prolapse repair in a remarkably accurate and far thinking paper[6]. He described the presence of upper vaginal soft

tissue supports and suggested that the uterus has a passive role in uterovaginal prolapse. These principles still apply today.

The sacrospinous colpopexy, for the management of post hysterectomy vault prolapse, evolved from Zweifel's first attempts in 1892 to secure the vault to the sacrotuberous ligament[95]. It was successfully described by Richter and Albrich in 1968, following earlier unsuccessful attempts with the sacrotuberous ligament[61]. Randall and Nichols introduced the operation to the United States in 1971 where it has become increasingly popular[55].

Surprisingly the operation has achieved little popularity in the English influenced gynaecological world. No reports have emanated from the United Kingdom, where transabdominal repairs of vault prolapse are favoured.

REVIEW OF THE FUNCTIONAL ANATOMY

Successful surgery for this condition is dependent on a thorough understanding of the anatomy of the supporting structures of the pelvis. Unfortunately most anatomical texts draw their understanding of the pelvic floor and surrounding structures from cadaver dissection.[86] This has produced a misconception about the shape of the pelvic floor. Moynihan pointed out: "the pathology of the living" differs from "the pathology of the dead"[6]. Because the levator ani maintains its position in the living through continuous activity, the loss of contractibility brought on by death will cause it to lose its position. If embalming is

performed by the traditional injection method the preservative fluid that is pumped into the arterial system causes the abdominal viscera to swell, distending the abdomen and distorting the levator plate[86]. If an immersion technique is used to fix cadavers the spatial relationship of the pelvis can be maintained. Comparison of these specimens with topographic studies of living individuals confirms this[13,14].

Consequently, in older texts the axis of the vagina is described as directed upwards and backwards at an angle of 45 degrees with the horizontal, parallel with the plane of the pelvic brim and at right angles to the uterus[74]. Using the newer techniques, it can be shown that in the living patient it adopts a more horizontal position over the levator plate[14]

Revision of the anatomy shows that the pelvic viscera are attached to the pelvic side walls by connective tissue called the endopelvic fascia. This is divided into regions that are individually named although in reality it is one continuous unit. The supporting structures of the uterus are collectively named the parametria whereas that supporting the vagina makes up the paracolpium.

Following a series of anatomical dissections, DeLancey (1992) divided the supporting structures of the vagina into three functional levels[14]. The so-called level I attachments support the upper vagina. Here the fibres of the paracolpium arise from a broad area on the pelvic side wall over the fascia of the piriformis muscle, sacroiliac joint and lateral sacrum. The fibres insert into the upper third of the vagina with some inserting anteriorly and

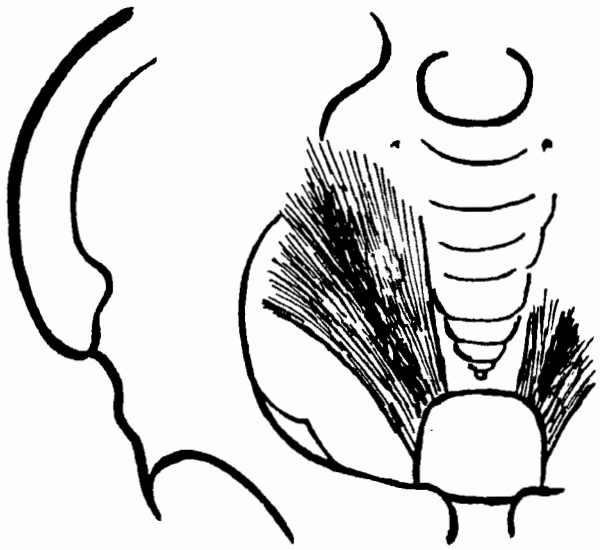

Figure I: Schematic representation of the Level I fibres of the paracolpium.

posteriorly (Fig I). They represent condensations in the endopelvic fascia and are composed of perivascular connective tissue and smooth muscle and carry blood vessels, lymphatics and nerves. They run in a mainly vertical direction from the pelvic side wall and their upper borders are continuous with the cardinal and uterosacral ligaments of the parametrium when the uterus is in situ. Transection of these fibres in cadaver specimens that have undergone hysterectomy in life, will allow vaginal vault eversion to occur[14].

The level II attachments (mid-vagina) are much shorter. Here the paracolpial tissues attach, rather than suspend, the vagina to the pelvis. The anterior wall connects to the arcus tendineus fascia and provides support for the bladder. This corresponds to the pubocervical fascia. The posterior wall is attached to the superior fascia of the levator ani muscles and forms the rectovaginal fascia. The lateral attachments of the vagina to the arcus tendineus fascia pelvis and superior fascia of the levator ani complete its fixation[14].

At level III (lower 1/3) the vagina is fused to surrounding structures and has limited mobility.

The levator ani comprises the pelvic diaphragm muscles: the pubococcygeus, iliococcygeus, puborectalis and coccygeus muscles. Together they form a thin broad muscle arising anteriorly from the posterior aspect of the pubic bone just lateral to the symphysis pubis and laterally from the white line of the obturator internus muscle fascia and ischial spine. The right and left muscle bellies swing backwards and downwards to fuse behind the anal canal and anterior to the coccyx to form the levator plate between these two structures[94]. Subluxation of the levator plate will cause it to act like a slide down which the rectum and upper vagina may descend with intra-abdominal pressure rises[5].

The fibres of the paracolpium are indirectly attached to the levator ani via the vaginal wall and rectovaginal septum which inserts into the perineal body.

Apart from the direct supports an indirect supporting mechanism for the vagina is provided by the levator plate acting as a platform against which the upper vagina is compressed with rises in intra-abdominal pressure. Narrowing of the urogenital hiatus also occurs with increases in intra-abdominal pressure[94].

Following hysterectomy the vaginal vault is suspended in the pelvis, over the levator plate, by the fibres of the paracolpium (Fig II). The functions of these mechanisms are interrelated

and are collectively responsible for preventing eversion.

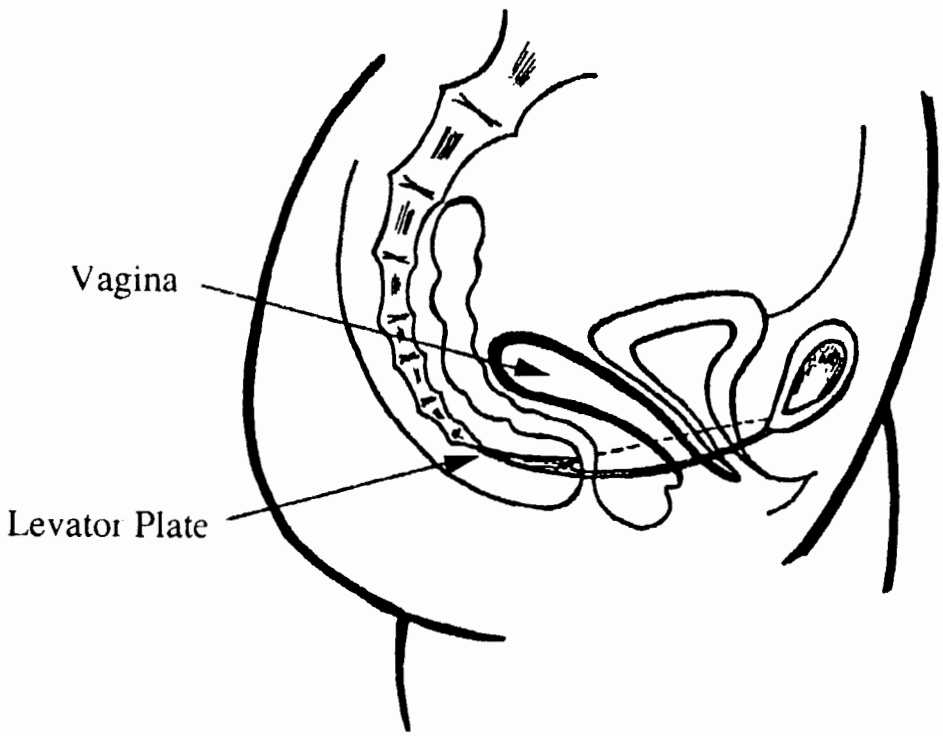

Figure II: Sagittal view of the pelvis following hysterectomy, demonstrating the horizontal position of the upper vagina over the levator plate.

AETIOLOGY AND PREVENTION

Pregnancy and parturition can cause damage to upper vaginal supports, pelvic blood vessels and pelvic nerves resulting in later prolapse formation[23,72], and are probably responsible for the vast majority of cases of uterovaginal prolapse.

Figure III: This patient underwent a vaginal hysterectomy in 1963. She presented with marked vault prolapse.

Age, endocrine status and conditions chronically raising intra-abdominal pressure (eg. obesity, constipation, chronic cough) are important factors contributing to genital prolapse. Racial differences in the morphological quality of the levator complex have been shown[94], although this may indirectly reflect lifestyle and nutritional status[73]

Vault prolapse (Fig III) is a delayed complication of hysterectomy, which is preceded by vaginal and abdominal hysterectomy with equal frequency[41,78]. Its occurrence may be

the result of damage to the upper vaginal supports occurring at the time of hysterectomy although women developing vault prolapse after hysterectomy may have been destined to develop major degrees of genital prolapse.

The employment of various surgical techniques at the time of hysterectomy may reduce the risk of later vault prolapse. Abdominally, one can do an intra-fascial hysterectomy minimizing damage to the fibres of the paracolpium. Vaginally, shortening of the uterosacral and cardinal ligaments and their attachment to the vault with obliteration of any significant enterocele sac may strengthen vault support.

MANAGEMENT

CONSERVATIVE

Shelf and ring pessaries are the commonest measures used for the conservative management of uterovaginal and vault prolapse (Fig IV). To be effective they are dependent on a degree of perineal support and are not without complications[64].

They undoubtedly have a use in the short term to promote healing of a decubitus ulcer preoperatively. In a patient unfit for, or unwilling to undergo surgery they are the only available option for symptom control.

Young women who have not completed their families are excellent candidates for conservative management with pessaries, and should be encouraged to try this form of treatment before proceeding to surgical repair.

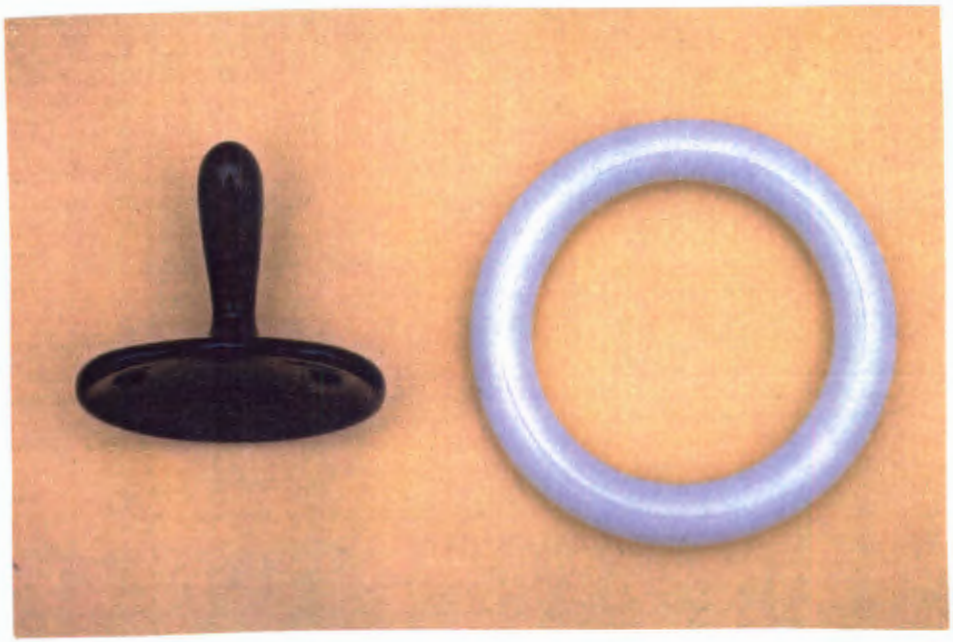

Figure IV: Examples of Ring and Shelf Pessaries.

Complications of their use in the elderly include vaginal ulceration and impaction and stress incontinence[63,85]. To prevent complications patients need regular vaginal assessment. This requires repeated trips to the doctor. It is also not established how successfully they control symptoms.

SURGICAL PROCEDURES FOR VAGINAL VAULT PROLAPSE

A wide range of surgical options is available to the gynaecologist for the treatment of vaginal vault prolapse (Table I). That so many variations of the procedures exist probably reflects that no one operation perfectly controls the condition. It is important to be familiar with the full range of procedures so that the most appropriate operation can be tailored to the patient.

Table I: Surgical options for vault prolapse

Colporrhaphy
Colpectomy, colpocleisis, vaginectomy
Abdominal
- **Ventral Fixation Procedures**
- **Sacrocolpopexy Procedures**
Abdominoperineal
Transvaginal vault fixation
- **Sacrospinous**
- **Iliococcygeus**

Colporrhaphy

This is one of the most common approaches for the management of lesser degrees of prolapse and has been successfully employed for many years. However, anterior and posterior vaginal repair along with obliteration of the enterocele sac will not adequately support a significantly prolapsed vault because of their inability to replace the level I supports[5,14]. The McCall culdoplasty[38], or modifications of it[43,67], are included to support the vault and prevent enterocele formation. Good results are reported but the size of the series is very small in some cases[43,67]. Repeated attempts at colporrhaphy are likely to shorten and narrow the vagina causing dyspareunia or apareunia. Francis and Jeffcoate[22] in 1961 claimed approximately 20% of women having vaginal repairs for genital prolapse later developed dyspareunia or apareunia due to vaginal narrowing. Pratt[54] (1966) concluded that a loss of vaginal depth of 25-45% must always be anticipated.

Symmonds et al. (1981) described a technique using a McCall posterior culdoplasty combined with vaginal repair[78]. Using this technique they claimed success in 89% of cases. However, in 35 of the 173 women they intentionally produced a short and tight vagina.

In an earlier series Symmonds and Pratt (1960) reported on 48 vaginal repairs for vault prolapse[79]. There were seven recurrences and only 12 women reported normal vaginal function.

Colpectomy and colpocleisis

These two procedures are rarely used apart from the aged patient for minimising perioperative complications. Good results have been reported for these older patients where more extensive surgery forms a risk and in whom conservation of vaginal function is not an issue[51,81]

Unfortunately they destroy vaginal coital function and frequently create post operative urinary stress incontinence[7,26]. Should the repair be carried out with the uterus in situ subsequent bleeding from the corpus will be difficult to manage. Overall success rates are not good[80] with recurrent vaginal prolapse and perineal or vulvar hernia occurring as complications of these procedures[26,44]. When stress incontinence occurs because of these procedures it becomes very difficult to treat[80].

Abdominal Procedures

More than 43 descriptions of operations for this condition have been described[62]. The fact that so many have been tried suggests that perfect operations do not exist. The operations can be grouped into two categories according to the anatomical orientation of the vagina postoperatively.

1.) Ventral fixation procedures and

2.) Sacrocolpopexy procedures.

Currently these are performed by open laparotomy but it is feasible that a laparoscopic

approach can achieve similar results. Published results of endoscopic repairs are not available. Current gynaecological textbooks favour the sacrocolpopexy over the ventral fixation procedures[44,58].

Ventral Fixation Procedures

The principle of these procedures is to fix the vaginal vault to the anterior abdominal wall.

Many authors have recommended the use of strips dissected from the anterior sheath of the rectus abdominis muscle. Fletcher described an abdominal colpocystopexy for the management of complete prolapse of the vagina and bladder in two patients[20]. Ward used ox fascia in a similar fashion[87] while Brady merely attached the vaginal vault to the anterior abdominal wall[8]. Williams and Richardson, in 1952, described their results using external oblique aponeurosis to support the prolapsed vault[92]. This involved passing the fascial strips retroperitoneally beneath the round ligament to emerge at the level of the vault. The free ends were then attached to the vaginal vault. They note that any enterocele must be dealt with at the time of operation by performing a Moschowitz repair.

Most of the subsequent operations in this group are merely modifications of the above procedures[49]. Few complications are reported and good control is claimed. Operating time, however, is usually long. Unfortunately most studies consisted of only a handful of patients, generally without adequate long term follow-up. Richardson and Williams provided follow-

up for their series in 1969[57]. They reported on 20 patients with a success of 90%. One patient failed in the early postoperative period, the other only after 11 years. The range of follow-up was 5 to 20 years!

Correction of any cystocele or rectocele in these patients requires a vaginal approach at the time of operation.

Despite initial success these procedures did not gain popularity. This was because of the complexity of the surgery and the abnormal vaginal axis created by the repair[16]. Criticism of this approach was made by Davies in 1952 on anatomical grounds[13]. Confirmation that the correct position of the vagina is horizontal was provided by DeLancey[14]. Concern about ureteric damage and subsequent enterocele formation prompted surgeons to seek a simpler operation that corrected the prolapse while leaving the vaginal axis in the horizontal plane[64]. The basic criticism is that forward rotation of the vagina predisposes to subsequent failure and is not anatomically correct[5]. Symmonds feels that a high rate of recurrent prolapse occurs with these operations[78]. A review of recent literature confirms this lack of popularity[5,10,31,41,43,65].

Sacrocolpopexy Procedures

The procedure involves suspending the vaginal vault from the hollow of the sacrum[5] or from the sacral promontory[1,37], using either strips of fascia or synthetic mesh (Fig V).

Arthure and Savage were among the first to report the operation of sacral hysteropexy or vaginopexy[2]. They reported a success rate of 95% but did not provide details of duration of follow-up. Their success rates must have been based on the adequacy of vault support because a large percentage (23%) of their patients developed cystoceles.

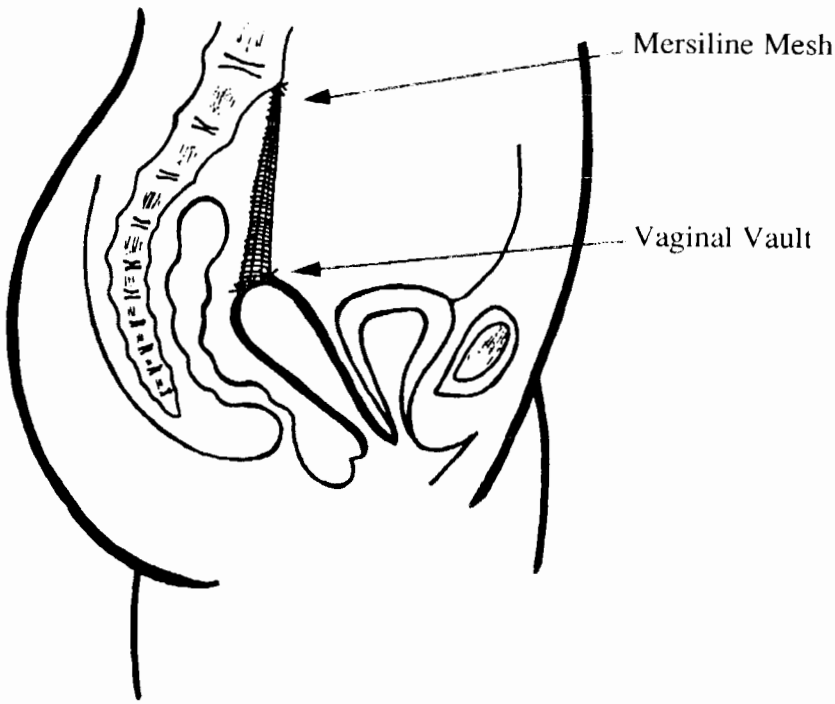

Fig V: Abdominal Sacrocolpopexy

Many reports followed on this method of transabdominal sacrocolpopexy. Of the many described procedures for the correction of vault prolapse, the sacral colpopexy is the most widely published with extensive follow-up[1,3,5,10,25,35,55,75,83]. It is an effective procedure with

success rates exceeding 90% (Table II). Up to two thirds of patients will require vaginal repair of coexistent cystocele or rectocele.

The principle complication is intraoperative haemorrhage. This occurs from the presacral vessels and can prove very difficult to control[1,50,76,82].

Table II

Results of the Transabdominal Repair - Sacrocolpopexy

	n	Follow-up	Success	Qual. Success	Failure
Addison et al (1985)[1]	**56**	**39**	**96%**	**-**	**4%**
Baker et al (1990)[3]	**59**	**6**	**86%**	**14%***	**-**
Creighton & Stanton (1991) [10]	**23**	**17**	**91%**	**9%**	
Snyder & Krantz (1991) [75]	**116**	**6**	**93%****	**7%**	**-**
Timmons et al 1992[83]	**163**	**?**	**98%**	**-**	**2%**

***Well-supported vault, but persistence of symptoms.**

**** Refers only to vault support. Cystocele/rectocele & urinary symptoms occurred in 29 patients (25%)**

Damage to bowel, bladder and ureter have been reported[3,83]. Post-operative complications centre on infection of the synthetic mesh that may require its removal[3,83]. To prevent infection of the mesh it is recommended that any anterior or posterior repair be performed as a secondary procedure and not at the time of surgery[44]. The average blood loss from this procedure is 250-500mls with operating times averaging between 1.5-4.5 hours[10,82,93].

It remains the most described procedure with excellent follow-up. It seems likely that placement and attachment of the Mersilene graft can be achieved by laparoscopic techniques. I am unaware of any published studies of this technique but have been told of its execution in other units. Such techniques would diminish postoperative morbidity and by so doing enhance the profile of the operation. The risk of pre sacral bleeding and bowel damage, however, would not be diminished.

Abdominoperineal procedure

This operation was initially reported by Zacharin and Hamilton[93] in 1980, which in their hands carries a success rate of 93%. It requires a team of abdominal and vaginal surgeons working together and is a complex procedure that requires extensive dissection and has a long operating time. Stanton and Creighton (1991) when comparing the procedure with the sacral colpopexy found it to be technically more difficult[10]. They only achieved a success rate of 70% with the Zacharin procedure compared with a 91% success rate in the sacral colpopexy group.

Transvaginal vault supporting procedures

Sacrospinous colpopexy

Since its introduction to America by Randall and Nicholls in 1971, it has gained rapid support[55]. The results of the repair are excellent with success rates exceeding 90%[41,46] (Table III). It is reported to add minimally to operation time[12] and reported blood loss is usually less than 100mls[39].

Table III

Results of the Transvaginal Sacrospinous Colpopexy

	n	Follow-up (mths)	Success	Qual. Success	Failure
Nichols (1982) [46]	**104**	**>24**	**95%**	**-**	**5%***
Morley & Delancey 1988 [41]	**100**	**>12**	**90%**	**6%****	**4%*****
Imperato et al. (1992)[28]	**179**	**?**	**90%**	**9%**	**1%**

*** All underwent successful subsequent repair**

**** Asymptomatic relaxation of structures other than the vault**

***** Well supported vault with asymptomatic cystocele**

Despite criticism in the literature of it being a potentially complicated procedure[10], the reports of complications are remarkably few[12,39]. Haemorrhage in association with the procedure has been reported by some major authors[28,41], as have injury to bladder and nerve. Fortunately

these are uncommon complications[41,46].

It is only designed to correct the vault prolapse and additional procedures are necessary to repair the defects in the anterior and posterior walls and the enterocele. It is recommended that if a full-length anterior colporrhaphy is undertaken, supplemental elevation of the urethrovesical junction, by pubourethral ligament plication, should be carried out to prevent the formation of stress urinary incontinence[45,46]. Suburethral supporting sutures will help to maintain a decent urethrovesical angle and prevent iatrogenic stress incontinence.

Despite the initially good success described with the procedure it is becoming apparent that the operation predisposes to subsequent recurrence of the cystocele, many of which will probably require repeat repair[7,88].

The major advantage of this procedure is the ability to do an anterior and posterior repair at the same time as the vault suspension as well as avoiding intraabdominal surgery.

Iliococcygeus vault suspension

This was initially described in 1963 by Inmon[29]. Shull et al. have provided a recent description of the procedure[70]. Their series is of 42 women who underwent the procedure for a variety of relaxation defects. The technique involves attaching the vaginal vault to the fascia overlying the iliococcygeus muscle. It is performed as a bilateral procedure. Separate

repairs are carried out to correct any coexistent cystocele, rectocele and enterocele. No major complications were encountered during surgery. Two patients failed to maintain vault support and a further four (10%) developed anterior wall defects.

This approach, which gives an anatomical result similar to the sacrospinous colpopexy, is attractive because of the easy access to the tissue and the absence of any major nerves and vessels in the vicinity of the suture placement. By minimizing the posterior displacement of the vagina it is hoped that there will be less tendency to produce anterior wall defects.

It is difficult to quantify success as 17 percent of the patients in this report were judged to have normal support for the vaginal vault or cervix preoperatively.

Larger studies, on patients with more specific relaxation defects, need to be completed before it can be compared with the procedures above.

Vaginal hysterectomy and repair

Figure VI: ***This patient with severe uterovaginal prolapse underwent a vaginal hysterectomy & sacrospinous colpopexy.***

Vaginal hysterectomy remains the standard method of treatment for procidentia[80]. The uterus plays a passive role in this condition; so the hysterectomy has to be combined with extensive anterior and posterior repair and plication and attachment of the uterosacral ligaments to the vault if a good result is to be achieved. Standard texts emphasise the use of the cardinal uterosacral ligament complexes to reduce the likelihood of posthysterectomy vaginal cuff prolapse. Many gynaecologists use the McCall culdoplasty in association with vaginal hysterectomy to achieve these aims[38]. Good results are achieved with these procedures and the rate of subsequent vault prolapse is low, when done for lesser degrees of prolapse [78].

In cases with prolapse beyond the introitus, the upper vaginal supports, and their adjoining structures, the uterosacral and cardinal ligaments, are so stretched and attenuated that shortening and attachment to the vault is unlikely to provide adequate support (Fig VI). Here the support of the vault is reliant on the respective repairs and probably only achieves support through the reduction in vaginal capacity[6]. Extra support may need to be provided in the form of a colpopexy, either transabdominal or transvaginal. Cases with prolapse of the cervix beyond the introitus or those in which the uterosacral-cardinal complex is totally lax fit this category. Not all surgeons agree about this approach. Morley feels that usually the standard hysterectomy, repair and McCall culdoplasty will be sufficient[40]. His approach is shared by Symmonds[78]. It is however sobering to remember the observation of TeLinde who wrote:-

"Every honest surgeon of extensive and long experience will have to admit that he is not entirely and absolutely satisfied with the long term results of all his operations for prolapse and allied conditions."[80]

Repair with conservation of the uterus

Here again, support and correction of uterine prolapse can be achieved both vaginally and abdominally. These operations have a place in the management of a person wanting to preserve their uterus either for social reasons or for future fertility. The chosen procedure should not disrupt future fertility or reproductive capability.

Abdominal

Techniques attaching the uterus to the sacrum or anterior abdominal wall have been described.

Ventrofixation procedures similar to those described for vault prolapse have been used. Here the uterus is fixed to the anterior abdominal wall[2]. The major drawback of this procedure is that progressive elongation of the uterus occurs with subsequent symptomatic prolapse. Further surgery can then be extremely hazardous[44]. Nesbitt devised a retropubic ventral uterine isthmic suspension for correction of prolapse with uterine preservation and simultaneous treatment of stress urinary incontinence[42]. He followed up 16 patients for between five and 10 years with no recurrence of the preoperative problems. Only one patient was of child bearing age so the potential for subsequent childbearing has not been fully explored. The surgery does draw the cervix out of the posterior fornix which could affect future fertility.

Nichols also described an abdominal sacrocervicopexy where a strap of fascia lata is attached from the uterine isthmus to the hollow of the sacrum through a retroperitoneal tunnel[47]. This fixes the cervix high in the vagina. There are no reports of subsequent successful pregnancies in this group.

All the transabdominal procedures have the theoretical risk of producing subsequent tubal

infertility so a vaginal option should be sought before proceeding with such surgery. Despite these theoretical risks successful subsequent pregnancies have been described[9,91].

Transvaginal

One of the best known and most extensively used operations for the treatment of prolapse, with uterine preservation, is the Manchester-Fothergill repair. It is primarily indicated when there is cervical elongation and adequate uterosacral ligaments. Many proponents of the operation exist and many papers have been presented detailing both efficacy[24,36,67] and complications[27,30,90].

The success of the operation is well documented but because of pregnancy related complications its role in young women, still wanting children, has been questioned. Reduced fertility and high pregnancy wastage have been documented. Problems with labour can also occur[27,,30,58,90].

It is a worthy operation that should still be considered when women have completed their family but wish to retain their uterus.

The sacrospinous colpopexy was initially described for the treatment of prolapse in young women in 1989[58]. Successful subsequent pregnancies were documented by Kovac and Cruikshank[33]. The documented pregnancy rate was 24%. This is lower than the results

obtained with some abdominal procedures[9,91].

HYPOTHESIS AND AIMS

HYPOTHESIS

The hypothesis is that the sacrospinous colpopexy achieves the aims of prolapse surgery; to relieve symptoms, restore anatomy and function and provide effective and sustained vault support. These goals can be achieved safely with low morbidity.

AIMS

1. To evaluate the transvaginal sacrospinous colpopexy as a secondary operation in the management of post hysterectomy vault prolapse.

2. To evaluate the role of the sacrospinous colpopexy as a primary adjunctive procedure at the time of hysterectomy for the management of major uterovaginal prolapse and procidentia.

3. To explore the possibility of its use as the sole procedure in the management of major uterovaginal prolapse and procidentia with preservation of the uterus - ie. a sacrospinous cervicopexy.

PATIENTS AND METHODS

STUDY DESIGN

Part I: A prospective study of all patients undergoing sacrospinous colpopexy for vault prolapse between December 1991 and December 1992.

Part II: A prospective study of all patients undergoing sacrospinous colpopexy as a primary procedure at the time of vaginal hysterectomy between April 1991 and December 1992.

Part III: A prospective study of all patients undergoing sacrospinous cervicopexy as a primary procedure with preservation of the uterus, between May 1992 and December 1992.

PATIENT SELECTION

Patients presenting to hospital with signs and symptoms of genital prolapse were recruited for possible inclusion in the study. They were divided into three groups: -

Group I: Patients who had previously undergone hysterectomy who now presented with signs and symptoms of vaginal vault prolapse.

Group II: Patients presenting to hospital with signs and symptoms of uterovaginal prolapse who were found to have 2nd or 3rd degree prolapse[85] and markedly attenuated supporting ligaments.

Group III: Patients presenting with the same signs and symptoms as Group II; who because of their advanced age and physical well-being it was felt might benefit from a shorter and simpler operative procedure.

All patients had the operation explained to them by the investigators (MP Carey and MC Slack) and informed consent was obtained. MC and MS were involved in all the surgery - 60 procedures being performed personally. Two surgeons were instructed in the remaining cases by MC or MS.

OPERATIVE TECHNIQUE:

Patients received 2gm of Tinidazole preoperatively and either low dose Heparin or Enoxaparin given at least two hours before surgery and continued for the duration of their stay in hospital. Patients with marked vaginal atrophy or ulceration were treated preoperatively with vaginal oestrogen cream. One patient required admission for seven days, two weeks preoperatively for soaked oestrogen packs.

GROUP I:

Surgery is performed with the patient in the lithotomy position. If present the cystocele is dealt with first. This is corrected using a standard anterior repair with suburethral buttressing[44,45]. The sacrospinous colpopexy begins with a longitudinal incision in the posterior vaginal wall from introitus to vault exposing the rectovaginal space. The epithelium

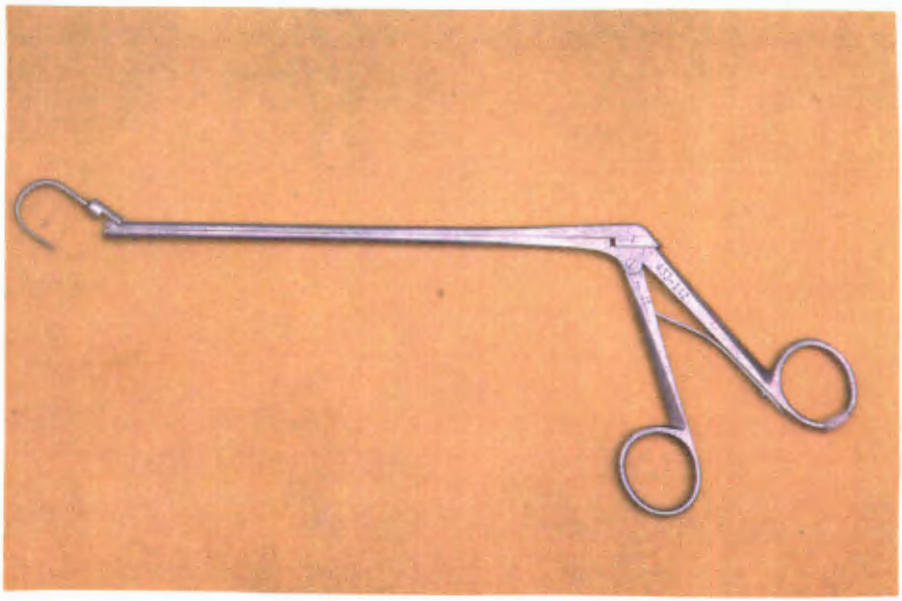

Fig VII: The Miya Hook Ligature Carrier. (The handles are in the open position)

is dissected laterally on both sides. The right ischial spine is palpated and exposed by a combination of blunt finger and scissor dissection, creating a window between the rectovaginal space and ischial spine through the right rectal pillar. The sacrospinous ligament is palpated as it passes in a posterior and medial direction from the ischial spine to the lower part of the sacrum. The upper border of the ligament is clearly defined and a Miya hook ligature carrier (Fig VII) loaded with a delayed absorbable suture (No 1 PDS) is placed through the ligament two finger breadths from the ischial spine.

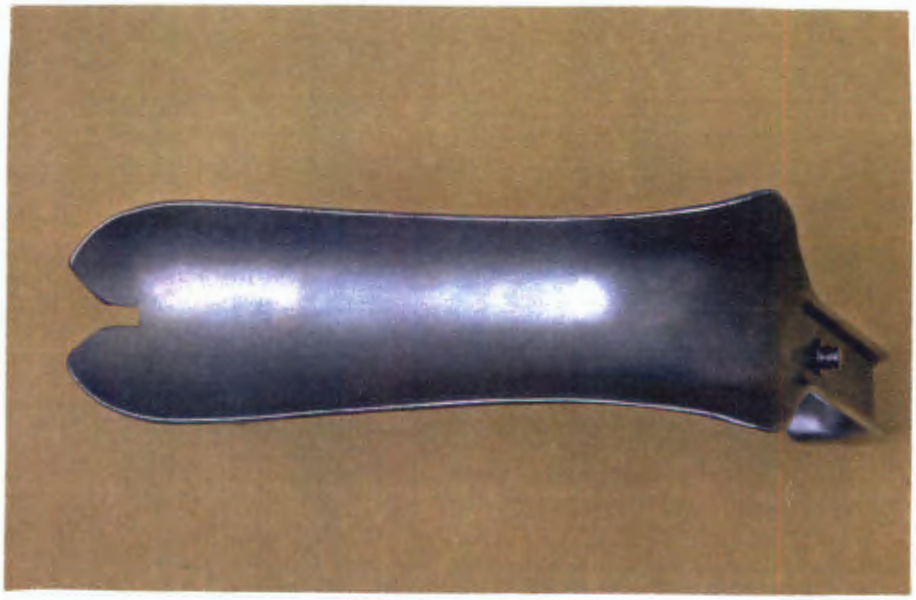

Figure VIII: Notched Speculum.

The rectum is retracted medially by a 18x4 cm Breisky-Navratil vaginal retractor placed in the vagina. A notched vaginal speculum (Fig VIII) is also inserted and the suture retrieved with a nerve hook (Fig XII).

The procedure is repeated so that two sutures are placed into the ligament (Fig IX); there being no need to perform a bilateral procedure[41]. The sutures are loaded onto a No 4 Mayo

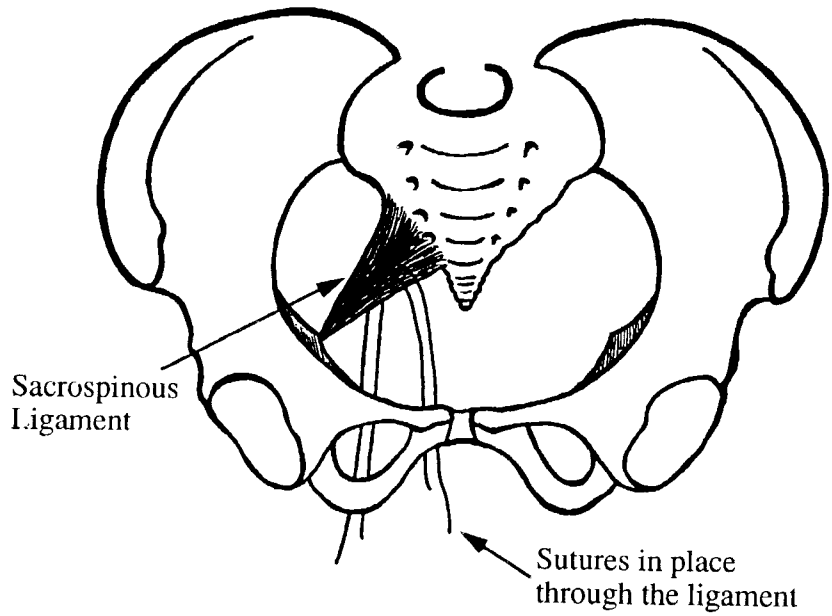

Figure IX: Sutures are placed into the middle of the ligament and attached to the vaginal vault.

needle and passed through the vaginal epithelium at the vaginal vault, one each side of the midline and held for later tying. The enterocele sac is dissected out and obliterated.

The rectovaginal septum is reconstituted by a continuous locking suture through Denonvilliers' fascia[94]. The upper third of the vagina is closed with interrupted sutures. The sacrospinous sutures are then tied taking the vault onto the ligament (Fig X) with care being taken to avoid a suture bridge between these two structures. Finally, the lower vagina is closed and a urethral catheter and vaginal pack inserted.

In the first 18 patients the sacrospinous ligament was exposed and sutures placed through

it using a long needle holder and a No 5 Mayo needle. In two patients non-absorbable sutures (No 1 Ethibond) were used to attach the vault to the sacrospinous ligament; one because of a shortened vagina and the other when repeat sacrospinous colpopexy was performed. In the latter scarring of the tissue in the region of the sacrospinous ligament required the sutures being placed on the left side.

Figure X: Final position of the vault after tying the sutures.

GROUP II:

Positioning and draping of the patient is identical to the above. A standard multiclamp vaginal hysterectomy is performed. A circumferential incision around the cervix starts the operation. All pedicles are secured and divided in the standard fashion. The enterocele sac is dissected, mobilized, excised and a high ligation performed to close the orifice of the sac. The uterosacral ligaments are attached to each other to prevent recurrence. On completion the anterior repair is performed and the operation then follows the identical pattern described above.

GROUP III

Following the procedure described above for positioning and preparation, surgery begins with the anterior repair and suburethral buttressing[44,45]. A longitudinal incision in the posterior vaginal wall from introitus to the posterior aspect of the cervix is made. The uterosacral ligaments are exposed and the enterocele sac is dissected out and obliterated.The operation is done as described above, except that after placement of the sutures in the sacrospinous ligament they are attached to the exposed posterior aspect of the cervix and uterosacral ligaments. The rectovaginal septum is again reconstituted using a continuous locking suture through Denonvilliers' fascia[94]. The epithelium over the cervix is closed with interrupted sutures that are continued for the upper third of the vagina. The sacrospinous sutures are then tied taking the cervix onto the sacrospinous ligament (Fig XI). Again, taking care to avoid a suture bridge. The lower vagina is then closed. A urethral catheter and pack are inserted.

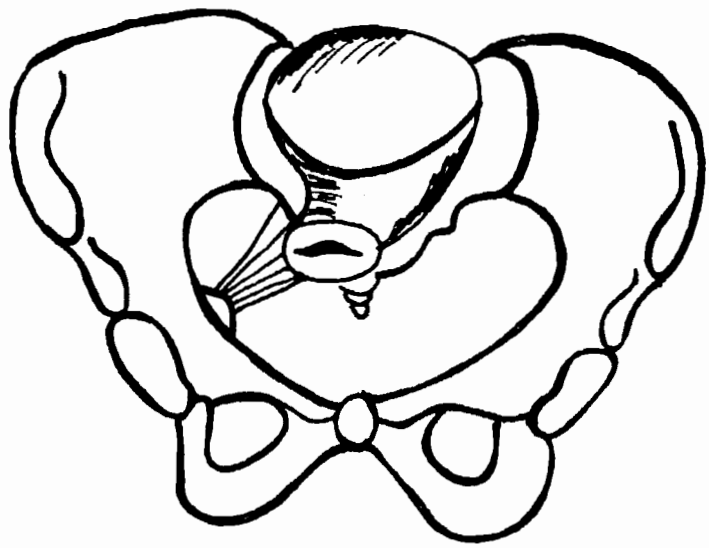

Figure XI: Sacrospinous cervicopexy: The posterior aspect of the cervix is drawn onto the sacrospinous ligament.

OPERATIVE AND PATIENT ASSESSMENT

The total operating time was calculated from when the patient was draped to when the vaginal pack was inserted at the end of the operation. The time taken to perform the sacrospinous colpopexy was calculated from when lateral dissection towards the ischial spine began to when the second suture was placed through the vaginal vault or, in the Part III group, the posterior aspect of the cervix.

Suction and a perineal pouch (Vi-drape) was used so that an accurate measurement of blood loss was obtained in all patients. Blood loss was measured as the sum of the blood in the suction bottle and perineal pouch. If swabs were used they were included in the calculation.

All details of the previous history obtained from the patients and their notes were captured on a data base. Postoperative details were also entered in the data base. This included all observations and recorded analgesic and antibiotic use.

Initial assessment was carried out 6-8 weeks after the operation; a thorough history and detailed examination were performed on all patients.

They again underwent examination and review by two observers (MC & MS) in January 1993.

GROUP I: PATIENTS DETAILS

Forty women with marked vault prolapse following hysterectomy underwent transvaginal sacrospinous colpopexy between December 1991 and December 1992. Their mean age was 62.7 years (Range 34-85), parity 2.2(0-6) and weight 61kg(47-89).

Table IV: Type of Previous Hysterectomy

	n	%
Vaginal	**21**	**52,5**
Abdominal	**19**	**47,5**

Abdominal and vaginal hysterectomy contributed equally to this series(Table IV). Following the primary surgery and before the sacrospinous colpopexy 13 women had undergone further surgery, two women another two repairs and one woman a further three procedures (Table V).

Table V: Number of preceding operative procedures

No of procedures	n	%
One	**24**	**60**
Two	**13**	**32,5**
Three	**2**	**5**
Four	**1**	**2,5**

Twenty-five patients had symptoms of prolapse alone (pressure, a lump down below & dragging), while a further 17 patients had urinary symptoms as well. Three women complained of difficulty defecating; two had apareunia. Of the 17 with urinary symptoms, nine experienced frequency and nocturia while seven complained of occasional stress incontinence. Stress incontinence was only demonstrable in three. (Table VI)

Table VI: Presenting Symptoms - vault prolapse

Symptom	n	%
Vaginal Protrusion	**40**	**100**
Pelvic discomfort/pressure	**40**	**100**
Urinary Symptoms	**17**	**42,5**
Difficulty defaecating	**3**	**7,5**
Failed Pessary	**3**	**7,5**
Apareunia	**2**	**5**

On examination 12 women had vaginal eversion and the remainder had prolapse to the introitus. In addition 25 (62.5%) had a cystocele and 26 (65%) a rectocele. All patients had an enterocele. (Table VII)

All 40 patients underwent posterior vaginal repair, dissection and obliteration of the enterocele sac and sacrospinous colpopexy. In 25 patients an anterior vaginal repair with suburethral buttressing sutures was also performed to treat coexistent cystocele. The buttressing sutures were included to prevent the development of stress incontinence following surgery[44,45]. Three women had a long-needle bladder neck suspension performed

simultaneously for stress incontinence.

Table VII: Examination Findings

Sign	n	%
Vaginal Eversion	**12**	**30**
Vault Prolapse to Introitus	**28**	**70**
Cystocele	**25**	**62,5**
Rectocele	**26**	**65**
Enterocele	**40**	**100**

GROUP II: PATIENT DETAILS

Thirteen patients with marked uterovaginal prolapse underwent sacrospinous colpopexy as a primary procedure at the time of vaginal hysterectomy. Their mean age was 68,2 years (Range 42-86), parity 2,8 (0-8) and weight 64,5 kg (52-89). (Table VIII)

Only two women had previously undergone surgery, one having had two previous repairs.

Nine patients had symptoms of prolapse and a further four had urinary symptoms as well. These were frequency and nocturia in three and difficulty with micturition in one.

On examination four women were found to have procidentia. The remainder had grade II prolapse with accompanying cystocele, rectocele and enterocele. One of these women had a marked rectal prolapse. (Table IX)

Twelve underwent a vaginal hysterectomy, anterior and posterior repair, dissection and obliteration of the enterocele sac and sacrospinous colpopexy. In one patient the anterior repair was omitted. A post anal rectopexy was performed on one patient for rectal prolapse besides the gynaecological procedures.

Table VIII: Comparison of Groups II & III

	Group II Sacrospinous + Hysterectomy	Group III Sacrospinous cervicopexy
n	**13**	**14**
Age (Yrs) mean (range)	**68,2(42-86)**	**76,9(63-93)**
Parity mean (range)	**2,8(0-8)**	**3,3(0-10)**
Weight mean (range)	**64(52-89)**	**63(54-76)**

GROUP III: PATIENT DETAILS

Fourteen patients underwent a sacrospinous cervicopexy as a primary procedure without hysterectomy. Their mean age was 76,9 (Range 63-93), parity 3,3 (0-10) and weight 63,6 kg (54-76)(Table VIII). All the patients complained of severe discomfort associated with the prolapse. Symptoms included "pressure," "something coming down" and reduced mobility. Seven of the women had a trial of therapy with pessaries but had returned requesting alternative therapy. In addition nine women also complained of urinary symptoms. Of these,

the majority (6) complained of frequency and nocturia. Two had difficulty passing urine while one suffered from stress incontinence. (Table IX)

Table IX: Presenting Signs & Symptoms - Groups II & III

	n (%) Sacrospinous + Hysterectomy	Sacrospinous cervicopexy n (%)
Pelvic pressure & discomfort	**13 (100)**	**14 (100)**
Protrusion	**13 (100)**	**14 (100)**
Urinary Symptoms	**4 (30)**	**9 (64)**
Failed Pessary	**-**	**7 (50)**
Grade II Prolapse	**9 (69)**	**12 (85)**
Procidentia	**4 (30)**	**2 (14)**
Enterocele	**13 (100)**	**14 (100)**
Cystocele	**13 (100)**	**14 (100)**
Rectocele	**13 (100)**	**14 (100)**

On examination 12 women had grade II uterine prolapse with marked cystocele, rectocele and enterocele. Procidentia was present in the others.

All patients in this group underwent a dilatation and curettage before proceeding with surgery. In 12 of the patients an anterior and posterior repair and dissection and closure of the enterocele sac were performed besides the sacrospinous colpopexy. In two cases the anterior repair was omitted. Always the sacrospinous sutures were attached to the posterior aspect of the cervix.

RESULTS:

GROUP I PATIENTS

Forty-one procedures were carried out on 40 patients. All patients were seen at six to eight weeks post operation, and again in January 1993; one patient has been lost to follow up.

The mean total operating time was 53 minutes (range 35-135) and 18 (10-60) minutes for the sacrospinous colpopexy. The average measured blood loss was 218 ml's (range 50-2500). Two patients experienced a large blood loss - 2500 and 650mls. A surgeon being instructed in his first two cases operated on these. Pudendal vein laceration occurred in the former, because of poor suture placement. A low pressure hydrostatic balloon catheter placed in the rectovaginal space and vaginal packing was used to control the bleeding. The pack and catheter were removed after 48 hours and the patient made an uneventful recovery. In the latter 650 ml's was lost because of bleeding from lacerated sacral veins. This was easily controlled by Liga clips. On both occasions the suture was placed under direct vision without the benefit of the Miya Hook. The patient who underwent a repeat procedure lost 600mls. Here, fibrosis near the right ligament required abandonment of the dissection on that side in favour of the left sacrospinous ligament. Successful suture placement was then achieved.

The postoperative course was uncomplicated in 35 (85%) of the cases. One patient developed a urinary tract infection. In five (12,1%) women a low grade pyrexia was noted. No source of infection could be found, but all five were treated empirically with antibiotics. Mild buttock discomfort was a common complaint but usually only lasted a few days. Two women experienced persistent right sided buttock pain. They were also treated with antibiotics. In one the pain had resolved by eight weeks. The second still had some discomfort at 12 weeks but reported that it was diminishing all the time. Neither of these women had any evidence of nerve damage.

Antibiotic usage was restricted to the eight patients who experienced problems. The mean opiate analgesic requirement was 2,2 doses (Range 0-6).

At six weeks 33 patients were asymptomatic. One still had buttock pain and four complained of frequency of urine. Three patients complained of symptoms of prolapse. Of these three, one had a complete vault prolapse and two had large cystoceles. A successful repeat procedure was carried out on the patient with vault prolapse who is completely asymptomatic now. Neither of the patients who presented with a cystocele had undergone an anterior repair as a primary procedure. In addition six women were noted to have small asymptomatic cystoceles.

The 39 patients seen in January 1993 had a mean follow up of 24 weeks (Range 6-52). Twenty-six (65.7%) were asymptomatic with no sign of prolapse. Ten (26,3%) of the women

were completely asymptomatic but on examination were noted to have a small cystocele. This left failure in three (8%) patients. (Table X)

Table X: Group I - Outcome of operation at final review

n = 39 Follow-up: Mean = 24 weeks, Range = 6-52 weeks		
Satisfactory Results		**36 (92%)**
Asymptomatic & excellent support	**26 (66,7 %)**	
Asymptomatic with cystocele	**10 (25,6%)**	
Satisfactory support of apex but with a symptomatic cystocele		**2 (5,4%)**
Recurrent vault prolapse		**1 (2,6%)**

Only one of the patients who presented with urinary symptoms had persistence of these postoperatively.

GROUP II PATIENTS

All thirteen patients were reviewed 6-8 weeks after surgery and again in January 1993. The mean follow up was 16 weeks (Range 6-44).

The mean operating time was 70 minutes with the sacrospinous component accounting for 21 minutes. The case that included a post anal rectopexy took 145 minutes and had the largest blood loss. Blood loss averaged 176 ml's. (Table XI)

Table XI: Operative details of Groups II & III

	Group II- Sacrospinous + Hysterectomy mean (range)	Group III Sacrospinous cervicopexy mean (range)
n	**13**	**14**
Total operating time (mins)	**70(40-145)**	**51(40-90)**
Time - sacrospinous	**21(10-85)**	**17(8-30)**
Blood Loss (mls)	**176(80-400)**	**158(50-400)**
Post-op. course	**n (%)**	**n (%)**
Uncomplicated	**8 (61,6)**	**10 (71,4)**
Unexplained Pyrexia	**3 (23)**	**3 (21,5)**
U.T.I.	**1 (7,7)**	**1 (7,1)**
Buttock pain	**1 (7,7)**	**0**
Analgesia	**mean(range)**	**mean (range)**
Opiod(No of doses)	**3,6 (2-6)**	**3,6 (1-11)**

The postoperative course was uncomplicated in eight cases. Three patients had unexplained pyrexia after full investigation. In a fourth patient a urinary tract infection was diagnosed. Moderate buttock pain that had resolved by 20 days was experienced by one patient.

The mean opiate analgesic requirement was 3,6 doses (Range 2-6). The four patients with pyrexia were all given antibiotics. At final review 12 (92,3%) of the patients were completely asymptomatic and had no sign of recurrent prolapse formation. One patient was asymptomatic but was noted to have a small cystocele. (Table XII)

GROUP III PATIENTS

Of the fourteen patients in this group 11 were followed up in January 1993. The mean follow up time was 14 weeks (Range 6-32).

The mean total operating time was 51 minutes (Range 40-90) and 17 minutes for the sacrospinous colpopexy (8-30). Blood loss averaged 158 ml's (50-400). All patients were discharged home on day six. (Table XI)

The immediate post operative course was uncomplicated in 10 (71%) patients. One woman developed a urinary tract infection and three had unexplained pyrexia. Antibiotics were prescribed successfully to these patients. The mean opiate analgesic requirement was 3,6 doses (Range 1-11). (Table XI)

Complete success was achieved in eight (72,7%) of the 11 patients followed up. Three were completely asymptomatic but were noted to have moderate cystoceles. No patients had persistence of any of the preoperative symptoms. (Table XII)

Table XII: Groups II & III -- Results

		Sacrospinous + Hysterectomy		Sacrospinous cervicopexy
		n = 13		n = 11
Follow-up(weeks) mean(Range)		16 (6-44)		14 (6-32)
Satisfactory Results		13 (100)		11 (100)
Asymptomatic/Excellent	12 (92,7)		8 (72,7)	
Asymptomatic Cystocele	1 (7,3)		3 (27,3)	
Satisfactory support of apex/uterus + symp. cystocele		0		0
Recurrent prolapse		0		0

DISCUSSION

Severe uterovaginal and vaginal vault prolapse are distressing conditions. They remain poorly understood and are often badly managed. In the past many women have tolerated such problems in silence and have regarded them as part of the ageing process. Women now have a greater expectation of therapy which apart from relief of symptoms includes maintenance of body image and coital function[5].

A wide range of successful surgical operations has been described. It appears that there is no "one operation" so it is important to choose the appropriate operation for the patient's needs. If successful, the surgery will relieve symptoms, restore function and anatomy and have low recurrence rates.

To fulfil the criteria of a suitable operation the surgery must obliterate the enterocele sac and allow simultaneous repair of the cystocele or rectocele, without reducing the functional capacity of the vagina. It must also provide effective and sustained vault support.

The sacrospinous colpopexy restores the vagina to a near correct anatomical position. It replaces the deficient level I supports, while repositioning it over the levator plate. This allows the levator plate to provide indirect support during episodes of raised intra-abdominal pressure. This procedure will only correct the vault prolapse and that other procedures will

be needed to treat the enterocele, cystocele and rectocele.

In our series, vaginal and abdominal hysterectomy preceded the condition in equal numbers. This has been reported by others[1]. Whether the development of prolapse is a reflection of poor surgical technique or merely a reflection of inherently weak connective tissue is difficult to know. Possibly the interval between the initial surgery and subsequent prolapse will give a clue to the aetiology. A short interval (< 2 years) will probably suggest poor surgical technique. Recurrence after five years is more likely to be secondary to poor tissue integrity. These cases would probably have presented with procidentia had they not undergone prior hysterectomy. More work needs to be done to accurately reevaluate current management of uterovaginal prolapse at the time of the primary repair. The low rates of post hysterectomy prolapse suggest that standard operative procedures are adequate but precise data in this area is lacking.

Half the women in group III had been unsuccessfully treated with pessaries. Considering the complications described above, and the seemingly poor relief obtained with pessaries, patients should be carefully evaluated before this form of treatment is prescribed in preference to surgery. With preoperative medical management and modern anaesthetic techniques very few women will be unfit for surgery. During the study period nearly all patients (irrespective of age), seen with prolapse, were fit for operation. Some of these women had previously had surgery refused them on the grounds of "frailty," although no attempts had been made to obtain anaesthetic opinion. It is my impression that these patients

tolerate the anaesthetic well but run into difficulties if there are complications in the postoperative period. Transvaginal procedures are ideal as they avoid the morbidity of major abdominal surgery. This allows rapid mobilization and is associated with the least postoperative discomfort. These procedures can also be performed under spinal anaesthetic. In this series the patients who had the operation performed under spinal block tolerated the procedure very well.

Obliterative techniques such as colpocleisis, colpectomy or vaginectomy are unlikely to have any surgical advantage over the sacrospinous colpopexy. In this series the actual sacrospinous ligature placement added, on average, 18 minutes to the standard repair procedure. Apart from the two cases where major blood loss was experienced the procedure itself only contributed minimally to bleeding.

Iatrogenic stress incontinence commonly occurs because of obliterative vaginal repairs[7,16,77]. Subsequent correction is then very difficult. Replacement of one problem (the prolapse) by another (stress incontinence) is worse than doing nothing at all. No women developed this complication post operatively. Should it occur, however, it would be readily accessible to surgical correction.

In the first 18 cases the sutures were placed similarly to that described by Morley and DeLancey[41]. Here the ligament was formally exposed and the sutures placed under vision. This is a difficult manoeuvre requiring considerably more dissection, additional operating

time and resulting in greater blood loss. The increased manipulation required predisposes to complications and suture placement did not appear to improve with experience. In our series, inadvertent damage to blood vessels occurred only with the old technique. In contrast the ligature carrier makes the procedure easy to perform.

Criticism that it is a "blind" procedure, and by implication carries a significantly high risk of damage to surrounding structures is unfounded[10]. Kettel[32] reviewed the anatomy in relation to the sacrospinous ligament and the position of placement of the ligatures. When placed correctly the only structures in danger of damage are the inferior gluteal vessels. Incorrect placement of the hook behind the sacrospinous ligament may lead to damage to these structures. In most of the published literature no cases of nerve, bowel or ureteric damage are reported[11,28,39,41]. Nichols[46] in his series of 173 cases reports two cases of transient nerve damage with no permanent sequelae. Suture placement was achievedunder direct vision in these cases.

By palpation, excellent appreciation of the anatomical landmarks and boundaries in the region of the sacrospinous ligament is gained. Using the hook accurate suture placement is achieved. The use of the correct instruments, as for any surgery, is crucial to the safe and successful execution of the operation. We found that what was a technically testing operation became relatively simple following the introduction of the hook. A retractor of adequate length is necessary for safe displacement of the adjacent structures (Fig XII).

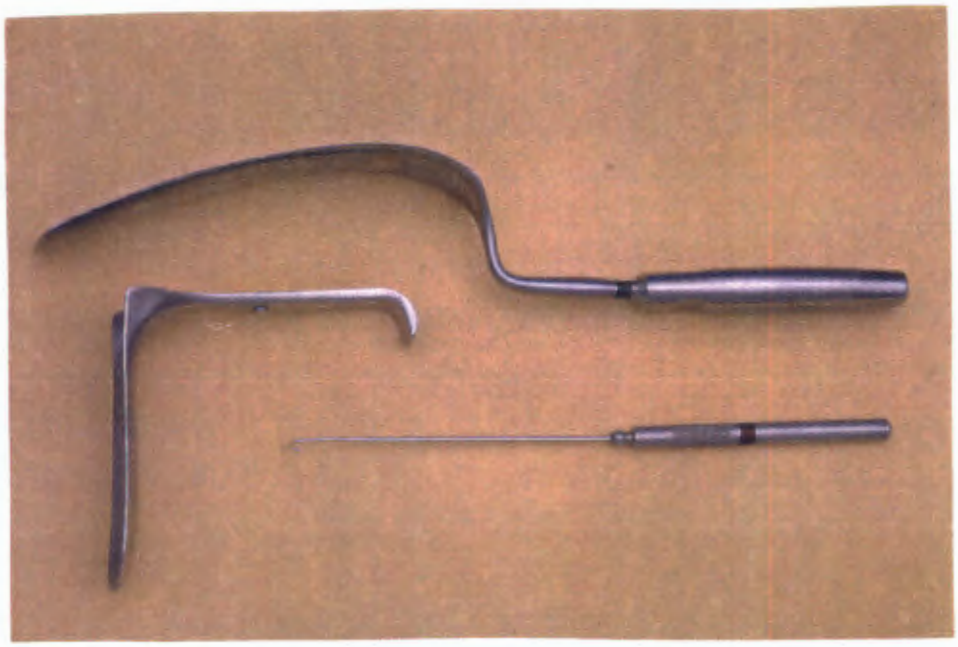

Figure XII: Surgical extras required for the operation: A long bladed Breisky-Navratill retractor, a notched speculum and a nerve hook.

The placement of a second suture through the ligament is to provide a backup. More than once sutures snapped when tying the vault onto the ligament. Having a second suture avoids having to repeat the dissection should this occur. Placement of the ligature carrier through the ligament carries the most risk of damage to surrounding structures. By loading the carrier with two ligatures this aim can be achieved with only one pass. This works well and has the advantage of diminishing operating time.

There is no need to do a bilateral procedure. Good results have been obtained in all studies with a unilateral approach. The slight deviation to the right is described as being of no consequence and may be beneficial since it moves the vault from its previously central position to one where it may be exposed to less pressure.

Absorbable sutures were used in this series. The small risk of nerve trauma might be a reason for recommending the use of absorbable material. The success of the repair depends on adequate fibrosis and scar tissue formation between the two structures, so there is no real reason to suppose that non-absorbable material will confer any advantages.

Because of the short operating time the procedure lends itself to a spinal anaesthetic, which can be used for high risk cases.

In all three groups a few patients developed unexplained pyrexia. This phenomenon has been noticed by other surgeons[28,41]. Following exclusion of respiratory, urinary, abdominal and vascular causes, and without any serious morbidity, we assumed that it related to resorption of a haematoma, either near the ligament or the right pararectal space. We did not attempt to image the area to prove this assumption. All cases were treated with empirical antibiotics to prevent development into an abscess and resolution without sequelae occurred in all. Prophylactic drainage of the site around the ligament does not seem to be justified as the condition resolved quickly and was not associated with any other complications.

The buttock pain experienced by some patients is probably also related to haematoma formation. It is important to exclude nerve damage in these patients. Evidence of damage to either of the major nerves in the area would require removal of the sutures. None of the patients in this series had any neurological deficit in relation to the buttock pain, and recovery was spontaneous and progressive.

Urinary symptoms in association with the prolapse were common, exceeding 30% in all groups. The predominant complaint was frequency and nocturia. Some patients also experienced stress incontinence and difficulty voiding. In the patients where stress incontinence was shown, a long needle bladder neck suspension was added to the operation. Usually an anterior repair was performed with suburethral buttressing, to prevent or treat stress incontinence. In all but one patient complete resolution of the symptoms of frequency and nocturia was achieved. Unfortunately no preoperative urodynamic studies were performed precluding an accurate diagnosis; but correction of the cystocele with subsequent reduction in residual volumes might have been responsible. Alternatively, support of the surrounding structures could reduce the mobility and subsequent mechanical irritation. Formal urodynamic evaluation needs to be performed preoperatively and postoperatively in all subsequent patients to prove this finding.

Bonney[6] observed that a retroverted uterus predisposed patients to anterior wall prolapse. By a similar principle a Burch colposuspension exposes the posterior wall allowing for the development of a rectocele, enterocele or uterine prolapse. In much the same way the sacrospinous colpopexy, by drawing the vagina posteriorly, predisposes the patients to cystocele formation. This has been noted by other authors[12,28,41]. Surgeons who have performed large numbers of sacrospinous fixation procedures feel that the problem of anterior vaginal wall prolapse has been avoided and that it is a bigger problem than admitted to in the literature (Dr R Scotti - personal communication). Imperato found that this also occurred with the abdominal sacrocolpopexies[28]. It would appear that a well-supported

anterior wall at the time of operation is not sufficient reason to avoid doing a repair[71]. Stretching of the vaginal epithelium probably accounts for partial support at the time of the operation but without a formal repair this will soon lose integrity and the bladder will prolapse into the vagina. Prevention of anterior wall prolapse provides the greatest challenge to the successful correction of vault prolapse.

When approaching the anterior wall at the time of operative repair there are two areas for consideration. The first is the correction of the existing cystocele. The second is the inclusion of a procedure to prevent the development of stress urinary incontinence postoperatively.

Iatrogenic stress incontinence is a well described complication following full length repair of the anterior wall[44,77]. We included a suburethral buttressing/plication with "Watson sutures"[88], in a technique similar to Nichols[45]. The use of "Kelly"[90] sutures, although originally designed to correct funnelling of the urethra, would achieve the same aim. Neither of these techniques is intended to correct the cystocele.

At the time of doing this series we still subscribed to the theory that cystocele formation was the result of stretching of the pubocervical fascia. No attempt was made to identify any specific sites of anterior wall dislocation. Consequently, we performed a standard full-length anterior repair for correction of the cystocele[44]. There is a possibility that our assessment of the defect may have been incorrect. Richardson et al. feel that there are four areas where the pubocervival fascia can detach, resulting in four specific defects that give rise to cystocele

formation[59]. The most common of these is the paravaginal defect, which will not be corrected by a classical anterior repair and requires a specific surgical approach. These are more easily corrected by a retropubic route but can also be repaired vaginally[60,69]. It is possible therefore that we failed to repair the specific defect at the time of operation. Whether employment of such a repair, at the time of operation, would prevent recurrence has not been shown.

A four-corner bladder and bladder neck suspension achieves excellent elevation of the cystocele with simultaneous correction of stress urinary incontinence[56]. I have used this technique in a subsequent patient, with good immediate postoperative results, but have no idea of long term success.

Support of the bladder base with a Marlex sling[21] has been used for large cystoceles. It is not possible to know whether this sort of procedure will confer any long term advantages. The use of these slings has been associated with erosion of the urethra with disastrous consequences (Personal communication, Mr J Sutherst).

It is important to identify any enterocele at the time of operation. This needs to be dissected out, excised and a high ligation of the peritoneum carried out. This can be equally well managed vaginally or abdominally. Farrell et al.[17] have described massive evisceration following sacrospinous colpopexy. It is possible that this started as an anterior or lateral enterocele[89] that progressed to evisceration. Prevention of this at the time of the initial procedure is not possible.

No reason for the failure was obvious in the patient who presented with recurrence of the vault prolapse. Possible causes could include: -

i) Failure to achieve a close approximation between the vault and the ligament.

ii) Poor suture placement - it is possible to place it too superficially ending in the fascia of the coccygeus muscle.

iii) Suture failure

iv) Failure of the ligament.

The only unavoidable one is the last, but also the least likely. Some critics feel that the use of ligaments as supporting structures will lead to the stretching and subsequent failure of the structure. In polio victims the ligaments of the knee will stretch and fail because of the poor muscle tone[52] It is unlikely that this will occur in the pelvis, where the pressure loads are much less.

Great care should be taken to avoid a suture bridge between the sacrospinous ligament and the vaginal vault. If any doubt exists at the time of surgery a finger placed in the rectum will allow the surgeon to appreciate how closely applied the two structures are and thus ensure tight approximation.

By applying traction to the carrier, firm attachment to the ligament can be demonstrated. The ligature carrier should be removed and reapplied if evidence of "give" exists. The suture should also be "tested" by pulling on it to ensure adequate attachment.

Accurate preoperative evaluation should identify cases where the vaginal length will not allow comfortable approximation of the vault to the ligament. These cases will benefit more from an abdominal approach where an artificial graft can be used to bridge the gap between the two.

Our results, although provisional, are good. Group I patients experienced complete symptomatic relief and vault support in 92,4% of cases. The follow-up period is too short to allow a firm conclusion to be drawn, but suggest that the results will be as good as those published. Some patients with asymptomatic cystocele formation may require repair in the future. Shull[71] suggests that 40% of patients who have signs of pelvic support loss at the 6-week post operative visit will develop a defect that will protrude outside the hymen within five years. He also claims that if relaxation is not displayed at six weeks the chance of a defect passing beyond the hymen before five years is less than 3%. It is essential that patients have continued follow-up of greater than five years before any conclusions can be drawn. It is hoped that we can review these patients at two years and again at five years.

The study has shown that the operation is relatively simple to do and should be easy to teach. It does require special instruments and surgeons wanting to adopt the procedure should ideally be instructed in the first few cases. Transabdominal procedures require no special ability apart from a sound knowledge of the anatomy. Retroperitoneal ventrofixation procedures[57,92] risk possible injury to the ureters. Haemorrhage, secondary to presacral vessel damage, is a well-documented complication of the abdominal sacrocolpopexy[1,3,37,75,83]. The

problem with this sort of bleeding which makes it different from other forms is that, when breached, the veins retract beneath the bony surface of the sacrum into the underlying channels of the cancellous bone making conventional haemostatic methods ineffective[82]. This has been severe enough in some circumstances to require abandoning the procedure. Presacral haemorrhage can be so difficult to control that Timmons has developed specialised instrumentation to help in these circumstances[82]. Haemorrhage is also a potential complication of the transvaginal repair, but appears to occur with less frequency and be more easily controlled. Injury to major vessels should not occur if the ligature is correctly placed. Bleeding is not a problem associated with ventrofixation procedures.

Damage to adjacent structures occurs infrequently irrespectively of the procedure used.

The mean operating time for the sacrospinous suture placement was 18 to 21 minutes. This is similar to Cruickshank's work[11]. The total operating time is much closer to 60 minutes; the time being taken up with the respective anterior and posterior repairs. Reported operating times for the abdominal approach, excluding any vaginal repair, are much longer[1,3,10,25]. For accurate comparison it would be necessary to compare total theatre time required to repair all the components of the prolapse as at least two-thirds of the abdominal cases will require a vaginal repair as well.

It is necessary to evaluate all future patients critically concerning preoperative analysis of site-specific pelvic support defects. Failure to do this will cloud the literature and prevent

sensible comparison of postoperative failures with operative techniques. Controlled randomised trials may help identify the best approach to the anterior vaginal wall.

In terms of vault support there is little to choose between the sacrospinous colpopexy and abdominal sacrocolpopexy. Both produce a well-supported vault and a functional vagina that has the correct anatomical axis. Results achieved with the sacrospinous colpopexy therefore compare favourably with those of the transabdominal repair. It must be remembered that comparison of different procedures is difficult unless it is done as part of a randomised controlled trial. Variations in surgical skill and patient characteristics are difficult to correct for when comparing the work from different units.

The ventrofixation abdominal procedures displace the vaginal axis anteriorly which may predispose to recurrence of the prolapse[41]. It is probably mainly for this reason that the operation has been superseded by the sacrocolpopexy. The abandonment of such procedures by the Mayo clinic group probably contributed to the decline in their popularity[78].

The abdominal sacrocolpopexy will be preferred in a patient with a short vagina. It may also be the operation of choice for the patient with paravaginal defects when a retropubic repair could be carried out simultaneously.

The major advantage of the transvaginal sacrospinous colpopexy is the avoidance of an abdominal operation and a shorter operating time. Consequently, the postoperative course is

likely to be less complicated with more rapid mobilization. Simultaneous correction of the other aspects of the prolapse is possible and good results obtainable.

It remains essential to remember that no perfect operation exists. The success and complication rates show that several diverse procedures give adequate results. It is important to match the operation to the patient and not vice versa. Surgeons treating major genital prolapse should be capable approaching the condition abdominally or vaginally.

The transvaginal sacrospinous colpopexy adheres to the principles of simplicity, preservation of vaginal axis and restoration of function. Two groups of operations that satisfy these principles are the abdominal sacrocolpopexy and the transvaginal sacrospinous colpopexy. The decision to perform a vaginal or abdominal procedure will depend, to a degree, on the physical condition of the patient and the surgical orientation of the operator.

The Role of the sacrospinous colpopexy as a primary procedure

The interim results of groups II and III were equally good. Employment of the procedure as a primary operation, however, is still controversial. Opponents of the prophylactic use of the procedure exist[41]. They site the low incidence of post hysterectomy prolapse, potential risks and possible additional expense as reasons for avoiding the procedure. The true incidence

of vault prolapse following hysterectomy is largely unknown. Estimates vary from 1% to 43%[11] but more accurately is probably not much higher than 5%[66]. Phaneuf had only seven cases of prolapse of the vagina after 5554 gynaecological operations[53]. Symmonds and Pratt reported that over a 15 year period at the Mayo clinic, during which time greater than 15,000 hysterectomies were performed, only 24 of the patients were treated for vaginal prolapse. They stated "even if we allow for the possibility that an equal number of patients with vaginal prolapse may have obtained treatment of prolapse elsewhere, the incidence of prolapse following hysterectomy performed at this clinic has not been great"[79]. In a subsequent article in 1981 however, Symmonds reporting on surgical results of post hysterectomy prolapse between 1968 and 1975 identified 40 cases previously operated on at the Mayo clinic[35,78]! During the same period they accumulated 150 cases of prolapse who had been operated on elsewhere. Our series presents 40 cases treated over a 12 month period in one hospital that suggests it is a significant and perhaps underrated problem. It is conceivable that many failures do not present again for treatment and merely "put up with" the problem.

When doing a hysterectomy for grade II or III prolapse it is often noted that the uterosacral and cardinal ligaments are so stretched and attenuated that it is unlikely they will provide adequate support for the vault. Ultimately support will rely on the anterior and posterior repairs, which will reduce the capacity of the vagina[77]. Ballard noted that in his series of 110 sacrospinous fixations, 38 (34%) were performed at the time of hysterectomy as the only way of maintaining adequate vaginal depth and axis[4].

In this series the sacrospinous component of the operation added, on average, 20 minutes to the operating time. With the correct instruments and increasing experience this had become as short as 10 minutes in later cases. The blood loss was no more than would be expected for a vaginal hysterectomy with simultaneous anterior and posterior repair and the postoperative course was largely uncomplicated.

Despite being easy to perform, with minimal complications, the operation should not be performed as an adjunct in all cases of vaginal hysterectomy, but should be reserved for those cases assessed as having uterosacral or cardinal ligaments so stretched or attenuated that they will not be able to provide adequate vault support. All surgical steps must have a role or not be included. As Ballard states, "it is difficult to make an asymptomatic patient feel better with surgery"[4]. Equally many cases probably exist where failure to perform the step will result in a suboptimal result. Careful preoperative and intra operative evaluation is crucial to good decision making.

In cases where prolapse beyond the introitus does not occur and where the uterosacral-cardinal complex is of reasonable calibre an effective result can be achieved with a vaginal hysterectomy and a McCall-type culdoplasty[40,41]. Thus it seems that "prophylactic" sacrospinous fixation has no place, as we have no means of identifying "at risk" patients.

Its therapeutic role in cases of procidentia is much more tangible. Here the level I supports have failed and the remaining ligaments have stretched sufficiently to allow total prolapse

of the uterus. Replacement of the vault with fixation to the sacrospinous ligament achieves an excellent result.

Cruickshank feels that the indications for doing a sacrospinous colpopexy at the time of doing a vaginal hysterectomy are: (1) Procidentia, (2) total laxity of the uterosacral-cardinal ligament complex and (3) the ability to pull the vaginal apex to or past the introitus after hyterectomy and other repairs have been carried out[12].

Again it becomes obvious that a clear answer will only be possible when the results of large, controlled randomised trials of vaginal hysterectomy alone versus vaginal hysterectomy plus sacrospinous colpopexy becomes available.

The sacrospinous cervicopexy

The sacrospinous cervicopexy is also an attractive idea as it can provide surgical correction of uterovaginal prolapse with preservation of the uterus. It has different indications according to the age of the patient.

In the elderly it has the theoretical advantage of avoiding any morbidity associated with the

hysterectomy. It is not difficult to perform and no technical difficulties were encountered in this series. This group of patients was older than the group who underwent simultaneous hysterectomy but had no other significant differences.

The operation was significantly shorter without the hysterectomy. Blood loss, however, was only marginally less and the postoperative course was identical in both groups.

Excellent success was achieved in terms of symptom control and uterine support. Development of an asymptomatic cystocele occurred in three patients again highlighting the need for a review of the approach to the anterior wall.

At follow-up the cervical os was clearly visible in all cases. This would allow investigation of the uterus should the need arise in the future. It is essential to do an assessment of the uterine cervix and corpus before proceeding with this operation.

These patients had previously had surgery refused them because of "frailty." Anaesthetic assessment excluded any genuine contraindications allowing all of them to undergo the procedure. All the patients tolerated the anaesthetic and procedure well.

This procedure would be contemplated in those patients with significant uterovaginal prolapse where it was considered that a standard hysterectomy and repair would not adequately correct the prolapse without significantly diminishing the vaginal volume. As such

it replaces vaginal hysterectomy plus sacrospinous colpopexy not vaginal hysterectomy alone.

Apart from the shorter operating time no obvious advantage has been shown by omitting the hysterectomy. Theoretically the patient should have a less complicated postoperative course. Subjectively the patients appeared to mobilise more quickly, but this aspect needs to be evaluated in a larger series.

Generalized prolapse in young women may be congenital, reflecting poor soft tissue strength. On examination these patients will have severe uterovaginal prolapse and barely perceptible uterosacral ligaments. If treatment with a ring-type pessary is successful the patient should be encouraged to complete her childbearing before surgery. Only if she is unable to retain the pessary and the symptoms become unbearable should a surgical approach be considered. In the young patient, still to complete her family, it may be an alternative to the Manchester-Fothergill operation. If there is cervical elongation and strong uterosacral and cardinal ligaments patients have traditionally been treated with a Manchester-type repair. This operation is not suitable for the patient with procidentia or one with a normal length cervix and marked ligament relaxation[48]. Despite good correction of lesser degrees of prolapse in young women the operation has been associated with subsequent infertility, cervical incompetency, premature labour and soft tissue dystocia[19,27,31,48,58,90].

Correction of uterovaginal prolapse with subsequent successful pregnancy has been

achieved[9,91] using various abdominal approaches. On purely theoretical grounds an abdominal approach should be avoided because of the chance of tubal damage with subsequent infertility. The long term results have not been good and can create difficulty if the prolapse reoccurs in the future[44].

A transvaginal cervicopexy will be less time consuming and have less morbidity. It will possibly eliminate the above complications, by not traumatising the cervix, and by avoiding the abdominal route prevent damage to the tubes and ovaries. The operation has been described in a small series of young women[58] and subsequent authors have documented successful pregnancies and vaginal deliveries after the operation[33]. Most of these cases were corrected using a bilateral sacrospinous attachment. It is difficult to recommend the procedure based on such limited follow-up but it does appear as if it has advantages over both the abdominal approach and the Manchester-Fothergill repair. With the tendency of women to postpone pregnancy until their 30's and 40's we may see more patients requiring treatment of this condition.

CONCLUSION

No perfect operation exists for the management of major genital prolapse. The complexities of the pelvic floor and its supporting structures prevent correction by a single procedure.

This study has shown that the sacrospinous colpopexy is a safe and effective procedure in the management of post hysterectomy vault prolapse. It is easy to learn and teach. Good control of symptoms is achieved with a well-supported vagina of functional length.

Criticism that it is a dangerous procedure is unfounded. Safe surgery depends on a thorough knowledge of the anatomy in the region of the ligament and careful and accurate suture placement. The technique using the Miya hook ligature carrier is superior to that where the sutures are placed under direct vision. Surgeons familiar with vaginal surgery should have no difficulty adopting the procedure after having the procedure demonstrated

The results are similar to those of the abdominal procedures, and it is essential that surgeons working with prolapse should be familiar with both approaches. A transvaginal approach avoids any morbidity associated with major abdominal surgery. Unless a laparotomy is indicated for other reasons or vaginal shortening prevents a close approximation to the ligament, the transvaginal colpopexy appears to be the procedure of choice in the older patient. In a younger patient the only advantage of the vaginal approach would be a more

rapid postoperative recovery. No conclusion on long term success can be drawn before follow-up of five years has been carried out.

Procidentia is an appropriate indication for its use as an adjunctive procedure at the time of hysterectomy. Greater numbers will be needed to establish its role as an adjunctive procedure for lesser degrees of prolapse.

The sacrospinous cervicopexy has a possible role in the surgical management of prolapse in young women. It may be the preferred operation in the very elderly or medically infirm, replacing colpocleisis and colpectomy.

The development of anterior wall prolapse following surgery highlights the need to consider the entire pelvic floor and all associated structures when performing surgery for genital prolapse. It is obvious from the literature that confusion exists about the classification of prolapse. Progress towards a universally accepted classification is essential before accurate comparisons, between different operations, can be made.

The sacrospinous colpopexy operation satisfies the principles, and achieves the aims, of prolapse surgery making it an ideal operation for this condition.

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