

## Sacrospinous Colpopexy

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### Introduction

The dramatic increase in life expectancy during the last hundred years is likely to result in increasing numbers of women presenting with vault prolapse and marked uterovaginal prolapse

The vaginal approach allows concomitant repair of all vaginal defects easily. The transvaginal sacrospinous colpopexy was described by Richter (1968). It evolved from Zweifel's attempts to attach the vaginal vault to the sacrospinous ligaments in 1892. The procedure was introduced in the United States in 1971 by Randall and Nichols where it became increasingly popular<sup>1</sup>.

Nichols<sup>2</sup> have advocated the use of transvaginal sacrospinous ligament fixation technique as an adjunct to vaginal hysterectomy and repair for marked uterovaginal prolapse in the presence of poor cardinal and uterosacral ligaments.

The tent theory simply states that "if the top of the tent caves in, the walls may follow". Of the three vaginal segments (anterior, superior, and posterior), maintenance of support for the superior segment, the top of the tent, is more important for maintenance of total vaginal support.

Because of this, the first step in any anterior or posterior vaginal repair is to ensure grade 0 support at the superior segmental uterine and cul-de-sac sites i.e. the cervix or vaginal cuff is supported at or above the ischial spine<sup>3</sup>.

In cases of moderate or severe uterovaginal prolapse, adjunct vaginal apex support may be necessary and these patients may be candidates for more than just uterosacral/cardinal ligament complex attachment to the vaginal vault

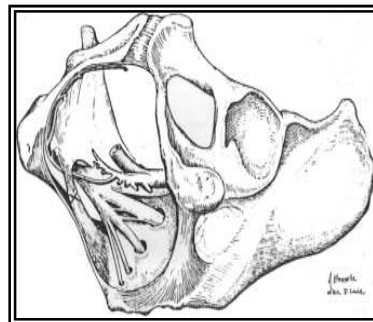
### Important Anatomical Points

The area around the sacrospinous ligament is another region that has become more important to the gynaecologist operating for problems of vaginal support. The sacrospinous ligament lies on the dorsal aspect of the coccygeal muscle. The rectal pillar separates it from the rectovaginal space. As its name implies, the sacrospinous ligament courses from the lateral aspect of the sacrum to the ischial spine. In its medial portion it fuses with the sacrotuberous ligament and is a distinct structure

only laterally. It can be reached from the rectovaginal space by perforation of the rectal pillar to enter the pararectal space or by dissection directly under the enterocele peritoneum

Many structures are near the sacrospinous ligament, and their location must be remembered during surgery in this region the sacral plexus lies immediately next to the ligament on its cephalic border and comes to lie on its lateral surface as the nerve passes through the greater sciatic foramen

Just before its exit, the plexus gives off the pudendal nerve, which, with its accompanying vessels, passes lateral to the sacrospinous ligament at its attachment to the ischial spine Figure 1. The nerve to levator ani muscle lies on the inner surface of the coccygeus muscle in its mid-portion. In developing this space, the tissues that are reflected medially and cranially to gain access contain the pelvic venous plexus of the internal iliac vein, as well as the middle rectal vessels. If they are mobilized too vigorously, they can cause considerable hemorrhage<sup>4</sup>.



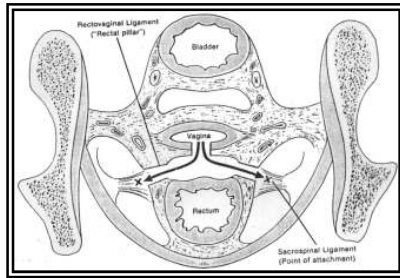
**Figure 1.** The surgical anatomy of the coccygeus muscle-sacrospinous ligament complex is identified. The pudendal artery and nerve pass beneath the ischial spine. At a distance of 3 to 5 cm medial to the ischial spine, at a point marked by the X, the complex should be penetrated by the tip of the Deschamps ligature carrier, safely avoiding the pudendal nerve and vessels by a wide margin<sup>5</sup>.

### The Technique

The procedure begins after correction of all other vaginal defects with or without hysterectomy by incision of the perineal skin and posterior vaginal mucosa to open the rectovaginal space and penetration of the right rectal pillar overlying the right pararectal space. (The ischial spine and the sacrospinous ligament-coccygeus muscle complex form a portion of the lateral wall of the pararectal space). Figure 2

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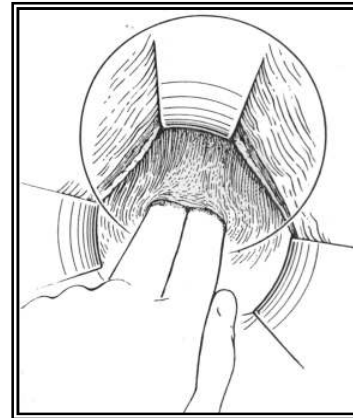
**Figure 2.** Route from the vagina through the rectovaginal space and the rectovaginal ligament (freed from the rectum) by way of the pararectal space to the point of attachment above the sacrospinous ligament<sup>5</sup>.

When the rectum has been carefully displaced by an appropriate retractor to the patient's left, the right ischial spine is carefully palpated. For proper suture placement, the surgeon must form a window through the descending rectal septum over the ischial spine. This window can be established by blunt penetration with the operator's finger, by the closed tips of curved Mayo scissors, or by a sharp-pointed hemostat, as the resistance of the tissue demands. The sacrospinous ligament-coccygeus muscle complex is palpated and usually can be visualized as it courses from the ischial spine to the sacrum. Figure 3.

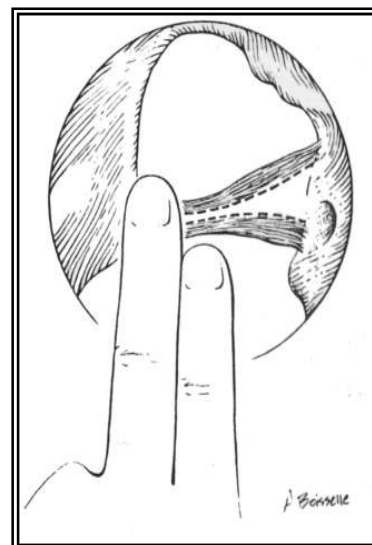
Once established, the window is gently enlarged in the axis of the vagina. This maneuver is usually accomplished by spreading the index and middle finger in the window to stretch the tissues, thereby providing palpable access and usually a clear view of the upper surface of the pelvic diaphragm, the ischial spine, and the coccygeus muscle. One retractor is placed in the twelve o'clock position to hold the cardinal ligament containing the ureter out of harm's way. Another retractor holds the patient's rectum to the left side. If needed, a shorter retractor can compress the distal portion of the pelvic diaphragm along the lateral wall of the pelvis. Bleeding from blood vessels is uncommon and can be controlled by packing with laparotomy towel, as this bleeding is usually of venous origin.

At a point 2 to 3 cm medial to the ischial spine, the sacrospinous ligament-coccygeus muscle complex is grasped by the tip of a long Allis or Babcock clamp and penetrated by the blunt tip of a long-handled Deschamps ligature carrier holding a full length of synthetic suture (proline size 1) or by the use of a long needle holder and the conventional needle.

If visual exposure is difficult and penetration can not be accomplished under direct vision, it can be accomplished safely by palpation.



**Figure 3.** Placement of the colpopexy stitches by palpation through a "window" in the descending rectal septum. When visual exposure is difficult and penetration cannot be accomplished under direct vision, it can be performed safely with palpation by use of the following maneuver: a window is created in the descending rectal septum between the rectovaginal space and the perirectal space. The window is wide enough to permit two or three finger breadths (2 to 3 cm), as noted. It overlies the ischial spine, which is in the lateral wall of the perirectal space<sup>5</sup>.



**Figure 4.** The index finger of the surgeon's left hand is inserted through the window into the perirectal space, and the tip of the middle finger is made to touch the medial surface of the right ischial spine<sup>5</sup>.

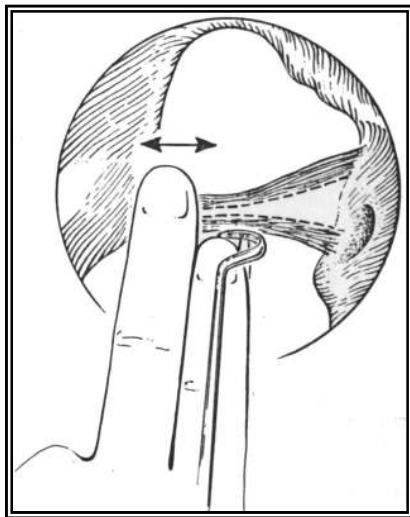
If the penetration is made through the right sacrospinous ligament coccygeus muscle complex, the index and middle fingers of the surgeon's left hand are inserted through the window in the rectal pillar into the right pararectal space. The tip of the middle index finger is placed on the medial surface of the right ischial spine Figure 4. A long handled Deschamps ligature carrier, holding a proper suture, is grasped in the right hand Figure 5. The curved tip of the carrier is gently slid down the undersurface of the left index finger to the posteroinferior border of the sacrospinous ligament to a point 2 to 3 cm medial to the ischial spine, which is still being

palpated by the middle finger of the left hand Figure 6. As the tip of the ligature carrier is rotated in a clockwise direction, a significant resistance is encountered Figure7. The resistance indicates that the carrier has been placed through the ligament, not superficial or deep to it. (this latter error could endanger the sciatic nerve and pudendal vessels and nerves). At the same time, the handle of the ligature carrier is moved through a larger clockwise arc beneath the palm of the left hand to permit vertical penetration of the ligament. If a gentle tug to the suture, which has been grasped by a hook, actually moves the patient a small degree on the table this indicates proper placement of the suture through the substance of the sacrospinous ligament.

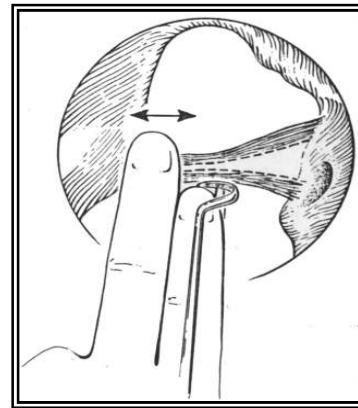
Direct palpation of the suture and of the ischial spine confirms the required distance of 2 to 3 cm between the two. If the suture seems too close to the ischial spine, traction is placed on it to identify its exact location, and a new suture is placed medial to the offending suture, which is then removed. An additional synthetic and non-absorbable suture, can be inserted through the muscle-ligament complex medial to the first suture.

These permanent stitches should be placed sub-mucosally in the vagina so that they are buried in the fibromuscular wall. The long colpopexy stitches are then held in hemostats to be tied later in the operation.

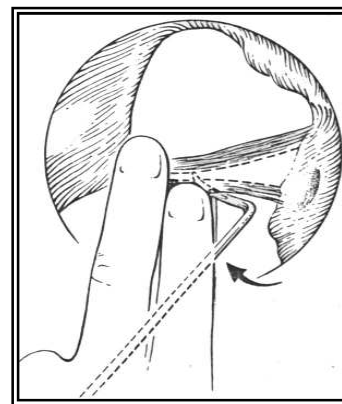
At the end of the operation, rectal examination confirms the integrity of the rectum and a vaginal pack is left if mild bleeding in the pararectal space was encountered.



**Figure5.** At a point 2 to 3 cm medial to the ischial spine, the ligature carrier is advanced. The ischial spine is still being palpated as shown<sup>5</sup>.



**Figure6.** The long-handled Deschamps ligature carrier holding a full length of synthetic suture is grasped in the right hand. The curved tip of the carrier is gently slid down the undersurface of the left index finger to the posteroinferior border of the sacrospinous ligament-coccygeus muscle complex<sup>5</sup>.



**Figure7.** The middle finger palpates the ischial spine, and the index finger touches the sacrospinous ligament as shown. The handle is rotated in a clockwise direction, as shown by the curved arrow<sup>5</sup>.

### Alternative Procedures

#### *Iliococcygeal Colpopexy*

Suspension of the vault bilaterally to the iliococcygeus fascia of the muscle just anterior to ischial spine the iliococcygeus suspension is a potentially less morbid procedure than the sacrospinous fixation because, in contrast to the sacrospinous ligament, the iliococcygeus fascia does not have critical structures such as the pudendal nerve or gluteal vessels immediately adjacent to it. Additionally, it avoids the marked posterior vaginal deflection seen with sacrospinous fixation and provides a more anatomic orientation for the vagina. Although the iliococcygeus suspension maintains the normal alignment of the vaginal cylinder, the ischial spines are considerably inferior to the normal position of the vaginal apex and therefore may result in foreshortening of the vaginal depth<sup>6,7,8</sup>, reported subjective success rate

of 91% and 94% for iliococcygeus colpopexy and sacrospinous colpopexy respectively.

### ***Abdominal Sacral Colpopexy***

Abdominal sacral colpopexy has a consistent cure rate of greater than 90%<sup>9</sup>. It is not without complications, including the risk of rare life-threatening intraoperative hemorrhage and a 3.3% incidence of vaginal mesh erosion. Erosions can usually be managed with vaginal excision of all or part of the mesh followed by partial colpocleisis<sup>10</sup>. An MRI comparison of anatomical changes related to surgical treatment of prolapse by vaginal or abdominal route done by Boukerrou et al 2005 showed that the vaginal length and axis were comparable in both groups

### ***Bilateral Bone Anchor Vaginal Vault Suspension***

Vaginal vault prolapse was corrected in six patients by suspending the apex of the vaginal vault to the ischial spine with Vesica bone anchors. Bladder neck suspension and correction of other vault pathology was performed at the same time. All patients had complete relief of their prolapse and have demonstrated no recurrence during the brief mean follow-up period of 7 months<sup>11</sup>.

### ***Repair of recurrent vaginal vault prolapse using sacrospinous ligament fixation with mesh interposition and reinforcement***

Repeated sacrospinous ligament fixation with mesh interposition and reinforcement is a safe and effective procedure for the correction of recurrent vault prolapse. The extended implanted mesh can be used for the repair of concurrent cystocele effectively. A long-term follow-up is necessary to detect any late complication<sup>12</sup>.

### ***Laparoscopic Extraperitoneal Sacrospinous Colpopexy***

Laparoscopic extraperitoneal sacrospinous suspension can eliminate the procedure of opening and closing the peritoneum and avoid interference with the intestine during surgery. It can be used as an alternative to the traditional procedure<sup>13</sup>.

### **Alternative instruments**

Technically, sacrospinous ligament suture placement is done by several instruments such as, the blunt angular Deschamps ligature carrier, the Miya hook which was developed and introduced by<sup>14</sup>, an arthroscopic ligature carrier (The Shutt Suture Punch System) described by<sup>15</sup>, laparoscopic suturing instrument (The Endo Stitch) applied by<sup>16</sup>, and the ligature carrier specifically designed for transvaginal sacrospinous colpopexy described

by<sup>17</sup>, Transvaginal sacrospinous colpopexy can be done also by a new minimally invasive procedure using the Raz Anchoring System (RAS). RAS seems to be quick, easy, safe, and effective in the suspension of vaginal apex to the sacrospinous ligament<sup>18</sup>.

### **How to Be Safe and Effective**

The sacrospinous ligament fixation is safe and effective with good medium-term results and few postoperative complications<sup>19</sup>.

- The procedure is much simplified by adequate exposure and retraction and placing the suture under direct vision. Placing the suture under direct vision has two advantages
  1. Obviating the need to special ligature carriers in placing the sutures
  2. Minimizing the potential risk of injuring the pudendal artery and nerve (pudendal complex) by placing the suture at least 2 cm from the tip of ischial spine. This risk is also further minimized by avoiding placing the stitch across the entire thickness of the ligament<sup>20</sup>.
- The permanent suture is the best to be used because it gives long lasting support<sup>6</sup>. If a suture bridge is left due to bad technique or if sacrospinous colpopexy is done bilaterally in the presence of a narrow vault, the under surface of the vagina can not reach the surface of each coccygeal muscle-sacrospinous ligament complex without suture bridge. In these two conditions, the non absorbable suture is still supposed to give a good result and the vault will stay in place<sup>21</sup>.
- Immediate, severe postoperative gluteal pain running down the posterior surface of the affected leg would indicate probable pudendal nerve trauma, a rare complication of sacrospinous colpopexy. Sutures placed in error adjacent to the ischial spine risk trauma to the pudendal nerve as it bends around the ischial spine, or to the posterior cutaneous nerve of the thigh, which is deep to the spine, or even to the sciatic nerve, which is deep and lateral to the spine. Also milder forms of sciatic pain may occur because of suture irritation<sup>7</sup>.
- Placement of sutures posterior to the sacrospinous ligament and/or placement of retractors beyond the ligament superiorly

or inferiorly may result in serious vascular injury to the underlying vessels. Vascular injury to the vessels surrounding the sacrospinous ligaments has been a controversial part of the recent literatures because of the assumption that the vessels adjacent and posterior to the sacrospinous ligament were always of pudendal origin. However<sup>22</sup>, clarify that previous misconception by providing information from more extensive, dual-approach dissections. The pudendal neurovascular bundle was found to be relatively protected from injury by the ischial spine and the sacrospinous ligament. Therefore, injury to the pudendal vessels would be uncommon but may respond to ligation of the internal iliac artery. The inferior gluteal artery is therefore probably the most commonly injured vessel in sacrospinous colpopexy because of its location. Because of its perpendicular course relative to the sacrospinous ligament, the inferior gluteal vessels may be injured either superior, posterior, or inferior to the ligament. Because of the existence of extensive anastomosis in this area between vertebral, internal iliac, and external iliac vessels, internal iliac artery ligation in case of injury to the inferior gluteal vessels is usually ineffective. In such case bleeding can be stopped by packing with laparotomy packs or by selective arterial catheterization and embolization which requires skilled radiologists on hand to perform the procedure<sup>22</sup>.

- The incidence of recurrent cystocele after sacrospinous suspension varying from 8% to 22% at different follow up times<sup>1,23</sup>. Special attention should be payed to the repair of the anterior segment as the change in the vaginal axis to a more posterior position exposes this segment to much stress and as some authors demonstrate the paravaginal defect to be the most common defect leading to anterior vaginal wall prolapse<sup>24, 25</sup>. The transvaginal paravaginal repair technique should be mastered by the gynaecologic surgeons concerned with pelvic reconstructive surgery in order to complete the entire pelvic reconstructive procedure via the transvaginal route.

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