

# capio<sup>®</sup>

*Suture Capturing Device*

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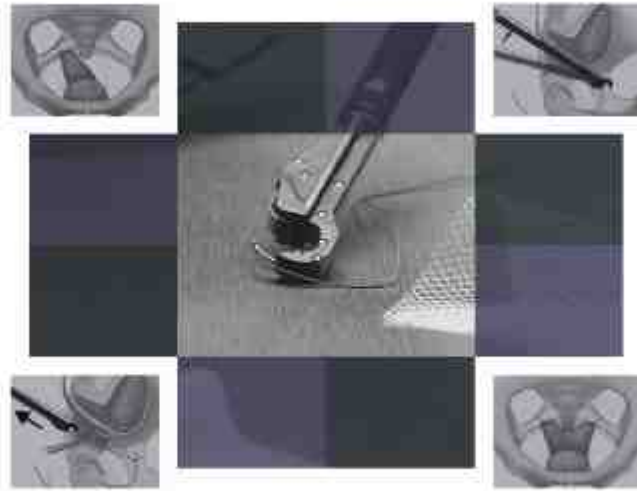
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T E C H N I Q U E



S P O T L I G H T

**Sacrospinous Ligament Suspension:  
Improved Outcomes Using the Capio Suture Capturing Device**

### Sacrospinous Ligament Suspension: Improved Outcomes Using the Capio Technique



Figure 1

Sacrospinous vaginal vault suspension has been utilized for the repair of vaginal vault prolapse for several decades – first described in Europe in 1958<sup>1</sup>. Although ‘traditional’ sacrospinous suspension techniques have been associated with successful suspension of the vaginal apex in 81-100% of cases,<sup>2,3,4,5</sup> limitations of the technique have included the technical challenge of exposing the deep vaginal anatomy, and unilateral suspension (*Figure 1*) resulting in deviation of the vaginal apex to one side, (usually to the right side).



Figure 2

In this publication, we summarize a new and improved approach to sacrospinous fixation using the Capio Device. This ‘push and catch’ suturing device allows for sutures to be placed with less dissection and no use of trocars. The technique addresses the basic limitations and disadvantages of the traditional sacrospinous repair, potentially offering an improved anatomic outcome with bilateral fixation (*Figure 2*) of the vaginal apex, and in appropriate cases, the ability to quickly and safely incorporate materials for mesh or graft augmentation.

For women with pelvic ligaments and connective tissue supports that are severely attenuated or absent, the sacrospinous ligament provides a consistently strong site for apical fixation. Sacrospinous ligament suspension carries the advantages of the transvaginal approach performed within the retroperitoneal rather than intraperitoneal space – thereby reducing the risk of ureteral, bowel or other intra-abdominal injury. Moreover, using the Capio Device, the procedure now involves fairly minimal dissection beyond that which is performed for traditional cystocele or rectocele repair. Whereas ‘traditional’ sacrospinous repairs once required two surgical assistants and a challenging dissection, use of the Capio Device has transformed the repair into a quick, efficient and easier repair from the standpoints of both patient and surgeon.



### Anterior Approach to the Sacrospinous Ligament

Access to the sacrospinous ligament and coccygeus muscle can be achieved by several means. The traditional approach described by Nichols<sup>6</sup>, involves a posterior vaginal incision and posterior colporrhaphy dissection, facilitating perforation of the rectal pillar near the ischial spine. In contrast, the ‘anterior’ sacrospinous suspension techniques performed through an anterior colporrhaphy incision, with blunt dissection of the ipsilateral paravesical and paravaginal area from the level of the bladder neck to the ischial spine. The anterior approach facilitates suspension of the vaginal apex without a posterior vaginal incision. This technique was first reported by our center in 2000<sup>7</sup>, and it now accounts for more than 90% of our vault fixation cases.

### Introducing the Capiro® Device

**Using the Capiro Device, our sacrospinous suspension technique has been modified in a few essential ways:**

1. “Anterior” approach to the sacrospinous ligament, rather than ‘posterior’ approach, for most cases.
2. Anatomy identified by palpation, with minimal to no use of retractors. The engineering of the Capiro Device facilitates safe and secure suturing into the ligament. We have found this has reduced our operative time, and need for assistance, during sacrospinous repairs.
3. Bilateral fixation of the vaginal apex, resulting in a more balanced and anatomically correct suspension when compared to ‘traditional’ unilateral sacrospinous fixation.

### Technique – No More Deep Retractors

Before introduction of the Capiro device, we frequently utilized Briesky-Navratil retractors for exposing the coccygeus muscle and sacrospinous ligament without obstructing the surgical field; some surgeons have found retractors or suction devices mounted with a fiberoptic light source to be particularly useful for identifying the retroperitoneal anatomy. Such retractors are still useful to have on the instrument tray for specific cases in which they might be needed. However using the Capiro Device, we have found that fewer cases require visual exposure of the deep vaginal anatomy.

### The Procedure: *Step by Step*

A simplified 'step by step' summary of the anterior sacrospinous technique with the Capio Device is as follows:

- 1 Shift to the "Anterior Approach".** Our approach to the apical repair most often occurs through a single, vertical anterior vaginal incision – a comfortable approach for any surgeon already performing a standard anterior colporrhaphy. This 'anterior approach' to the sacrospinous ligament is a change in orientation for many surgeons trained in the 'posterior' sacrospinous technique – but it offers several advantages including (1) suitable for bilateral, rather than unilateral suspension of the vaginal apex, (2) superior vaginal width, and no narrowing of the apical suspension points, and (3) ability to incorporate mesh reinforcement ('arcus to arcus') for advanced cystocele repair, with minimal extra effort.



Figure 3

- 2 Vaginal Incision and Sharp Dissection.** (Figure 3) The vertical incision is extended from the level of bladder neck to the vaginal apex. The pubocervical fascia is dissected away from the vaginal skin flaps using Metzenbaum scissors, in the standard fashion of anterior colporrhaphy. Sharp dissection is continued until the descending pubic ramus can be palpated on each side.

- 3 Blunt Dissection to Ischial Spine.** Using gentle, blunt dissection technique laterally and posteriorly, with a few gentle sweeps along the surface of the obturator muscle, the ischial spine becomes easily palpable. Remaining fibers should be swept off of their attachment point on the pelvic sidewall and obturator internus muscle surface.

**Note:** *If the case includes placement of a mesh or graft to reinforce a large cystocele or paravaginal defect, the above dissection will be adequate. The Capio Device, in this case, would be used to secure sutures into the Arcus Tendineous and Obturator Muscle – allowing for an "arcus to arcus" graft to be placed.*

- 4 Palpate the Sacrospinous Ligament.** (Figure 4) Once the ischial spine is palpated, the location of the sacrospinous ligament can now be precisely determined. Palpate the firm, fixed soft tissue just medial to the spine, and trace it towards the sacrum. We typically place one suture into each side, targeting the mid to outer-third of the ligament.



Figure 4

- 5 Place the Sutures.** (Figure 5) Without the use of retractors, the bladder and paravesical tissues can be retracted medially using an index finger; with the free hand, the Capio device can be advanced to the ligament. The head of the Capio Device is gently secured against the ligament and deployed. When the device is retracted, the surgeon now has two free suture ends, and can carry on with standard anchoring into the ipsilateral vaginal apex.



Figure 5



### Safety Considerations & Suture Placement

Various devices for placing sutures into the sacrospinous ligament preceded the introduction of the Capiro® Device – including the Deschamps ligature carrier, Miya hook<sup>8</sup>. The Capiro Device<sup>9</sup>, however, was in our opinion the first device to substantially reduce the invasiveness, amount of dissection, and overall difficulty of the procedure.

Suturing into the sacrospinous ligament should be performed with key anatomic landmarks in mind. The lateral suspension suture is placed through the ligament roughly fingerbreadth medial to the ischial spine to safeguard against injury to the pudendal vessels, though the risk of this particular complication may be commonly overestimated.<sup>18</sup> Care should be taken to place sutures through the superficial portion of the ligament, rather than deep into or around it. Medially, the rectum represents the anatomic boundary for suture placement. If retractors are used during this stage of the operation, the surgeon must avoid traumatic insertion of retractors beyond the ligament, or excessive medial traction against the rectum and presacral area, as this can cause nerve injury and postoperative pain. As previously mentioned, using the Capiro Device allows for retractors to be avoided in the vast majority of cases.

Regardless of the type of suture used or anatomic approach to the ligament, the surgeon should take care to avoid the creation of a ‘suture bridge’ between the vagina and ligament; the use of pulley stitches, which attach one end of each suture to the vaginal cuff epithelium, may help in applying the vagina directly against the ligament.

### Pre and Perioperative Considerations

The decision to proceed with sacrospinous ligament suspension may be influenced by a patient’s specific anatomic features, or medical history. For women with prior intra-abdominal surgery, pelvic adhesions or other contraindications to abdominal surgery, the fully retroperitoneal nature of sacrospinous ligament suspension may confer advantages with respect to surgical risk, operative time, and speed of recovery. Preoperative evaluation should also include assessment of bony and soft tissue pelvic anatomy. Markedly foreshortened bony pelvic dimensions – such as a true ‘platypoid’ pelvis – may limit the surgeon’s ability to preserve adequate vaginal length, and weigh against the choice of sacrospinous suspension for sexually active patients. With respect to soft tissue, the length of the vaginal vault should be sufficient to avoid tension following sacrospinous fixation – which may predispose to suture pullout, anatomic distortion, and possibly even an ‘unmasking’ of potential urinary incontinence due to posterior displacement of the urethra from the pubic bone. In the absence of adequate length, operative revision of the cuff, or suspension to a more anterior or distal structure such as iliococcygeus fascia,<sup>10</sup> may be performed. The Capiro suturing device lends itself very well to suturing into these alternate fixation points.

Preoperative planning should include assessment of estrogen status for postmenopausal women, and consideration of systemic or local estrogen therapy before surgery if the vaginal cuff epithelium appears thin or poorly vascularized. Estrogen improves vaginal vascularization and

supports an improved epithelium and connective tissue. A well-estrogenized vaginal epithelium should therefore facilitate healing at the site of suture fixation, and reduce the likelihood of subsequent surgical failure resulting from suture 'pullout' from the vaginal side.

At the time of surgery, coexisting pelvic floor support defects need to be recognized and repaired. An unrecognized enterocele, in particular, is often to blame for the rare case of recurrent apical prolapse following sacrospinous suspension. As with all reconstructive operations, appropriate patient selection and flexibility in the operating room will maximize the odds of success.



Figure 6

### **Incorporate Mesh or Graft Repair – With Minimal Extra Effort**

Traditionally, the most common indication for sacrospinous ligament suspension has been to resuspend a prolapsed post-hysterectomy vaginal apex. However along with the increasing popularity of mesh and graft augmentation for the repair of advanced prolapse, sacrospinous anchoring sutures have also been increasingly used to secure the adjunctive material (*Figure 6*). Using the Capio Device, we have developed a technique that facilitates 'trocar-free' application of anterior and/or posterior grafts, using essentially the same dissection described herein. However, a full discussion of mesh and graft augmentation techniques is beyond the scope of this article.

### **Anatomic Outcomes**

The long-term efficacy of sacrospinous ligament suspension has been borne out by numerous clinical series. Although the majority of outcomes reported for the sacrospinous ligament suspension have referred to either the posterior or apical approach, reports evaluating the anterior sacrospinous ligament suspension have found similar rates of success. Furthermore, based on one retrospective analysis of 168 women following either anterior (n=76) or posterior (n=92) sacrospinous vault suspension, no measurable differences appeared to exist with respect to apical support, vaginal caliber according to maximum dilator size, or angle of the vaginal vault.<sup>11</sup> It should be noted that these previous studies evaluated unilateral suspension, whereas today the vast majority of our repairs involve bilateral fixation using the anterior approach, for reasons already outlined including (1) bilateral fixation of the vaginal apex, (2) elimination of narrowing of the vaginal apex, and (3) ability to combine the apical suspension with anterior mesh ('arcus to arcus') reinforcement in appropriate cases.

### **Safety & Complications**

Aside from the general risks accompanying transvaginal reconstructive surgery, specific potential risks associated with the sacrospinous should be addressed. Gluteal pain or paresthesias may occur after sacrospinous suspension,<sup>2,12,13</sup> possibly due to peripheral nerve trauma. Though these symptoms are nearly always transient and self-limited, they may persist for a period of weeks or even months postoperatively. Cruikshank found that 20 of 135 women experienced buttock pain after sacrospinous ligament suspension, with all cases resolving spontaneously by 6-weeks. Pudendal nerve entrapment may result in pain localizing in the buttocks or perineum, and may

improve following replacement of lateral fixation sutures more medially.<sup>14</sup> Even in the absence of direct pudendal nerve injury, pain may still occur due to the wide distribution of nerve tissue throughout the ligament and apparently most concentrated in its medial portion<sup>15</sup>. Sciatic nerve irritation after sacrospinous suspension has been described as a new onset problem,<sup>16</sup> and as an exacerbation of previous symptoms.<sup>3</sup>

Serious vascular injury is a rare complication of sacrospinous ligament suspension. In order to effectively manage pelvic hemorrhage, familiarity with the surrounding anatomic landmarks is essential. Verdeja et al<sup>17</sup> demonstrated that the pudendal neurovascular bundle ranges in location from 0.90 - 1.30cm medial to the ischial spine; the sciatic nerve is located 3.10 - 3.30cm medial to the spine. Based on these anatomical relationships, the sacrospinous ligament would appear to be most vulnerable along its lateral third. Yet another series of cadaver dissections, performed by Barksdale et al<sup>18</sup>, showed the pudendal neurovascular bundle to be relatively shielded from injury by the ischial spine and sacrospinous ligament. The inferior gluteal artery – with a more perpendicular course relative to the ligament – was the vascular structure whose location appeared most vulnerable to injury. The authors referred to three elements of the operation that may carry particular risk: suture placement along the posterior ligament, retractor placement beyond the ligament, and overly aggressive denuding of the ligament surface.

Throughout a 16-year experience performing sacrospinous ligament suspension procedures at our center, hemorrhage from the ligament or coccygeus muscle has been observed as an exceedingly rare event. And in using the Capiro® Device over the past eight years at our referral center, we have not had a single major vascular or neurological injury; and in my opinion, the safety profile of this device has proven to be excellent. Furthermore, avoidance of deep vaginal retractors using the Capiro Device has sharply reduced the observed complaints of nerve irritation that used to result from overzealous retraction against the rectum and presacral area.

### Conclusions

Use of the Capiro Device for sacrospinous suspension has evolved into a procedure with little resemblance to traditional ‘posterior’ sacrospinous repair – in terms of invasiveness, anatomic outcome, and operative time and morbidity. We have found this approach to be appropriate for the majority of women presenting with apical prolapse, resulting in highly favorable anatomic outcomes with minimal surgical morbidity.



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