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# How to manage peroperative haemorrhage when vaginally treating genital prolapse

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ABSTRACT

Surgery of genital prolapse causes haemorrhagic complications in about 1% of cases. The pelvis is highly vascular and accessing the usual landmarks of vaginal surgery, in particular the sciatic spine, is delicate work. Meticulous dissection of closed spaces is often difficult, and exposure and haemostatic procedures will be challenging in the event of any bleeding complication. When fixing prosthesis to the sacrospinous ligament, the inferior gluteal artery and its coccygeal branch are at risk. Fixation to the sacrospinous ligament must be performed more than 25 mm away from the sciatic spine and, if possible, must not transfixiate it. Safe insertion of prosthesis requires sufficient experience, and an adequate learning curve. Being aware of vascular anatomy allows one to understand and treat haemorrhagic incidents. Packing or selective embolization seem to be the two methods to adopt, depending on the severity of bleeding and the conditions of exposure on the one hand, and on the technical resources available for embolization, on the other. Hypogastric ligature appears to be ineffective in this context.



## Introduction

Laparoscopic promontofixation and use of vaginal prosthesis have dramatically changed traditional methods of genital prolapse surgical repair (paravaginal suspension . . . ). Data concerning these techniques, their complications, notably rectal and bladder wounds, and their treatment, is abundant, as they are dreaded. Complications such as intra-operative haemorrhages are less often described.

Our aim is to clarify the pelvic vascular anatomy, and particularly near the sciatic spine, which is an anatomic landmark used when vaginally treating genital prolapse, and an essential point for prosthetic placement. We also review the techniques described to treat intra-operative haemorrhages.

## Method

A literature search was performed using PUBMED. We studied articles, written in French and English, detailing the sciatic spine's vascular environment and those reporting hemorrhagic incidents during vaginal prolapse surgery. Most of them are case reports. To our knowledge, there is no study comparing the different approaches in case of bleeding incidents during surgery.

## Bleeding incidents in vaginal surgery for genital prolapse

Whichever the access route chosen to surgically treat genital prolapse, there are relatively few cases of intraoperative haemorrhages reported in literature. This complication draws more attention during vaginal surgery as certain procedures must be performed blindly and accurate haemostasis is difficult when bleeding occurs. Severe vascular lesions with haemorrhagic complications occur in 0.5–1% of sacrospinofixations [1,2]. Haemorrhages may be severe, even life-threatening, when prevesical or prerectal prosthesis is introduced vaginally, as several authors have reported since the development of these new techniques [3–12].

A precise figure of the incidence of these complications is difficult; authors choosing different thresholds when evaluating blood loss volume. In 2009, Jacquetin and Cosson studied three important series from a total of 1978 patients and reported haemorrhages above 500 ml or major haematoma in 1.2% of cases (Prolift$^{TM}$) [13]. Although these meshes are not available anymore, the rate of intraoperative bleeding seems comparable to when transobturator or transgluteal route is not used to place the prosthesis, namely 1.4%, as reported in a prospective series evaluating results of Elevate$^{TM}$ prosthesis on 70 patients (corresponding to a venous wound with over 300 ml of blood loss when dissecting the ischioanal space) [14].

Depending on different available industrial devices, the tendinous arch of the pelvic fascia (TAPF) is the anterior position

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of the placement of the prosthesis when treating cystoceles. The latter often involving a transobturator route as is the case for Apogee™ (AMS – American Medical System) [9]. The posterior prosthetic arm may sometimes be fixed on the sacrospinous ligament (SSL) therefore achieving an anterior sacrospinous fixation. This is the case for Elevate™ (AMS) which is fixed by a harpoon in the ligament [14], Pinnacle™ (Boston Scientific) [15], or UpHold™ (Boston Scientific) which is fixed with a needle device (Capio™ – Boston Scientific) on the SSL 20 mm medial of the sciatic spine [16]. Vascular pedicles that travel near these sites or on the route of the trocars used to place the implants are at risk during the procedure.

When treating a posterior level prolapse or for vaginal dome fixation, the prosthesis rest on the SSL.

## Vascular anatomy of the sciatic spine region

The SSL is more traditionally used for the treatment of rectocele (Elevate Posterior™), although when treating cystoceles, the sacrospinous ligament may be used to fix prosthesis (posterior arm of Elevate Anterior™, Pinnacle™, UpHold™). The SSL is the anchorage point for the posterior sacrospinous fixations of the vaginal dome, allowing for treatment of medium level prolapse, which is still considered as the gold standard when treating posthysterectomy prolapse with unilateral suture of the vaginal dome to the median portion of the SSL [17].

Table 1 summarizes the average distance of the main vascular pedicles involved with the sciatic spine when passing behind the sacrospinous ligament in different anatomic studies [18–20]. Figs. 1 and 2 illustrate the vascular anatomy of the sciatic spine region.

### *Internal pudendal artery (IPA)*

The IPA was often implicated in haemorrhages during sacrospinous fixations [21]. Thompson et al. directed a series on 23 feminine pelvises dissections. They wished to clarify anatomic connections between vascular structures near the sciatic spine and the SSL. They showed that the IPA was not really at risk, being medial, under the spine, and 5 mm away from it behind the ligament [18]. According to the authors, it is the inferior gluteal artery that is at risk.

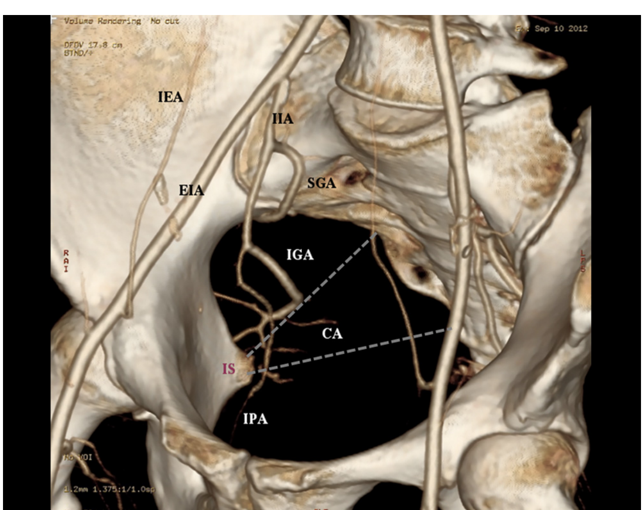


**Fig. 1.** Vascular anatomy of the sciatic spine region. Global view.
*Abbreviations:* IIA, Internal Iliac Artery; EIA, External Iliac Artery; IEA, Inferior Epigastric Artery; SGA, Superior Gluteal Artery; IGA, Inferior Gluteal Artery; IPA, Internal Pudendal Artery; CA, Coccygeal Artery; IS, Ischial Spine; ——, Sacrospinous Ligament.

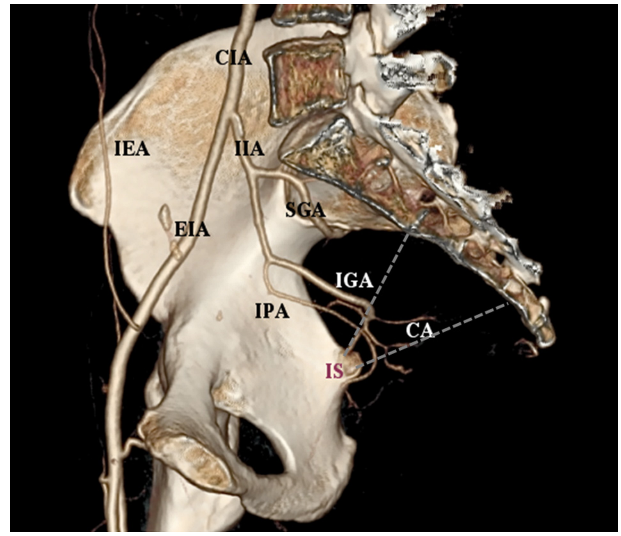


**Fig. 2.** Vascular anatomy of the sciatic spine region. Right hemipelvis. Sagittal view.
*Abbreviations:* CIA, Common Iliac artery; IIA, Internal Iliac Artery; EIA, External Iliac Artery; IEA, Inferior Epigastric Artery; SGA, Superior Gluteal Artery; IGA, Inferior Gluteal Artery; IPA, Internal Pudendal Artery; CA, Coccygeal Artery; IS, Ischial Spine; ——, Sacrospinous Ligament.

For Roshanravan et al., who performed dissections on 21 anatomic subjects, the IPA originates from the anterior branch of the internal iliac artery (IIA) and has a common trunk with the inferior gluteal artery in 10% of cases (division behind the sciatic spine). In 89% of cases, it travels directly behind the spine. In other cases, it is less than 1.5 mm medial of the spine, with a mean diameter of 2.3 mm, before entering the ischioanal fossa with the pudendal vein. It seems that this artery is protected by the sciatic spine and the sacrospinous and sacrotuberous ligaments. Therefore, the inferior gluteal artery would be more at risk than the IPA [20].

### *Inferior gluteal artery (IGA)*

For Barksdale et al., when the vessels are damaged behind the SSL, there is a massive haemorrhage risk [4]. They report several unpublished cases of life-threatening haemorrhages in patients subjected to a sacrospinous fixation and for whom ligature of the IIA was not effective. According to them, the IGA was implicated in these cases.

The IGA's origin varies. Most often stemming from the anterior division of the IIA, it may less frequently emanate from the posterior division, or from a common stem with the superior gluteal artery. With its vein [19], it has a posterior and lateral direction, entering the sciatic foramen and crossing the sciatic

**Table 1**
Average distance (mm) from the sciatic spine of the main vascular pedicles involved when passing behind sacrospinous ligament.

| | Thompson et al., Obstet Gynecol, 1999 | Sagsoz et al., Eur J Obstet Gynecol Reprod Biol, 2002 | Roshanravan et al., Am J Obstet Gynecol, 2007 |
|---|---|---|---|
| Number of anatomic subject | 23 | 9 | 21 |
| Internal pudendal artery (IPA) | <5 | 1.48 (0–5.5) | <1.5 |
| Coccygeal artery (CA) | 12 (7–17) | – | – |
| Inferior gluteal artery (IGA) | – | 17.02 (12.5–22.3) | 24.2 (15–36) |