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Postoperative pelvic pain: An imaging approach

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Key Words
Pelvis; Pain; Postoperative; MRI; Scan

Abstract
Postoperative pelvic pain after gynecological surgery is a readily detected but unspecific sign of complication. Imaging as a complement to physical examination helps establish the etiological diagnosis. In the context of emergency surgery, vascular, urinary and digestive injuries constitute the most frequent intraoperative complications. During the follow-up of patients who had undergone pelvic surgery, imaging should be performed to detect recurrent disease, postoperative fibrosis, adhesions and more specific complications related to prosthetic material. Current guidelines recommend using pelvic ultrasonography as the first line imaging modality whereas the use of pelvic computed tomography and/or magnetic resonance imaging should be restricted to specific situations, depending on local availability of equipment and suspected disease.

One must differentiate between acute postoperative pelvic pain, which generally reflects an urgent complication related to peritoneal irritation (bleeding, perforation of a hollow organ, collection, obstruction), and later postoperative pelvic pain secondary to surgery. Imaging usually makes it possible to make an etiological diagnosis of postoperative pain and complications. The advantages of ultrasound are its accessibility and its low cost, and it

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remains the first-line test in patient with pelvic pain [1]. Conversely, computed tomography (CT) and magnetic resonance imaging (MRI) are often performed in second line [2]. In the emergency context, CT may be indicated in first line in case of acute hemorrhage, suspicion of a urinary/digestive wound or gastrointestinal obstruction. In patient with chronic pelvic pain, the combination of ultrasound and MRI is the most relevant in the etiological inquiry, particularly to screen for scar tissue fibrosis, adhesions, recurrences, or complications specific to certain prosthetic materials, in treatment for disorders of pelvic stability [3].

**Acute complication**

**Hematoma**

Hemorrhagic complications after pelvic surgery are rare ranging between 1.1% and 4.1% [4,5]. The complication rate is greater in case of laparotomy or cancer surgery. Vascular injury is the most serious hemorrhagic situation and requires emergency secondary surgery, often without imaging in case of hemodynamic instability of the patient. For stable patients, CT makes it possible to screen for active leakage of iodinated contrast material. Management involves pelvic arterial embolization in these patients.

Postoperative hematoma, however, is more commonly depicted with ultrasound (Fig. 1) or CT (Fig. 2). In case of hemodynamic stability, clinical monitoring with or without radiological monitoring is sufficient. Secondary surgery is considered in case of complicated hematoma [2]. Hematomas have a tendency to become infected (Fig. 3), which may require percutaneous radiological drainage or a repeat surgery. In the presence of prosthetic material, the removal of the material is recommended [6].

**Infection**

Infections occur in less than 1% of cases of suburethral bands in surgery for stress urinary incontinence [7]. In gynecological cancer surgery, the celioscopic route presents fewer infections than the laparotomy route [8]. Post-hysteroscopy infections are uncommon (0.2%) [9]. In case of clinical suspicion of postoperative infection, ultrasound and CT are mainly used to screen for signs of pelvic abscess or collection (Fig. 4).

In the absence of diagnosis and treatment, postoperative infections may develop into pelvic peritonitis. Postoperative infections may be responsible for sequellae in the form of uterine synechiae, hydrosalpinx, tubal stenosis, with an increased risk of infertility or of secondary ectopic pregnancy.

**Uterine perforation**

The rate of perforation is approximately 1% [9]. Perforation can be caused by a lack of visibility, fragility of the uterine

![Figure 1](image1.png) Endovaginal ultrasound in sagittal plane shows intravaginal hematoma after surgery for prolapses (arrow).

![Figure 2](image2.png) Unenhanced CT scan shows hematoma after hysterectomy in woman presenting with pelvic pain: a: in the axial plane, CT shows an abdominal wall hematoma (arrow); b: CT in the sagittal plane confirms hematoma of Douglas pouch (arrow).
walls or a surgical procedure. The proximity of digestive and urinary structures can cause injuries of these organs and entrapments [10].

On ultrasound as on MRI, in case of perforation, one can continuously visualize a solution transfixing the myometrium with an adjacent intraperitoneal hematoma (Fig. 5). In case of ultrasound-based suspicion of entrapment, MRI is particularly helpful to confirm the fatty nature of the entrapped epiploic fringes (Fig. 6).

**Injury to nearby organs**

**Bladder**

Urological risks in the form of injuries of the urethra or bladder are more commonly encountered in cancer surgery, endometriosis, and treatment of urinary incontinence or of pelvic stability disorder. Bladder and urethral injuries are the most common complication of suburethral bands; the prevalence is evaluated at 5% and may reach up to 24% [7].

Urethrovaginal fistulas are rare. They may be secondary to suburethral bands that are too tight, leading to erosion. This causes pain as well as major urinary functional signs [11]. The clinical assessment orients toward this diagnosis and should be confirmed by cystoscopy. CT (Fig. 7a) and cystography (Fig. 7b) may help in making the diagnosis.

After hysterectomy, the risk of injury increases to 2.2% [12]. When the diagnosis is made intraoperatively, the bladder is sutured and a resting urinary catheter is set up for 8 to 10 days. A cystography verifies the absence of urinary fistula before removal of the catheter. In a postoperative context, testing for a urinoma requires the conduct of a urinary scan.

**Digestive**

Digestive injuries and perforations are rare during gynecological surgery (<1%) but serious. An intraoperative diagnosis is often made, but it is sometimes revealed later by a peritonitis or an obstruction. CT is often necessary to confirm perforation. Direct signs of organ injury are presence of a
Figure 5. Uterine perforation with collected hematoma of Douglas pouch. Sagittal view (a) of an endovaginal ultrasound shows a hyperechoic continuity solution in the uterine fundus corresponding to the perforation (black arrow) associated with a posterior collected hematoma (white arrow), without Doppler signal on the axial view (b). Sagittal view of a T1-weighted (c) and a gadolinium-chelate enhanced T1-weighted fat suppressed MR image (d) confirm the perforation with a hyperintense path transfixing the myometrium until the serosa without uptake of contrast material.

Figure 6. Uterine perforation with incarcerated sigmoidal omental fat (black arrow) after hysteroscopy for retained placenta. T1-weighted (a) and T1-weighted fat suppressed MR image in the axial plane (b) confirming fat nature of the sigmoidal omental that shows hypersignal then hyposignal after fat saturation.

Figure 7. CT scan of a post-operative uretro-vaginal fistula on delayed phase (a) and cystoscopy (b) showing extravasation of contrast material in the vagina (white arrow).
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Figure 8. Non-enhanced CT scan in a patient with rectal wound after bilateral adnexectomy. Sagittal view (a) and axial view (b): hydroaeric collection of Douglas pouch (white arrow) and aeric tone continuity solution (black arrow).

Figure 9. Lymphoceles. a: CT scan showing bilateral lymphoceles under external iliac veins (arrow); b: T2-weighted MR image in the axial plane shows hyperintense lymphocele under external iliac right vein (dotted arrow).

water-gas collection that indicates the presence of pneumoperitoneum (Fig. 8) [2].

Lymphocele

Gynecological cancer surgery often requires pelvic and/or lumbo-aortic lymph curettage. Postoperative lymphoceles are symptomatic in 8 to 10% of cases [13]. The diagnosis is initially based on ultrasound, but requires CT or the MRI (Fig. 9) because it is important to determine their relationships with subperitoneal vessels, to avoid confusing them with a collection of another nature, particularly intraperitoneal.

Management is based on percutaneous drainage, which is performed under ultrasound or CT guidance. In case of recurrence or failure, surgical drainage should be planned.

Postpartum deep thrombophlebitis

The right ovarian vein drains into the inferior vena cava, whereas the left one drains into the left renal vein. Postpartum thrombophlebites of the ovarian vein — particularly on the right due to this anatomical specificity — can be life-threatening through the occurrence of a pulmonary embolism or septic shock with a mortality of approximately 1% [14, 15].

In case of pelvic pain associated with fever post-partum, one should know how to detect thrombophlebitis and infectious pathology. An emergency CT examination using intravenous administration of iodinated contrast material is the key test for etiological diagnosis (Fig. 10). Treatment is based on antibiotics and anticoagulants.

Textiloma

Textiloma (also referred to gossypiboma or retained foreign object) has an incidence ranging between 1/1000 and 1/15,000 [16]. Protocols for counting compresses, which are currently radio-opaque, make it possible to minimize this complication. In patients with suspected textiloma, imaging is helpful for the diagnosis (Fig. 11).

Chronic complication

Scarring

Scars can be collected with hemorrhagic, infectious or inflammatory contents. In patient with chronic pelvic pain,
superficial scar lesions in the form of fibrosis, chronic serum or migration of an endometriosis lesion should be suspected (Fig. 12) [17].

Eventration

The incidence of eventration is less than 3% [3]. The major risk of eventration is acute intestinal obstruction by strangulation of the viscera in the hernial orifice, generating a risk of intestinal necrosis. CT is the modality of choice, providing the direct diagnosis of eventration and information regarding content, mechanism of obstruction and severity of the disease (Fig. 13). Eventration requires emergency surgery.

Peritoneal adhesions and pseudocysts

The frequency of adhesions can reach up to 90%. The relation between pelvic pain and adhesions remains uncertain. Some studies demonstrate the efficacy of adhesiolysis for analgesic purposes and others estimate that they are not totally involved in the pain process. Obstructions can appear secondary to adhesions and are responsible for abdominal pain syndrome [18]. The combination of ultrasound and MRI can help detect adhesions. On ultrasound, one can dynamically assess, upon insertion of the catheter, the responsibility or not of pain adjacent to an image of adhesion.

Peritoneal pseudocysts are structures with cystic appearance detected by chronic pelvic pain grinding the peritoneal
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Figure 13. Axial (a) and sagittal (b) view of a portal phase CT scan showing an eventration (filled arrow) with colic content (doted arrow).

Figure 14. T2-weighted MR images in sagittal (a) and axial planes (b) show hypersignal corresponding to a quadrangular anterior peritoneal pseudo-cyst milling neighboring organs.

organs while being depressible, unlike other cysts. They are often associated with intraperitoneal effusion and dystrophic ovaries in a context of a history of infection or surgery (Fig. 14).

Pudendal neuralgia

The pudendal nerve is the central somatic nerve component of the perineum. Pudendal neuralgia mainly affects women over 60 years of age with history of pelvic or orthopedic surgery. Seated posture is a contributing factor (cycling, occupational). Pudendal neuralgia manifested as chronic pain meeting the diagnostic criteria of Nantes (i.e., pain in the pudendal nerve area, worsening in seated position, without nocturnal waking or objective sensory deficit and having a positive diagnostic block to infiltration of corticosteroids and xylocaine in the nerve). These infiltrations are performed under CT guidance.

A pelvic MRI is necessary to rule out a compressive lesion such as hematoma, infection or tumor, particularly along the course of the nerve (Fig. 15) [19,20]. The management of pudendal neuralgia is complex and requires an expert consensus opinion.

Figure 15. T2-weighted MR image shows tissue mass (white arrow) on left pudendal nerve path responsible for organic neuralgia.

Recurrence of initial disease

Pelvic pain may indicate recurrence of the initial disease. MRI plays a dominant role in the early detection of recurrence thanks to high degrees of sensitivity (Fig. 16) [21]. For benign diseases, endometriosis in particular, the rate
Figure 16. Tumor recurrence under the right external iliac vein in a woman treated for cervical cancer. T2-weighted MRI: T2-hyposignal tissular lesion (a) uptakes toward the necrotic center under the external iliac right vein (filled arrow) on the FAT SAT enhanced with gadolinium MRI scan (b) associated with an external iliac vein thrombosis (dotted arrow) (c).

Figure 17. 3D reconstruction of endovaginal ultrasound shows recurrent endometriosis of sigmoid colon (central dot).

do of recurrence may reach up to 20% at two years [22]. It is suspected in case of recurrence of pain, then confirmed by physical examination and imaging, particularly ultrasound (Fig. 17) and MRI [23].

Prosthetic surgery

Painful complications of prosthetic surgery for pelvic stability are mainly represented by erosions, organ perforations, exposures, infections, and retractions of prostheses. These complications are observed in up to 1.5% of patients [24]. Perineal ultrasound allows good visualization of suburethral bands and pelvic-peritoneal prostheses [25]. Perineal ultrasound should be performed as first line modality to screen for a complication of prosthesis. MRI can be useful as an additional tool, in particular to better determine the extent of a prosthetic infection or to reveal organ compression secondary to retraction of prosthesis (Fig. 18) [26].
Conclusion

Postoperative pelvic pain in gynaecological surgery is often a sign of a complication, although unspecific.

The physical examination rules out a surgical emergency, sometimes complemented by ultrasound and CT scan to screen for an acute complication in the form of vascular, urinary or digestive injury or obstruction.

In the longer term, in case of pain, one must know how to test for recurrence of a tumoral pathology or endometriosis, scar tissue fibrosis, adhesions, or specific complications of certain surgeries such as prosthetic surgery.

However, imaging does not currently make it possible to make a diagnosis for all types of postoperative pain. One should therefore not hesitate to ask for assistance from multidisciplinary teams and pain centers to best managed patients, particularly in case of neuralgia.

Clinical case

Description

A 65-year-old woman who was treated by promontofixation presented with chronic pelvic pain, dyspareunia and fever a few months after surgery.

Questions

1. What imaging do you propose?  
The following tests are performed: endovaginal ultrasound (Fig. 19), T1- and T2-weighted MRI in sagittal plane (Fig. 20).
2. What does prosthetic material look like on imaging?
3. What is your diagnosis?
4. What is the conduct to be followed?

Take-home messages

- Acute pelvic pain:
  - rule out a surgical emergency: a vascular, urological or digestive injury, an obstruction;
  - role of CT scan with IV of contrast material;
  - ultrasound and CT are also useful to screen for signs of infection (abscess, effusion), hematoma, deep thrombophlebitis, etc.

- Chronic pelvic pain:
  - pelvic ultrasound to be performed in first line, often supplemented by an MRI;
  - recurrence of pain (oncology, endometriosis);
  - scarring pathology (fibrosis, pseudocysts, adhesions, etc.);
  - screen for a pathology specific to prosthetic surgery (perforation, retraction, etc.);
  - know how to consider pudendal neuralgia (using the Nantes criteria).

Figure 18. Axial view of a perineal ultrasound shows hyperechoic nodule (arrow) corresponding to a painful prosthetic shrinking on the path of the probe (a). T2-weighted MR image in sagittal plane; in rest (b), hypointense prosthesis (dotted arrow) involving feces stasis above the shrinking after thrust (c).

Figure 19. Sagittal view of an endovaginal ultrasonography of uterine fundus.
Answers

1. In the first place, a pelvic ultrasound by subpubic then endovaginal route to study the prostheses and to screen for a pelvic collection. Secondly, an injected pelvic MRI to screen for a peri-prosthetic collection and to screen for bone or disc anomalies that might suggest spondylodiscitis.


3. Prosthetic infection post-promontofixation with peritoneal-vaginal fistula formation. On the ultrasound, we visualise hyperechogenic prosthetic material above the vaginal fundus (dotted arrow). On MRI, a collection (solid arrow) is seen adjacent to the prosthetic material, forming a fistula into the vagina. The rest of the prosthesis is still hypointense on T2-weighted image and that there is no abnormality of the signal of adjacent intervertebral discs. There is no sign suggesting spondylodiscitis.


Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References


Figure 20. T2-weighted MR image in sagittal plane (a) and gadolinium chelate enhanced T1-weighted fat suppressed MR image (b).
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