LETTER / Cardiovascular imaging

Acute complications of benign uterine leiomyomas: Treatment of intraperitoneal haemorrhage by embolisation of the uterine arteries

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Uterine leiomyoma is the most common benign tumour in women, with an estimated prevalence of between 20 and 77% depending on the series [1]. Leiomyomas are usually asymptomatic (50–80%) [2], but they can become symptomatic (causing uterine bleeding, abdominal pain, dysuria, reproductive disorders) [3], and in rare cases can be complicated by acute peritoneal haemorrhage [4].

We report the cases of two patients with uterine leiomyomas complicated by intraperitoneal haemorrhagic shock who underwent embolisation of the uterine artery to ensure haemodynamic stabilisation before scheduled surgery.

Observations

Our two patients, of 47 and 44 years of age, both nulliparous and nulligravid, with no particular history apart from the older woman having hypertension controlled by monotherapy, came to the emergency department in a state of haemorrhagic shock with abdominal pain.

The first reported sudden abdominal pain combined with a state of shock occurring on the second day of her menstrual period with normal flow. The second also presented for severe abdominal pain which occurred in the toilet during the effort of defaecation. It was followed by pallor and episodes of malaise.

In both cases, the initial examination showed anaemia without external bleeding, hypotension, and a negative blood βHCG value.

Given these symptoms, the patients were rapidly sent for an abdominopelvic CT examination. In both cases, the CT-scan showed a very abundant haemoperitoneum and...
the presence of a voluminous uterus with a multilieomyomatous appearance, the most voluminous leiomyoma being in the fundal position and measuring 10 × 9 × 7 cm for the first patient (Fig. 1), and 14 × 14 × 8.5 cm for the second (Fig. 2). Both were vascularised, enhancing after injection. No arterial blush was found, suggesting active intraperitoneal extravasation, nor adnexal mass bleeding.

Given these symptoms, the diagnoses of ectopic pregnancies or adnexal complications were excluded and it was decided that the uterine leiomyomas were responsible for these states of haemorrhagic shock.

After multidisciplinary discussion, a combined strategy was decided, starting with haemostasis by embolisation of the uterine arteries to obtain haemodynamic stabilisation, followed subsequently by a scheduled hysterectomy given the number of leiomyomas, the absence of any wish to become pregnant, the severity of the clinical picture and uncertainty concerning possible recurrence.

Selective catheterisation of the uterine arteries was undertaken via a bilateral approach in the femoral axes using 4-French introducers followed by embolisation, with Bead Block® calibrated polyvinyl alcohol (PVA) microspheres (Bead Block; Biocompatibles, Farnham, UK) 2 mL 500/700 μm, 4 mL 700/900 μm, and 2 mL 900/1200 μm for the first patient (Fig. 3), and by Embosphere® calibrated tris-acryl microspheres (Embosphere; Biosphere Medical, Rockland, MA) 6 mL 700/900 μm in each uterine artery for the second patient (Fig. 4). Combining this with intensive care measures, including in particular transfusion of packed red blood cells and frozen fresh plasma, restored haemodynamic stability.

Laparoscopic exploration was carried out during the following days for peritoneal examination and evacuation of the haemoperitoneum. Because of the volume of the uteri and to avoid any morcellation, the procedure was converted to laparotomy in each case.

The definitive histological examination confirmed the diagnosis of benign fundal pedunculated subserosal leiomyoma in the first patient and benign anterior intramural leiomyoma in the second, with no histological evidence of malignancy and both having signs on the embolisation material of the beginnings of ischaemia (Fig. 5).

Discussion

The three symptoms of abdominal pain, hypotension and haemoperitoneum in young women of childbearing age should first suggest an ectopic extra-uterine pregnancy, rupture of a corpus luteum, adnexal torsion or torsion of a fibroma, and secondly rupture of an ovarian tumour or intracystic haemorrhage [5]. A negative βHCG result and ultrasound and CT imaging will eliminate these diagnoses. If a uterine mass is found (sometimes the patient is already aware of the existence of this), the possible diagnosis of rupture of a leiomyoma will need to be discussed.

Intraperitoneal haemorrhage induced by subserosal leiomyomas is a rare complication which is life-threatening in the short term unless appropriate treatment is initiated. Less than a hundred cases have been reported in the literature. Rokitansky was the first to describe this complication in 1861. Less than 30 cases have been reported between 1950 and the present day, with nearly fifty before the 1950s. Study of the nearly thirty most recent cases shows that this acute complication affects women throughout the potentially childbearing years, (extremes 22–50 years old, mean: 37.5).

There is no significant difference depending on parity, once correlated with age. Among the women, 45.5% (n = 10) were nulliparous and nulligravid, 9.1% (n = 2) primiparous, and 36.4% multiparous (including 18.2% G2P2 with n = 4 and 18.2% G3P3 n = 4).

Seventy-four percent (n = 17) of the leiomyomas involved were subserosal, 65% (n = 11) of which were pedunculated and 35% (n = 6) not pedunculated. The others were intramural (26% n = 6). Subserosal leiomyomas only represent 5

Figure 1. Forty-seven-year-old G0P0 patient in haemorrhagic shock. Axial (a) and sagittal (b) acquisition. Very abundant haemoperitoneum (asterisk) visible in the different quadrants of the abdomen. Fundal uterine mass, of 10 cm in the largest diameter, showing contrast uptake (arrowhead). No arterial bleeding seen.
to 10% of all uterine leiomyomas; this difference is easily explained by their external character.

The majority of leiomyomas were in a fundal or posterior position (80% \( n = 16 \), and 10% \( n = 2 \), respectively). Only 5% were in a lateral position and 5% on the anterior surface. The irritation caused by the sacral promontory on the surface of the leiomyoma could explain this difference [6].

The leiomyomas in question had a mean measurement of 12.6 cm (6–24 cm).

The causes given to explain this complication are venous congestion during menstruation, associated with uterine contractions that can distend the blood vessels (36%, \( n = 9 \)), venous congestion during pregnancy (8%, \( n = 2 \)), straining during defaecation (16%, \( n = 4 \)), any situations leading to increased abdominal pressure (sports, strenuous exercise, massage) (8%, \( n = 2 \)), abdominal trauma (8%, \( n = 2 \)) and violent coitus (Boxed text 1). Sometimes no cause was given, the rupture seeming to be spontaneous (24%, \( n = 6 \)): the rapid growth of far larger leiomyomas has been discussed. In these cases, the mean measurement of the leiomyomas was 16 cm as against 11 cm for those where a cause was found. This growth might increase pressure and result in rupture of peripheral vessels. All these factors could lead to the rupture of superficial vessels, particularly the veins surrounding these leiomyomas. In 83.3% of cases (\( n = 20 \),

**Boxed text 1 Causes of bleeding reported [15–18].**

- Venous congestion:
  - During menstruation.
  - During pregnancy.
- Increased abdominal pressure:
  - Straining on defaecation.
  - Sporting activities
  - Abdominal massage.
- Trauma (direct and violent coitus).
- Rapid growth

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**Figure 2.** Forty-four-year-old G0P0 patient in haemorrhagic shock. A and B. Axial acquisition and sagittal reconstruction showing the presence of a voluminous haemoperitoneum (asterisk). C and D. Voluminous uterine mass, compatible with a 14 cm leiomyoma, showing heterogeneous enhancement (arrowhead). No signs of blood extravasation seen.
Figure 3. Same patient as Fig. 1: arteriogram using a 4-French bilateral femoral approach: a: global aortogram immediately showing a voluminous sinuous left uterine artery (arrowhead); b: selective injection of the left hypogastric artery via a right femoral Seldinger approach, OPR incidence 27°. Normal arrangement of the hypogastric artery. The left uterine artery is perfectly individualised providing hypervascularisation of the fibromatous uterus (arrowhead); c: control aortogram after exclusion of the uterine arteries using microspheres.

Figure 4. Same patient as Fig. 2: bilateral approach using femoral Seldinger: a and b: bilateral catheterisation by crossover of the horizontal part of the uterine arteries and simultaneous injection showing the hypervascularisation of a leiomyomatous uterus; c and d: final control aortogram after exclusion with calibrated microspheres.
bleeding was considered to be of venous origin and in only 12.5% \((n=3)\) was it of arterial origin, with 4.2% \((n=1)\) of mixed origin. The origin of mixed bleeding was traumatic with the pedicle of the subserosal leiomyoma being torn out. This preferentially venous origin may explain why active intraperitoneal extravasation of blood was not observed in the CT and angiographic examinations, as we saw in our two cases. Emergency therapeutic management must consider any desire to become pregnant. Myomectomy is of course the ideal solution for retaining fertility. Hysterectomy is indisputable in the case of multiple leiomyomas and as long as there is no desire to become pregnant. Various propositions have therefore been formulated for treatment: hysterectomy [7,8]; myomectomy [9–12]; vascular surgical suturing [13,14]. To date all the patients who survived this complication received surgical treatment by emergency laparotomy. We feel that there is a place for a combined strategy starting with endovascular haemostasis to ensure haemodynamic stabilisation and allow scheduled surgery in the best conditions.

In the two cases that we report, permanent embolisation was performed using non-resorbable particles. The absence of any desire for pregnancy and the existence of numerous leiomyomas led to secondary hysterectomy at a slightly later time, at first with a laparoscopic approach.

The absence of a specific arterial pedicle to the leiomyomas meant that, to be effective, non-elective bilateral arterial embolisation had to be performed. The same is true for scheduled uterine embolisation for leiomyomas. In both cases that we report, the source of bleeding was without doubt venous but it was possible to quickly stabilise the haemodynamics by bilateral embolisation.

**Conclusion**

Haemorrhagic rupture of leiomyomas in the peritoneal cavity is a rare complication which concerns women of childbearing age typically with a fundal or posterior subserosal leiomyoma. Its seriousness requires appropriate emergency management.

Conditions resulting in pelvic congestion (menstruation, pregnancy) and increased abdominal pressure (defaecation, effort, trauma) encourage this bleeding, which is essentially venous.

Treatment aims to stop the haemorrhage and ideally preserve the uterus in young women. When it has been possible to make the diagnosis preoperatively, we also suggest emergency uterine artery embolisation so that surgery — myomectomy, if this is possible when the patient wishes to become pregnant, or hysterectomy — can be scheduled later.

**Disclosure of interest**

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

**References**


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