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Case Report

Imaging findings of a torsed pedunculated uterine leiomyoma: A case report

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ABSTRACT

Torsion of a pedunculated uterine leiomyoma is an incredibly rare occurrence, considered a surgical emergency due to the risk of ischemic gangrene and resulting reactive peritonitis. Imaging modalities have traditionally played a limited role in evaluation of leiomyoma torsion due to modest sensitivity and specificity. We present the case of a 58-year old female with a known pedunculated fibroid who presented with acute abdominal pain. Computed tomography and ultrasound findings suggested a preoperative diagnosis of leiomyoma torsion, confirmed intraoperatively. While direct visualization at surgery remain the primary means of diagnosis of pedunculated fibroid torsion, familiarity of potential imaging findings in conjunction with the clinical presentation may enable the interpreting radiologist to consider this entity in the differential prospectively.

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Introduction

Uterine leiomyomas, more commonly known as uterine fibroids, are the result of uterine smooth muscle overgrowth. They may be further categorized according to their location: intramural, subserosal, submucosal, and even within the broad ligament of the ovary and are among the most common pathologies of the female urogenital tract, with incidence as high as 60% in women of reproductive age [1,9]. Uncomplicated uterine fibroids are most often asymptomatic, however, when symptomatic may result in pain, menorrhagia, dysmenorrhea, and even infertility. Conversely, torsion of pedunculated leiomyoma, is considered an acute surgical

emergency due to the high risk of ischemic gangrene and ensuing reactive peritonitis. Leiomyoma torsion is an incredibly rare entity, with a reported incidence of less than 0.25% in one review of patients requiring surgery for a complicated uterine fibroid [9]. Imaging findings are of only modest sensitivity and specificity, with inconsistent findings that overlap with the more commonly encountered leiomyoma degeneration. This often leads to this uncommon diagnosis not being included within the differential, leaving leiomyoma torsion to most often be diagnosed via direct visualization intraoperatively. In our case, we aim to provide specific multimodality imaging findings that enabled the development of an accurate preoperative diagnosis of one case of pedunculated leiomyoma torsion.

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Case presentation

A nulliparous, postmenopausal 58-year-old female with past medical history of hypertension presented to our emergency department with a chief complaint of excruciating lower abdominal pain acutely worsening over the past day with associated nausea, emesis, and diarrhea. She had a remote CT from 2011 which revealed an exophytic fibroid extending from the right uterus measuring up to 7 cm (Fig. 1). She had been seen the day prior at a separate facility, where a computed tomography (CT) of the abdomen/pelvis demonstrated enlargement of the known pedunculated fibroid since 2011, now measuring up to 9 cm (Fig. 2). The current CT also revealed vascular congestion of the uterus and adjacent vessels, including the vascular pedicle of the fibroid, with patchy internal enhancement of the leiomyoma. She denied history of sexually transmitted infection, pelvic inflammatory disease or prior abdominal surgery. Genitourinary exam was normal, and on physical exam, she appeared distended with right lower quadrant tenderness. Findings were felt to reflect fibroid degeneration and the patient was discharged.

When the patient presented at our emergency department the following day, a repeat CT again demonstrated the large exophytic fibroid extending from the right uterine fundus via a stalk with interval increase in the surrounding stranding and inflammation (Fig. 3). There was now no evidence of internal enhancement of the fibroid, raising concern for leiomyoma torsion. This was then followed by a transvaginal ultrasound which revealed a heterogeneous right adnexal mass measuring $7.9 \times 8.9 \times 9.3$ cm, corresponding to the mass found on CT, with free fluid in the cul-de-sac. Power Doppler was employed to further inspect the exophytic fibroid and the vascular pedicle connecting it to the superior right margin of the uterine fundus (Fig. 4). Blood flow was visualized within the proximal stalk but not beyond into the mass, raising suspicion of pedunculated leiomyoma torsion. Comparison of the normal flow within a pedunculated fibroid in another patient is shown in Fig. 5. Both ovaries were visualized and appeared normal in size and morphology. At this time, the patient was scheduled for a laparoscopic myomectomy, which confirmed the diagnosis of pedunculated fibroid torsion with visualization of the twisted vascular pedicle. Gross pathology and histology confirmed the smooth muscle origin of the mass and again demonstrated the vascular pedicle (Fig. 6).

Discussion

Although torsion of a uterine leiomyoma is considered a surgical emergency, given the overlap in clinical presentation and low incidence, other potential causes of an acute abdomen, such as appendicitis, pelvic inflammatory disease, and ovarian torsion should be excluded prior to considering leiomyoma torsion. Even in the absence of these other causes, pain is usually attributed to a degenerating leiomyoma rather than leiomyomatous torsion [4,5]. It is important to note that although uterine leiomyomas are indeed



Fig. 1 – (a) Axial contrast enhanced CT image through the pelvis from 2011 reveals the minimally heterogeneous pedunculated fibroid (arrows) extending from the right lateral uterus. (b) Sagittal contrast enhanced CT image through the pelvis in 2011, with partially imaged minimally homogeneous exophytic uterine fibroid (arrow).

exceedingly common, pedunculation (a prerequisite for torsion) is uncommon, and rarer still is torsion of a pedunculated leiomyoma, in fact so rare that the true incidence rate is currently unknown [4,8]. A recent 2018 retrospective analysis revealed that of 2022 patients undergoing surgery for complications arising from a diagnosed subserosal leiomyoma, only 5 cases of fibroid torsion were intraoperatively



Fig. 2 – (a) Axial contrast enhanced CT through the pelvis from the day prior to presentation at our facility. There has been interval growth in the pedunculated fibroid (star). There continues to be some patchy enhancement throughout the fibroid (arrowhead). Note the vascular congestion within the pedicle (arrow). **(b)** Contrast enhanced sagittal CT image performed the day prior to arrival at our facility reveals the large pedunculated fibroid (star) and adjacent vascular engorgement within the pedicle (arrow). There remains some patchy internal enhancement within the fibroid.



Fig. 3 – (a) Contrast-enhanced axial CT of the pelvis from the day of admission, with vascular congestion adjacent the right uterus within the proximal fibroid stalk (arrow). The inferior-most aspect of the nonenhancing fibroid is identified with surrounding inflammatory change (arrowheads). **(b)** Contrast-enhanced coronal CT image of the pelvis from the day of admission with demonstration of the engorged proximal stalk of the leiomyoma (arrow). **(c)** Contrast enhanced sagittal CT image of the pelvis from the day of admission with engorged proximal stalk of the leiomyoma (arrow). Additionally, note the nonenhancing fibroid suggesting complete torsion when compared to Fig. 2b from the day prior.

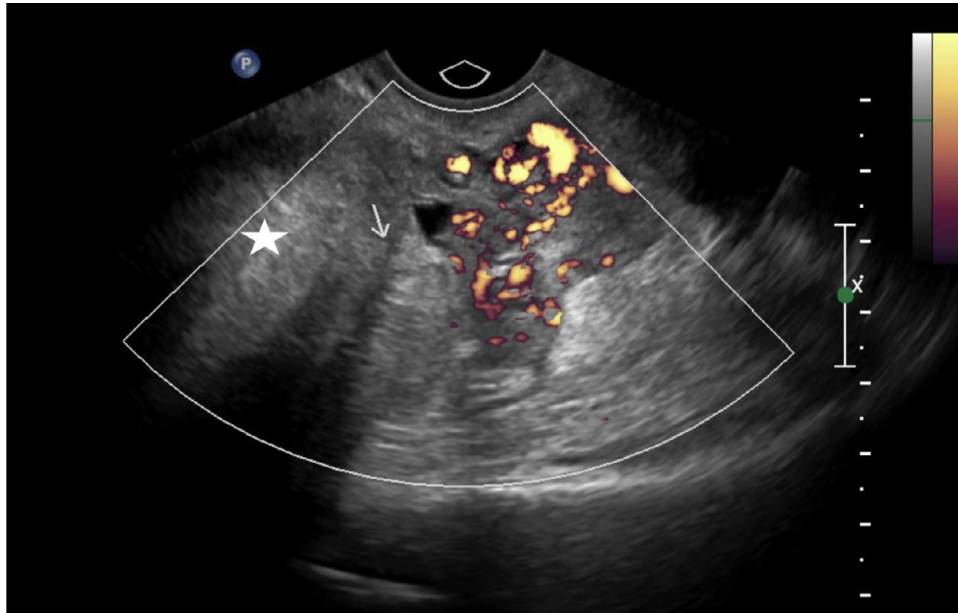


Fig. 4 – Power Doppler image of the stalk region of the pedunculated leiomyoma (arrow) demonstrates lack of blood flow, concerning for torsion. The large leiomyoma extends outside of the field of view (star).

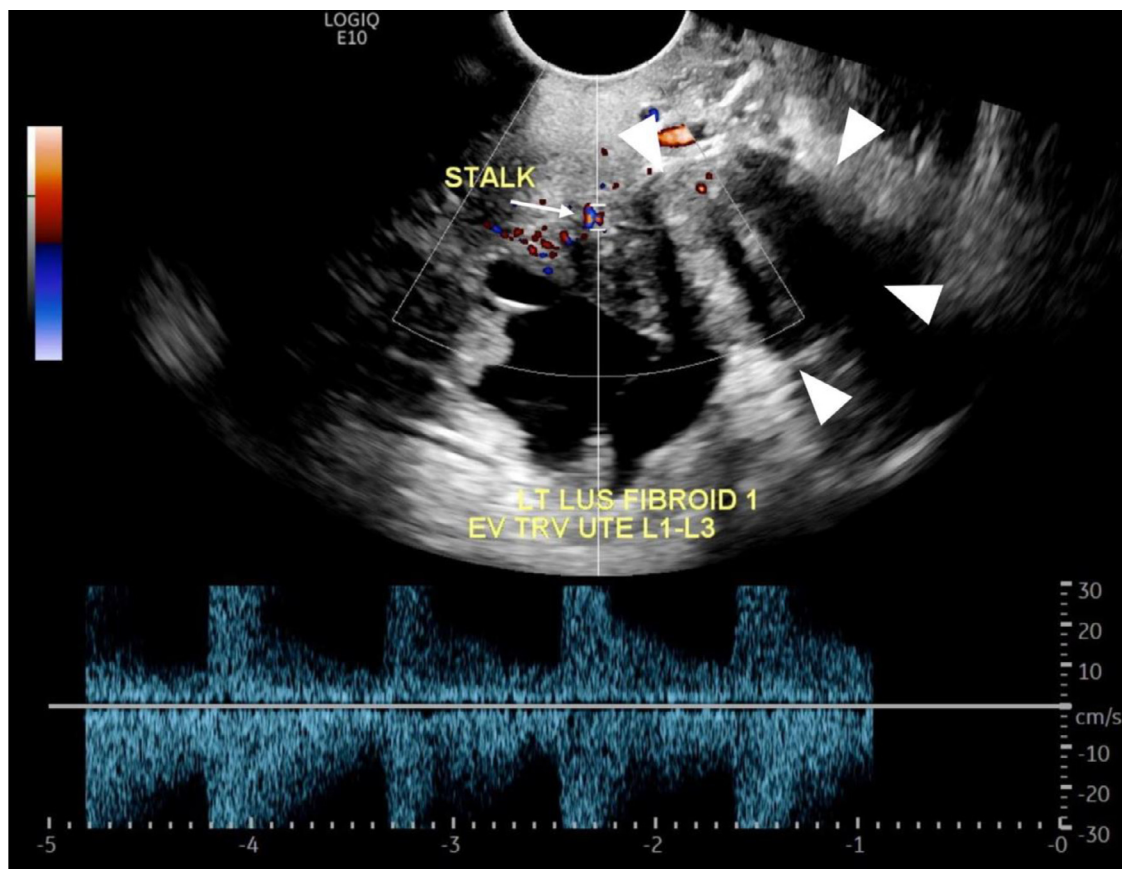


Fig. 5 – Single pelvic ultrasound in different patient for comparison with a pedunculated fibroid clearly shows Doppler flow within the stalk (arrow) and within the fibroid (arrowheads), with spectral waveform.

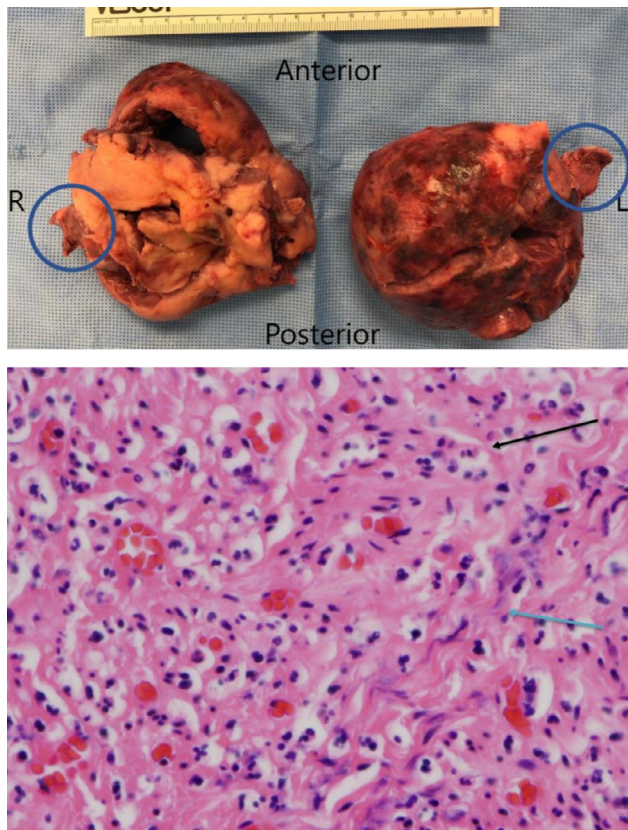


Fig. 6 – (a) Gross pathology specimen of the resected fibroid with internal regions of degeneration and the vascular pedicle (blue circles). (b) Hematoxylin and eosin stain of the specimen with numerous lymphocytic inflammatory cells (black arrow) as well as interspersed smooth muscle cells consistent with leiomyoma (blue arrow). (Color version of figure is available online.)

confirmed, an incidence of less than 0.25% in this surgical population [9].

Torsion of a pedunculated fibroid resulting in an acute abdomen requires immediate surgical intervention, as prolonged torsion can result in ischemic gangrene and resulting peritonitis [6]. Additionally, there has been a report of associated small bowel volvulus [2]. Management of leiomyoma torsion is with laparoscopic myomectomy, even in the case of first trimester obstetric patients, where the complications associated with untreated fibroid torsion outweigh the risk of obstetric operation [3,10].

In previous reports CT, ultrasound (US), and magnetic resonance imaging have all been used to elucidate the presence of a pedunculated leiomyoma, but the efficacy in establishing a preoperative diagnosis of fibroid torsion has not been established. Roy et al reported that torsion of a uterine leiomyoma could be visualized both by CT and US imaging modalities but noted that US was less sensitive as a screening tool, likely related in part to technical factors and the scanning technologist's experience [7]. Similarly, Tsai et al found that although US provided adequate visualization of a pedunculated leiomy-

oma, torsion of the fibroid was difficult to appreciate prospectively with imaging [8]. Finally, Kim et al reported nonspecific magnetic resonance imaging findings, with similar subsequent US studies, noting that although color Doppler may raise suspicion for torsion of a uterine fibroid, similar findings in a subserosal fibroid are still too inconsistent to create definitive diagnostic US criteria, especially when a torsed pedicle is thin [4]. The general consensus in the current literature appears to be that preoperative imaging findings remain inconsistent with only modest sensitivity and specificity, and that direct visualization during laparoscopic surgery is the preferred method of determining accurate diagnosis of a torsed leiomyoma.

Our case demonstrates multimodality imaging examples of this rare entity. Specifically, CT of the pelvis with intravenous contrast may reveal interval changes in size, abnormal or even absent perfusion of the fibroid and congestion of the vascular pedicle at the site of torsion. The use of color and power Doppler on US to interrogate presence or absence of blood flow through the pedicle and within the fibroid, as seen in this case, may be an additional technique with which to evaluate for the presence of pedunculated leiomyoma torsion. These imaging findings in conjunction with clinical presentation may raise the preoperative suspicion of torsion. We would also add that the comparison to previous and outside studies helped improve interpretation of the imaging findings in this case. The change in size and evolution of perfusion changes in the fibroid raised confidence in the preoperative diagnosis. While direct visualization and surgery remain the primary means of diagnosis of torsed pedunculated fibroid, awareness of these imaging findings in conjunction with the clinical presentation may help radiologists to consider this entity in the differential prospectively.

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