

Primary Leiomyoma of the Fallopian Tube: Preoperative Ultrasound Findings

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Leiomyoma of the fallopian tube is extremely rare. Most cases are asymptomatic and found incidentally at autopsy or unrelated operation. These leiomyomas tend to be singular, small, and unilateral, with a resultant rare preoperative diagnosis. They are often managed with laparotomy, as seen in the literature review. Therefore, preoperative imaging is never reported. We describe a case of leiomyoma of the fallopian tube, which was suspected before operation and treated by laparoscopic approach. Transvaginal ultrasound clearly showed a hypoechoic solid mass separate from the left ovary and uterus in a 44-year-old woman. Color Doppler ultrasound detected low impedance flow in this mass. Diagnostic laparoscopy and the follow-up laparoscopic salpingoectomy revealed a primary leiomyoma of the fallopian tube. We conclude that powerful ultrasound could be helpful in diagnosing rare gynecologic disorders but laparoscopy can be used for definite diagnosis and management of such disorders. [*J Chin Med Assoc* 2007;70(2):80–83]

Key Words: color Doppler ultrasound, fallopian tube, leiomyoma, transvaginal ultrasound

Introduction

Leiomyoma is extremely rarely found in the fallopian tube in contrast to the uterus.¹ Embryologically, the uterus and the tube are identically derived from the Müllerian ducts, but leiomyoma is much more frequently found in the uterus than the fallopian tube. Under the influence of sex steroids such as estrogen or progesterone, the uterine myometrium demonstrates marked morphologic and functional changes during the menstrual cycle. The tubal musculature, in contrast, fails to exhibit significant growth changes, even during pregnancy or menstruation. These phenomena might explain the difference in the incidence between the 2 organs.

Leiomyoma of the fallopian tube was found to be singular, small, and unilateral,² although 1 case was reported to have a weight of 13.1 kg.³ Most cases are located on the left side.² These tumors are asymptomatic, although tubal leiomyoma may progress, with excessive growth, torsion, degenerative change, or even

ectopic pregnancy or obstructive etiology, to induce clinical symptoms.^{1,2,4} Prior to the introduction of transvaginal ultrasound, these tumors were uniformly recognized incidentally, only at the time of pelvic surgery or autopsy. Therefore, preoperative imaging was never reported. We describe a case of leiomyoma of the fallopian tube, which was suspected before operation and treated by laparoscopic approach.

Case Report

A 44-year-old woman, gravida 3, para 2, had continuous lower abdominal pain, lasting for 2 days, upon admission. Her previous history was unremarkable except for an appendectomy. On pelvic examination, tumors were detected in the left adnexal area without rebound pain or tenderness. Transvaginal ultrasound showed a 31 × 17 × 16-mm hypoechoic mass, which could be clearly distinguished from the left ovary and the uterus (Figure 1). The ultrasonic differential diagnosis included

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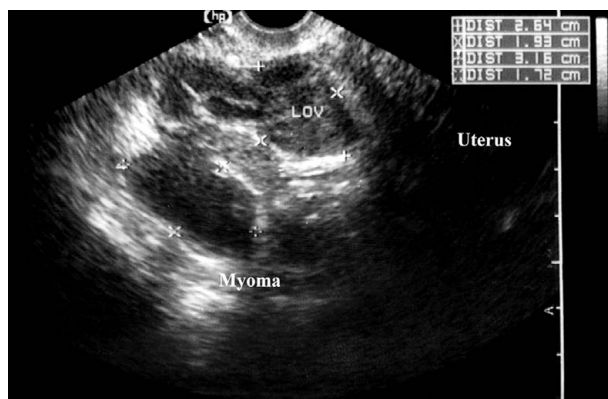


Figure 1. The hypoechoic mass ($31 \times 17 \times 16$ mm) located on the left adnexal area is clearly separated from the ipsilateral ovary and uterus, suggestive of a tubal origin (B-mode transvaginal ultrasound).

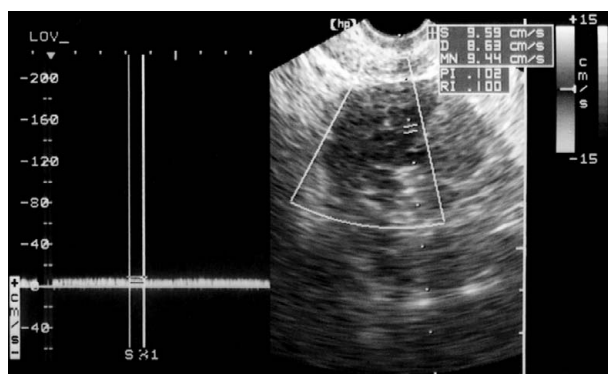


Figure 2. Doppler waveform analysis of the tumor demonstrates low impedance to blood flow (pulsatility index = 0.102; resistance index = 0.100).

subserous uterine leiomyoma, broad ligament leiomyoma, tubal lesion, adnexa torsion, or other. Doppler waveform analysis of the tumor demonstrated low impedance to blood flow (pulsatility index, PI = 0.102; resistance index, RI = 0.100) (Figure 2). The pregnancy test was negative. Serum CA-125 was 12.7 U/mL. Other laboratory examinations were all within normal limits.

Due to the uncertain condition, diagnostic laparoscopy was performed, with the finding of a sausage-shaped complex mass involving the left tube. Grossly, this mass was 3 cm, ovoid, smooth, and with firm characteristics. The right-side tube, both ovaries, and the uterus were grossly normal. Laparoscopic salpingectomy was performed. The cut surface of the mass was pink with an elastic consistency, similar to leiomyoma. Microscopic examination showed bundles of smooth muscle fibers and a tubal epithelial layer with a diagnosis of primary tubal leiomyoma (Figure 3). The postoperative course was smooth.

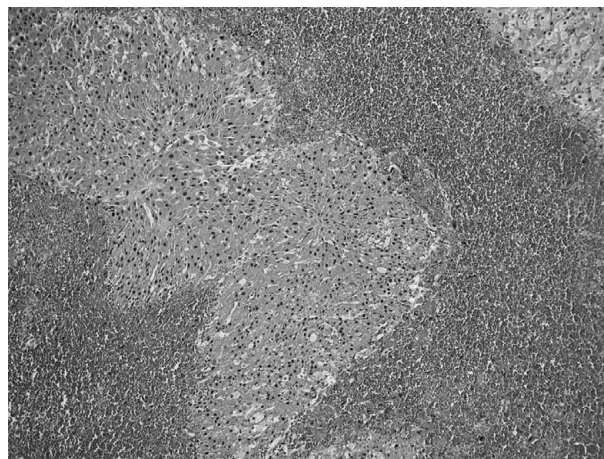


Figure 3. Cross-section of the fallopian tube with a 3-cm benign vascular leiomyoma (cellular structure in tubal leiomyoma consisting of interleaved bundles of smooth muscle fibers).

Discussion

Despite excellent imaging of the pelvis with ultrasound, computed tomography or magnetic resonance imaging, radiologists sometimes have difficulty making an accurate diagnosis when evaluating an adnexal mass, especially fallopian tube diseases, partly because primary neoplasm of the fallopian tube is uncommon. Transvaginal ultrasound can help to diagnose a tubal mass but cannot make differential diagnosis between malignancy and benignity.⁵ The depiction of fallopian tube carcinoma by transvaginal ultrasound is only described as an adnexal mass with mixed echogenicity; the ovary on the same side is normal and is adjacent to the mass.^{6,7} The process of neovascularization, which is a prerequisite for tumor growth, has been studied previously in many gynecologic pelvic tumors.⁶ It is evident from these studies that the newly-formed vessels in the tumor exhibit high-velocity blood flow with low resistance index (<0.40) (Table 1).^{5,8-13} These blood flow changes are detected by use of the color Doppler technique or even 3-D power imaging. Additional 3-D power Doppler examination depicted vascular geometry typical for malignant tumor vessels such as arteriovenous shunts, tumor lakes, blind ends, and dichotomous branching in each of the cases with fallopian tube carcinoma.⁷

Benign tumors are reported less frequently than malignant neoplasm of the fallopian tube. Benign neoplasms include various histologic types, such as leiomyoma, teratoma, fibromas, adenomatoid tumor, mucosal polyp, lipoma, hemangioma, mesothelioma, and papillomas.⁷ In addition, benign adnexal masses suggestive of an origin from the fallopian tube are tubo-ovarian

Table 1. Literature review of tubal lesions detected by transvaginal ultrasound and color Doppler ultrasound

Reference (number of patients)	Morphology	Flow	Histopathology
Shalan et al (1) ⁵	30 × 25-mm sausage-shaped complex mass with papillary projection	RI: 0.35	Adenocarcinoma
Kurjak et al (8) ¹²	Complex and/or sausage-shaped cystic masses of different sizes	RI: 0.29–0.40	Adenocarcinoma
Podobnik et al (1) ¹³	60 × 40-mm sausage-shaped complex mass with papillary projection	RI: 0.34	Clear cell carcinoma
Szabo et al (49) ¹⁰	A tubal gestation	Marked blood flow changes	Ectopic pregnancy
Zalel et al (25) ⁸	Adnexal masses suggestive of tubal masses of various sizes (mean: 59 × 34 mm)	RI: 0.752 ± 0.04 (hydrosalpinx) RI: 0.448 ± 0.04 (TOA) No blood flow (torsion)	Hydrosalpinx: 18 TOA: 6 Torsion: 1
Baumgartel et al (2) ⁹	Isolated tubal torsion	High impedance or absent flow	Isolated tubal torsion
Schiebler et al (1) ¹¹	Bilateral cystic lesion suspended from fimbriated ends of the fallopian tube	No	Hydatid cysts of Morgagni
Yang et al (1)*	31 × 17 × 16-mm hypoechoic mass separated from the left ovary and uterus	RI: 0.100 PI: 0.102	Primary leiomyoma

*This report. PI = pulsatility index; RI = resistance index; TOA = tubo-ovarian abscess.

abscess (TOA), hydrosalpinx, tubal torsion, ectopic pregnancy, and hydatid cysts of Morgagni. In our study, color Doppler flow of the hydrosalpinx was 0.752 ± 0.04 of RI, and an abundant flow with reduced resistance to flow ($RI = 0.448 \pm 0.04$) was seen in the TOA.⁸ As for adnexal torsion, no blood flow was detected.^{8,9} There is a significantly greater increase of blood flow on the side with tubal ectopic gestation and in the adjacent supplying vessels than in the main uterine arteries.¹¹ For the diagnosis of hydatid cysts of Morgagni, a circular hypoechoic lesion with no markedly increasing blood flow was noted.¹¹

Leiomyoma substantially affects blood flow velocity in the uterine arteries, such that low PI and RI values are common in uterine leiomyoma. However, color Doppler ultrasound is still not adequate to distinguish benign from malignant lesions. Subsequently, the lesion is presented as a hypoechoic solid concentric mass with poor sound through transmission because of the muscular component predominating in most cases. In spite of there being several previous reports of tubal leiomyoma, neither clear nor visualized sonographic appearance could be found in the literature. Almost all cases were managed by laparotomy for fear of the potential for malignancy.

In our case, a hypoechoic mass in the left adnexal area without papillary growth or cystic change was noted by transvaginal ultrasound. The lesion was separated from the uterus as well as the ovary on the same side (Figure 1). The margin of the right ovary was distinct. Clinically, both an inflammatory process and

pregnancy could be easily excluded by laboratory and physical examinations. All examinations favored a mass coming from the fallopian tube, but differential diagnosis between benignity and malignancy could not be made. Diagnostic laparoscopy was an excellent tool to assist in this uncertain condition.^{14,15}

To our knowledge, no clear ultrasound feature has yet been demonstrated for tubal myoma. This report describes the revelation of this rare tumor preoperatively with the help of transvaginal ultrasound and color Doppler ultrasound, although laparoscopy should be applied to make a final definite diagnosis.

References

1. Schut D, Stovall DW. Leiomyoma of the fallopian tube: a case report. *J Reprod Med* 1993;38:741–2.
2. Roberts CL, Marschall HK. Fibromyoma of the fallopian tube. *Am J Obstet Gynecol* 1961;82:364–6.
3. Crissman JD, Handwerker D. Leiomyoma of the fallopian tube: report of a case. *Am J Obstet Gynecol* 1976;126:1046.
4. Escoffery CT, Fletcher H. Leiomyoma of the fallopian tube: an unusual cause of abdominal pain. *Int J Gynecol Obstet* 1992; 38:128–9.
5. Shalan H, Sosic A, Kurjak A. Fallopian tube carcinoma: recent diagnostic approach by color Doppler imaging. *Ultrasound Obstet Gynecol* 1992;2:297–9.
6. Kurjak A, Kupersic S, Jacobs I. Preoperative diagnosis of the primary fallopian tube carcinoma by three-dimensional static and power Doppler sonography. *Ultrasound Obstet Gynecol* 2000;15:246–51.
7. Green TH, Scully RE. Tumors of the fallopian tube. *Clin Obstet Gynecol* 1962;5:886–95.

8. Zalel Y, Soriano D, Lipitz S, Mashiach S, Achiron R. Contribution of color Doppler flow to the ultrasonographic diagnosis of tubal abnormalities. *J Ultrasound Med* 2000;19:645-9.
9. Baumgartel PB, Fleischer AC, Cullinan JA, Bluth RF. Color Doppler sonography of tubal torsion. *Ultrasound Obstet Gynecol* 1996;7:367-70.
10. Szabo I, Csabay L, Belics Z, Fekete T, Papp Z. Assessment of uterine circulation in ectopic pregnancy by transvaginal color Doppler. *Eur J Obstet Gynecol Reprod Biol* 2003;106:203-8.
11. Schiebler ML, Dotters D, Baudoïn L, Keefe B. Sonographic diagnosis of hydatids of Morgagni of the fallopian tube. *J Ultrasound Med* 1992;11:115-6.
12. Kurjak A, Kupesic S, Ilijas M, Sparac V, Kosuta D. Preoperative diagnosis of primary fallopian tube carcinoma. *Gynecol Oncol* 1998;68:29-34.
13. Podobnik M, Singer Z, Ciglar S, Bulic M. Pre-operative diagnosis of primary fallopian tube carcinoma by transvaginal ultrasound, cytological finding and CA-125. *Ultrasound Med Biol* 1993;19:587-91.
14. Wang PH. Tuberculous peritonitis should always be considered as a differential diagnosis in abdominal carcinomatosis. *Taiwanese J Obstet Gynecol* 2004;43:182-4. [Letter]
15. Wen KC, Yang CC, Wang PH. Primary fallopian tube leiomyoma managed by laparoscopy. *J Minim Invasive Gynecol* 2005;12:193.