

Laparoscopic ultrasonic dissection of uterine vessels in women with benign uterine pathologies

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Summary

Uterine artery dissection is a new minimally invasive surgical technique used for the treatment of leiomyomas and adenomyomas. Three women underwent laparoscopically-assisted bilateral uterine dissection using ultrasonically activated shears. Surgery was uneventful, and patients were discharged on the second day after. Reduction in tumor volume measured by ultrasound was impressive (36%-68%), and the women felt their symptoms had improved. A larger series and longer follow-up are required to evaluate which patients will benefit from this technique. To our knowledge, this is the first report in the literature of origin uterine artery dissection in the area of the off-going part from the hypogastric artery using ultrasonically activated shears in symptomatic leiomyomas.

Key words: Leiomyoma; Ultrasonically activated shears; Uterine artery dissection.

Introduction

Leiomyomata and adenomyosis are the most common uterine tumours, affecting approximately 20-40% of women older than 35 years of age [1]. The long-established and conventional treatment for symptomatic or rapidly enlarging myomas is hysterectomy. In the Czech Republic, an estimated 20,000 hysterectomies are performed each year [2]. Over the past 20 years, a number of surgical alternatives to hysterectomy have been developed. Some of these following procedures (myomectomy, myolysis) provide alternatives for women with uterine myomas that reduce morbidity, and/or decrease the cost of care [3]. The procedure uterine artery embolization (UAE) has been recently introduced by Ravina [4] as a therapeutic alternative to treatment of myomas. Another set of techniques that has been introduced in a pilot study incorporates the use of laparoscopically-assisted coagulation and occlusion of uterine vessels [5].

We believe this is the first report of laparoscopic dissection of a uterine vessel (LDUV) using ultrasonic instruments in women with symptomatic leiomyomas.

Case Reports

The first patient was a 44-year-old gravida 4, para 3, woman who had had severe dysmenorrhea and pelvic pain for three years. Her medical history was not contributory. Sonography showed a large uterus measuring 94x50x45 mm and two fundal myomas, with the dominant one 20x30x30 mm. Adenomyosis was suspected from the sonographic picture and elevated CA 125 of 50 U/ml. We performed laparoscopic ultrasonic dissection of the uterine vessels and anastomosis zones with ovarian vessels in 50 minutes with minimal blood loss. Two doses of IM Novalgine (metamizolum natrium), 2 g, to relieve pain were

given postoperatively. The patient was discharged on the second day free from pain. She returned to work two weeks later. Three months later, ultrasound showed volume reduction of both the uterus (89 x 45 x 45 mm, 17%) and the dominant myoma (10 x 10 x 5 mm, 97.3%). The woman reported irregular bleeding and vasomotor symptoms (hot flashes) of failing ovarian function; 10 mg estradiol valerate and 125 mg hydroprogesterone capronate were administered intramuscularly only once. Within one month the vasomotor symptoms decreased. The last visit showed that the patient's symptoms were completely resolved. Hormonal evaluation was within normal range for premenopausal women.

The second patient was a 38-year-old gravida 4, para 2, woman with menorrhagia and pelvic pain of four years' duration. Sonography showed a myoma 98 x 80 x 69 mm in the left fundal area. The uterus was 120 x 77 x 70 mm and the endometrium was 9 mm thick. Laparoscopic ultrasonic dissection of both uterine arteries was performed with no difficulty in 45 minutes. The patient was given two doses of IM Novalgine, 1.5 g, to relieve pain right after surgery and was discharged on the second day.

Three months later, ultrasound showed prominent volume reduction of both the uterus (90x51x55 mm, 61%) and the dominant myoma (46x43x40 mm, 69%). The woman was symptom free and satisfied with the procedure. Her hormonal status showed no change.

The third patient was a 36-year-old nulliparous woman who presented with menorrhagia of 12 months' duration. Clinical examination revealed a uterine size compatible with a 10-week gestation. Sonography was performed prior to LDUV, and showed a solitary intramural fibroid extending anteriorly from the fundus and body, not displacing the cavity of the uterus. The fibroid measured 60 x 40 x 45 mm. The uterus measured 80 x 45 x 50 mm. Laparoscopic dissection of the uterine vessels was done, using ultrasonically activated shears only. The operating time was 30 min and blood loss was about 30 ml. The patient was well and was discharged on the second postoperative day. She was also well at the review in the third postoperative week. Ten weeks later, ultrasound showed prominent volume reduction of both the uterus (73 x 40 x 42 mm, 32%) and the dominant myoma (49 x 39 x 35 mm, 39%). The woman reported that menorrhagia had improved.

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Operative technique

Laparoscopy was performed in the lithotomy position using videomonitoring equipment. The telescope was inserted subumbilically and one 5-mm port was made suprapubically and medially. Two 5-mm ports were placed in each of the lower quadrants at the lateral edge of the rectus abdominis muscle. Dissection using ultrasonically activated shears (LCS-K5) (Ultracission, Ethicon EndoSurgery, Johnson Johnson, Ltd., Cincinnati, OH, USA) was started. The Ultracission was applied at power levels from 1 up to 5 (full power). Lower power levels allowed better coagulation but slower cutting. Higher power levels allowed faster transection of relatively avascular tissue. The line of dissection was between the round ligament anteriorly, infundibulopelvic ligament medially and pelvic sidewall laterally. The peritoneum was opened and paravesical and obturator space developed by blunt dissection. This ultrasonic technique allows skeletonization of the obliterated hypogastric artery, which was grasped and traced until the uterine artery was reached. Subsequently, distancing uterine vessels from the ureter with safe ultrasonic coagulation of uterine vessels and cutting just medial to their origin from the hypogastric artery were performed. With the assistant surgeon pressing the ureter medially with a grasper, the uterine artery was isolated easily from the ureter and hypogastric artery. Then the uterine artery was thoroughly desiccated with ultrasonic activated shears while visualizing the ureter. Power settings were usually level 1 for coagulation and level 5 for dissection. We did not close the peritoneal windows. After a final check to control hemostasis the Redon catheter was left for drainage. Prophylaxis consisted of a single dose of cefazolin 1 g, IV.

Discussion

In recent years alternative approaches to surgical management of leiomyomas have been suggested, and a number have undergone at least some degree of clinical evaluation. What appears common to these techniques is the concept of devascularization of the tumor. What distinguishes the approaches is the mechanism and technologies employed to occlude blood supply to the lesion. The first report of treating symptomatic myomas by surgical occlusion of uterine vessels was described by Liu [5] in 2000. Both uterine arteries, as well as the anastomosis zone of uterine arteries and ovarian arteries were occluded in all three women. Liu *et al.* [6] slightly modified this technique by cutting off the uterine artery after bipolar coagulation. Surgery was uneventful, and all women experienced improvement in symptoms with no complications. Postoperative ultrasound showed progressive reduction in the size of the dominant myoma. To date, in the studies of Liu *et al.* [6], the dominant myoma size was substantially reduced (average 76%). Vaginal expulsion of submucous fibroids after bipolar coagulation of uterine vessels or uterine artery embolization was reported [7-9]. It also occurred after gonadotropin releasing hormone treatment [10].

The laparoscopic technique of origin uterine artery dissection has successfully been used in cases of radical hysterectomy or pelvic lymphadenectomy [2]. Our previous experience was successfully applied in three cases

of uterine artery dissection in women with benign uterine lesions. Only in the first case were there coagulated anastomotic sites of uterine and ovarian vessels. We think that, with respect to temporary indications of ovarian dysfunction, any occlusion of ovarian vessels should be approached very carefully. In a recent literature review (Medline), we found reference only to bipolar coagulation of uterine vessels in laparoscopic surgery of myomas, but to the best of our knowledge, this is first case report of laparoscopy-assisted dissection of the uterine artery performed by ultrasonically activated shears. We modified the operative technique described by Liu [5] using LDUV to avoid persistent partial blood circulation. The ultrasonically activated scalpel was originally developed to carry out a surgical incision with concomitant hemostasis [11]. The ultrasonic operative technique provides both hemostasis and cutting with decreased charring of tissue and less thermal damage surrounding structures, allowing better healing because there is less need to evacuate a smoke from the abdominal cavity. To provide hemostasis in the three women having surgery only the ultrasonic surgical technique was used, including the coagulation and cutting of the uterine artery in the area of the off-going part from the hypogastric artery. We appreciated the possibility of using the LCS tip for the separation of particular layers of retroperitoneal tissue.

Three laparoscopically-treated patients who subsequently experienced improvement in symptoms with no complications have been described. Postoperative ultrasound showed both a progressive 68% mean reduction in size of the dominant myoma and a 36% mean reduction in uterine size.

The technique of UAE resulted in fibroid shrinkage by 39% to 70% and a clinical response rate of 85% to 90%, but it is limited by radiation exposure, ovarian failure, postembolisation syndrome, and potentially fatal complications after treatment [8, 12]. In contrast, LDUV achieves complete interruption of the uterine arteries, so it may have a therapeutic effect similar to that of myolysis, UAE and coagulation of the uterine artery. The procedure can be completed within 30-40 minutes with only minimal blood loss if performed by experienced laparoscopists. The disadvantages of laparoscopic dissection of uterine vessels are related to laparoscopic and anesthetic risk.

Conclusion

Laparoscopic uterine artery dissection appears to provide successful treatment for some women suffering from uterine adenomyomas and leiomyomas. Further studies are required to identify which patients will benefit most from this technique, and to evaluate whether uterine artery dissection does become a useful adjunct to the well-established surgical treatments in the management of benign uterine tumors.

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