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FULL RESEARCH ARTICLE

Pelvic pain management with ultrasound-guided superior hypogastric plexus block (SHPB) after uterine artery embolization for symptomatic myomatosis

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ABSTRACT

Introduction: *Severe pelvic pain is the most common adverse effect after uterine artery embolization (UAE) for symptomatic myomas. The aim of this case series is to describe pelvic pain management with ultrasound-guided superior hypogastric plexus block (SHPB) in patients treated with UAE for symptomatic myomas.* **Material and Methods:** *We present a case series of women with symptomatic uterine myomas treated with UAE and ultrasound-guided SHPB. The visual analog scale (VAS) was used to assess pelvic pain with a rating of minimal (0–2), moderate (3–7), and severe (8–10). The initial VAS was recorded immediately after UAE, and the final VAS twelve to fourteen hours after SHPB and before discharge.* **Results:** *Eighteen cases of ultrasound-guided SHPB after UAE were included. A gelatin sponge was used for embolization in 16 women and polidocanol (3%) was added in two cases. Ultrasonographic-guided SHPB was performed with a Chiba 16-gauge needle in 14 patients and a 22-gauge in four cases. The adequate needle tip placement in the anterior wall of L5 was confirmed by fluoroscopy. The mean age of the women was 40.38 ± 7.6 years. The mean initial VAS was mild (1.2 ± 2.2) similar to the final VAS (2.5 ±1.8). The mean number of myomas was 2.4 ± 1.6, and the mean uterine volume was 811.5 ± 599.04 mL. The relevant aspects of the UAE and ultrasound-guided SHPB of specific cases are presented.* **Conclusion:** *This report is the first to demonstrate the efficacy of ultrasound-guided SHPB for managing pelvic pain after UAE in patients with symptomatic myomas.*

Keywords: *Menorrhagia. Superior hypogastric plexus block. Uterine artery embolization. Gelatin sponge. Uterine myomatosis. Interventional radiology.*

INTRODUCTION

Uterine myomatosis may be asymptomatic or present with menorrhagia and acute or chronic pelvic pain. Uterine artery embolization (UAE) is a minimally invasive alternative to surgical treatment. It is indicated in symptomatic patients who wish to preserve the uterus for reproduction or in whom surgery is contraindicated due to high surgical risk or adhesions. In UAE, the uterine arteries supplying the myoma are occluded, causing ischemia and infarcts in the myoma. Normal myometrium remains viable through collateral circulation[1,2]. Subsequently, ischemic degeneration and regression of the myoma occur, resulting in uterine shrinkage and improvement or disappearance of symptoms such as pelvic pain, bleeding, and compression of adjacent organs[3]. Various embolizing materials have been used, such as gelatin sponge[4,5], polyvinyl alcohol[1], and microspheres[6].

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Severe pelvic pain is the most common adverse effect in the first 8 to 12 hours after UAE due to myoma ischemia and infarction[7]. Pain control after UAE is critical for a good clinical outcome and early patient discharge[8]. In 1990, Plancarte et al.[9] first described superior hypogastric plexus block (SHPB) with fluoroscopic guidance for the management of oncologic pelvic pain. Since then, techniques with different imaging modalities have been described, including the first ultrasound-guided SHPB procedure by Mishra et al.[10] via an anterior approach targeting the most anterior portion of the fifth lumbar (L5) vertebra for the management of oncologic pain. In 2004, Rosuli et al.[11] first reported SHPB with fluoroscopic guidance for pelvic pain management after UAE.

SHPB reduces the need for analgesics and allows same-day discharge after UAE[12,13]. The availability of new materials for radial or femoral punctures with collagen seals allows UAE to be performed as an outpatient procedure[13]. In middle- or low-income countries such as Mexico, where public health infrastructure is insufficient, and there is limited availability of narcotic analgesics and embolizing materials such as spheres or catheters, UAE is performed with materials such as gelatin sponge, which has been effective and low cost[14-16]. SHPB performed with fluoroscopic guidance increases radiation exposure to the medical staff and patients[8]. Therefore, this case series describes the experience of pelvic pain management with ultrasound-guided SHPB after UAE in patients with symptomatic myomas.

MATERIAL AND METHODS

We report a series of cases of women with uterine myomatosis detected by pelvic ultrasound treated from July 2020 to August 2022 at the Interventional Radiology Unit of the Premier Clinic and the Imaging Department of the "Dr. Juan Graham Casasus" Regional Hospital in Villahermosa, Tabasco, Mexico. Patients with pedunculated subserosal myomas and with SHPB performed with fluoroscopic guidance were excluded. Informed consent was not required for data obtained during routine medical care. The protocol was approved by the institutional research ethics committee and the research committee.

Study population and variables

The following variables from women diagnosed with uterine myomatosis who underwent ultrasound-guided SHPB after UAE were recorded: age, parity, clinical manifestations of uterine myomatosis such as menorrhagia, anemia, pain, constipation, urinary urgency, previous myomectomy, uterine size (cm), uterine volume (mL), main myoma size (cm), main myoma volume (mL), number and location of myomas, Chiba needle gauge (G), and adverse events such as unwanted embolization, abdominal distention, and dysuria.

Visual analog scale (VAS): the initial VAS, reported immediately at the end of UAE, and the final VAS, between twelve and fourteen hours after SHPB and before discharge, were obtained. The scale was reported as mild (0–2), moderate (3–7), or severe (8–10) pain.

UAE protocol

A SonoAce R3™ system (Samsung Co. Seoul, Korea) with a 2–4 Mhz convex transducer or a uSmart3300™ system (Terason Co. Burlington, MA, USA) with a 2–4 Mhz convex transducer was used. A 5 Fr vascular introducer sheath (Boston Scientific Corp. Quincy, MA. USA), a Cobra curve 2 catheter, 4 Fr (Terumo Co. Fujinomiya, Japan), a 150-cm curved tip guidewire (Terumo Co), a microcatheter, and a Direxion microguide (Boston Scientific Corp. Quincy, MA. USA) were used. The contrast media was iopromide 300 mg I/mL (Bayer Inc., Berlin, Germany). Hemostatic, absorbable gelatin sponge was used for embolization (Pfizer, Kalamazoo, MI, USA).

A 5 Fr vascular introducer sheath was placed in the right common femoral artery. A catheter was introduced over a guidewire to access and embolize the left uterine artery. Then, the right uterine artery was embolized using the Waltman loop technique[17–20]. A gelatin sponge (8.0 × 12.5 × 10 cm) was used for embolization in addition to amikacin 500 mg, 3 mL of simple lidocaine (2%), and the contrast adjusted to one 20 mL vial. Embolization was performed until stasis, defined as the visual absence of contrast flow after five heartbeats. A microcatheter was used if the catheter could not be advanced through the horizontal portion of the uterine artery. C-arm fluoroscopy (Philips, Eindhoven, The Netherlands) was used to confirm adequate needle tip position and the spread of the mixed gelatin sponge and contrast.

During UAE, patients received moderate sedation with intravenous midazolam and fentanyl.

Pain management protocol consisted in ketorolac 60 mg intravenously, and 8 mg dexamethasone. Patients

also received 8 mg of ondansetron, 40 mg omeprazole, and 1 gr ceftriaxone. The antibiotic was replaced by clindamycin 300 mg in patients with an allergy.

In women with severe and persistent menorrhagia, in whom complete cessation of menstrual bleeding was desired, 2 mL of the sclerosant polidocanol (3%) was added to the gelatin sponge mixture to increase endothelial injury, prolong uterine ischemia, and prevent recanalization of myomas with reduced myometrial viability[15].

SHPB protocol

After UAE, the intravascular catheter was placed at the tip of the left external iliac artery to identify the bifurcation of the arteries. Lidocaine with 2% epinephrine was infiltrated in the infraumbilical region, and the skin was incised with a no. 11 scalpel blade. Under ultrasound guidance, in sagittal view, the needle was advanced to the anterior wall of L5. Adequate needle position was confirmed by fluoroscopy in an anteroposterior projection with a caudal angulation of 10° and a lateral projection. When the needle was positioned in the anterior wall of L5, it was aspirated to ensure that it was not in a blood vessel. A mixture of 20 mL ropivacaine (150 mg), 2 mL of dexamethasone (8 mg), and 7 mL of contrast (iopromide 300 mgI/mL) was then administered.

Adjuvant intravenous analgesics, a mixture of 500 mL saline with tramadol 100 mg in a continuous infusion for 6 hours and ketorolac 30 mg every 8 hours, were administered. Also, ceftriaxone 1 g IV and gabapentin 300 mg PO were administered every 12 hours. In some patients, clindamycin 300 mg IV every 8 hours was indicated in case of intestinal loop puncture. Patients were discharged twelve to fourteen hours after UAE and SHPB. Oral medication was indicated, ketorolac 10 mg PO every 8 hours for 4 days. On the fifth day, paracetamol tablets 500 mg PO every 8 hours for 6 days, ciprofloxacin 500 mg PO every 12 hours for 5 days, and gabapentin 300 mg PO every 12 hours for 7 days were prescribed, and in case of severe pain, tramadol 50 mg PO every 8 or 12 hours. A pelvic ultrasound was indicated three and six months after UAE.

Statistical analysis

Quantitative variables are presented as means, standard deviations, and ranges, and qualitative variables as frequencies and percentages. Data were analyzed with Microsoft Excel™ version 18.0 (Microsoft Corp., Seattle, WA, USA).

RESULTS

UAE was performed in 23 patients with uterine myomatosis. Five patients were excluded. Two cases were due to technical difficulties because embolization of both uterine arteries failed, and angiography showed vascular flow. In three patients, it was not possible to perform ultrasound-guided SHPB, so fluoroscopic guidance was used. This report includes 18 cases in which ultrasound-guided SHPB was performed for pelvic pain management after UAE in patients with uterine myomatosis (Table 1). The mean age was 40.38 ± 7.6 years. Menorrhagia occurred in 16 (88.9%) patients, and pelvic pain in 12 (66.7%). The mean number of myomas was 2.4 ± 1.6. The mean uterine volume was 811.5 ± 599 mL, and the volume of the largest myoma was 353 ± 418.9 mL. A gelatin sponge (5.23 cm^3) was used as an embolization material in 16 women, and polidocanol (3%) was added in two cases.

The mean initial VAS was mild (1.2 ± 2.2) after UAE and was comparable to the final VAS (2.5 ± 1.8) after twelve to fourteen hours of the ultrasound-guided SHPB. SHPB adverse events are shown in Table 1. In the first two included patients, the VAS was moderate (initial 7 and final 5) and (initial 5 and final 3) because there was no experience with the procedure. In contrast, the next 16 cases had mild or moderate at initial and final pelvic pain. On the other hand, the 22-gauge Chiba needle was used in the first two cases, but the needle was not strong enough to penetrate myomas with fibrosis. In 14 cases, a 16-gauge needle was used because it is larger, and we were able to penetrate the uterus and fibrotic myomas and guide the needle to the anterior wall of L5. Only in two other cases a 22-gauge needle was used because it was necessary to pass through the intestinal loops due to small myomas. In all cases, fluoroscopy was used to confirm adequate needle tip position during ultrasound-guided SHPB.

The relevant aspects of the specific cases shown in the Figures are described below:

Case 7 is a 46-year-old woman with 5 myomas treated with UAE and ultrasound-guided SHPB. The VAS was mild (initial 0 and final 3). Figure 1 shows fluoroscopy with increased density of the uterus by the embolization material. After SHPB, the characteristic

Table 1. Description of 18 women with uterine myomas and ultrasound-guided SHPB for pelvic pain management after UAE

Case #	Age (years)	Parity	Symptoms	Number of myomas	Largest myoma volume (mL)	Uterine volume (mL)	Needle diameter for SHPB	Initial VAS	Final VAS	SHPB adverse events
1	49	0	Menorrhagia, pain	1	298.9	704	22 G	7	5	Abdominal distension
2	29	0	ND	1	248.2	530	22 G	5	3	None
3	40	0	Pain	1	461.8	1094.4	16 G	0	5	Abdominal distension
4	37	0	Menorrhagia, pain	1	594	1056.4	16 G	0	3	Myoma abortion
5	30	0	Menorrhagia, pain	1	1867	2872.72	16 G	0	3	None
6	44	1	Menorrhagia, pain	1	370.35	1022.32	16 G	0	5	None
7	46	1	Menorrhagia, anemia	5	167.7	425.56	16 G	0	3	None
8[a]	42	0	Menorrhagia, pain, anemia	6	32	1183.44	16 G	0	1	None
9	33	0	Menorrhagia	2	196.7	355.35	16 G	0	2	None
10	30	0	Menorrhagia, pain, urinary urgency	2	600.66	959.1	16 G	0	4	Undesirable right gluteal artery embolization, SAH 170/100 mmHg
11	36	0	Menorrhagia, anemia, pain	1	273.6	724.31	16 G	0	2	None
12	33	1	Menorrhagia, pain	3	17.4	170.45	22 G	1	5	Dysuria, hemorrhage, mild hematuria after foley catheter removal.
13	37	0	Menorrhagia, pain, constipation, urinary urgency	5	473.07	1022.9	16 G	2	0	Severe pain (VAS 9) 20 horas after embolization
14	47	0	Menorrhagia	4	32.6	452.05	16 G	0	1	None
15	46	2	Menorrhagia, pain	2	57.3	372.51	16 G	0	1	None
16	54	0	Menorrhagia	3	145.3	331.7	16 G.	0	0	Needle repositioning in SHPB for very hard myoma
17	41	1	Menorrhagia	2	268.9	641.3	22 G	5	3	SHPB in S1
18[a]	53	3	Menorrhagia, pain	2	249.5	688.7	16 G	0	0	None

SHPB: superior hypogastric plexus block; ND: no data; G: gauge; UAE: uterine artery embolization; SAH: systemic arterial hypertension; [a]polidocanol was added to the gelatin sponge for UAE to prolong uterine ischemia and prevent recanalization of the nutritional supply to the myomas and achieve control of menorrhagia.

shape of contrast media distribution was observed in the retroperitoneum.

Case 9 is a 33-year-old woman with a small uterus and uterine myomatosis. UAE and ultrasound-guided SHPB were performed. The VAS was mild (initial 0 and final 2). In Figure 2, pelvic ultrasound in grayscale shows perfusion of the myomas and a normal pattern of the myometrial spiral arteries. The needle can be seen placed in the anterior wall of L5-S1. The echogenic embolizing material is seen, and the uterus is well-defined by increased density after UAE.

Case 11 is a 36-year-old woman with myomatosis. During UAE, staining was observed in the periphery of the right uterine horn, suggestive of endometriosis. SHPB was performed with ultrasonographic guidance. VAS was mild (initial 0 and final 2). Figure 3, a pelvic ultrasound in grayscale, shows a submucosal myoma measuring 92.1 × 64.7 × 87.7 mm with a volume of 273.6 mL. Angiography shows hypoplasia of the right uterine artery. The 16-G needle tip is located at the anterior border of L5. The embolizing material outlining the myoma and an endometriotic

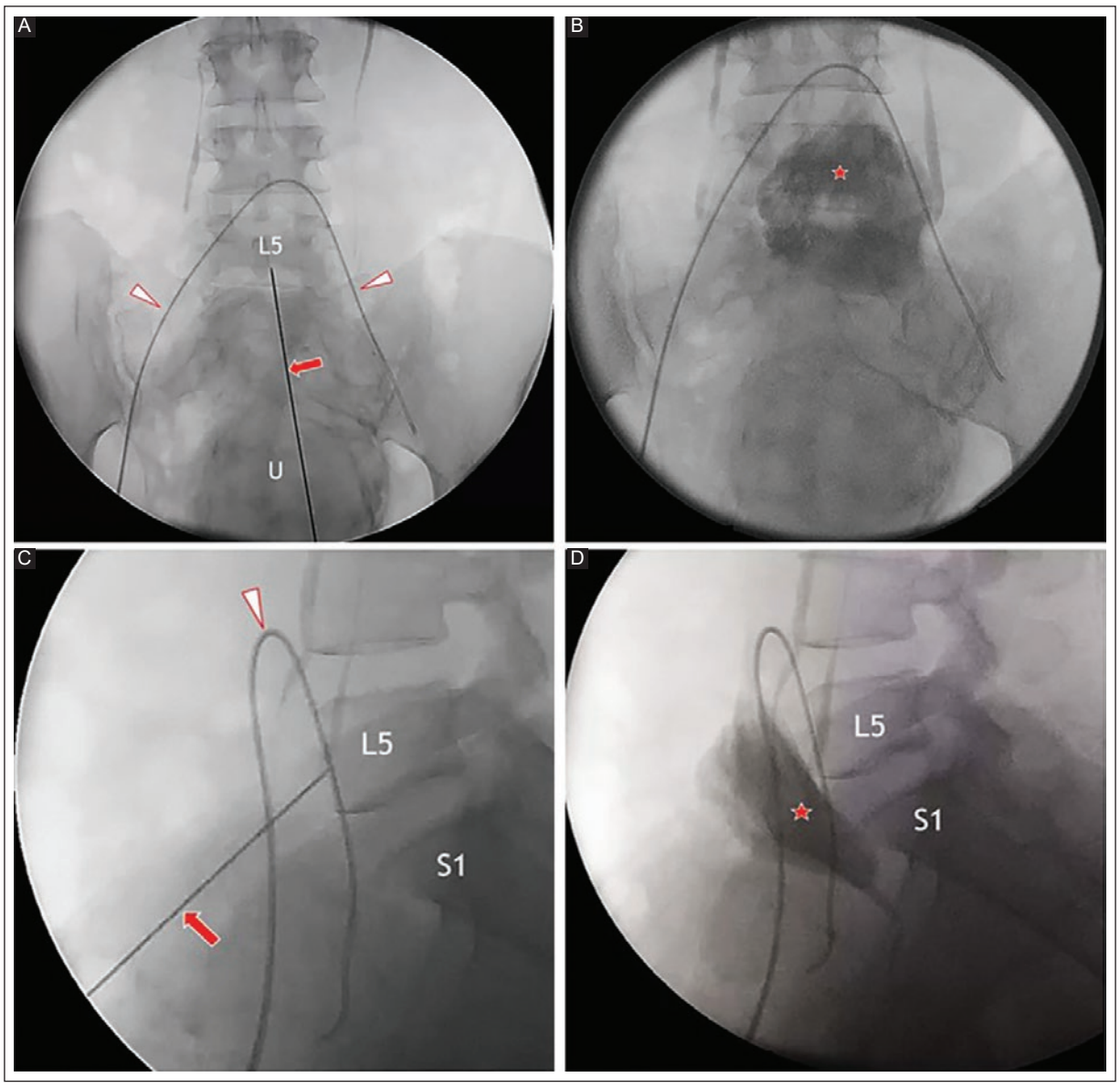


Figure 1. A 46-year-old woman with five myomas who underwent UAE. SHPB was performed with ultrasonographic guidance (case 7). VAS was mild (initial 0 anf final 3). **A-C**: pelvic fluoroscopy after UAE, AP, and lateral projection, the Chiba 14-G needle (arrow), and the uterus (U) with increased density due to the embolization material can be seen. The angiography catheter is in the bifurcation of the aorta (arrowheads). **B-D**: after SHPB, the characteristic shape of mixed contrast distribution in the retroperitoneum is seen (stars).

VAS: visual analog scale; SHPB: superior hypogastric plexus block; UAE: uterine artery embolization; AP: anteroposterior.

cyst is visible; contrast diffusion was observed after SHPB. At ultrasonographic follow-up three months after UAE, there was no evidence of myoma. The patient was asymptomatic.

Case 12 is a 33-year-old woman with three small uterine myomas that required the use of a fine needle (22-gauge) because the intestinal loops had to be penetrated. One of the myomas was in the cervix, and although standard management is a hysterectomy, she turned to UAE because of her desire to have children. SHPB was performed with ultrasonographic guidance. The initial VAS was mild (1), and the final VAS was moderate (5). In Figure 4, pelvic ultrasound in grayscale shows three myomas, one in the cervix measured 36 × 27.3 × 33.1 mm with a volume of 17.02 mL. The follow-up ultrasound showed a decrease in volume (2.17 mL) with a reduction of 87.3% of the original size of the myoma in the cervix. Seven months after UAE, the myoma was not found in the cervix. The patient was asymptomatic.

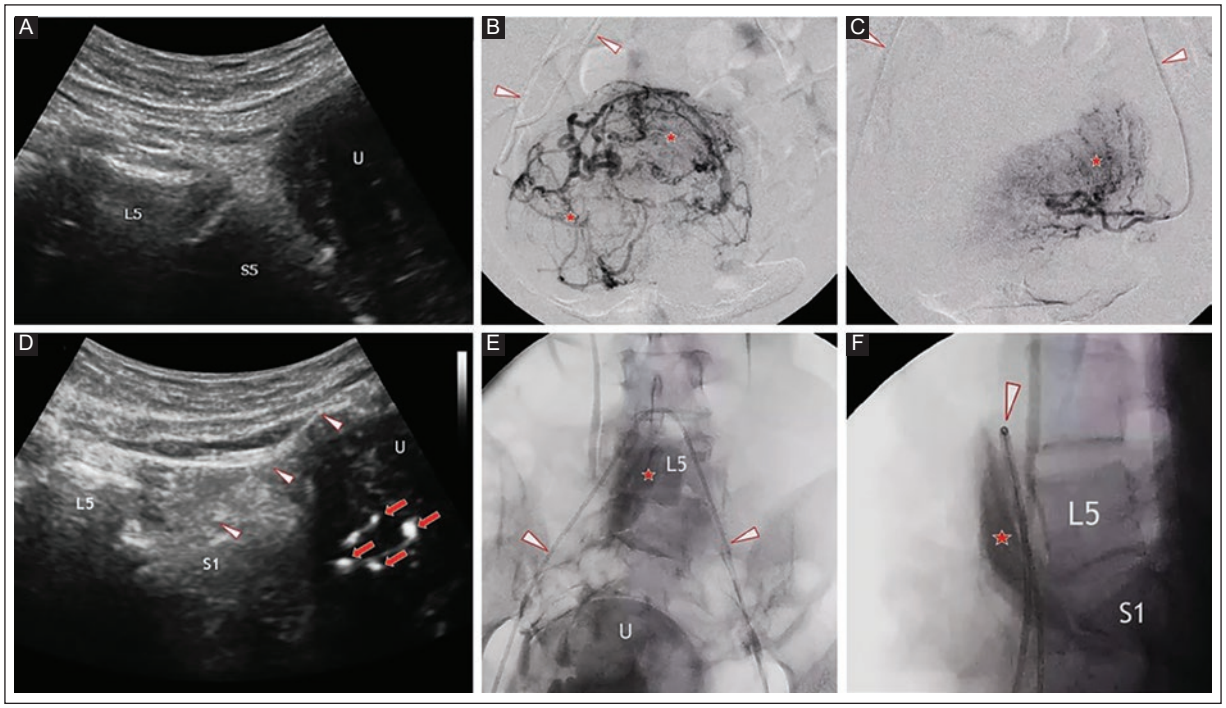


Figure 2. A 33-year-old woman with uterine myomas who underwent UAE. SHPB was performed with ultrasonographic guidance (case 9). Initial VAS was 0, and final, 2. **A**: pelvic ultrasound before SHPB. The uterus (U) is small and below the anterior wall of L5. **B**: digital subtraction angiography of the right uterine artery (arrowheads). Perfusion, mainly of myomas, is observed (stars). UAE was later performed. **C**: digital subtraction angiography of the left uterine artery (arrowheads); a normal arterial pattern of the spiral arteries of the myometrium is seen (star). **D**: puncture for ultrasound-guided SHPB. The needle (arrowheads) is seen outside the uterus (U) between L5-S1. Echogenic myoma embolization material (arrows) administered in the uterus (U). **E**: AP views, the needle was placed in the anterior wall of L5 before SHPB. The uterus (U) with increased density after UAE. The angiography catheter is in the bifurcation of the aorta (arrowheads). **F**: lateral view after SHNB showing contrast media diffusion (star). The catheter identifies the bifurcation of the aorta (arrowhead). The characteristic shape of mixed contrast distribution in the retroperitoneum is seen (star).

VAS: visual analog scale; SHPB: superior hypogastric plexus block; UAE: uterine artery embolization; L5: 5th lumbar vertebrae; S1: 1st sacral vertebra. AP: anteroposterior.

Case 13 is a 37-year-old woman with a large volume uterus (1022.9 mL) with 5 myomas. UAE and ultrasound-guided SHPB were performed. The VAS was mild (initial 2 and final 0). In Figure 5, pelvic ultrasound shows the Chiba needle passing through the uterus to the anterior wall of L5. Fluoroscopy shows that fibrosis of the myoma deviated the needle. After SHPB, contrast media diffusion is observed.

Case 17 is a 41-year-old woman with uterine myomatosis. UAE and ultrasound-guided SHPB were performed. The VAS initial was moderate (5) and the VAS final was mild (3). In Figure 6, a pelvic ultrasound in grayscale, the colon is outlined above the uterus and overlaps with the body of L5 (unidentified image); the echogenic embolizing material can be seen. Compression with the transducer was useful to displace the colon to better visualize the uterus and the anterior border of L5 and S1. When the needle collided with the sacral promontory, the mixture diffused mainly into the anterior border of the sacrum and the lower 2/3 of L5, causing analgesia mainly of the inferior hypogastric plexus.

DISCUSSION

In this case series, pelvic pain control by ultrasound-guided SHPB was demonstrated with a mild initial and final VAS in the first hours after UAE. This report is the first of ultrasound-guided SHPB for the management of pelvic pain after UAE. Ultrasonographic guidance replaces fluoroscopic guidance, which means a reduction in radiation with benefits for the medical team and patients.

The efficacy of SHPB has been demonstrated for the control of pelvic pain after UAE with reduced analgesic requirements and same-day discharge[7,8,13]. In 2004, a study of 139 patients with SHPB after UAE was the first time for pelvic pain control[11]. Yoon J et al.[12] compared

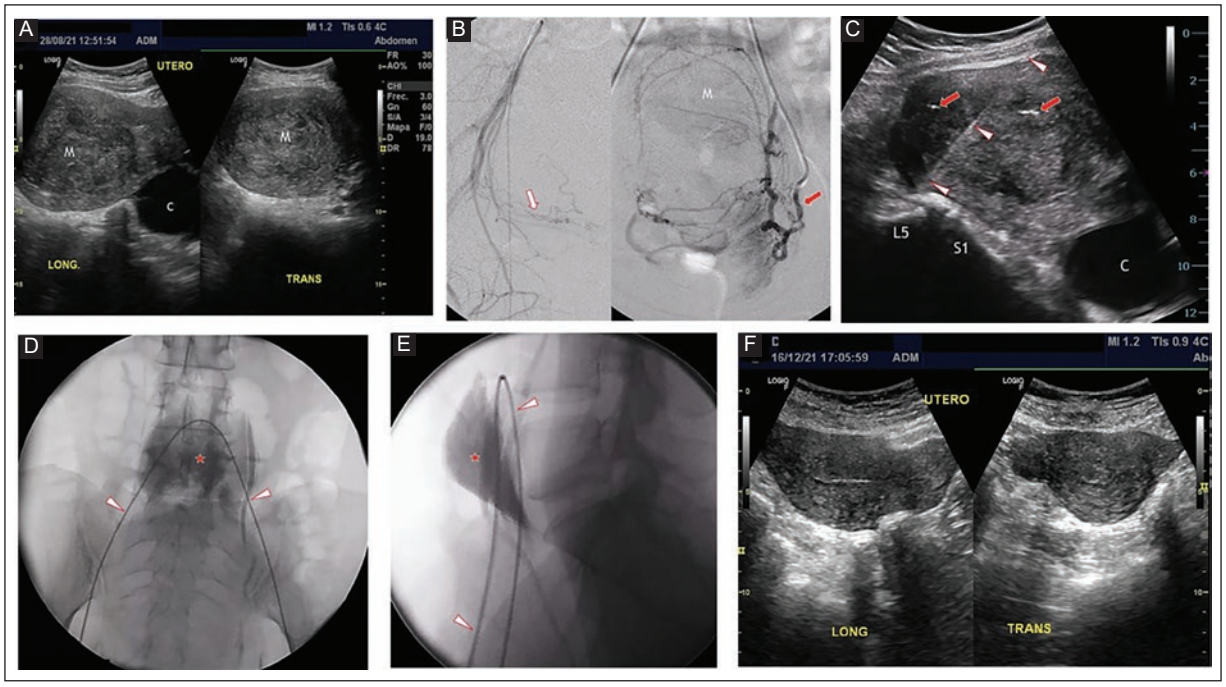


Figure 3. A 36-year-old woman who underwent UAE. SHPB was performed with ultrasonographic guidance. Initial VAS was 0, and final, 2 (case 11). **A:** pelvic ultrasound showing a submucosal myoma (M) measuring 92.1 × 64.7 × 87.7 mm with a volume of 273.6 ml in longitudinal and transversal view with an endometriotic cyst (C). **B**: a fusion image of digital subtraction angiography shows hypoplasia of the right (white arrow) and left (red arrow) uterine arteries with irrigation of the myoma (M) and myometrium. **C:** puncture with transuterine ultrasonographic guidance. A Chiba 16 G needle (arrowheads) reaching the anterior border of L5. The embolizing material is delimited in the myoma (arrows) and the endometriotic cyst (C) **D-E**: AP and lateral projection. After SHPB, mixed contrast media diffusion is seen (star). The catheter identifies the bifurcation of the aorta (arrowheads). **F:** ultrasound three months after UAE. The patient is without the myoma and asymptomatic.

VAS: visual analog scale; SHPB: superior hypogastric plexus block; UAE: uterine artery embolization; L5: 5th lumbar vertebra.

SHPB with placebo in a clinical trial of 44 patients randomized 1:1. Pain was lower in the SHPB group (1.0 ± 2.1) than in the control group (2.6 ± 2.0) (p = 0.01). Pereira et al.[8] studied 34 patients with SHPB after UAE. Twenty-six (87%) patients did not require a patient-controlled analgesic pump. Our results showed adequate pelvic pain control after UAE with mild initial and final VAS. SHPB is a safe and effective procedure that can significantly reduce pelvic pain after UAE and allow same-day discharge[8].

Fluoroscopic guidance is the standard procedure for SHPB[8,9,11,13]. In a study by Mishra et al.,[10] ultrasound-guided puncture without fluoroscopy was performed for the first time in SHPB to manage oncologic pain. The combination of ultrasound-guided puncture with fluoroscopy to check needle position has been previously described in oncologic pain management[21,22]. On the other hand, the 20–22 G needle has been used by several authors for SHPB,[9,11,13] while Pereira used a coaxial system with an 18 G needle and a 22 G needle inside it to pass through fibrotic myomas. In the first two cases, we used the 22 G needle but did not achieve adequate analgesia (initial VAS 7/5 and final VAS 5/3, respectively). This was due to technical difficulties. The needle was bent and had to be removed to align and re-locate it, so it could not go through the myomas. In 14 cases, we used a 16-G needle that went through the uterus and the fibrous myoma directing the needle to the anterior wall of L5. Based on the experience from the reported cases, we consider that the 16-G needle offers advantages for SHPB.

The addition of corticosteroids to SHPB increases the duration of analgesia after UAE[3,13,23,24]. Stewart JK et al.[13] showed that adding triamcinolone to SHPB resulted in prolonged analgesia after UAE in 16 patients. In Mexico, triamcinolone is not available. We use dexamethasone, which has been useful in brachial plexus blockade[3,23]. The availability of opioids in Mexico is limited, so we used tramadol with our patients. In addition, gabapentin after hysterectomy has proved its efficacy[25]. Lidocaine has an analgesic effect at low doses[26,27]. The additional administration of a

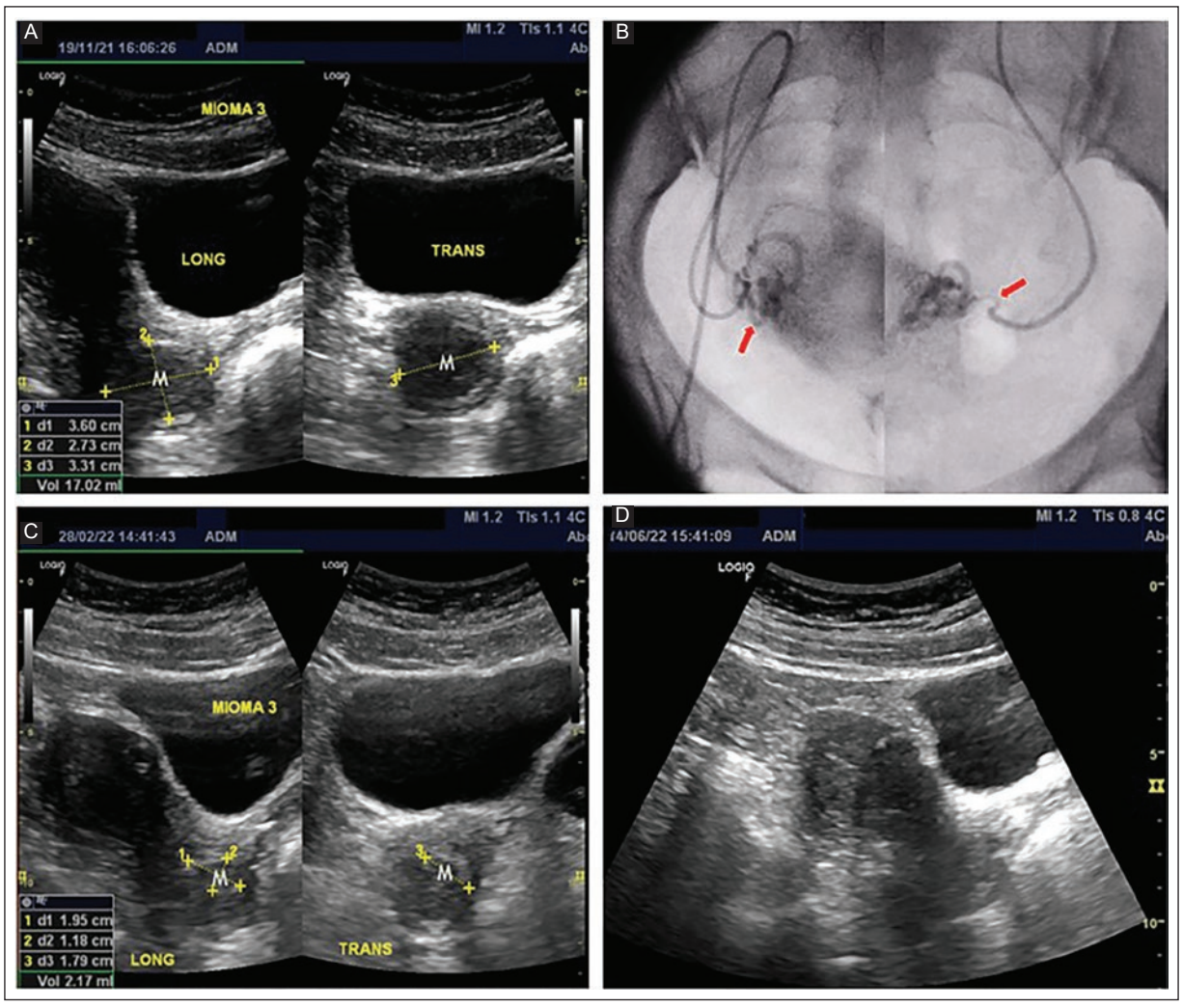


Figure 4. A 33-year-old woman with three myomas causing pain and menorrhagia who underwent UAE. SHPB was performed with ultrasonographic guidance. Initial VAS was 1, and final, 5 (case 12). **A**: grayscale ultrasound; myoma (M) measuring 36 × 27.3 × 33.1 mm with a volume of 17.02 ml, located in the cervix in longitudinal and transverse view. **B**: a fusion image of digital subtraction angiography shows small uterine arteries (arrows). **C**: grayscale ultrasound at follow-up three months after UAE, volume decrease of 2.17 is observed with a reduction of 87.3% of the original size of the myoma. **D**: seven months after UAE, the myoma was not observed in the cervix; the patient was asymptomatic.

VAS: visual analog scale; SHPB: superior hypogastric plexus block; UAE: uterine artery embolization.

corticosteroid, gabapentin, and lidocaine in our patients for pain management after UAE may be useful based on previous reports[24–27].

The usefulness of gelatin sponges for temporary embolization (2-4 weeks) is well established; after that, the effect disappears, and the vascular pathways recanalize. In two patients, polidocanol was added to the gelatin sponge to achieve vascular obliteration with obstruction and to avoid the recurrence of menorrhagia[28]. In very large myomas or the presence of multiple myomas, a large amount of necrotic tissue with the risk of infection, as occurs with splenic embolization, and the use of antibiotics in the embolization mixture have been described[29,30]. In our case series, amikacin was added to the gelatin sponge for UAE. In our country, its low cost and proven efficacy are the main reasons for using a gelatin sponge.

The strength of this study is that SHPB with ultrasonographic guidance is a technically simple and safe procedure that can be performed by an interventional radiologist[8,12]. The weaknesses are related to the study design and small sample size. No control group was included to demonstrate the reduction in parenteral and oral analgesics in patients with SHPB. In addition, parenteral and oral analgesics requirements were not recorded, so it was not possible to quantify the effect of SHPB on reducing analgesic needs. On the other hand, the effect of the additional administration of

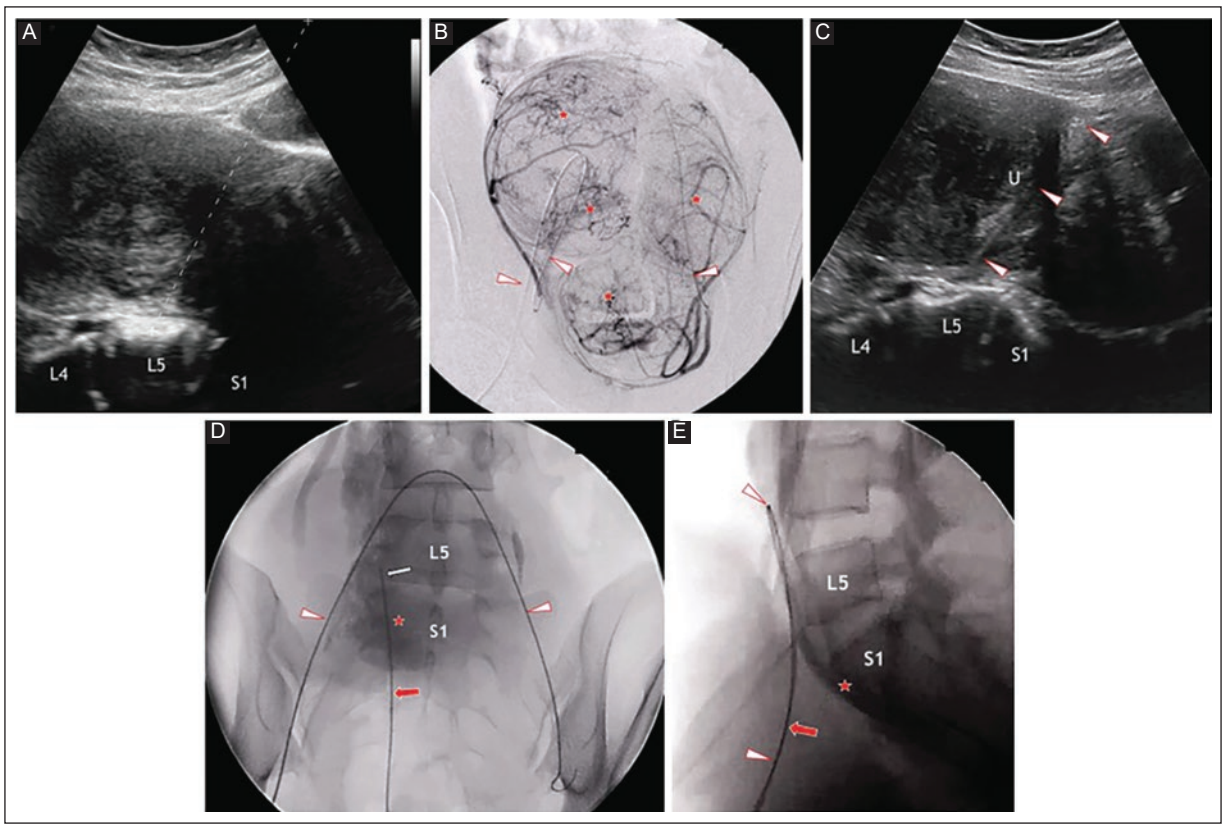


Figure 5. A 37-year-old woman with uterine myoma who underwent UAE. SHPB was performed with ultrasonographic guidance. Initial VAS was 2, and final, 0 (case 13). **A:** pelvic ultrasound before SHPB. The planning circle (dashed line) from the skin to the anterior wall of L5 is a guide. **B:** a fusion image of digital subtraction angiography shows the two uterine arteries with myomas (stars). Both catheters are seen (arrowheads). **C:** SHPB with ultrasound guidance, the needle (arrowheads) crosses the uterus (U) to the anterior wall of L5. **D-E:** fluoroscopy in AP and lateral projection. The needle (red arrow) of the SHPB is seen. Myoma fibrotic deviated the needle (white arrow). The angiographic catheter is located at the bifurcation of the aorta (arrowheads). After SHPB, diffusion of the contrast is observed (star).

SHPB: superior hypogastric plexus block; VAS: visual analog scale; AP: anteroposterior; L5: 5th lumbar vertebra; UAE: uterine artery embolization.

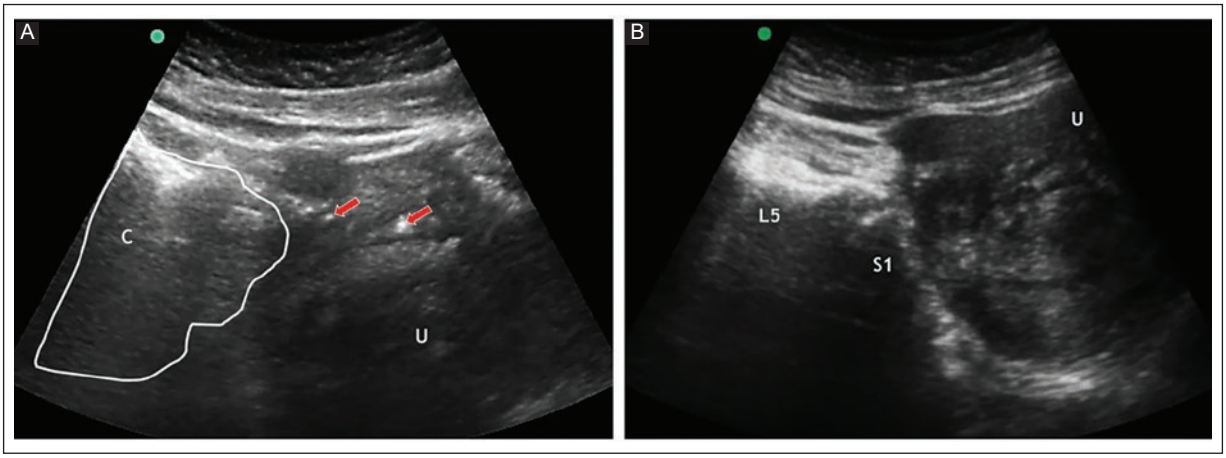


Figure 6. A 41-year-old woman with uterine myomatosis who underwent UAE. SHPB was performed with ultrasonographic guidance. Initial VAS was 5, and final, 3 (case 17). **A**: pelvic ultrasound in grayscale, the colon (C) is delineated (white circumference) above the uterus (U) and overlaps with the vertebral body of L5, which is not visible in the image. The echogenic embolizing material is observed (red arrows). **B:** compression with the transducer was useful to displace the colon, which disappears and allows better visualization of the uterus (U) and the anterior border of L5 and S1.

VAS: visual analog scale; SHPB: superior hypogastric plexus block; UAE: uterine artery embolization; L5: 5th lumbar vertebra.

dexamethasone,[23,24] antibiotics,[29] lidocaine[26,27], and gabapentin[25] was not compared with controls. Their use was decided based on reports in the literature.

Conclusion

This case series demonstrated the efficacy of ultrasound-guided SHPB for the management of pelvic pain after UAE. SHPB has an impact on the same-day discharge after UAE and patient comfort. Clinical trials are needed to confirm the superiority of the ultrasound-guided SHPB for the management of pelvic pain after UAE compared with fluoroscopic guidance. Ultrasound-guided SHPB is an easily accessible procedure with health, economic, and social implications. SHPB has the potential to make UAE an even more attractive option for middle-aged women with symptomatic myomas as an alternative to hysterectomy[8].

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of Individuals. This study was conducted in compliance with the Declaration of Helsinki (1964) and its subsequent amendments.

Confidentiality of Data. The authors declare they followed their center's protocol for sharing patient data.

Right to privacy and informed consent. Informed consent was not required for this observational study of information collected during routine clinical care.

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