

Uterine artery embolization prior to hysterectomy as a prevention of the risk of hemorrhage

Mariana Juárez^{1*}, Manuel A. Leal¹, Fausto M. Coronel², and Lino E. Cardiel¹

¹Service of Gynecology and Obstetrics; ²Service of Maternal Fetal Medicine. Hospital General de México "Dr. Eduardo Liceaga", Mexico City, Mexico

Abstract

Uterine leiomyomas are the most common tumors of the female genital tract, patients with uterine fibroids are usually asymptomatic. Approximately 20-50% of them experience acute symptoms such as pelvic pain, vaginal bleeding, or infertility, and will require treatment. Among the treatment options are conservative (hysteroscopy, laparoscopy or open myomectomy) and radical (hysterectomy) depending mainly on the reproductive desire of the patient. The purpose of presenting this series of clinical cases is to present a new alternative in the management of uterine leiomyomas, combining the use of uterine artery embolization and subsequent performance of total abdominal hysterectomy.

Keywords: Embolization. Uterine arteries. Hysterectomy. Transfusion. Hemorrhage. Myomectomy.

Introduction

Uterine leiomyomas are the most common tumors of the female genital tract, with an estimated incidence between 40 and 60% at 35 years and between 60 and 70% at 50 years in the general population. Patients with uterine fibroids are usually asymptomatic. Despite this, 20-50% of them experience acute symptoms such as pelvic pain, vaginal bleeding or infertility, and will require treatment¹. The standard treatment of symptomatic uterine fibroids is conservative (hysteroscopy, laparoscopy or open myomectomy) or radical (hysterectomy) depending mainly on the reproductive desire of the patient.¹ These tumors are densely vascularized. Therefore, myomectomy can often be a challenging procedure with significant risk of perioperative and postoperative bleeding, prolonged duration of the surgical procedure, postoperative complications, and need for transfusion. In the literature, it has been shown that

transfusion is necessary in up to 20% of cases after abdominal myomectomy¹.

As this is an innovative technique, there is not much information regarding the benefits in terms of the need for blood transfusion. According to the study conducted by B. Mclucas in 1999, an incidence of 12.5% is reported for patients in whom only myomectomy was performed against 0% in patients who were associated with uterine artery embolization and myomectomy. As well, they report a reduction of 75% in the blood loss quantification comparing both methods. (365 ml in simple myomectomy versus 56 ml in association with embolization)². As did N. Butori et al. in their publication made in 2011 and Cécile Malartic et al. 2012 publication, reporting a 0% need for blood transfusion with blood loss range of 0-800 ml^{3,4}. Also, a decrease in hospital stay time of an average of 3.6 days has also been demonstrated in patients with simple myomectomy versus 3.9 days in embolization with myomectomy². Reporting a range of 3-12 days³.

Correspondence:

*Mariana Juárez

E-mail: mjuarez_93@hotmail.com

Date of reception: 26-02-2022

Date of acceptance: 10-05-2022

DOI: 10.24875/HGMX.22000008

Available online: 09-08-2022

Rev Med Hosp Gen Mex. 2022;85(3):126-130

www.hospitalgeneral.mx

0185-1063/© 2022 Sociedad Médica del Hospital General de México. Published by Permanyer. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Some features of fibroids have already been identified as risk factors for such complications in open myomectomy: history of previous myomectomy, uterus volume greater than 20 centimeters, perioperative removal of more than 10 fibroids, and midline incisions^{1,5-9}.

The efficacy of uterine artery embolization is well documented for the treatment of uterine fibroids, alone or in combination with surgical myomectomy. Some studies on preventive embolization of uterine arteries (maximum 24 hours before surgery), have shown encouraging results with respect to blood loss, need for perioperative or postoperative transfusion, surgical revision and hemostatic hysterectomy¹⁰. Today, uterine artery embolization is an established procedure worldwide to treat fibroids as an alternative to surgery. However, the combination of this procedure and subsequent myomectomy is still subject to discussion.

Embolization is indicated for uterine fibroids that cause symptoms that significantly alter lifestyle, heavy menstrual bleeding, severe dysmenorrhea, anemia, pain, mass effect in the bladder or at the intestinal level^{11,12}. Its contraindications would include a viable pregnancy, active infection, uterine or ovarian malignancy¹³. The following complications of this procedure are known: hematoma at the puncture site, arterial thrombosis, false aneurysm, arterial dissection, migration of atherosclerotic plaque, allergy to contrast medium, with a total incidence of 1 to 2% in all procedures^{14,15}. It is extremely important to remember that uterine artery embolization can cause very significant pain after the procedure due to the ischemic changes that occur, presenting with greater intensity in the first 24 hours, with a maximum peak at 7 hours post-surgery. Therefore, joint management is recommended according to institutional protocol with the anesthesiology service for postoperative pain management, in some case series the application of epidural analgesia is even recommended in cases of uncontrollable pain¹⁶⁻¹⁹.

Case report

Patient 1 (Fig. 1)

A 35-year-old female with no significant medical history. Patient who started current condition of 1 year of evolution with increased abdominal volume, added increased amount of menstrual bleeding and dysmenorrhea. Ultrasonographic findings: uterus of 34.7x24.6x12.8 cm, myometrium with heterogeneous ovoid image of hypoechoic predominance with central and peripheral vascularity of 28.3x23.2x14.2 cm, transmural myomatosis. Embolization of the uterine arteries by radiointervention service,

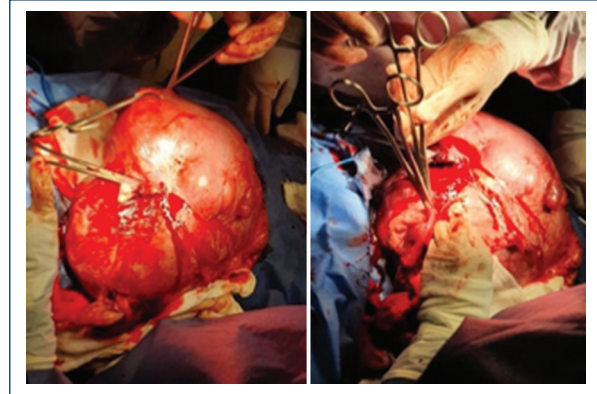


Figure 1. Uterus of approximately 30x14.5x6 cm with irregular edges, increased consistency. Clamps in round ligament, utero-ovarian ligament, uterine tube.

femoral route with an 18G needle, a 5Fr vascular introducer, both internal iliac arteries and subsequently both uterine artery were catheterized using Gelfoam paste, lidocaine, 0.5% Lauromacrogol, and 1 cc lipiodol. Splinting of the ureters is performed after performing a total abdominal hysterectomy by the Urology service with double J catheters. A gynecological procedure is performed where the following findings are reported: uterus of approximately 30x14.5x6 cm with irregular edges, increased consistency, ovaries of 3 x 2 cm, weight of the piece 8900 gr, total trans-surgical bleeding of 1800 cc (1335 ml associated with extraction of surgical piece). She was admitted to the operating room with a hemoglobin of 9.8 g/dl. A transfusion of 2 trans-surgical erythrocyte concentrates was performed by the anesthesiology service due to hemodynamic instability after removal of the surgical piece, as well as vasoactive drugs and the administration of 1 gr of tranexamic acid in single dose. In recovery area we found hemoglobin of 7.8 g/dl, transfusion of 2 additional packed red blood cells is indicated, subsequently reporting a hemoglobin of 8.7 g/dl. Clinical data suggestive of pneumothorax are found, so they request support from the cabinet by means of an antero-posterior chest X-ray where pneumothorax of 40% is evident. Placement of an endopleural tube was requested from the pulmonology service. Four days later, it was decided to remove the endopleural tube. Discharge from the gynecology service with follow-up of a double J catheter by urology in an outpatient clinic, which is withdrawn by said service.

Patient 2 (Fig. 2)

41-year-old female patient. Diagnosis of uterine myomatosis of large elements was made by private clinic and

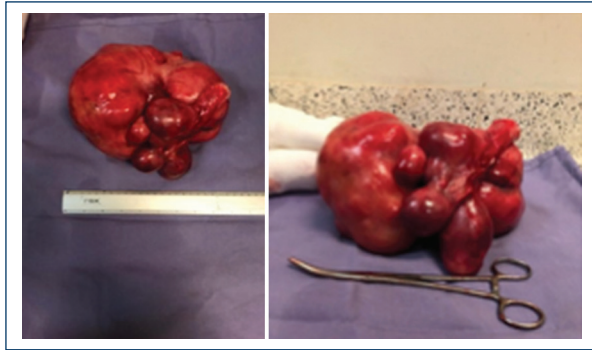


Figure 2. Uterus 6x5x4 cm, bilobed fibroid in the uterine fundus 25x12 cm, 3 fibroids in the posterior face of the uterus 6x5, 4x4, 3x2 cm respectively. Surgical piece removed.

they referred the patient to our unit for management. Magnetic resonance imaging cabinet study support is performed on 06.17.21: Large element Myomatosis FIGO 4, 6 y 7. Uterine artery embolization is performed on 08.10.21 by the radiointervention service: left uterine artery with 7 cc of embolizing agent consisting of Gelfoam mixture + 2 cc of sclerol + 3 cc of lipiodol; right uterine artery with 3 cc of embolizing material, a 100% decrease in tissue staining is observed. She was admitted to the gynecology operating room and the ureteral splinting was performed with a double J catheter by the urology service: laterally displaced ureteral meatus, at the expense of extrinsic compression secondary to uterine myomatosis. A total abdominal hysterectomy was performed where the following findings were reported: uterus 6x5x4 cm, bilobed fibroid in the uterine fundus 25x12 cm, 3 fibroids in the posterior face of the uterus 6x5, 4x4, 3x2 cm respectively, ovaries without alterations, total bleeding 830cc. In the recovery area, the presence of hematuria in the urine collection bag was noted, assessed by the urology service, who indicated not to remove the catheters until it was cleared. Upon admission with a hemoglobin of 14 g/dl, on the first postoperative day, a blood count was taken, where a decrease in levels up to 7.7 g/dl was noted, it was decided to transfuse an erythrocyte concentrate, with level of hemoglobin of 8.2 g/dl post-transfusion. Upon presenting adequate evolution, discharge from the service is decided and removal of double J catheters was performed post-surgical evaluation in the outpatient clinic with evidence of clear urine.

Patient 3 (Fig. 3)

30-year-old female. The current condition began a year earlier with increased abdominal perimeter and

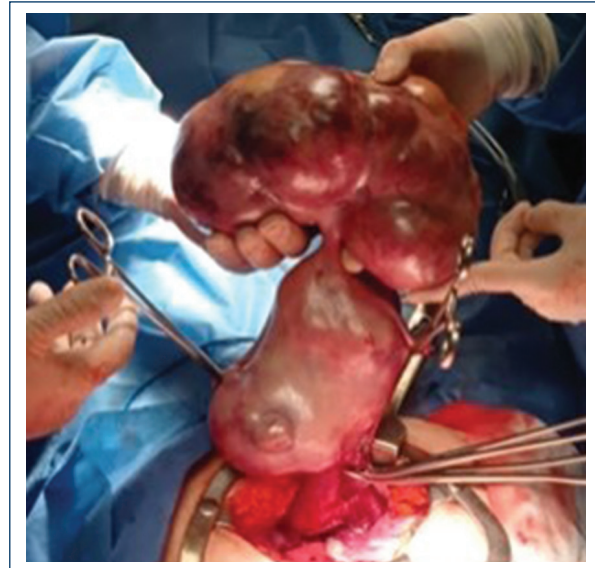


Figure 3. Uterus of 15x10x6 cm, irregular due to multiple fibroids, fibroid in the uterine fundus of approximately 17x12x10 cm. Surgical piece removed.

pain in the hypogastrium. On physical examination, the uterus was 25x18x15 cm, so pre-surgical tests were requested. Uterine artery embolization is performed on admission and a day later double J catheter placement is performed by the Urology service and a surgical intervention is performed where the following findings are reported: uterus of 15x10x6 cm, irregular due to multiple fibroids, fibroid in the uterine fundus of approximately 17x12x10 cm, right ovary of 3x2x2 cm, left ovary of 3x2x2 cm, weight of the piece 2,600 gr. Total bleeding 900 cc (390 ml associated with extraction of surgical piece). Patient with adequate clinical evolution, so two days after the intervention, double J catheters were removed and hospital discharge was decided. Patient who did not require transfusion of erythrocyte concentrates.

Comment

Three cases of leiomyomatosis are presented in which, according to our literature review on the success in the use of uterine artery embolization prior to myomectomy in reducing the rate of trans-surgical bleeding, it was decided to implement in our previous case to performing a total abdominal hysterectomy in order to demonstrate the usefulness of this method. As well as the splinting of the ureters by the urology service to protect these structures. It is important to remember that this method is used as a complement to simple

myomectomy, however, there is no report in the literature regarding the success of this embolization technique together with total abdominal hysterectomy. Our three patients had loss of uterine anatomy secondary to leiomyoma-type uterine tumors. It is important to note that in our three reported cases the same pre-surgical measures were implemented and to highlight the large size of the uterine fibroids to be treated in our patients.

Despite the success shown in the literature in the implementation of this method, we must be aware of the possible complications associated with this previously discussed treatment alternative. In the case of our patients, it is worth mentioning the complications that arose after surgical management, such as the need to use an endopleural tube secondary to pneumothorax, the need for blood transfusion, the permanence of a Foley catheter and double J catheters in patients 1 and 2. It is also important to consider that performing such procedures led to an increased hospital cost. In our hospital experience, by not implementing this embolization method in patients with this type of pathology, on average they would require a transfusion of 3-4 packed red blood cells. Just as the requirement of stay in the intensive care area on average for 1-2 days has been seen derived from trans-surgical hemorrhage. It is important to remember that we must subtract from the total surgical bleeding, the bleeding derived from our surgical piece, which represents 15% of the weight of the surgical piece. With the above, we would demonstrate that on average we find in our patients an average bleeding according to the literature reports. However, with our patient 3, success was evidenced with the pre-surgical measures previously mentioned as prevention of hemorrhage, without presenting complications derived from procedures or requiring transfusion of blood products.

Therefore, it is relevant to mention that it is only a case report of three patients, in addition to the fact that, as previously mentioned, this alternative procedure has not been implemented to carry out this surgical technique, so it would be necessary to report more cases to evaluate the success or failure of this innovation. Now our patients have adequate post-surgical evolution despite the complications that have arisen.

Conclusion

The objective of our case report is to propose a new therapeutic method for the management of uterine myomatosis of large elements in order to reduce the need

for transfusion of blood products in patients who are candidates for surgical management.

Regarding our cases, it is evident that derived from underlying pathology, our patients presented complications derived from both the surgical procedure and the placement of double J catheters. However, no complications associated with performing uterine artery embolization were reported. It is important to note that our patients presented a total distortion of the uterine anatomy that compromised the correct performance of our pre-surgical steps, and this could be associated with the complications raised in our cases reports. A decrease in the requirement for blood transfusions was observed, as well as a decrease in trans-surgical bleeding estimated according to our hospital experience, in addition to a decrease in the need to stay in the intensive care area derived from complications secondary to surgical bleeding. It is worth mentioning that in our third case there were no complications associated with the surgical procedure, there was no increase in the days of hospital stay, and no transfusion of blood products was required. Such a case is the success that we would expect to find in the rest of our patients who are waiting for surgical date by our protocol.

In addition, the small number of patients in whom this new treatment method has been implemented is emphasized, so our results would not be conclusive with respect to recommending or avoiding the use of this technique.

Acknowledgments

The authors acknowledge the gynecology and obstetrics service of the General Hospital of Mexico for granting us the facilities to carry out the pertinent activities to carry out this article, as well as the radiointervention service for their support in carrying out a fundamental part of our clinical case study.

Funding

There is no funding for this clinical case study.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments have been performed on humans or animals for this research.

Data confidentiality. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

References

1. Preoperative Uterine Artery Embolization (PUAE) Before Uterine Fibroid Myomectomy E. Dumoussset, P. Chabrot, B. Rabischong, N. Mazet, S. Nasser, C. Darcha, et al. *Cardiovasc Intervent Radiol* (2008) 31:514–520.
2. B. McLucas, L. Adler, Uterine fibroid embolization compared with myomectomy, *International Journal of Gynecology & Obstetrics*, Volume 74, Issue 3, 2001, Pages 297-299.
3. Noémie Butori, Hervé Tixier, Laurence Filipuzzi, William Mutamba, Boris Guiu, Jean-Pierre Cercueil, Serge Douvrie, Paul Sagot, Denis Krausé, Romaric Loffroy, Interest of uterine artery embolization with gelatin sponge particles prior to myomectomy for large and/or multiple fibroids, *European Journal of Radiology*, Volume 79, Issue 1, 2011, Pages 1-6.
4. Cécile Malartic, Olivier Morel, Yann Fargeaudou, Olivier Le Dref, Afchine Fazel, Emmanuel Barranger, Philippe Soyer, Conservative two-step procedure including uterine artery embolization with embosphere and surgical myomectomy for the treatment of multiple fibroids: Preliminary experience, *European Journal of Radiology*, Volume 81, Issue 1, 2012, Pages 1-5.
5. Ryan GL, Syrop CH, van Voorhis BJ. Role, epidemiology, and natural history of benign uterine mass lesions. *Clin Obstet Gynecol* 2005; 48:312-24.
6. Reducing the risk of bleeding after myomectomy: is preemptive embolization a valuable tool? Ylann Abrahamsi, Sophia Najid, Arthur Petit, Eric Sauvanet and Luigi Novelli. *CVIR* 2021.
7. Katsumori T, Nakajima K, Mihara T. Is a large fibroid a high risk factor for uterine artery embolization? *AJR Am J Roentgenol* 2003; 181(05): 1309-1314.
8. Berci V, Valcseva, Kozics D, et al. Safety and effectiveness of UFE in fibroids larger than 10 cm. *Cardiovasc Interv Radiol* 2015 33, (05): 1152-1156.
9. Smeets AJ, Nijenhuis RJ, van Rooij WJ, et al. Uterine artery embolization in patients with a large fibroid burde: long term clinical an MR follow up. *Cardiovasc Intervent Radiol* 2010; 33(05):943-948.
10. Gupta JK, Sinha A, Lumsden MA, Hickey M. Uterine artery embolization for symptomatic uterine fibroids. *Cochrane Database Syst Rev* 2014: CD005073.
11. Ravina JH, Herbreteau D, Ciraru-Vigneron N, Bouret JM, Houdart E, et al. Arterial embolisation to treat uterine myomata. *Lancet*. 1995 Sep 9;346(8976):671-2. doi: 10.1016/s0140-6736(95)92282-2. PMID: 7544859
12. Uterine Artery Embolization for Symptomatic Leiomyomata. Hans van Orverghen. Jim A. Reekers. Springer Science Business Media New York and the Cardiovascular and international Radiological Society of Europe (CIRSE) 2014.
13. Andrews TA, Spies JB, Sacks D et al (2004) Patient care and uterine artery embolization for leiomyomata. *J Vasc Interv Radiol* 15: 115-120.
14. Kim HS, Czuczman GJ, Nicholson WK, Pham LD, Richman JM (2008) Pain levels within 24 hours after UAE: a comparison of morphine and fentanyl patient/controlled analgesia. *Cardiovasc Interv Radiol* 31:1100-1107.
15. Hehenkamp W, Volkers NA, Birnie E, Reekers JA, Ankum WM(2006) Pain an return to daily activities after uterine artery embolization and hysterectomy in the treatment of symptomatic uterine fibroids: results from the randomized EMMY trial. *Cardiovasc Interv Radiol* 29: 179-187.
16. Roth AR, Spies JB, Walsh SM, Wood BJ, Gomez-Jorge J, Levy EB (2000) Pain after uterine artery embolization for leiomyomata: can its severity be predicted and does severity predict outcome? *J Vasc Interv Radiol* 11:1047.
17. Pron G, Mocarski E, Bennett J et al (2003) Tolerance, hospital stay and recovery after uterine artery embolization for fibroids, the Ontario uterine fibroid embolization trial. *J Vasc Interv Radiol* 14: 1243-1250.
18. Hehenkamp W, Volkers NA, Birnie E, Reekers JA, Ankum WM(2006) Pain an return to daily activities after uterine artery embolization and hysterectomy in the treatment of symptomatic uterine fibroids: results from the randomized EMMY trial. *Cardiovasc Interv Radiol* 29:179-187.
19. Kim HS, Czuczman GJ, Nicholson WK, Pham LD, Richman JM (2008) Pain levels within 24 hours after UAE: a comparison of morphine and fentanyl patient/controlled analgesia. *Cardiovasc Interv Radiol* 31:1100-1107.