

TREATMENT OF SYMPTOMATIC UTERINE FIBROIDS WITH UTERINE ARTERY EMBOLIZATION

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ARTICLE INFORMATION:

Article History

Received: 28 January 2012

Accepted in revised form:

25 November 2012

Published: 25 November 2012

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Keywords:

Uterine Fibroids, Uterine Artery Embolization, Interventional Radiology, Dysfunctional Uterine Bleeding.

ABSTRACT:

Uterine fibroids are the most common solid tumors of female genital tract; they develop in 20%–40% of women of childbearing age¹. The true prevalence of uterine fibroids is unknown, because more than 50% of these tumors are asymptomatic². Twenty percent to 30% of hysterectomies are performed to treat uterine fibroids that cause bleeding, pelvic pain, and/or refractory anemia³. However, therapeutic alternatives to hysterectomy exist for patients with these neoplasms. A primary alternative is treatment with gonadotropin-releasing hormone agonists, alone or in combination with more conservative surgical treatments, such as myomectomy or myolysis. Gonadotropin-releasing hormone agonists have not been proven to be a definitive solution⁴. Uterine artery embolization (UAE) was introduced in 1995⁵. Since that time it has been described as an alternative to hysterectomy for the management of non-acute uterine hemorrhage caused by fibroids⁶. The aim of our study is to evaluate the efficiency of uterine artery embolization in treatment of symptomatic uterine fibroids.

معلومات المقال

تاريخ المقال:

استلم في: 28 يناير 2012

قبل بعد المراجعة في: 25 نوفمبر 2012

نشر في: 28 نوفمبر 2012

المؤلف المسئول: وائل ابراهيم

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الكلمات المفتاحية:

الأورام الليفية الرحمية، الرحم الانصمام الشرياني، الأشعة التداخلية، نزيف الرحم مختلفة.

المخلص العربي:

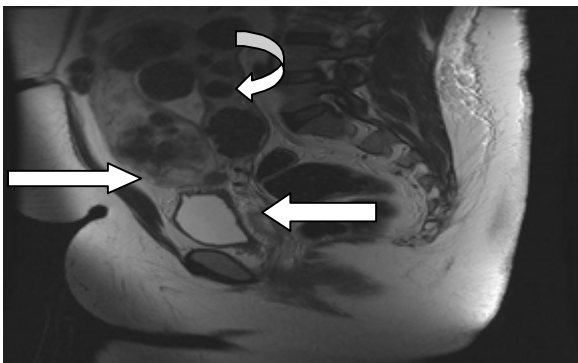
علاج الأورام الليفية الرحمية ذات الأعراض بالانصمام الشرياني الرحمي

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الأورام الليفية الرحمية هي أورام الصلبة الأكثر شيوعاً من المسالك التناسلية للإناث، وهي تتطور في 20% 40% من النساء في سن الإنجاب. صحيح أن نسب انتشار الأورام الليفية الرحمية غير معروف، لأن أكثر من 50% من هذه الأورام هي بدون أعراض. يتم تنفيذ عشرين في المئة إلى 30% من عمليات استئصال الرحم لعلاج الأورام الليفية الرحمية التي تسبب النزيف، وآلام الحوض، و / أو فقر الدم. ومع ذلك، فإن هناك بدائل علاجية لاستئصال الرحم موجودة لمرضى هذه الأورام. وثمة بديل هو الهرمون الموجه للغدد التناسلية والذي لم يتم الاعتراف به بصورة نهائية كعلاج أكيد، والذي يمكن استخدامه بمفرده أو بالاشتراك مع بعض العلاجات الجراحية التحفظية، مثل استئصال الأورام العضلية أو تحلل العضل. وقدم الانصمام الشرياني الرحمي في عام 1995 ومنذ ذلك الوقت وصف بأنه بديل لاستئصال الرحم لعلاج نزيف الرحم غير الحاد الناجم عن الأورام الليفية. والهدف من دراستنا هو تقييم كفاءة الانصمام الشرياني الرحمي في علاج أعراض الأورام الليفية الرحمية.

MATERIALS AND METHODS:

Our study population consisted of 48 women, 8 were not legible for uterine artery embolization and excluded, they have accidentally discovered non symptomatized fibroids. The other 40 women received uterine artery embolization, 8 of them were singles, 32 married, 3 of married women are nulliparous, 8 had history of miscarriage and the rest of 21 women are multiparaous, they are 25 to 52 years old with mean age of 38.8 years, only 3 of our patients are at post menopausal age. All of included patients had symptomatic uterine fibroids with failed hormonal therapy whom were candidates for hysterectomy, Patients whom wished to maintain fertility or had contraindications to surgery, nine of our patients had previous history of myomectomy. Eighty five percent of our patients (n=34) complaining of menorrhagia, 35% (n=14) had metrorrhagia, and 20% (n=8) had urinary and bowel symptoms related to pelvic fullness, the overall number of counted fibroids at our patients were 191 (mean=4.77), 50% (n=95) of mural type, 25% are subserosal, and 25% are of submucous type ,Fig 1,. Those patients referred to our IR unite by the gynecology department from July 2009 to Dec 2010.



Figur1. MRI pelvis Sagittal T2W without contrast, showing different types of fibroids ,Mural (short arrow), submucous (long arrow), subserous (curved arrow).

All included patients were examined by vaginal US and pelvic MRI Which was performed, before and at 3 and 9 months after embolization by using (MDXT MRI machine ,GE, USA) , the following MRI sequences were performed before and after embolization: - Coronal SSFSE 6/2 mm, Axial T2 FS 7/2 mm from renal hilum to symphysis pubis, Axial T2 HR 5/1 mm, Sagittal oblique T2 HR 5/1 mm, Short axis T2 5/1, Axial DWI6/1 free breathing (P value 50,150,600) from renal hilum to symphysis, we used 12 channel Torso coil, all patients received 20m hyoscine butylbromide IM before scanning to diminish intestinal movement., 30 second, delay back to back), Axial 2D T1 FS 8/2 mm post contrast from renal hilum to

symphysis pubis, Sagittal oblique 3DT1 fat sat 5/1 mm pre and post contrast (3 phases, 30 second, delay back to back), Axial 2D T1 FS 8/2 mm post contrast from renal hilum to symphysis, we used 12 channel Torso coil, all patients received 20m hyoscine butylbromide IM before scanning to diminish intestinal movement .MRI images were assessed by sub-specialized women imaging consultant, on each image, the number and site (s) of fibroleiomyomas was recorded. Total volume of fibroleiomyomas at each patient was calculated by measuring the maximum linear dimensions in three planes and applying the ellipsoid formula (product of the three measurements x 0.52) for each fibroleiomyomas, (for numerous fibroleiomyomas we calculated only the largest 8), then fibroleiomyomas total volume was calculated. Total percentage of reduction of fibroleiomyomas in each patient was analyzed at 3 months and 9 months post embolization. Before UAE, we had an interview at our IR clinic with all patients, they were asked to fill questioner with our case manager regarding their symptoms with scoring system from 1-5 regarding severity of symptoms, then patients were evaluated by anesthesiologist at pre-anesthesia clinic, an intravenous line and a Foley catheter were placed in all patients. The right common femoral artery was our preferred approach for access , a non selective pelvic angiogram was obtained, by using a 5- F pigtail catheter (Johnson & Johnson, Cordis Europe, Oosteinde, the Netherlands), to identify the uterine arteries, images were obtained at the rate of 2-3 frames/s. Nonionic contrast agents (UltravistR [iopromid] 370 IU per 100 ml, Schering-Germany, and Omnipaque R [iohexol] 350 IU 100 per ml, Nycomed, Ireland) were administered using an Angiomat 6000 (Liebel-Flarsheim Company, USA) automatic injector, the catheter was exchanged for a 5-F C2 Cobra catheter (Johnson & Johnson, Cordis, Europe, Oosteinde, the Netherlands), or F5 RUC catheter (Cook Europe, Denmark). Bilateral selective uterine artery catheterization was performed with the catheter tips placed within the transverse portions of the uterine arteries. A coaxial micro-catheter (Rebar by Micro Therapeutics, Inc. ev3, California, USA) was used in those cases in which the C2 Cobra or RUC catheters obstructed flow in the uterine arteries; the uterine artery was selectively catheterized. Polyvinyl alcohol particles (Polyvinyl Alcohol Embolization Particles, TRUFILL™ 150-1000 µm, Cordis Endovascular Systems, Miami, FL, USA) 300-

500 and 500-700 mic mixed with contrast agent, were used to embolize the uterine vascular bed by hand injection, under fluoroscopic guidance to avoid back flow of PVA. All patients received 1 g of cefazolin intravenously 2 hours before and immediately after the procedure. All procedures were done under general anesthesia or deep conscious sedation which induced with midazolam and fentanyl citrate. Technically successful embolization was considered achieved when we occluded the uterine vascular bed and led to markedly reduced flow in the uterine artery. The technical success rate with bilateral UAE in our study was 97%: 39 of 40 patients. A micro-catheter had to be employed in 12 patients (30%) of the 40 patients who underwent UAE. The mean polyvinyl alcohol dose received was 257 mg \pm 117 (SD) (range, 15–600 mg). The mean time to perform the procedure was 83.7 minutes \pm 30 (range, 70–150 minutes); the mean time to perform fluoroscopy was 37 minutes \pm 13 (range, 15–76 minutes). The analgesic regimen for all patients involved the use of PCA (personal control of analgesia) pumps to intravenously deliver morphine during the first 24 hours after the procedure. All patients were discharged within 24-48 hours, (with mean time of hospital stay of 40 hours), if they had no fever and had not requested pain relief medication in addition to that already prescribed. Our home medication regimen for the patients who underwent UAE is outlined in Table 1. Patients were instructed to take their temperature daily for 1 week and to contact our case manager by telephone at the first sign of any symptoms of concern.

RESULTS:

Patients were recruited consecutively during the study period, from July 2009 to Dec 2010, and there were 1 years of follow-up. All patients received single session of embolization except one patient which had sever spasm of left uterine artery, symptoms were persistent with unilateral embolization, so another session of embolization was performed for her, Fig 2

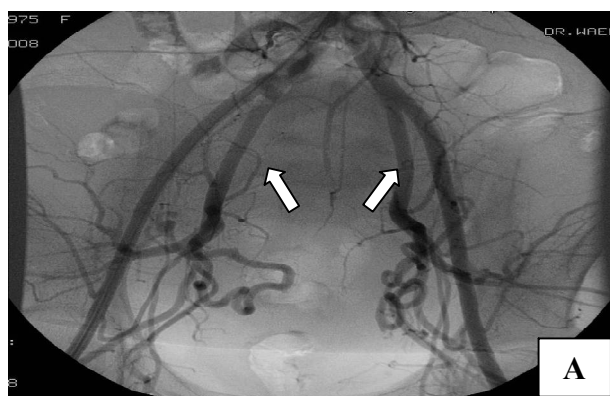


Figure 2. Pelvic angiogram A. Pre uterine artery embolization both uterine artery can be clearly seen (arrows). B. Post unilateral uterine artery embolization only left uterine artery can be seen.

We examined the patients to evaluate the efficiency of the uterine artery embolization interventions. After 9 months of follow-up, the overall clinical success rate for the 40 patients who underwent UAE, which was based on the cessation of bleeding, was 97% (39 of 40 patients). Twenty nine (72.5%) of 40 patients had a full recovery; five (12.5%) a partial recovery; five (12.5%) amenorrhea, and one (2.5%) needed surgical treatment after failure of embolization.

Day	Time	Medication
Day 1-3	7 AM	Percocet 1-2 tabs (oxycodone with acetaminophen) Toradol 10 mg (Ketorolac) Levaquin 500 mg (Levofloxacin)
	1 PM	Percocet 1-2 tabs (oxycodone with acetaminophen) Toradol 10 mg (Ketorolac)
	7 PM	Percocet 1-2 tabs (oxycodone with acetaminophen) Toradol 10 mg (Ketorolac)
	11 PM	Percocet 1-2 tabs (oxycodone with acetaminophen) Toradol 10 mg (Ketorolac)
Day 4-5	7 AM	Percocet 1-2 tabs (oxycodone with acetaminophen) Toradol 10 mg (Ketorolac)
	7 PM	Percocet 1-2 tabs (oxycodone with acetaminophen)
Day 6-10		Ibuprofen 200 mg every 6hrs

Table 1. Table of post uterine artery embolization home medication.

Four of the 29 patients who experienced clinical improvement had undergone unilateral embolization only. The mean dominant fibroid volume decreased in 97% of cases, at 3 months follow-up the fibroid volume reduction range from 11-100% (mean of 57.9%), after 9 months recalculation of fibroid volume reduction was done which show over all mean reduction of 65%. The mean uterine fibroid volume was 488.5 cm³ (range 23–3655 cm³) before embolization and 45.46 cm³ (range, 00–2300 cm³) after embolization, Fig 3 Treatment received analysis revealed that 4 (10%) of the 40 patients who underwent UAE, made

emergency department visits. The reasons for the emergency department visits are listed in Table 2. No one of them readmitted to the hospital. Six of the patients who underwent UAE show symptoms of post-embolization syndrome with mild degree which needed no hospital admission however 3 of them needed short stay at ER observation room for few hours, as well as one patient encountered severe pelvic pain which also treated at ER unite. Intra-procedural safety analysis revealed that 8 (20%) of the 40 patients who underwent UAE, had complications all of them were self limiting and needed no further management. Within the 30 days following the procedures, complications were recorded for 25 (62.5%) of the 40 patients who underwent UAE. The patients, who underwent UAE, resumed their routine activities after one or two weeks mean of 9 days.

DISCUSSION:

Ravina et al first performed UAE in patients with uterine fibroids previous to hysterectomy in 1994⁷ and later presented the method as a treatment alternative to hysterectomy⁸. Since then, a number of series involving patients with uterine fibroids who were treated with UAE have been reported in the literature⁹. Thirty seven percent to 90% of patients treated with uterine artery embolization have reportedly experienced a full recovery; and 86% to 96% have reportedly had overall improvements, including full, pronounced, moderate, or slight improvement and amenorrhea, as variously described in the literature¹⁰. Our results are within the ranges reported. The same is true with regard to the reduction in dominant fibroid volume, the reported measurements of which have been highly variable, between 20% and 100%, depending on the time of the follow-up examination after embolization¹¹. In our study, the results regarding hospital stay, emergency department visits, and readmissions are compared to data reported in the literature for those patient underwent hysterectomy¹². One purpose of our study was to compare the length of hospital stay between the two treatments. The results of this comparison demonstrated that the hospital stay for the patients who underwent UAE was shorter than that for the patients who underwent hysterectomy.

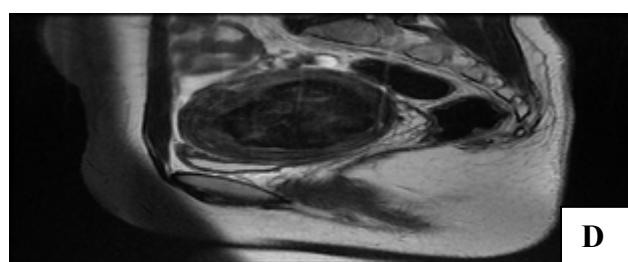
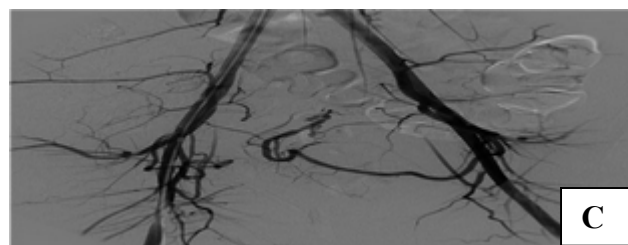
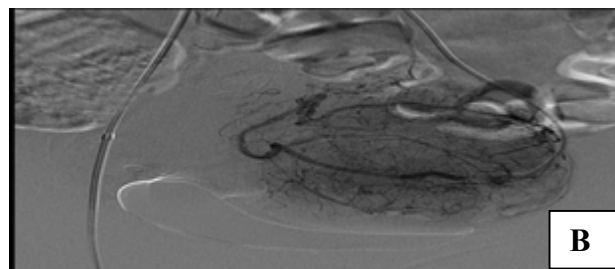
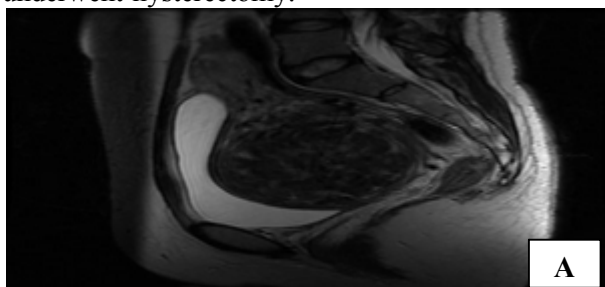


Figure3. A. Sagittal T2W images show sub-serous sizable fibroid. B. Pelvic angiogram showing both uterine arteries with main supply of fibroid through hypertrophied left uterine artery. C. Selective cannulation of left uterine artery followed by embolization. D. Post uterine artery embolization MRI showing significant volume reduction of fibroid .

Therefore, one could propose that UAE, as compared with hysterectomy, has proven to be an efficient treatment of abnormal bleeding in patients with uterine fibroids in our health care system. On the other hand, we want to emphasize that although the patients who underwent UAE made more emergency department visits than did those who underwent hysterectomy when comparing our result to reported data at literature¹³, the latter group tended to do so for major complications, whereas the UAE patients visited the emergency department because of post-embolization syndrome or pelvic pain. Pelvic pain in patients who have undergone UAE has been described in 83.7% or more cases¹⁴, but, to our knowledge, the seriousness of this complication has been discussed specifically in only one series, in which 4% of patients went to the emergency department and 8% were readmitted because of pain¹⁵. We believe that another interesting fact regarding our study is that the period before resuming normal activities for the patients who underwent UAE was substantially shorter than that reported for patients underwent hysterectomy¹⁶. An important result of our study is that we did not have to perform any post-embolization

A: Age. **A.S=** Arterial spasm, **U.A.D=** Uterine artery dissection, **G.A.P=** Gluteal artery perforation, **U.A.P=** Uterine artery

Table 2. Table of Intra or post uterine artery embolization complications

perforation, **C.R=** Contrast reaction, **VD=** Vaginal discharge, **P.S.H=** Puncture site haematoma, **U.R=** Urinary retention, **T.P=** Thigh prasthesia, **P.E.S=** Post embolization syndrome, **S.P.P=** Sever pelvic pain, **U.T.I=** Urinary tract infection, **R.U.C=** Reno uretral colic, **V.V=** Vulvovaginitis, **DVT=** Deep venous thrombosis.

	A	Intra-procedure complications					Post –procedure complications										
		Intra-procedure complications					Minor				Moderate					Major	
		A.S	U.A.D	G.A.P	U.A.P	C.R	V.D	P.S.H	U.R	T.P		P.E.S	S.P.P	U.T.I	R.U.C	V.V	D.V.T
1	37						+										
2	47					+									+		
3	31		+						+								
4	41			+							+	+					
5	42	+					+										
6	37																
7	43		+				+										
8	47							+									
9	41	+												+			
10	34						+									+	
11	38				+					+							
12	36			+													
13	29	+					+										
14	42																
15	33														+		
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28	41			+					+								
29	50						+				+	+					+
30	32					+					+	+					
31	44	+					+										
32	31																
33	32						+										
34	48	+												+			
35	46																
36	40						+										
37	46										+						
38	42																
39	52						+										
40	32	+															

hysterectomy procedures owing to the types of complications described in the literature—namely, pyometra and endometrial necrosis, hematometra, persistent pain, ureteral compression, infection, or acute septic uterine necrosis¹⁷ Two cases of hysterectomy with bowel resection performed owing to necrosis of a subserous fibroid⁽¹⁸⁾ and one death due to sepsis⁽¹⁹⁾ also have been reported in the literature. With regard to safety, the percentage of patients with complications was higher in the UAE group; however, the patients who underwent hysterectomy had more major complications than did those who underwent UAE.

CONCLUSION:

In light of the findings just described, one can conclude that UAE is safe and thus should be offered as an alternative treatment to patients whose only other therapeutic option is hysterectomy.

Assessment of the long-term outcomes of embolization is warranted, however, and, to that end, the patients who participated in this study will continue to be followed up for 2 years .

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