

Outcomes and complications of uterine artery embolization in patients with cervical ectopic pregnancy and ectopic pregnancies caused by surgical incision

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Received: November, 22, 2020 Accepted: January, 08, 2021

Abstract

Ectopic pregnancy is an urgent and life-threatening condition that must be diagnosed and treated rapidly. The aim of the current study was to evaluate outcomes and complications of uterine arterial embolization (UAE) in patients with cervical ectopic pregnancy and ectopic pregnancies caused by surgical incisions. In a retrospective study, all patients with cervical and incisional ectopic pregnancies treated by administration of methotrexate and bilateral angioembolization of the uterine artery between September 2012 and September 2017 were reviewed. Inclusion criteria include all pregnancies with abdominal or pelvic pain, vaginal bleeding or spotting with the diagnosis of cervical or incisional ectopic pregnancy undergoing the operation of uterine artery angioembolization. Mothers with a history of kidney diseases, high diastolic blood pressure, and allergy to radiocontrast agents, active hyperthyroidism, and unwillingness to undergo the surgery were excluded from the study. The patients' information about postoperative complications one day after the embolization and measured β hCG titration in 2nd, 4th, 6th and 8th week was reviewed. Fifty-six patients with inclusion criteria were investigated. The mean $\pm$ SD of age was 32.29 ± 5.39 years. The results showed that the treatment was successful in 98.2% of the patients. No specific complications were observed in the cases. Non-specific complications were reported in 47 (83.93%) Patients. The findings of the present study suggest that the UAE in patients with cervical ectopic pregnancy and ectopic pregnancies caused by the incision of previous surgeries was successful, and can be used as a definite treatment with maintaining the productivity of uterine.

Keywords: Uterine artery embolization, Ectopic pregnancy, Outcomes and complications

Introduction

Ectopic pregnancy (EP) is a condition where the fertilized egg is implanted in a place other than the inner wall of the uterus and begins to grow [1]. EP is a life-threatening condition that must be diagnosed and treated quickly [2-6]. EP is one of the most important causes of maternal mortality, especially in the first trimester of pregnancy [7], accounting for 10 to 15% of the deaths, particularly in developing countries [8]. Its incidence has increased in recent years due to advanced diagnostic techniques, with the help of infertility treatment methods, and an increase in the number of elective caesareans, especially in Iran [9]. EP occurs in 1.3 to 2 percent of pregnancies [10]. EP reduces the chance of future successful pregnancy [7].

EP can be treated by medications and surgery. In a condition where tubal pregnancy size is big, the β hCG level of serum is high and fetal heartbeats, the rate of medical treatment success is low [11]. Basically, surgical treatments include salpingectomy and salpingostomy. Invasive surgery of fallopian tubes may affect the fertility and the amount of ovarian reserve. Therefore, pharmacotherapy is a better medical approach for the patients tending to maintain their reproductive capacity [10, 12, 13]. However, the success rate of systemic methotrexate treatment alone is very low in the cervical ectopic pregnancy and cesarean scar ectopic pregnancy. The failure rate of the treatment was 57% in an ectopic pregnancy with scars of previous cesarean and 13-43% in the cervical

EP [14]. Hysterectomy may be necessary in cases where bleeding is not controlled by conservative methods. Unfortunately, the rate of damage to the urethra shows a sign of warning due to the proximity of the uterus to the cervix (with the balloon inside) in case of hysterectomy [15]. Another technique for the treatment of EP that has recently been considered is uterine artery embolization (UAE) [12, 14, 16, 17]. UAE can prevent severe uterine bleeding [17, 18]. However, this technique has not yet been widely utilized, and limited studies have been conducted in this area. A study in South Korea in 2017 showed UAE can be used as an effective and safe treatment for EP [19]. Another study carried out in the United States in 2015 showed that UAE has been successful in achieving homeostasis, and can be used as an EP treatment [20].

There has not yet been any agreement on the best treatment for non-tubal EP [17]. It is also recommended as one of the research priorities in the clinical guidelines [21].

Limited studies have been conducted on the use of UAE in the treatment of the EP. This study was carried out for the first time in Iran to determine the success rate of UAE in patients with EP.

Materials and Methods

In a cross-sectional retrospective study, all patients with cervical ectopic pregnancy and cesarean scar ectopic pregnancy treated with systemic methotrexate from September 2012 to September 2017 undergoing UAE in Rasht Razi hospital were reviewed in order to evaluate outcomes and complications of UAE in these patients. Ethics approval for this study was obtained from Guilan University of Medical Sciences Research Ethics Committees with this code: IR.GUMS.REC.1396.443.UAE surgery in Razi hospital is always performed by a single vascular surgeon with bilateral femoral access (cross-over). The opposite uterine artery was then catheterized and embolized with coils or a combination of coils and Gelfoam.

Inclusion criteria included pregnant women referring with symptoms of abdominal or pelvic pain or vaginal bleeding or spotting with the positive pregnancy test, whose cervical or incisional ectopic pregnancy was diagnosed by measuring the serum level of β hCG and ultrasonography, and were treated with systemic methotrexate prescription and UAE. Mothers with the history of kidney diseases, high diastolic blood pressure, allergy to radiocontrast agent, active hyperthyroidism, and unwillingness to

undergo the surgery were excluded from the study. Since all patients were examined during the above-mentioned period, the population census sampling method was used. Finally, 56 patients were enrolled in the study.

Patients' data were collected by medical record review. The data about postoperative complications one day after embolization therapy, and measured β hCG titration on the 2nd, 4th, 6th and 8th weeks after surgery were collected. The specific surgical complications including coil malposition, uterine artery rupture, dissection, pseudoaneurysm, fistula, and vasospasm during surgery and the nonspecific complications including inflammation and infection, pain and hematoma of the site, retroperitoneal hematoma, and accompanying curettage were investigated. The treatment was considered successful in case of the ability to maintain uterus.

The data were analyzed using SPSS version 18. In this study, qualitative variables were described by frequencies and percentages and quantitative variables were described by median (minimum-maximum). The association between complications with mass size and age was analyzed using Fisher's Exact Test and Mann Whitney tests repeatedly. $P < 0.05$ was considered as statistical significance.

Results

In this study, 56 women with ectopic cervical pregnancy and ectopic pregnancies due to the incision of previous surgery were studied. The mean $\pm$ SD age of the subjects was 32.29 ± 5.39 years (range: 18-42 years). Table 1 shows the frequency of the variables in patients with cervical and incisional ectopic pregnancy. The results of the study showed that the treatment was successful (maternal capacity to maintain uterus) in most of the cases (98.2%).

In this study, no significant association was observed between non-specific complications and age or mass size (Table 2).

Discussion

EP is the leading cause of death in the first trimester of pregnancy. Its incidence correlates with the existence of the pelvic inflammatory disease, cesarean delivery, dilation and curettage, use of IUDs, use of auxiliary fertility technology and pregnancy at the age of more than 35 years. Attention to EP treatments has led to a significant reduction of maternal mortality [16]. The patients are treated based on the prevention of severe complications and the maintenance of fertility [22]. In the present study, the mean $\pm$ SD age of women with EP was 32.29 ± 5.39

Table 1. The Frequency of the variables in patients with cervical and incisional ectopic pregnancy

Variable	Subgroup	Number (%)
Mass Size	<3 cm	14 (25)
	3-5 cm	30 (53.57)
	>5 cm	12 (21.43)
β hCG titration	Decreasing	56 (100)
	Increasing	0
Accompanying curettage	Yes	52 (92.86)
	No	4 (7.14)
Fetal heart pulse before embolization	Yes	4 (7.14)
	No	52 (92.86)
Non-specific complications	No	9 (16.07)
	Pain in the surgery site	44 (78.57)
	Retroperitoneal hematoma	3 (5.36)
	Inflammation and infection	0
Specific complications	Coil malposition	0
	Uterine artery injury	0
Success percentage	Yes	55 (98.2)
	No	1 (1.8)

Table 2. The Association between complication with age and mass size in patients with cervical and incisional ectopic pregnancy

Variables	Without complication	With complication	Total	p-value
Mass size				
<3 cm	1 (7.14)	13 (92.86)	14 (25.00)	
3-5 cm	7 (23.33)	23 (76.67)	30 (53.57)	
>5 cm	1 (8.33)	11 (92.67)	12 (21.43)	
Frequency (%)				0.430*
Age				
Median (Min-Max)	34.00 (18-38)	33.00 (18-42)	33.00 (18-42)	0.646**

* Fisher's Exact Test ** Mann Whitney test

years. In another study in South Korea, the mean age of women was 35.2 years found in 13 subjects [17].

In this study, no statistically significant difference between non-specific complications and age was observed. Similar results were reported by Dragusin et al. in Romania and no statistically significant difference was found between age and non-specific complications [20]. In a study by Shu Zhang et al., no significant relationship was observed between the patient's age in both groups receiving a single dose of methotrexate and UAE method [19]. In most previous studies, age has been identified as a risk factor for EP. However, no relationship between patient's age and non-specific complications of EP was seen in this study.

Also, no significant relationship was found between specific complications and mass size or gestational sac in the present study. In a prospective cohort by Xia et al., 67 patients with cervical EP were studied. In the study, 26 patients were treated with UAE and topical injection of methotrexate, 16 patients

were treated with curettage after UAE therapy, and 25 patients were treated with intramuscular methotrexate and curettage. Consequently, the results showed no significant difference between the size of the gestational sac or mass in two groups with and without embolization, which is consistent with the results of the present study [23]. In the present study, the success rate of the UAE method was 98.2%, and only one case led to hysterectomy (1.8%). Kwon et al. reported that the success rate of this method was 76.9% [17]. Yang et al. studied 66 women with EP in the previous Cesarean section scar. The success rate of the treatment in the group undergoing UAE was significantly higher (89.5%) than that in the two groups of systemic methotrexate therapy (58.8%) and treatment by dilatation and curettage (27.3%) [24]. In Krissi's study, out of 25 patients undergoing UAE, 24 patients (96%) were treated successfully [14]. Firouznia et al. showed that out of 23 patients with symptomatic fibroid undergoing UAE, 14 patients (61%) were re-pregnant [25]. A Chinese study

investigated 26 patients with EP. 14 patients underwent UAE with intrauterine injections of methotrexate (UAE group), and 12 patients received a single dose of intramuscular methotrexate injection with uterine curettage (non-UAE group). All the 14 patients in the UAE group were treated successfully, and one patient in the non-UAE group had vaginal bleeding greater than 1200 ml during the curettage of the uterus, and the patient received emergency treatment of UAE [19].

In the study of Gerardo et al., about 33% of the cervical EPs led to hysterectomy [26]. There was no specific treatment protocol for this on the discretion of the physician for each patient [26].

UAE is effective in the treatment of this type of pregnancy by blocking the blood flow of the uterine arteries, reducing the vascularization and trophoblastic degeneration [24]. However, this method is still not used pervasively. Limited studies have been conducted in this area and there is no agreement on the best treatment for this type of EP [15, 17].

One of the limitations of this study is its nature of the retrospective research and incomplete medical records in some patients regarding certain information such as an EP site. This is because the EP cases in the Cesarean scar were not distinguishable from the cervical EP. Also, follow-up was not examined for re-pregnancy in the present study. One of the strengths of this study was its relatively high sample size. Considering the fact that all patients were treated with systemic methotrexate, it is suggested that a clinical trial is conducted for studying the effect of local injection of methotrexate along with UAE on the treatment of non-tubal EP in future studies.

UAE is successful in patients with cervical and ectopic pregnancy and ectopic pregnancies due to the incision of previous surgery and can be considered as a definitive treatment with maintaining the uterus ability. In addition, it can be used as an effective and safe intervention in the treatment of EP, especially by vascular surgeons due to the absence of any specific complications.

Acknowledgments

The authors thank Razi Clinical Research Development Unit and all the women who participated in this study for their time and generosity.

Author contribution

All authors contributed equally in all parts of article and approving the final version of the manuscript before submission

Conflict of Interest

Authors declare no conflicts of interest.

Ethical declaration

Ethics approval for this study was obtained from Guilan University of Medical Sciences Research Ethics Committees with this code: IR.GUMS.REC.1396.443.

Funding source

There was no source of funding.

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