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Original Research Article

A retrospective study on ectopic pregnancy aspiration by transvaginal ultrasound at Institute of Kidney Diseases And Research Centre

Vineet V. Mishra, Priyanka H. Rane*, Rohina S. Aggarwal, Kunur N. Shah

Department of Obstetrics and Gynecology, Institute of Kidney Diseases and Research Centre, Asarwa, Ahmedabad, Gujarat, India

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*Correspondence:

Dr. Priyanka H. Rane,

E-mail: pborole26@gmail.com

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ABSTRACT

Background: Majority of the reports suggest that the frequency of ectopic pregnancies have grown in the last 30 years, especially in patients conceived through artificial reproductive techniques (ART). To prevent severe morbidity and mortality its prompt diagnosis and appropriate management is important. In a select patient population, most of the unruptured, live ectopic pregnancies can be successfully managed without surgical intervention using trans-vaginal ultrasound guided aspiration and instillation of local injection KCl or administration of systemic Inj. Methotrexate.

Methods: This study is a hospital based retrospective cohort study from January 2014 to December 2022 on patients who presented to Institute of Kidney Diseases and Research Centre (IKDRC) with unruptured ectopic pregnancy confirmed with ultrasound and β HCG. All the patients were analyzed according to history, clinical presentation, investigations, treatment and complications.

Results: β -HCG day 1 or 2 post procedure dropped in all cases but in variable levels ranging from 1.3% to 85.88%, while the drop during days 7-10, was more significant and reassuring; ranged from 48.69% to 98.95%.

Conclusions: By aspiration of ectopic gestational sac transvaginally under ultrasonographic guidance it is able to preserve the integrity of uterus and fallopian tube and thus the future fertility. The study will educate other healthcare professionals.

Keywords: Ectopic, Pregnancy, Transvaginal ultrasound guided aspiration

INTRODUCTION

Ectopic pregnancy is a life-threatening disease. Its incidence is significantly increased after tubal surgery and after embryo transfer in in-vitro fertilization techniques. Early unruptured tubal pregnancies are now being diagnosed more frequently, since both ultrasound techniques and β -chorionic gonadotropin (β HCG) assays are more readily available. According to the Centers for Disease Control and Prevention, ectopic pregnancy accounts for approximately 2% of all reported pregnancies.¹ Despite improvements in diagnosis and management, ruptured ectopic pregnancy continues to be

a significant cause of pregnancy-related mortality and morbidity. The prevalence of ectopic pregnancy among women presenting to an emergency department with first-trimester vaginal bleeding, or abdominal pain, or both, has been reported to be as high as 18%.²

The fallopian tube is the most common location of ectopic implantation, accounting for more than 90% of cases. However, implantation in the abdomen (1%), cervix (1%), ovary (1-3%), and caesarean scar (1-3%) can occur and often results in greater morbidity because of delayed diagnosis and treatment.^{3,4} An ectopic pregnancy also can co-occur with an intrauterine pregnancy, a condition

known as heterotopic pregnancy. The risk of heterotopic pregnancy among women with a naturally achieved pregnancy is estimated to range from 1 in 4,000 to 1 in 30,000, whereas the risk among women who have undergone in vitro fertilization is estimated to be as high as 1 in 1004.⁵ Caesarean scar ectopic pregnancy is a rare condition and incidence is reported as 1:1800 to 1:2216 of total pregnancies at a rate of 6.1% of all ectopic pregnancies in women with a history of previous caesarean section.⁶ Ovarian pregnancy constitutes up to 3% of ectopic pregnancies.⁷

Women with a history of ectopic pregnancy are at increased risk of recurrence. The chance of a repeat ectopic pregnancy in a woman with a history of one ectopic pregnancy is approximately 10%. In a woman with two or more prior ectopic pregnancies, the risk of recurrence increases to more than 25%.² Variety of treatment modalities have been utilized ranging from systemic or local medical management minimally invasive procedures such as transvaginal aspiration of sac content and uterine artery embolization to more radical surgeries.⁸⁻¹³

We present a hospital based retrospective study of successful management of this rare form of ectopic pregnancies done in IKDRC, India utilizing ultrasound guided transvaginal aspiration of the sac content. We present about the risk factors, procedure complications in the study.

METHODS

This was a hospital based retrospective study diagnosed and treated at Obstetrics and Gynaecology department of Institute of Kidney Diseases and Research Centre, Ahmedabad, India from January 2014 to December 2022. The study was approved by Institutional Ethical committee. Detailed history and clinical evaluation were noted. Pregnant women with unruptured ectopic gestational sac on ultrasonographic evaluation were included in the study and patients who were hemodynamically unstable, with ruptured ectopic and with hemoperitoneum were excluded. Transvaginal Ultrasound with Voluson E8 or Voluson E10 USG machine is used to diagnose ectopic pregnancies in women with positive urine test or serum β -hCG titres positive for pregnancy.

Sonographic criteria for diagnosis of unruptured ectopic pregnancy was - a) empty uterine cavity, with gestational sac located at cervical region (cervical pregnancy), b) ampullary region of fallopian tube (tubal pregnancy), c) a gestational sac embedded within myometrium and fibrous tissue of caesarean section scar at lower uterine segment (caesarean scar ectopic pregnancy-CSEP), d) at gestational sac at ovarian site (ovarian pregnancy) and e) a high velocity low impedance vascular flow surrounding the gestational sac. After the sonographic diagnosis, patients were thoroughly counselled regarding the treatment option available and risks - benefits.

TVS guided aspiration of ectopic sac was performed under general anaesthesia using a 17 gauge oocyte retrieval needle in hemodynamically stable patients after obtaining informed consent. A double lumen was used to aspirate and to inject. Under transvaginal ultrasound guidance (Voluson E8), using the transvaginal probe, the needle was introduced through the nearest vaginal fornix into the chorionic sac cavity. At first step aspiration of amniotic fluid and gestational sac was done and in cases where cardiac activity is present, Injection KCL (potassium chloride (0.5-1ml, 2 mEq/ml solution) was injected in sac, causing immediate cessation of cardiac activity. Dissection microscopy for chorionic villi was performed on aspirates before submission for permanent histology. Patients were kept under observation for 48 hrs. Intramuscular MTX (50mg/m² body surface area) was administered in cases with live ectopic pregnancies after confirming normal liver and renal functions.

Average time taken for the procedure was 20-30 mins. Follow up of patients was taken by transvaginal ultrasound and quantitative β HCG titres until levels come within normal limits. β HCG level on day of transvaginal aspiration was taken as day zero β HCG. Follow up β HCG level was taken on 1-2 days, 7-10 days and 28 days. Final resolution was considered when β HCG returned to <5 mIU/ml.

Statistical analysis

Data was collected and recorded in Microsoft excel. Categorical numerical variables were expressed as count / percentage

RESULTS

The incidence of unruptured ectopic pregnancies in our study was 40 (14.98%) from January 2014 to December 2022 who underwent ectopic aspiration under transvaginal ultrasound guidance. Mean gestational age at diagnosis was 6.6 weeks (range 5-10 weeks). 40% of patients showed cardiac activity. Risk factors were history of abortions, tubal surgery and infertility patients (78%). β HCG Day 1 or 2 post procedure dropped in all cases but in variable levels ranging from 1.3% to 85.88%, while the drop during days 7-10, was more significant and reassuring; ranged from 48.69% to 98.95%. Patients showing cardiac activity showed initial rise in β HCG on 1-2 days and then there was rapid fall in β HCG. All patients were successfully managed by transvaginal ultrasound guided ectopic aspiration and only one patient was managed surgically for ruptured ectopic post ectopic aspiration. Ultrasound examination post aspiration showed collapsed sacs. Dissection microscopy for chorionic villi was performed on aspirates before submission for permanent histology. Cytology examination of the aspirated tissue showed embryonic tissue in 3 cases and trophoblast and chorionic villi or chorionic villi only in the remaining cases.

Table 1: Incidence.

	Number	Percentage
Total pregnancies	9865	100%
Ectopic pregnancies	267	2.7%
Ectopic aspiration	40	14.98%

Table 2: Parity.

Parity	Frequency/ Number	Percentage
1	07	17.5 %
2	04	10%
3	26	65%
>4	03	7.5%

Table 3: Modes of conception.

Modes of conception	Number of patients	Percentage
IVF conceived	26	65%
Spontaneous conceived	13	32.5%
IUI conceived	01	2.5%

Table 4: Risk factors.

Risk Factors	Number of patients	Percentage
History of tubal surgery	03	7.5%
IUCD	0	0
History of caesarean section	02	5%
Previous abortion	11	27.5%
Previous ectopic	03	7.5%
Infertility	10	25%
None	05	12.5%

Table 5: Site of ectopic – tubal, cervical, ovarian, scar ectopic.

Site of ectopic	Number of patients	Percentage
Ovarian	01	2.5%
Cervical heterotopic	01	2.5%
Tubal	36	90%
Scar ectopic	02	5%
Total	40	100%

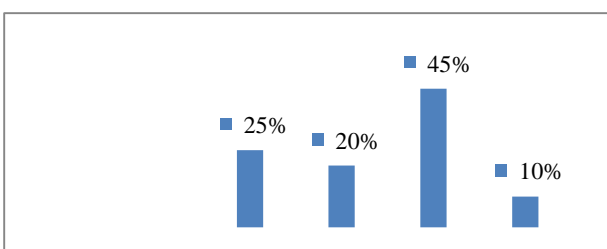


Figure 1: Age.

Table 6: Clinical presentation.

Signs and symptoms	Number of patients	Percentage
Asymptomatic	05	12.5%
Amenorrhea	38	95%
Lower abdominal pain	35	87.5%
Vaginal bleeding	30	75%
Fornices tenderness	28	70%
Cervical tenderness	20	50%

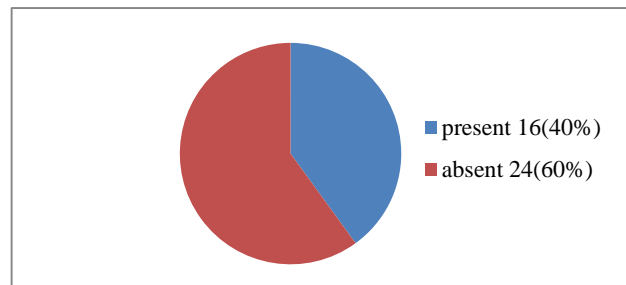


Figure 2: Fetal cardiac activity.

Table 7: Intra procedure along with ectopic aspiration.

Ectopic aspiration with	Number of patients	Percentage
Inj KCL	04	10%
Inj Methotrexate	03	7.5%

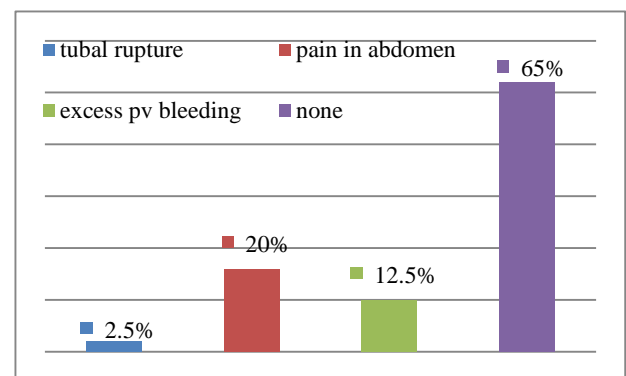


Figure 3: Post procedure complications.

DISCUSSION

In this study majority of women in whom ectopic aspiration was done were in the age group 31-35 years. Majority of women with ectopic pregnancy were multigravida (82.5 %) while (17.5%) were primigravida. Several studies show that multiparous women are found to be more prone to ectopic pregnancy - Gaddagi et al 62.2%, Shetty K et al 83.9%, Panchal D et al 81.66% and Poonam et al 83.6%.¹⁴⁻¹⁷ Multiple pregnancies and infections that cause tubal damage are most likely to have increased occurrence in multigravida women.¹⁸

The commonest presenting complaints are abdominal pain, amenorrhea and abnormal vaginal bleeding.

Clinical signs include abdominal tenderness, cervical tenderness and adnexal tenderness. In our study 87.5% patients presented with lower abdominal pain and 75% vaginal bleeding while 5 patients (12.5%) were asymptomatic. Yu et al reported in their series of 100 cases

with scar ectopic pregnancies that 45% patients were asymptomatic, 55% had vaginal bleeding and 7% had pain in lower abdomen.¹⁰ In a study done by Porwal Sanjay et al, 87.5% reported with pain in abdomen and 67.5% encountered bleeding per vagina.¹⁹ In present study fornix tenderness in 70% which is similar to Gaddagi et al study with 70.3% and Shetty K et al with 48.4%.^{14,15}

Table 8: Clinical presentation of ectopic pregnancy.

Clinical presentation	Present study	Yu et al ¹⁰	Porwal et al ¹⁹	Gaddagi et al ¹⁴	Shetty K et al
Asymptomatic	12.5%	45%	-	-	-
Amenorrhea	95%			75.7%	77.4%
Pain in abdomen	87.5%	7%	87.5%	89.2%	80.6%
Bleeding per vagina	75%	55%	67.5%	43.2%	61.3%
Fornices tenderness	70%	-	-	70.3%	48.4%
Cervical tenderness	50%	-	-	75.7 %	51.6%

Table 9: Risk factors in ectopic pregnancy.

Risk Factors	Present study	Samiya et al ²³	Shetty et al ¹⁵	Porwal et al ¹⁹
Tubal surgery	7.5%	-	3.2%	10%
IUCD	-	-	6.4%	5%
Cesarean section	5%	-	-	-
Previous abortion	27.5%	21.05%	29%	-
Previous ectopic	7.5%	5.2%	3.2%	5%
Infertility	25%	8.77%	3.2%	22.5%
None	12.5%	-	-	-

Cervical tenderness is 50% in present study similar to Gaddagi et al 75.7% and Shetty et al 51.6% as shown in Table 8.^{14,15} These features help in early diagnosis of ectopic pregnancies. The diagnostic tools used for diagnosis of ectopic pregnancy are urine pregnancy test, serum β HCG and ultrasound. Ultrasonography can definitively diagnose an ectopic pregnancy when a gestational sac with a yolk sac, or embryo, or both, is noted in the adnexa; Measurement of the serum β HCG level aids in the diagnosis of women at risk of ectopic pregnancy.^{4,5} Serial measurement of β HCG and progesterone concentrations may be useful when the diagnosis remains unclear.²⁰ Ultrasound guided aspiration of the gestational sac content has been used as a minimally invasive approach.²¹

Every sexually active, reproductive-aged woman who presents with abdominal pain or vaginal bleeding should be screened for pregnancy, regardless of whether she is currently using contraception.^{2,3} Women who become pregnant and have known significant risk factors should be evaluated for possible ectopic pregnancy even in the absence of symptoms. In our study major risk factors are history of previous abortions, tubal surgery and infertility

(85%). In this study the most common site of ectopic was ampulla (51%), cornual (21%), at infundibulum (16%), isthmus (12%). Ampullary part of the tube was commonly involved in most of the ectopic pregnancies in other studies.²²

In the present study most common risk factor was history of previous abortion which was seen in 27.5% which is similar to Samiya et al study with 21.05% and 29% in Shetty et al study.^{15,23} In present study 25% were infertility related which is similar to Porwal et al study 22.5% as shown in Table 9.¹⁹

In our study β HCG day 1 or 2 post procedure dropped in all cases but in variable levels ranging from 1.3% to 85.88%, while the drop during days 7-10, was more significant and reassuring; ranged from 48.69% to 98.95%. Our outcome is in concordance with Maha Al Bassam et al study which showed percentage drop of β HCG during days 1-2 post ultrasound guided transvaginal aspiration in 11 patients ranging from 1.1% - 74.7% and drop during 7-10 days from 45.7% to 92.5%.²⁴ Ectopic pregnancy is implantation of a pregnancy other than intrauterine site. Other implantation sites are caesarean scar, ovarian,

heterotopic are sites. In our study these types of ectopic pregnancies account for 5% scar ectopic, 2.5% cervical heterotopic and 2.5% ovarian. These are rarest forms of ectopic pregnancies but low implantation ectopic pregnancies are becoming a common finding.²⁵ There are serious complications associated with these ectopic pregnancies such as uterine rupture, massive bleeding and life-threatening complications after 1st trimester, therefore termination in 1st trimester is strongly recommended.^{25,26} Methotrexate use was used in 3 cases and KCL injection in 4 cases in conjunction with aspiration of the gestational sac. The usual technique for injection of methotrexate use is 20-22 gauge needles.^{26,27} In our study we have used 17 gauge needles with double lumen for aspiration of the embryo and injection of methotrexate. In a study done by Hwu et al 16 gauge double lumen needle was used.²¹ Recently, Nawroth et al, also described the combined effect of local and systemic MTX administration with or without aspiration.²⁸ Potassium chloride (KCL), or hyperosmolar glucose, or a hypertonic solution of sodium chloride has been used as well.²⁹⁻³¹ Mansour et al reported the use of oocyte-retrieval needles to aspirate a live six-to-eight-week embryo in cases of multifetal pregnancy reduction.³² At this gestational age, the embryo is fragile and soft so it is easily aspirated through a 17 gauge needle. When a progressive reassuring drop is seen in β HCG, follow up with ultrasound might not be indicated as the residual sac could continue to be detected on ultrasound as echogenic area before complete regression for 2 months.^{21,33} The resulting intermittent vaginal bleeding while the tissue is being reabsorbed cause the patient some anxiety, so this aspect of the process should be fully explained to the patient.

Limitations

This was a single centered study with small sized samples. So, the findings of the study may not be generalized in all ectopic pregnancies.

CONCLUSION

Early identification of risk factors, diagnosis with essential aids like trans vaginal ultrasound and β HCG and timely intervention will definitely help in reducing morbidity and mortality and to improve reproductive outcome. Trans vaginal ultrasound guided aspiration can be safely used to treat ectopic pregnancies as it is a minimally invasive approach and they avoid long treatment duration, thereby potentially reducing the risk of morbidities associated with these rare, yet increasing in incidence condition, thus preserving patient's fertility.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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