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**Original Research Article**

# Comprehensive management of ectopic pregnancy at a tertiary care hospital

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## ABSTRACT

**Background:** The study was conducted to determine incidence, common type, risk factors, clinical presentation and to formulate standard management protocol of ectopic pregnancy in our hospital.
**Methods:** This study was a prospective observational study conducted at the department of obstetrics and gynecology, SVBP Hospital, LLRM Medical College, Meerut.
**Results:** In our study, 52 patients were diagnosed with ectopic pregnancy making incidence of 1.06%. Majority 50% of cases were within the 25-30 years and were multiparous gravida 4 (25%). The leading risk factor was history of previous abdomino-pelvic surgery (11.54%). Majority of cases had tubal ectopic pregnancy (80.8%) and there were 4 cases of caesarean scar ectopic followed by 1 case of heterotopic pregnancy. In our study 100% of cases presented with amenorrhoea, lower abdominal pain in 80.7% cases and bleeding per vagina in 17.31% cases. Majority of patients (81.82%) were managed surgically. 39 cases had unilateral salpingectomy out of which 11 had contralateral tubal ligation done. Salpingotomy was done in 1 case. 4 cases had surgical removal of caesarean scar ectopic. 18.18% cases received medical management.
**Conclusions:** Early diagnosis, better health care facilities, management and blood availability help in reducing mortality rates.

**Keywords:** Ectopic pregnancy, Heterotopic pregnancy, Salpingectomy

## INTRODUCTION

Ectopic pregnancy is a clinical condition where a fertilized egg is implanted outside the uterine cavity. Its incidence is around 1-2% of all pregnancies.[1-4] Diagnosing ectopic pregnancy can be challenging because the classic triad of symptoms (lower abdominal pain, amenorrhea and vaginal bleeding) is not always present. Ectopic pregnancy ranges from non-specific symptoms to a state of shock if there has been bleeding from a ruptured ectopic. Effective management of ectopic pregnancy depends on the patient's clinical status, size and location of the ectopic pregnancy.

### *Sites of implantation*

Extrauterine pregnancies is implanted in locations outside the uterus. The most common site for ectopic pregnancies is the fallopian tubes, constituting around 1% of all pregnancies.[5] Within the fallopian tubes, different segments may be affected, including the ampulla, isthmus, infundibulum, and interstitial region.[6] Abdominal pregnancies can be divided as primary or secondary. Ectopic pregnancies may also be occurring in various locations such as the cervix, angular region, cornual area, ovary and even in the previous scar tissue, though the latter comprises less than 1% of cases.

***Etiology***

Salpingitis and pelvic inflammatory disease (PID) constitute a major cause, due to adhesions and narrowing of the tubal lumen which disrupt the normal transport of the fertilized egg. Iatrogenic factors, including contraception failure and complications of IUCDs, can elevate the risk of tubal pregnancies.[7] Sterilization failure and the use of progestin-only pills also contribute due to tubal motility impairment.[8] Tubal surgeries and pre-existing tubal pathologies influences the structure of the fallopian tubes. Artificial reproductive technology and history of a prior ectopic pregnancy, fallopian tube's developmental defect and prior abortions poses a risk for ectopic pregnancy.

***Clinical features of ectopic pregnancy***

The symptoms of ectopic pregnancy include amenorrhea (6-8 weeks), vaginal bleeding and abdominal and shoulder-tip pain. Signs include pallor, shock and tense and tender abdomen, bowels distended, shifting dullness present, muscle guarding absent on per abdominal examination. On per vaginal examination- vagina is blanched and white, uterus is slight bulky and fornix is tender.

***Fate of tubal ectopic pregnancy[9]***

It can be in the form of tubal mole, abortion or tubal rupture.

Interstitial rupture occurs at 4 months, isthmic ruptures at 6-8 weeks, while ampullary at around 8-12 weeks.

***Diagnosis of ectopic pregnancy[10-11]***

*Serum β-HCG concentration[12]*

When BHCG level is >1500 IU/l and uterine cavity appears empty in TVS or β-HCG level > 6000 IU/l and there is empty uterine cavity in TAS- it is suggestive of ectopic pregnancy.[13]

*Culdocentesis*

The presence of non-clotting blood in the aspirate during culdocentesis is significant because it demonstrates intra-abdominal bleeding.[14] A hematocrit level in the aspirate higher than 15% confirms ruptured ectopic pregnancy.

*MRI*

MRI for confirmation specially in CSP.

*Laparoscopy*

Both diagnostic and therapeutic laparoscopy is done in single setting.

*Transvaginal ultrasonography[15]*

Transvaginal ultrasonography (TVS) is preferred imaging modality for ectopic pregnancy diagnosis due to its high sensitivity and early detection. Echogenic free fluid within the pouch of Douglas may be suggestive of hemoperitoneum secondary to a ruptured ectopic pregnancy or tubal miscarriage, but it may also be seen with the hemorrhagic ovarian cyst rupture.[16]

***Management of ectopic pregnancy[17]***

Management of ruptured ectopic pregnancy is done by laparotomy followed by salpingectomy.

***Management of unruptured ectopic pregnancy***

*Surgical management[18]*

In nulliparous women laparoscopic linear salpingostomy and in multiparous women laparoscopic salpingectomy is done. The surgical treatment by laparotomy is still the most preferred treatment modality used in our hospital despite recent advancements.

Medical management is done when hemodynamically patient is stable; BHCG <3000 IU/l, tubal diameter <4 cm with no cardiac activity and no intra-abdominal hemorrhage.[19]

Many different agents have been used to treat ectopic pregnancies including systemic and local methotrexate, local potassium chloride, or actinomycin. Methotrexate is a folic acid antagonist that arrests mitosis and targets rapidly dividing cells. Adverse effects of methotrexate therapy include vomiting, diarrhea, stomatitis, abdominal discomfort, photosensitivity skin reaction, pneumonitis, impaired liver function. Rarely severe neutropenia and reversible alopecia may be seen. Bone marrow, gastrointestinal mucosa and hair are vulnerable to the effects of methotrexate. Patient is given single dose of methotrexate 50 mg/m$^2$ IM. Monitoring done by measuring serum BHCG on day 4 and day 7. β-HCG levels are followed on day 4 and then on day 7 if it's decline is >15%, patient is followed up weekly until β-HCG is <10 mIU/ml. If decline is <15%, a repeat dose of methotrexate 50 mg/m$^2$ is given on day 7. Variable dose methotrexate includes 1 mg/kg IM on day 1, 3, 5, 7 and leucovorin 0.1 mg/kg IM on day 2, 4, 6, 8. Serum BHCG is monitored weekly until <5 mIU/ml.

Surgical procedures are done when BHCG levels are not declining despite medical therapy and persistent fetal cardiac activity.

Expectant management for spontaneous resolution occurs when initial BHCG less than 1000 IU/L and subsequent levels are falling, gestational sac <4 cm, no fetal heart beat on TVS, no rupture or bleeding on TVS. In this patient is closely monitored.[20]

***Abdominal pregnancy***

*Primary abdominal pregnancy*

It is primary implantation of zygote in peritoneal cavity.

*Secondary abdominal pregnancy*

Most abdominal pregnancies are secondary to primary sites like fallopian tube, uterus and ovary. Symptoms include lower abdominal pain and vaginal bleeding. Signs include proper contour of uterus cannot made out and easy and superficial palpation of fetal parts with malpresentation.

On pelvic examination- uterus is not felt separated from abdominal mass. MRI is used to confirm diagnosis. Surgery is the only treatment for an abdominal pregnancy. Postoperative methotrexate is given.

***Ovarian pregnancy -***

Spiegelberg's criteria include affected tube must be intact, G sac must occupy the position of the ovary**,** G sac in the ovary must be connected to the uterus by ovarian ligament and definitive ovarian tissue with sac wall on histopathology should be seen. Ovariotomy to be done.

***Cornual pregnancy[21]***

Implantation of fertilized ovum in rudimentary horn of bicornuate uterus. If not diagnosed on time, it may lead to rupture of horns usually at 12-16 weeks leading to shock. Laparotomy after basic resuscitation and removal of the affected rudimentary horn along with the tubes.

***Cervical pregnancy[22]***

Implantation of zygote occurring in the endocervical canal below the internal os. Clinical feature includes painless vaginal bleeding in 90% cervical pregnancy. Multiple dose methotrexate is treatment.

***Heterotopic pregnancy***

It is a condition wherein both intrauterine and ectopic pregnancy coexists. Management is surgical procedure and usually intrauterine pregnancy continues after treatment of ectopic pregnancy.[23,24]

***Interstitial pregnancy***

Implantation of embryo in interstitial part of the tube. Pregnancy may involve the myometrium and advance to 12-14 weeks. USG and laparoscopy lead to early detection. Immediate laparotomy followed by salpingectomy wedge resection of the cornua and reconstruction of the uterine wall is done ·

***Cesarean scar pregnancy (CSP)[25]***

Cesarean scar pregnancy (CSP) occurs when an embryo implants at the scar site from a prior caesarean delivery. It involves implantation occurring in microscopic dehiscence tract of the caesarean scar. It is classified into endogenic ("on the scar") and exogenic ("in-the niche"). The clinical presentation is variable, from asymptomatic cases to uterine rupture and hemoperitoneum.[26]

*Diagnosis[27]*

The initial finding of a low, anteriorly located G sac should rise suspicion of CSP. Transvaginal ultrasound imaging is the optimal diagnostic modality for evaluating suspected CSP cases due to its higher image resolution. Ultrasonographic criteria for CSP include the uterine cavity and endocervix should be empty; gestational sac along with placenta seen embedded in the hysterotomy scar, a triangular (at 8 weeks of gestation and earlier) or rounded or oval (after 8 weeks of gestation) gestational sac that fills the scar "niche". MRI has been used along with ultrasound imaging for the diagnosis of CSP. The treatment for CSP include hysteroscopy, laparoscopy, laparotomy, transvaginal surgery, curettage, uterine artery embolization (UAE), medical treatment like methotrexate (both local guided injection and systemic administration), direct potassium chloride (KCl) injection, high-intensity focused ultrasound imaging, needle guided sac decompression, the use of balloon catheters, and combinations of these methods.

***Aim and objectives***

*Primary objectives*

To determine incidence of ectopic pregnancy in our hospital which is a tertiary care centre, to determine the common type of ectopic pregnancy in present day scenario and to identify the risk factors and clinical presentation of ectopic pregnancy.

*Secondary objectives*

Formulate standard management protocol in ectopic pregnancy.

## METHODS

This study was a prospective observational study conducted at the department of obstetrics and gynecology, SVBP Hospital, LLRM Medical College, Meerut. It spanned for 1 year (1st October 2022 to 30th September 2023).

***Inclusion criteria***

All women with confirmed ectopic pregnancy which were admitted to department of OBG, LLRM Medical college, SVBP Hospital, Meerut during the study period.

***Exclusion criteria***

All the intrauterine pregnancies were excluded.

***Methodology***

A detailed demographic history including age, socioeconomic status, and history related to risk factors for ectopic pregnancy, menstrual and obstetric history was taken. General, systemic, abdominal, and vaginal examinations were performed. Diagnostic modalities like transvaginal sonography (TVS) or transabdominal sonography (TAS) were conducted. Apart from the routine surgical profile, β-HCG assay, UPT, MRI were performed as and when required. Management of ectopic pregnancy was analysed. Statistical analysis data were collected and tabulated at the end of the study in MS Excel using the statistical package for social sciences (SPSS) version 2.1.

***Statistical analysis***

The data collected throughout the study period were tabulated using Microsoft Excel and analyzed using SPSS Version 2.1. The primary objectives focused on determining the incidence of ectopic pregnancy and identifying the most prevalent types under current conditions. Risk factors and clinical presentations were also closely examined. For secondary objectives, the gathered data helped in formulating a standard management protocol for ectopic pregnancy. Descriptive statistics, such as frequencies and percentages, were calculated to achieve a comprehensive analysis of the data.

## RESULTS

In one year of study period 52 cases of ectopic pregnancy were admitted to our hospital accounting for incidence of 1.09%. For individuals aged less than 20 years, there were 9 cases, making up 17.3% of the total. There was a significant p value of 0.00027. The age group 20-25 years comprised 3 cases, which was 5.8% of the total. The largest group was those aged 25-30 years, encompassing 26 cases or 50% of the total. The 30-35 years group included 12 cases, representing 23.1% of the total. The 35-40 years group had 2 cases, accounting for 3.8%. No cases were reported in individuals over 40 years.

**Table 1: Age distribution.**

| Age (years) | Number of cases | Percentage | P value |
|---|---|---|---|
| **<20** | 9 | 17.3 | 0.00027 |
| **20-25** | 3 | 5.8 | |
| **25-30** | 26 | 50.0 | |
| **30-35** | 12 | 23.1 | |
| **35-40** | 2 | 3.8 | |
| **>40** | 0 | 0 | |
| **Total** | 52 | 100.0 | |

**Table 2: Site of ectopic pregnancy.**

| | Number of cases | Percentage | P value |
|---|---|---|---|
| **Tubal** | 47 | 90.38 | 0.000455 |
| Ampullary | 35 | 67.3 | |
| Cornual | 6 | 11.5 | |
| Infundibulum | 6 | 11.5 | |
| **Cesarean scar** | 4 | 7.7 | |
| **Heterotopic pregnancy** | 1 | 1.9 | |
| **Total** | 52 | 100.0 | |

The majority of cases were tubal pregnancies, totalling 47 cases and accounting for 90.38% of the total with a significant p value of 0.000455. Amongst which ampullary pregnancies were the commonest with 35 cases representing 67.3% of the total. Fewer cases were seen at other sites: cornual (6 cases, 11.5%), infundibulum (6 cases, 11.5%), and cesarean scar pregnancies (4 cases, 7.7%). Additionally, there was one case of a heterotopic pregnancy, making up 1.9% of the total.

**Table 3: Risk factors.**

| Parameters | N | % | P value |
|---|---|---|---|
| **Previous history of TB** | 4 | 7.69 | df=3 |
| **Previous history of PID** | 3 | 5.77 | |
| **Previous history of ectopic pregnancy** | 1 | 1.92 | |
| **Previous history of abdomino-pelvic surgery** | 6 | 11.54 | |

Risk factors included previous history of tuberculosis (TB) with 4 cases (7.69%), previous history of pelvic inflammatory disease (PID) with 3 cases (5.77%), previous history of ectopic pregnancy with 1 case (1.92%), and previous history of abdominal-pelvic surgery with 6 cases (11.54%). Additionally, the Table 3 includes a p value noted as significant with degrees of freedom (df) being 3.

**Table 4: Clinical features at the time presentation.**

| Parameters | Number | Percentage |
|---|---|---|
| **Amenorrhea** | 52 | 100.00 |
| **Abdominal pain** | 42 | 80.77 |
| **Bleeding per vagina** | 9 | 17.31 |
| **Shock** | 6 | 11.54 |

Amenorrhea was universally present, reported in all 52 individuals, making up 100.00% of the cases. Abdominal pain was also frequently reported, occurring in 42 participants, which corresponded to 80.77% of the group. Bleeding per vagina was observed in 9 individuals, constituting 17.31% of the cases. Lastly, a smaller percentage, 11.54%, represented those who experienced shock, totalling 6 individuals in the study. Majority of patients 46 cases accounted for 88.4% presented with

forniceal fullness, 80.76% had forniceal tenderness, 73.07% cases had cervical motion tenderness while 57.6% had abdominal tenderness.

**Table 5: Clinical signs at the time of presentation.**

| Clinical signs | Number | Percentage |
|---|---|---|
| **Abdominal tenderness** | 30 | 57.6 |
| **Forniceal fullness** | 46 | 88.4 |
| **Forniceal tenderness** | 42 | 80.76 |
| **Cervical motion tenderness** | 38 | 73.07 |

**Table 6: Diagnostic modalities used by patients.**

| Parameter | Number | Percentage |
|---|---|---|
| **TVS/TAS** | 52 | 100.00 |
| **Beta-HCG** | 13 | 25.00 |
| **MRI** | 4 | 7.69 |

Transvaginal sonography (TVS) and transabdominal sonography (TAS) were used in all instances, accounting for 100.00% of the cases, which is shown by the number 52. Beta-HCG tests were performed in 13 cases, making up 25.00% of the total diagnostic procedures used. Magnetic resonance imaging (MRI) was the least utilized method, being applied in only 4 cases of cesarean scar ectopic, which constitutes 7.69% of the procedures.

**Table 7: Management of ectopic pregnancy.**

| Treatment type | Count | Percentage |
|---|---|---|
| **Expectant** | 0 | 0 |
| **Medical** | 8 | 18.18 |
| **Surgical** | 44 | 81.82 |

The treatments consist of- expectant, medical, and surgical. No patients (0%) received expectant treatment, highlighting a lack of cases where a wait-and-see approach was applicable. Medical treatment was administered to 8 patients, making up 18.18% of the cases, which suggests a limited but significant use of non-surgical interventions.

**Table 8: Surgical management.**

| Surgical management | Count | Percentage |
|---|---|---|
| **Laparoscopy** | 0 | 0 |
| **Laparotomy** | 44 | 100.0 |
| **Salpingotomy** | 1 | 2.27 |
| **Salpingectomy** | 39 | 88.63 |
| **Surgical removal of scar ectopic** | 4 | 9.0 |

The majority of treatments were surgical, with 44 patients receiving such care, accounting for 81.82% of the total. Operative laparoscopy facility was not present at the time of study hence all patients underwent traditional laparotomy. Laparotomy was performed 44 times, also reaching a 100.0% occurrence within its category. For more specific types of surgeries, salpingotomy was carried out once, making up 2.27% of the surgical procedures, whereas salpingectomy was more common, conducted 39 times and representing 88.63% of the operations in its category. Lastly, surgical removal of scar ectopic was performed 4 times, comprising 9.0% of the total procedures of its kind.

## DISCUSSION

In our study, 52 patients were diagnosed with ectopic pregnancy with an incidence of 1.06%. Study conducted by Patel on 108 patients had an incidence of 1.09%.[28] The incidence of ectopic pregnancy is rising due to better diagnostic modalities, early diagnosis and management. This demographic distribution suggests that our sample mainly consists of young adults. The rising trend in reproductive age group is increased incidence of STD and PID in this age group. The age group frequencies further support this, showing a significant majority 50% within the 25-30 age range, while those aged 30-35 years constituted 23.1% of the sample, and the under-20 group was represented at 17.3%. Majority of patients were multiparous gravida 4 (25%). Multiparous women had higher incidence of ectopic pregnancy due to previous infections, abortions and pelvic surgeries. Results were similar in study conducted by Patel et al in which most of the cases were in age group of 20-30 years (45.3%) and multiparous (59.25%).[28] Study conducted by Parmar et al stated that age group between 21-30 years (69.9%) and multigravida (68.5%) were potential risk factor for ectopic pregnancy.[29] Majority of patients had gestational age at presentation of 6-8 weeks (53.8%) and lowest incidence was found among 4-6 weeks of gestation (7.7%). Comparable results were appreciated by Palve et al.[30] From the study it was concluded that the leading risk factor for ectopic pregnancy was history of previous abdomino-pelvic surgery (11.54%) followed by previous history of tuberculosis (7.69%), history of pelvic inflammatory disease (5.77%), previous history of ectopic pregnancy (1.92%). Results from study on ectopic pregnancy by Patel were in contrast the most common risk factor was pelvic inflammatory disease (16.7%), past history of infertility (14.8%) followed by IUCD (12.03%).[28] Majortity of cases had tubal ectopic pregnancy (80.8%) in which ampullary was the most common site. There were 4 cases of cesarean scar ectopic accounting for 7.7% cases followed by 1 case of heterotopic pregnancy. Study by Patel et al had comparable findings.[28] Singh et al concluded majority of cases 63% as tubal ectopic.[31] Study by Palve et al revealed 14.8% of each cornual and heterotopic ectopic followed by one case of interstitial and 1 of scar ectopic pregnancy.[30] The presentation of ectopic pregnancy varies from mild symptoms to state of shock with hemoperitoneum. In our study 100% of cases presented with amenorrhoea, lower abdominal pain was seen in 80.7% cases and bleeding per vagina was seen in 17.31% cases. Pain abdomen ranged from mild aches to sudden, sharp pain. 6 patients presented with shock. Patel et al concluded that lower abdominal

pain in 90.74 cases.[28] Findings of Parmar et al showed 80.9% cases had lower abdominal pain followed by bleeding per vagina 60%, amenorrhoea was seen in 60% cases, nausea and vomiting in 32.9% case.[29] Majority of patients in our study (88.4%) presented with forniceal fullness, (80.76%) had forniceal tenderness, (73.07%) cases had cervical motion tenderness on bimanual examination while (57.6%) had abdominal tenderness. According to study done by Yadav et al stated 51.25% cases showed fullness in fornices, forniceal tenderness seen in 60% cases, cervical forniceal tenderness in 52.5% and abdominal tenderness was seen in 37.5% cases.[32] Transvaginal ultrasound was used as diagnostic modality in all cases showing adenexal pathology. USG was the initial investigation for symptomatic women followed by beta-HCG. Beta-HCG was done in 25% cases as a diagnostic aid. 4 cases had MRI finding suggestive of scar ectopic pregnancy. Similar findings were shown by Patel et al stating 100% USG diagnosed ectopic pregnancy and beta-HCG was done in 37 patients.[28] Majority of patients (81.82%) were managed surgically. Among surgically managed patients, laparotomy was done, 39 cases had unilateral salpingectomy out of which 11 had contralateral tubal ligation done. Salpingotomy was done in 1 case. 4 cases had surgical removal of caesarean scar ectopic. 18.18% cases received medical management. They were given injection methotrexate and followed by serial beta HCG levels. Our findings were similar to Bhavna et al which stated that out of 110 cases, laparotomy was done in 100 cases and rest were managed medically.[33] Study by Patel had unilateral salpingectomy as the most common treatment modality (79.62%).[28] Laparotomy was mostly done (90% cases) and laparoscopic management was done only in 54% cases. In our study laparoscopic management was not done. Study done on caesarean scar pregnancy by Juneja et al 2 cases of caesarean scar ectopic were managed medically by injection methotrexate.[34] In our study 4 cases of caesarean scar ectopic required surgical intervention. Intraoperatively 34 cases were ruptured tubal ectopic while there were only 6 cases of unruptured tubal ectopic. Findings were consistent with study of Mehta et al, where 55% cases had ruptured tubal ectopic and only 10% cases were unruptured tubal ectopic.[35] Singh et al stated that 81% cases had hemoperitoneum.[31] There was no maternal mortality in our study. This was concomitant with study by Palve et al.[29]

The study is limited to a single tertiary care center, which may not represent the broader population or different healthcare settings. The one-year duration of the study is not sufficient to note long-term trends in the incidence and types of ectopic pregnancy. Longer duration provides better understanding of management and complications related to ectopic pregnancy. Longer follow up period is necessary to know the effect of future fertility in patients treated with different management modalities. One big limitation is failure to use laparoscopy as the first line surgical option which was not possible in our setup. The study's observational design can identify associations but cannot establish causal relationships between risk factors and ectopic pregnancy.

The study may not account for all potential confounding variables, such as detailed socioeconomic influences, which could affect the incidence and presentation of ectopic pregnancy.

## CONCLUSION

Ectopic pregnancy is considered as one of the most critical obstetric emergencies. Identification of risk factors like PID, previous history of TB, history of abdominopelvic surgery, use of artificial reproductive techniques, high suspicion and use of modalities like transvaginal ultrasound, beta HCG levels prompt its early detection. Classical triad of amenorrhoea, abdominal pain and vaginal bleeding raises the suspicion of ectopic pregnancy. Early diagnosis, better healthcare facilities, management either medically or surgically and blood availability help in reducing mortality and morbidity rates and also for preservation of future fertility.

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