e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(8); 1058-1065

Original Research Article

A Comparative Study of Medical and Surgical Management in Ectopic Pregnancy: Outcomes and Implications

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Received: 01-05-2026 / Revised: 15-06-2026 / Accepted: 21-07-2026
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Conflict of interest: Nil

Abstract

Aim: This study aims to compare the effectiveness of medical and surgical management in achieving successful resolution of ectopic pregnancy. The study seeks to analyze the clinical implications of these findings to guide optimal management strategies for ectopic pregnancy.

Method: This study is a retrospective observational study carried out at C.U.Shah Medical College and Shreemad Rajchandra Sarvamangal Hospital, Surendranagar, Gujarat, covered all women diagnosed with ectopic pregnancy who received either medical or surgical management at CUSMCH in last 5 years from January 2018 to December 2022.

Results: Among 110 patients, 46 (41.8%) received medical management and 64 (58.2%) underwent surgical intervention. The success rate was 78.3% in the medical group and 96.9% in the surgical group ($p = 0.01$). Medical management failure requiring surgery occurred in 21.7% of cases. Complications were more frequent in the surgical group (12.5%), largely due to presentation with ruptured ectopic pregnancy and hemodynamic instability. Hospital stay was shorter in uncomplicated medically managed cases but required prolonged follow-up. Subsequent conception rates were comparable between groups (50% in medical vs. 44.4% in surgical).

Discussion: Both medical and surgical management are effective for ectopic pregnancy when appropriately selected. Methotrexate is a suitable fertility-preserving option in stable, unruptured cases with reliable follow-up, whereas surgery remains the definitive and life-saving treatment in ruptured or unstable cases. Individualized, patient-centered decision-making is essential to optimize clinical and reproductive outcomes.

Keywords: Ectopic pregnancy, Methotrexate, Surgical management, Fertility outcome, Tubal pregnancy.

DOI: 10.25258/ijcpr.18.8.160

Introduction

Ectopic pregnancy is one of the most common factors of the first-trimester maternal morbidity and may be life-threatening in case of late diagnosis or tubal rupture. The modern management of the problem has been changed to not being strictly surgical but being tailored to the specific needs of the woman depending on her hemodynamic status, implantation location, serum beta-human chorionic gonadotropin (beta-hCG) levels, sonographic results, symptoms, and the fertility preferences of the woman. Present recommendations in RCOG, NICE and ACOG favor methotrexate in ectopic pregnancies that are carefully selected and clinically stable and intact, whereas emergency surgery is necessary in case of rupture, hemodynamic instability, contraindication to methotrexate, or medical treatment failure [1-4]. This comparative study evaluates medical and surgical management with respect to treatment success, safety, hospital stay, fertility preservation, follow-up burden, and ethical considerations in clinical settings in India. Generally, surgical management is quicker and more definitive, and is desirable in cases of emergency, whereas medical management is organ-sparing, less invasive, and can be appropriate in early and stable cases. An informed consent based on rational

patient-centered approach with the help of counselling and ethics-sensitive decision making is the best clinical and reproductive outcome.

Ectopic pregnancy refers to implantation of a fertilized ovum outside the endometrial cavity, usually in the fallopian tube. It remains a significant obstetric emergency due to the fact that tubal rupture can cause serious intra-abdominal hemorrhage and maternal mortality in case of delayed intervention [1,2].

The prevalence of ectopic pregnancy is about 11 per 1,000 pregnancies in the United Kingdom based on international guidance, which demonstrates that it is not a rare clinical challenge and needs quick-paced diagnosis routes with the application of transvaginal ultrasonography and consecutive beta-hCG assays [1]. Expectant management, medical therapy, and surgery are now part of the management options, although the option varies depending on presentation and risk profile as opposed to one universal protocol [2-4].

The clinical significance of a meaningful comparison between medical and surgical approaches is the fact that both of the methods are effective, but there is a difference between the speed of the resolution, the use of resources, complications, and the implication on future fertility. Systemic methotrexate, typically through a single-dose or multidose regimen, is typically termed as medical treatment, and must be closely monitored with regard to hormones [2,4].

Typical surgical therapy involves laparoscopy, and salpingectomy or salpingostomy is chosen based on the state of the tubes, bleeding, bilateral tube presence, and fertility goals [2,3]. The current reviews indicate that surgery has a better immediate success rate but methotrexate is still an option in the selectively chosen women since it does not require anesthesia and may maintain the tube [5-7].

Medical Management: Methotrexate is the non-surgical therapy of choice in the selected hemodynamically stable women with no signs of rupture and reliable attendance of follow-up in tubal ectopic pregnancy [2-4].

The medication suppresses the rapid proliferating trophoblastic tissue and allows the slow resolution of the ectopic pregnancy. Instructions have been made that methotrexate can only be provided after a keen verification that intrauterine viable pregnancy does not exist since improper use in pregnancy when the location is unknown may damage a desirable intrauterine pregnancy [4,8]. The follow-up is a critical component of treatment and NICE suggests measuring serum hCG on days 4 and 7 following methotrexate, and then weekly until negative value is reached [3].

The significant benefits of medical management are that they are minimally invasive, do not need surgical intervention, anesthesia, cause less immediate procedural morbidity, and may maintain the tubal anatomy [2,6]. It may be especially appealing in young women who have fertility issues, few pelvic adhesions, and early diagnosis. Nevertheless, this choice has significant limitations. It is slower than surgery, serial monitoring is required, treatment failure may happen and some patients may later need surgical salvage. Hepatic disease, renal dysfunction, hematologic abnormality, breastfeeding, inability to follow up, and extreme pain are also contraindications to eligibility [2,4]. Recent comparative literature indicates that methotrexate can have a shorter initial hospitalization and good reproductive results in some cases, although its effectiveness decreases with increasing baseline beta-hCG, large ectopic mass, and presence of cardiac activity [5-7].

Surgical Management: Surgery is still the only definite way of treating ectopic pregnancy among women with rupture, hemodynamic instability, and contraindications to methotrexate, substantial hemoperitoneum or unsuccessful medical treatment [1-4]. Laparoscopy is used in most centers, where the patient is stable, and surgical expertise is available since it has a lower postoperative pain, blood loss, and recovery time than laparotomy [2]. The two predominant tubal surgeries are salpingectomy that removes the affected tube and salpingostomy that removes the ectopic tissue but preserves the tube. The decision will be made based on the level of tubal damage, persistent bleeding, the health of the contralateral tubes, and future pregnancy plans [2,3]. The key advantages of surgery are the ability to fix bleeding quickly, the ability to directly manage it, and a very high definitive success rate of surgery in a single intervention. These features render surgery essential in cases of emergencies and very convenient where the extended follow-up is a challenge. Simultaneously, surgery is a highly invasive procedure that places the patient at risk of anesthesia and operative risks, and can potentially impair future fertility in the event of the need of salpingectomy, particularly in women with tubal disease previously present [2,6,7]. Salpingostomy can retain the tube but needs follow up due to the possibility of the recurrence of trophoblastic tissue following conservative surgery [2]. Therefore, surgery is clinically better in unstable or advanced presentation, yet is not necessarily the most ideal fertility-preserving approach in all stable women diagnosed at an early stage.

Aim of the Study: To compare the effectiveness and outcomes of medical (methotrexate) versus surgical management in patients with ectopic pregnancy.

Objectives

- To compare the treatment success rates between medical and surgical management.
- To evaluate the complications associated with each treatment modality.
- To compare duration of hospital stay and follow-up burden.
- To assess subsequent fertility outcomes in both groups.

Inclusion Criteria

- Women diagnosed with ectopic pregnancy (confirmed by ultrasound and/or β-hCG levels)
- Patients who underwent either medical management with methotrexate or surgical management
- Availability of complete medical records and follow-up data

Exclusion Criteria

- Incomplete or missing medical records
- Patients with inadequate follow-up data
- Patients who did not receive definitive medical or surgical management

Methodology

This retrospective observational study was conducted at C. U. Shah Medical College and Hospital, Surendranagar, Gujarat. The study included patients diagnosed with ectopic pregnancy over a period of five years, from January 2018 to December 2022.

A total of 110 eligible patients were included based on predefined inclusion and exclusion criteria.

Participants were categorized into two groups based on the treatment received:

Group A: Patients managed medically with methotrexate (n = 46)

Group B: Patients managed surgically (laparoscopic/laparotomy; salpingectomy or salpingostomy) (n = 64)

Clinical data were collected from hospital records, and outcomes were analyzed in terms of treatment success, complications, hospital stay, and fertility outcomes.

Results

Over the course of the study, 124 women were diagnosed with ectopic pregnancy at CUSMCH between January 2018 and December 2022. Having implemented the inclusion and exclusion criteria, the final analysis incorporated 110 cases.

Table 1: Distribution of Study Participants and Baseline Characteristics

Total Analyzed Cases	110 patients (after applying inclusion/exclusion criteria)
Surgical Management Group	58.2% (64 patients)
Medical Management Group	41.8% (46 patients)
Average Patient Age	27.6 +/- 4.20 years (predominantly 21 to 30 years old)
Obstetric History Majority	Multigravida (62%)
Average Gestational Age at Diagnosis	6 weeks 6 days +/- 1 week 5 days
Unruptured Ectopic Pregnancy at Presentation	65.5% (72 women)
Ruptured Ectopic Pregnancy at Presentation	34.5% (38 patients)

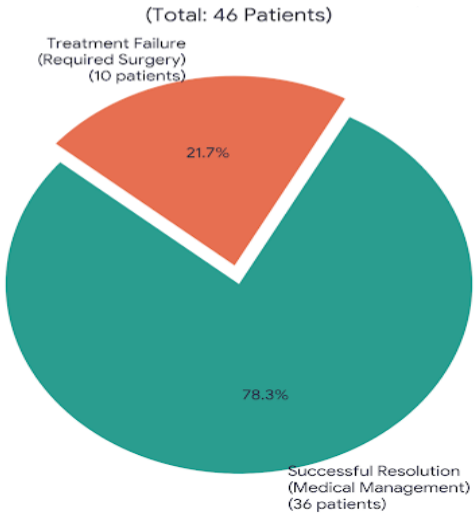

Figure 1: Outcomes of Methotrexate medical management

Such results have been supported by evidence that indicates that methotrexate can be used successfully in the selected stable women, though failure to treatment can happen in cases with an increased beta-hCG level, large ectopic mass, or non-compliance with follow-up [2,4,5].

Table 2: Outcomes of Methotrexate medical management

Outcome	Number of cases (n)	Percentage (%)
Successful resolution	36	78.3
Treatment failure	10	21.7
Total	46	100

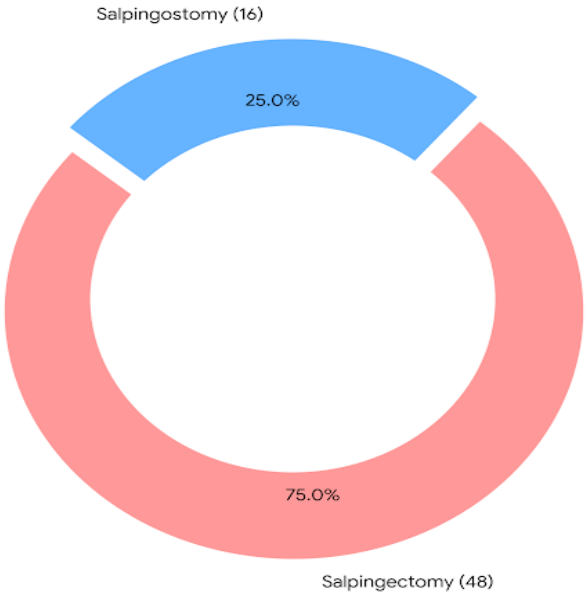

Figure 2: Types of procedures used in surgical management group

Table 3: Types of Procedures Used in Surgical Management Group

Procedure	Number of cases (n)	Percentage (%)
Salpingostomy	16	25
Salpingectomy	48	75
Total	64	100

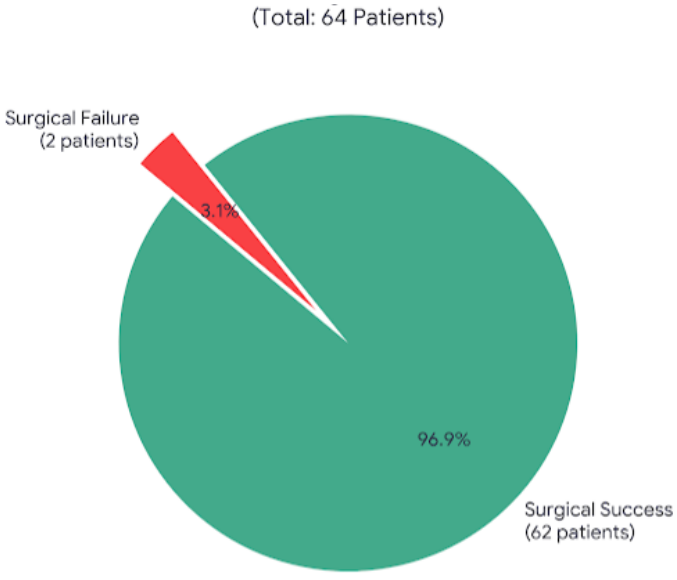

Figure 3: Outcome of surgical management

This is consistent with available literature that surgery is the most conclusive therapy particularly in ruptured ectopic pregnancy, hemodynamic instability or unsuccessful medical therapy [1-3]. Postoperative complications occurred in 8 patients (12.5%), including hemoperitoneum, need for blood transfusion and postoperative fever.

Table 4: Outcome of surgical management

Outcome	Number of cases (n)	Percentage (%)
Surgical success	62	96.9
Surgical failure	2	3.1
Total	64	100

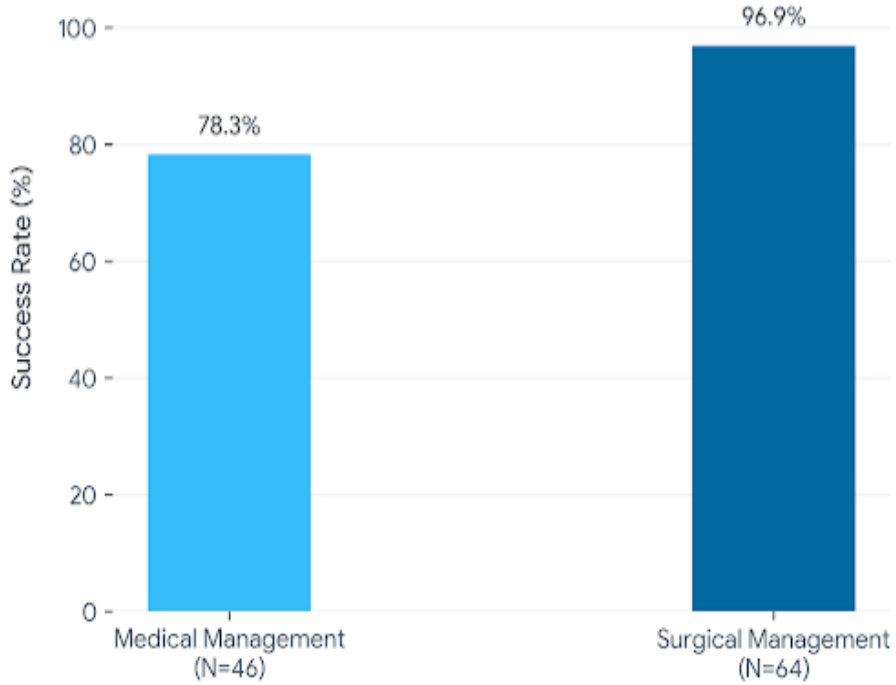

Figure 4: Treatment success rate comparison

When the two groups were compared, it was revealed that the success rate of the immediate treatment of the surgical group was higher compared to the medical group. Patients in the medical management group were hemodynamically stable and therefore managed conservatively with organ-preserving treatment, without the need for surgical intervention. The treatment success difference between the two groups was statistically significant and the p-value was [0.01].

Table 5: Treatment success rate comparison

Treatment modality	Number of cases	Success rate (%)
Medical management	46	78.3
Surgical management	64	96.9

On fertility outcome, follow-up data was available on 81 cases.

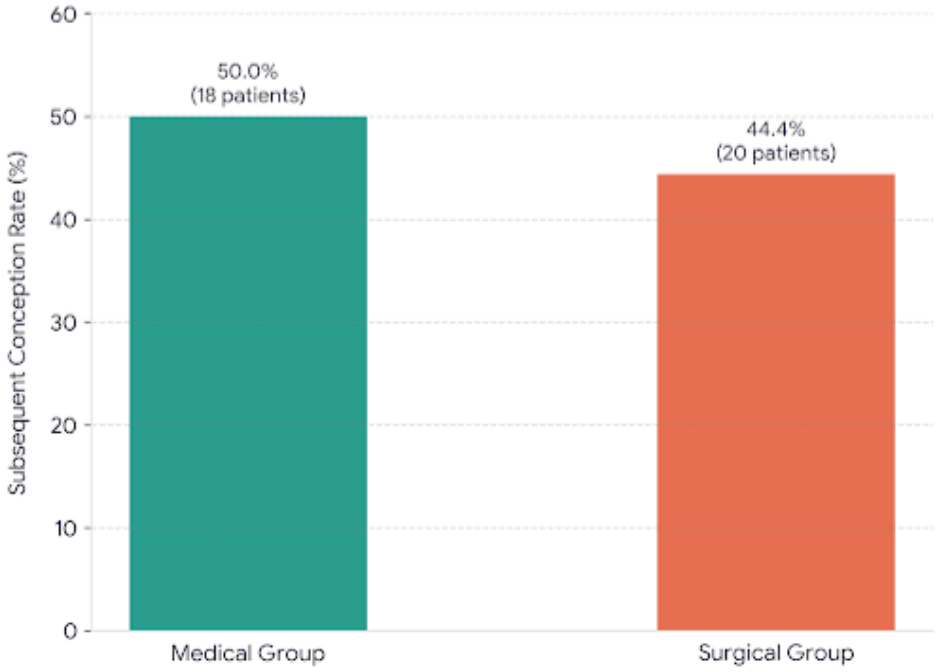

Figure 5: Subsequent fertility outcomes by treatment modality

It was also observed that fertility outcome was also determined by treatment modality as well as underlying tube status, degree of damage and status of the contralateral tube, which is also supported by earlier literature [6,7].

Table 6: Subsequent fertility outcomes by treatment modality

Treatment Group	Total patients followed up	Patients with subsequent conception	Subsequent conception rate (%)
Medical Group	36	18	50
Surgical Group	45	20	44.4
Total	**81**	**38**	**46.9**

Patients with ruptured ectopic pregnancy and hemodynamic compromise showed more complications and most of them had to undergo a surgical procedure. The frequent complications were hemoperitoneum, blood transfusion, postoperative morbidity and increased hospital stay. Persistent ectopic pregnancy, delayed resolution, and conversion to surgery were the primary undesired outcomes in the medical group. This has also been observed in comparative studies that have indicated that surgical treatment is more resolvable, as compared to the medical treatment that involves more surveillance and close selection of patients [5-7].

Time of stay in hospital was usually shorter in uncomplicated cases that were managed medically, but in case of surgical management, more particularly those who came in as an emergency, time of stay was relatively longer. The medical group had a higher burden of follow-up because of the necessity of serial monitoring of beta-hCG levels and recurring clinical examinations [3,5]. On the whole, the results show that medical management is efficient in cautiously chosen stable patients with unruptured ectopic pregnancy, but surgical management is the most preferred definitive option of ruptured ectopic pregnancy, unstable patients, or cases not suitable to methotrexate therapy [1-5].

Discussion

Ectopic pregnancy has remained one of the leading causes of maternal morbidity during early pregnancy and has been a big obstetric crisis. The current retrospective clinical observational trial was conducted to estimate the success of medical and surgical management in terms of treatment success, complications, and fertility outcome. The conclusions of the current research indicate that both treatment options have an already determined position, but their efficacy is determined mainly by clinical presentation, imaging results, biochemical variables, and the dependability of follow-up.

The current research involved medical management among clinically stable women with unruptured ectopic pregnancy and favourable baseline characteristics. Methotrexate is still a key non-surgical choice, given that it is minimally invasive, does not require anaesthesia, and can maintain tubal

anatomy [2-4]. Such benefits are particularly valuable in a woman with future fertility issues. Nonetheless, medical management outcomes are closely associated with selective attitude to patients, reduced initial beta-hCG level, lack of rupture, and adherence to follow-up [2,5]. In the current research, not all patients in the medical group were able to avoid subsequent surgery and this demonstrates the established shortcoming of methotrexate in instances of poor response or aggravation of symptoms.

Ruptured ectopic pregnancy, hemodynamic instability, women with serious symptoms, contraindications to methotrexate, and failure of medical treatment were more frequent indicators of surgical management. This is in line with the general guidelines that regard surgery as the conclusive and life-saving therapy in this case [1-4]. In the current research, surgery demonstrated an increased immediate success of treatment and an opportunity to resolve clinically quickly. Surgery is essential in emergencies because it is possible to handle active bleeding and eliminate the ectopic gestation directly. Meanwhile, surgery is more invasive, has risks linked to anaesthesia and operative morbidity and can impact future fertility, especially when salpingectomy is necessary [6,7].

The current results also show that comparison of medical and surgical management can never be viewed in isolation of the condition of the patient at diagnosis. Surgical group complications used to be associated with the severity of presentation, particularly rupture and internal bleeding, and not necessarily the surgical procedure. Similarly, the medical group complications had to do primarily with the failure of treatment, the delay in resolving the issue, and the necessity of further surgery. Consequently, the findings confirm the principle that the choice of treatment modality should be made based on clinical appropriateness and not the expectation that one treatment is superior to the rest [5-7].

The preservation of fertility is one of the most important matters in ectopic pregnancy management. Fertility outcome on follow-up, in the present study, was seemingly to be influenced by many factors such as baseline tubal status, degree of pathology, precedent pelvic disease and the well-being of the contralateral tube.

Past studies have revealed that long-term fertility prognosis can be similar in well-chosen patients, but tubal-sparing or medical treatment can be regarded as helpful in patients who have intentions to conceive in the future [6,7]. Nevertheless, this benefit is not unconditional, and the counselling must be personal. The other notable finding of the current study is that medical management has a higher burden of follow-up. Methotrexate-treated patients needed to be monitored using serial serum beta-hCG and revisited repeatedly until clearance occurred. Conversely, surgery was quicker to resolve, which can be beneficial in busy tertiary hospitals, emergencies or in patients who have poor access to repeated follow-up [3,5]. Therefore, both medical and practical and logistically related factors are at play in the decision between the two modalities.

There are limitations of the study. Being a retrospective study, it was reliant on the completeness and accuracy of hospital records. In not all cases, some of the follow-up data, particularly the reproductive outcomes, might not have been available. Moreover, it is a single-centre study, and the findings may not be applicable to all the settings. However, the research offers valuable clinical data on the comparative results of medical and surgical management in a five-year period in a tertiary care hospital.

Altogether, the current paper advocates a patient-centred and personal approach to ectopic pregnancy. Medical management is applicable in the selected stable patients with unruptured ectopic pregnancy and good compliance, but surgical management is necessary in ruptured ectopic pregnancy, unstable patients and in failures or contraindication of medical therapy. The most significant aspects of enhancing maternal safety and reproductive outcome are early diagnosis, timely choice of treatment and proper counselling [1-8].

Limitations

- The retrospective nature of the study may be associated with inherent limitations related to data completeness and potential information bias.
- Being a single-center study, the findings may have limited external generalizability to other clinical settings.
- A degree of selection bias is present, as hemodynamically stable patients were preferentially managed medically, whereas unstable or ruptured cases underwent surgical intervention.
- Follow-up data for assessment of fertility outcomes was not available for all patients, thereby limiting long-term outcome evaluation.
- Economic evaluation and quality-of-life measures were not included in the analysis.

Conclusion

The current retrospective clinical observational study concludes that medical and surgical treatment is an effective method to treat ectopic pregnancy in cases that are selected appropriately. Methotrexate medical management is a beneficial, less invasive, and fertility-saving procedure in patients with unruptured ectopic pregnancy who have stable

conditions and good follow-up [2-5]. Its success is, however, limited to selection of cases and strict biochemical surveillance.

Surgery is the final and life-saving intervention in ruptured ectopic pregnancy, hemodynamic instability, contraindication to methotrexate and failure of medical treatment [1-4]. It provides immediate high success and quick clinical resolution especially during emergency clinical cases.

Thus, it cannot be said that medical or surgical treatment is universally the best. Treatment is to be tailored based on clinical presentation, ultrasound results, serum beta-hCG level, risk of rupture, reproductive desires, and possibility of follow-up. The most important factors that determine positive maternal and reproductive outcomes are early diagnosis, timely intervention and proper counselling [1-8].

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