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Original Research Article

Comparative Analysis of Medical and Surgical Approaches in the Management of Ectopic Pregnancy: Clinical Outcomes and Effectiveness

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Abstract:

Background: Various treatment options are available for managing ectopic pregnancy; however, their potential impact on future fertility remains a topic of debate.

Objective: This study aimed to compare the medical and surgical treatment modalities for ectopic pregnancy and evaluate their effects on subsequent fertility outcomes and pregnancy-related complications.

Materials and Methods: This analytical cross-sectional study included women with a history of ectopic pregnancy who had been treated either with a single dose of methotrexate or by laparotomic salpingectomy at the Department of Obstetrics and Gynecology, Patna Medical College and Hospital, Patna, Bihar, India. Although 329 women were contacted through telephone follow-up, responses were received from 147, and 114 women who attempted conception after treatment were enrolled. Data were collected on age, need for fertility medications, conception rates, and pregnancy outcomes.

Result: The mean age of the 114 participants was 28.56 ± 5.63 years. Among those who attempted conception, 61.9% of women in the medical group and 64.3% in the surgical group achieved pregnancy, with no statistically significant difference ($p = 0.141$). Adverse pregnancy outcomes were also comparable between the two groups, including recurrent ectopic pregnancy ($p = 1.000$), miscarriage ($p = 0.605$), and preterm delivery ($p = 0.648$). Assisted reproductive techniques were required for 15.1% of medically treated women and 12.5% of surgically treated women, again with no significant difference ($p = 0.135$). Overall, both treatment approaches demonstrated similar fertility and obstetric outcomes.

Conclusion: Surgical treatment appears to be as safe as medical management regarding future fertility, and either approach may be chosen based on individual patient factors without concern for long-term reproductive impact.

Keywords: Ectopic pregnancy, Fertility preservation, medical management, obstetric complications Reproductive outcomes, Salpingectomy.

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Introduction

Ectopic pregnancy is a major medical issue that is defined by the implantation of a fertilized ovum outside the uterus, mostly in the Fallopian tubes. It still ranks among the top causes of early pregnancy-related mortalities and morbidities globally [1]. The early detection of ectopic pregnancies has been made possible by new imaging techniques and biochemical markers, as a result, the doctors can intervene promptly thus, tubal rupture and internal bleeding become less life-threatening. Nevertheless, the treatment option that would be the least harmful to the patient remains the most important point in the clinical decision-making process [2].

Methotrexate, the main drug used in medical management, has been indicated as a very good alternative to surgery in specific cases. The non-invasive method has many advantages, among others, the preservation of the tube, and less time to recover after the procedure [3]. Methotrexate acts by blocking the growth of the tissue that would otherwise support the pregnancy thus, causing the ectopic pregnancy to resolve by itself [4]. The treatment's success is however dependent on the selection of patients as per strict criteria, for instance, the patient must be stable, have low initial β-hCG levels and no fetal heart activity. If the medical treatment does not

work, complications might arise and require surgical intervention as in the case of medical failure [5].

Radical surgery is still the standard treatment that is to be deployed in cases of patients who are hemodynamically unstable, those who have contraindications to methotrexate, or when imaging suggests a high risk of rupture [6]. Depending on the clinical case, a salpingostomy or salpingectomy may be done by either laparoscopy or laparotomy. The surgical treatment is of paramount importance in emergency situations since it immediately removes the ectopic tissue and gains absolute control over any potential bleeding inside the abdomen. Nonetheless, surgery inherently involves certain risks such as postoperative adhesions, damage to the tube, infections, and prolonged recovery periods that might affect fertility potential in the future [7].

The preference of medical or surgical options gets determined by many factors such as the patient's clinical picture, reproductive intentions, finance, the availability of diagnostic tools, and the skill of the doctor treating [8]. Side by side studies have resulted in different outcomes demonstrated that methotrexate gives a higher chance of preserving the tube, whereas operation remains more conclusive for acute cases. It is of great importance to decide which method gives better fertility results, as many women with ectopic pregnancy want to have a child in the future. Therefore, the determination of the long-term reproductive implications of each treatment is a major concern in present-day gynecological practice [9].

Progress in diagnostic technologies has brought major changes to the treatment approaches for ectopic pregnancy. The combination of high-definition transvaginal ultrasound and continuous serum β-hCG testing allows the detection of ectopic pregnancies at a very early stage, even before the severe symptoms appear. The early diagnosis has allowed more patients to be treated with the conservative method of medical treatment which, in turn, has led to the decrease of emergency surgical procedures. Still, in many of the low-resource areas, delayed presentation is the norm because of the people's ignorance, poor access to medical care, and low income. In such situations, the surgical treatment option remains the primary intervention that can save a woman's life [10,11].

Thus, this research will be based on comparing clinical effectiveness of medical and surgical management of ectopic pregnancy. Through measuring the success rate of treatments, the time required to resolve complication patterns, and fertility rates, this research aims at producing evidence which can help clinicians in making the most suitable choice of intervention. Finally, the results would likely benefit better patient care and improve reproductive outcomes and the overall management of this potentially life-threatening disease.

Besides, patient-centered outcomes have become a greater issue of concern in assessing the ectopic pregnancy management strategies. In addition to clinical success and complication rates, postoperative pain, emotional distress, treatment satisfaction, and the quality of life in general have a significant influence on the therapy selection. There are several psychological traumas that most women face after an ectopic pregnancy because of the fear of pregnancy in future and the fear of the treatment complication. The integration of these patient-reported outcomes into the research process not only enhances clinical decision-making but also makes the provision of care more comprehensive. With the contemporary healthcare transitioning towards personalized medicine, this kind of holistic assessment is critical in the creation of customary management procedures to meet physiological as well as psychosocial requirements.

Methodology

Study Design: This was a cross-sectional hospital-based observational study conducted to compare the clinical outcomes of medical versus surgical management in women diagnosed with ectopic pregnancy

Study Area: The study was conducted in the Department of Obstetrics and Gynecology, Patna Medical College and Hospital, Patna, Bihar, India from January 2024 to December 2024

Study Population: The study included women diagnosed with ectopic pregnancy who were managed either medically with a single-dose methotrexate regimen (50 mg/m²) or surgically with salpingectomy via laparotomy. Only patients meeting diagnostic criteria and treated exclusively with one of these two modalities were included in the analysis.

Inclusion and Exclusion Criteria

Inclusion:

- Women with confirmed ectopic pregnancy treated with single-dose methotrexate or salpingectomy.

Exclusion:

- Women who required both medical and surgical interventions,
- Those who underwent bilateral tubectomy during surgery,
- Patients who received multiple-dose methotrexate,
- Women with previous pregnancies conceived through IVF or IUI.

All eligible participants were contacted via telephone to obtain information regarding fertility outcomes and subsequent pregnancies.

Data Collection: The method of data collection included a thorough examination of the hospital medical records in addition to telephone follow-up interviews with eligible participants. Demographic information, clinical presentation, diagnosis, β-hCG tests, and treatment type were all parts of the information obtained. Follow-up data was concerned with the fertility outcomes, the rate of subsequent pregnancies and any complications after treatment. Patients were put into a medical and surgical treatment group so that an outcome could be compared systematically. The main outcome measures were treatment success, future fertility and pregnancy viability and the secondary outcome measures complication and need of further intervention.

Procedure

Hospital documentation was examined to find all the cases of ectopic pregnancy that were eligible and recorded clinical information, diagnoses and treatment used. The medical group administered a single dose regimen of methotrexate (50mg/m 2) with regular monitoring procedures and the surgical group underwent salpingectomy laparotomic Ally. Follow-up information on the fertility outcomes, later pregnancy, and the complications were collected by phone calls after extraction of data. Each of the information was systematically documented and patients were divided into medical and surgical groups to be compared in terms of information.

Statistical Analysis: SPSS (Version 16.0; SPSS Inc., Chicago, USA) was used to conduct statistical analysis. The fertility and pregnancy outcomes of the medical and surgical groups were compared using the Chi-square test. P-values less than 0.05 were deemed statistically significant.

Results

Table 1 explains the patient's outcome and fertility table after the treatment of ectopic pregnancy. The study period involved 250 women who were treated of tubal ectopic pregnancy, of which 193 women were treated with single dose of methotrexate and 57 women were treated through salpingectomy (proportions maintained). Out of them, there were 99 women who replied to follow-up contact and 77 of them who tried to conceive once again agreed to participate. The average age of the participants was 28.56 with a standard deviation of 5.63 years (17-44 years). Among the 77 women, 63 (81.8%) had been treated medically, and 14 (18.2%) had treated surgically. A total of 48 women (62.3%) became pregnant with treatment. The medical group showed 39 women pregnancy (61.9) and the surgical group had 9 women pregnancy (64.3) with no significant difference between the groups (p = 0.141). These results imply that medical and surgical treatments have similar fertility results.

Table 1: Fertility outcomes after treatment of ectopic pregnancy

Pregnancy Outcome	Medical Treatment Group	Surgical Treatment Group	p-value
Pregnant	39 (61.9%)	9 (64.3%)	0.141
Not Pregnant	24 (38.1%)	5 (35.7%)	1.0
Total	63 (100%)	14 (100%)	

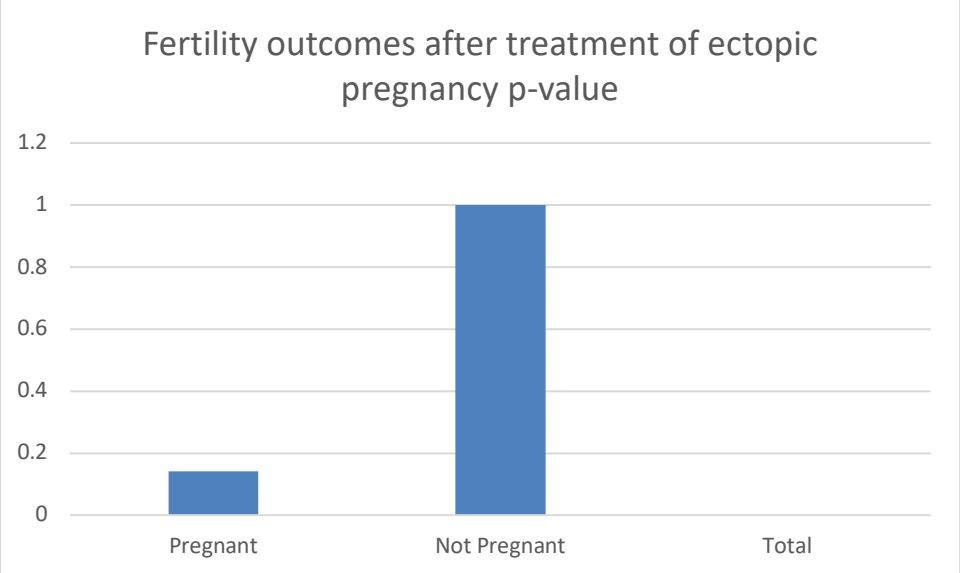

Figure 1: Fertility outcomes after treatment of ectopic pregnancy

Table 2 indicates the pregnancy outcomes of women who became pregnant after treatment. Out of the 48 women who conceived a pregnancy no major differences were seen between medical and surgical group

of women in terms of term birth, preterm delivery, abortion or recurrent ectopic pregnancy. The medical group had 62.2% term pregnancies, 14.8% preterm births and 11.5% abortions or repeated ectopic pregnancies. Similar percentages were seen in surgical cohort, 40 percent in term pregnancies, 20 percent in preterm delivery, abortion and recurrent ectopic pregnancy. A statistical analysis showed that there was no significant difference in the adverse outcomes of the treatment groups ($p > 0.05$ in all). Such findings suggest that the treatment modalities have similar obstetric outcomes after ectopic pregnancy.

Table 2: Pregnancy outcomes following ectopic pregnancy treatment

Outcome	Medical Treatment Group	Surgical Treatment Group	p-value
Preterm Pregnancy	7 (14.8%)	2 (20%)	0.648
Term Pregnancy	24 (62.2%)	4 (40%)	0.298
Abortion	4 (11.5%)	2 (20%)	0.605
Recurrent Ectopic	4 (11.5%)	2 (20%)	0.605
Total	39 (100%)	10 (100%)	

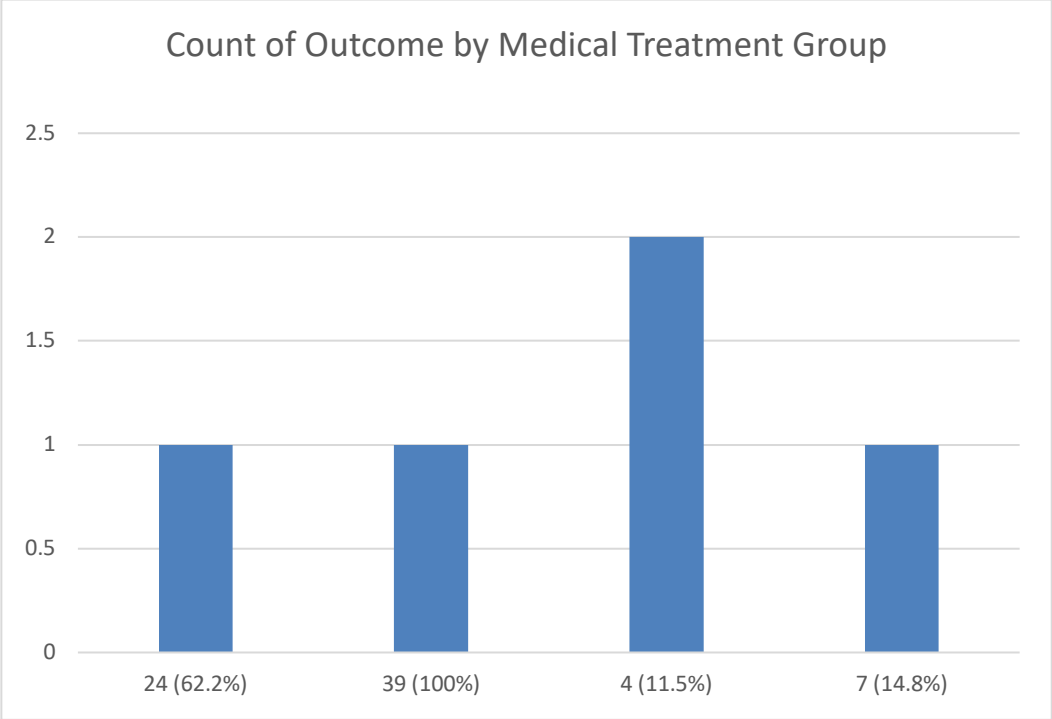

Figure 2: Pregnancy outcomes following ectopic pregnancy treatment

Table 3 compiles the necessity of assisted reproductive treatment (ART) between the two groups.A total sample of 13 women who needed fertility treatment to conceive once again, 12 (15.2) of those who were in the medical group and 1 (12.5) of those who were in the surgical group. The variation was not significant ($p = 0.135$). Such results imply that there are no major differences between the two management strategies in terms of the necessity to use ART after treatment.

Table 3: Need for fertility treatment after ectopic pregnancy

Group	Number of Patients	Percentage	p-value
Medical Treatment	12	15.20%	0.135
Surgical Treatment	1	12.50%	

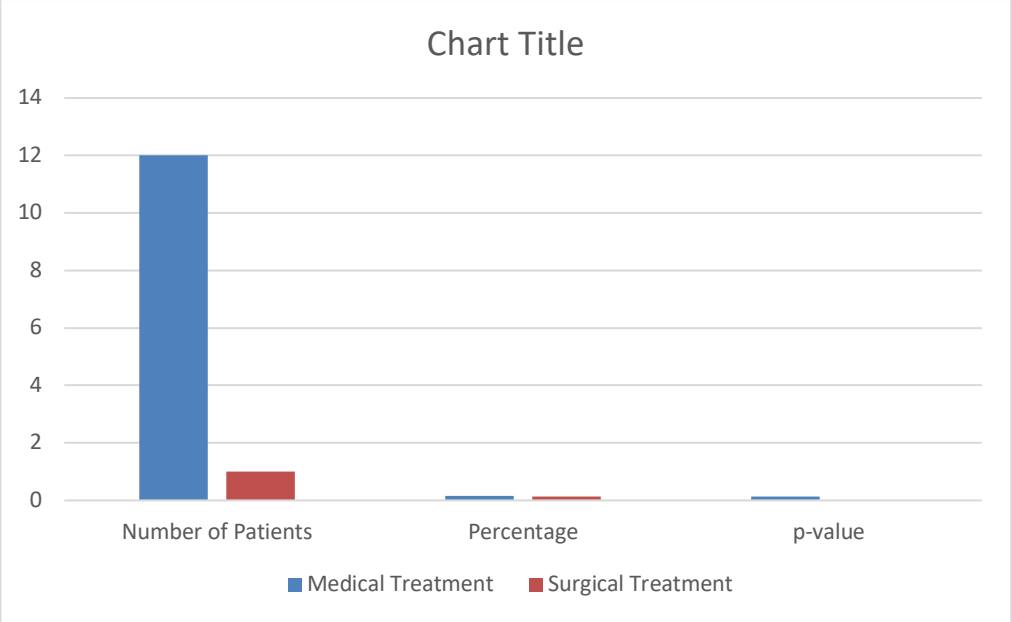

Figure 3: Need for fertility treatment after ectopic pregnancy

Discussion

This study has pointed out that long-term fertility outcomes are similar across the pharmacological and surgical treatments of ectopic pregnancy. Baggio et al., (2021) have reported that among women actively seeking pregnancy after treatment, the rates were almost the same for those treated with methotrexate and those who underwent salpingectomy [12]. The evidence from the studies already conducted finds support here, particularly in the case of methotrexate being a fertile and effective option for women with unstable ectopic pregnancies; however, surgical management has been made a reliable treatment albeit through Gould et al., (2022) when urgency in the clinic or medical contraindications arise for prescribing the drug [13].

As well, the current study did not find any significant differences in the obstetric outcomes of the women who had been treated and later successfully conceived. Term delivery, preterm birth, miscarriage, and recurrent ectopic pregnancy rates were found to be the same in both treatment groups. These results are consistent with previous studies showing that the choice of initial management technique does not negatively affect the ability to have a healthy intrauterine pregnancy. This implies that after methotrexate treatment the fallopian tube integrity is highly maintained, and that in cases where salpingectomy is performed, it does not cause a huge decline in future reproductive potential because of the compensatory function of the tube on the opposite side.

The study by Ezeome et al. (2021) was able to provide some valuable information about the need for assisted reproductive treatment (ART) following ectopic pregnancy as a factor that needs to be considered [14]. The number of women needing ART was minimal and the difference between the groups receiving different kinds of treatment was not significant. Revzin et al. (2021) pointed out that both the methotrexate medication and surgery allowed a great part of women to get pregnant naturally, without the need for advanced fertility treatments [15]. So, those findings might be a good reason for patients to be less worried about their fertility in the future after they have been treated for ectopic pregnancy.

The average age of the participants and the distribution of different treatment options available in this study are like those in big and published studies thus adding to the generalizability of the results. Moreover, the use of follow-up den and direct patient communication adds strength to the evaluation of long-term reproductive outcomes. However, there are limitations in this study. Loss to follow-up could have affected the fertility outcome estimates' accuracies and the small sample size (especially in the surgical group) limits the statistical power to detect small differences.

The study delivered great insights into the reproductive prognosis after ectopic pregnancy, despite its limitations. The comparable outcomes noticed between the medical and surgical groups advocacy the individualization of treatment selection based on clinical presentation, patient preference, and resource availability. The study's findings highlight the fact that even though medical and surgical management are different, they are still both effective and safe and at the same time, favor future fertility and obstetric outcomes. The results provide some valuable evidence for clinical decision-making and patient counselling during ectopic pregnancy management.

Conclusion

The present research is indicative that medical and surgical treatment are both efficacious in the management of ectopic pregnancy and when they are properly chosen. Methotrexate given in a single dose proved to be a good and non-invasive option for patients with early-stage, non-ruptured ectopic pregnancies who are stable, and therefore, it has been supporting good fertility outcomes. Surgical salpingectomy continued to be the procedure of choice for women with rupture, severe symptoms, or those who have been deemed unsuitable for methotrexate, thus offering immediate and definitive management.

Considering the above, it seems that the choice of treatment should be based on the individual physician's assessment of clinical condition and diagnostic findings. It is the triad of timely diagnosis, appropriate selection of treatment modality, and proper follow-up that will lead to improved safety and future reproductive potential in women with ectopic pregnancy.

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