



## Open v/s Minimal Invasive Surgery in Ruptured Ectopic Pregnancy

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(Received: 07 October 2023

Revised: 12 November

Accepted: 06 December)

### KEYWORDS

Ruptured Ectopic Pregnancy (REP), Women Treated, Operative Laparoscopy, Medical, Economic Activity, Laparoscopic Surgery, Normal Deliveries, Gynaecological Emergency.

### Abstract

**Background:** In some individuals, conservative surgical treatment is now effectively being replaced with methotrexate-based medical therapy. A woman's health is seriously jeopardized by ectopic pregnancy, which calls for immediate care and forceful early intervention. Even though laparoscopic surgery is thought to be the best course of action, Ruptured Ectopic Pregnancies (REP) is a frequent gynaecological emergency in places with limited resources, where laparoscopic surgery is the primary therapy. In the surgical care of women with REP, prospective randomized data combining laparoscopic procedures with laparotomy are lacking.

**Objective:** To investigate the effects of open and minimally invasive surgeries on a woman's ability to get pregnant in the future after undergoing surgery for an ectopic pregnancy rupture.

**Method:** We looked at individuals who had salpingectomy and methotrexate treatment between 2010 and 2022. There were 21 cautious surgical operations performed between 1990 and 1995 (5.3% ectopic pregnancies). Ectopic births to normal births were 1:24. From 2010 to 2022, medical care was provided for 19 pregnancies (3.4% of ruptured deliveries).

**Results:** The ectopic birth rate at that time was 1:16.8. Patients receiving medicinal treatment were comparable to those receiving surgical treatment, with the exception that none were reported to have rebound discomfort, only 1/18 had an ultrasound scan that revealed a fatal heart, and none had a gestational sac larger than 4 cm.

**Conclusion:** In an environment with limited resources, operational laparoscopy for women undergoing treatment for REP is possible and has been linked to a considerable reduction in morbidity as well as a speedier return to economic activity.

## I. INTRODUCTION

One of the most serious conditions that may arise during a pregnancy is ectopic pregnancy, in which fertilized eggs are implanted outside of the uterus. Worldwide, an ectopic pregnancy is responsible for around 2% of all pregnancies; in India, however, the incidence ranges from 3.5 to 7.1%, and it is a leading cause of pregnancy loss and morbidity in mothers [1, 2]. The majority of ectopic pregnancy cases are fallopian tube pregnancies, and symptoms-free or symptomatic amenorrhea typically lasts for seven weeks before the diagnosis. A rapid, potentially fatal emergency, tubal rupture needs prompt medical intervention [2, 3].

In gynaecology, [3], laparoscopy and laparotomy have both been used for a number of years. Minimally invasive

surgery has been regarded as the safest and most successful surgical approach since the early 1990s [4, 5]. The treatment of ruptured ectopic pregnancy in affluent nations is mostly based on laparoscopy due to the availability of experienced labour, efficient logistics, enhanced anaesthesia and cardiovascular monitoring, well-coordinated surgical care, and affordable health insurance [5, 6]. Laparoscopic methods are used to treat ruptured tubal ectopic pregnancy with the goal of minimizing intraoperative blood loss, the need for analgesics, length of hospital stay, and increased recovery time, while also being helpful in treating patients with significant hemoperitonium [7, 8]. Nonetheless, in low resource settings, laparoscopic procedures surgery is still recommended.



Prospective randomized data about the best surgical management for women with Ruptured Ectopic Pregnancy (REPs) are lacking. In order to effectively treat tubal ectopic pregnancy, laparoscopic salpingectomy was considerably less effective than salpingectomy via laparotomy, according a meta-analysis of two trials including hemodynamically normal women with small, uncomplicated tubal ectopic pregnancies [8, 9].

But when it came to much shorter operating times, less blood lost during surgery, the need for analgesics, the amount of time it took to return to regular activities, overall hospital expenses, shorter hospital stays, and faster recovery times for women who were hemodynamically stable, the laparoscopic technique outperformed the laparotomy [10, 11].

To our knowledge, there are no systematic randomized studies comparing laparotomy with ultrasonography in the surgical care of women with REP in any scenario, despite some findings suggesting that laparoscopic treatment is possible in women with considerable hemoperitoneum. There is little information currently available about the optimal surgical treatment strategy for women with suspected REP, mostly from small-scale retrospective research [12, 13]. The two studies included in the Cochrane and met evaluation on this subject did not include REPs.

Making decisions on the elective surgery of women with REP in environments with limited resources is crucial and has serious repercussions. If laparoscopic treatment proves to be advantageous and practical, a significant investment in tools, [14], supplies, and training will be needed to help as many women as possible take advantage of these less invasive procedures. The status quo, however, might be maintained if there are no differences in the results between the two surgical methods, giving women the comfort that they are not being restricted access to a superior alternative surgical method [14, 15].

## 1.1 Objective of the study

- Examine the effects of minimally invasive and open surgery on future reproductive success and fertility.
- Compare the prices of open surgery vs minimally invasive surgery, taking into account the direct expenses of medical care as well as any possible secondary expenditures related to recuperation and rehabilitation.

## II.LITERATURE REVIEW

(Jyothisna, P., & Devi, V. 2020) [16] Worldwide, the prevalence of ectopic pregnancies has sharply increased during the last 20 years. The development of methods for medically assisted reproduction is one of the main causes of this. The goal of the current research on ectopic pregnancy cases is to gather information on the incidence and clinical manifestation, danger signs, and related mortality and morbidity of mothers. Every instance of ectopic pregnancy that was detected and admitted to the CKM hospital throughout the course of 18 months. A thorough history and clinical assessment were completed. An examination of the abdomen was performed to look for guarding, stiffness, discomfort, masses, free peritoneal fluid, and Cullen's sign. A vaginal biopsy was performed to check for masses in the fornix, cervix colour, discomfort, uterine size, mobility, and smoothness. Version 17 of SPSS was used to capture and analyse the data in operating systems format.

(Goldstein, J. S., 2006) [17] Although they are uncommon, spontaneous heterotopic pregnancies may exceed 1:100 when hormonal treatments are used. Due to the increasing usage of transvaginal ultrasound, doctors have tried using less intrusive techniques such transvaginal guided KCl, or potassium chloride, injection to treat heterotopic pregnancy. But there aren't many statistics on how well this therapy works.

(Nacharaju, M., 2014) [18] The implantation and subsequent growth of an embryo outside the walls of the uterus is known as ectopic pregnancy. It may manifest in a variety of ways, ranging from acute hemoperitoneum to persistent ectopic pregnancy. This persistent ectopic pregnancy instance is unique in that it has a big hematosalpinx and no traditional symptoms. An outpatient clinic received a complaint from an elderly South Indian lady who had irregular spotting for two months without any accompanying discomfort. The prior menstrual cycles were regular, and there was no history of amenorrhea. The patient had severe anaemia but was hemodynamically stable. The cervical motions were not painful, the abdomen was soft to the touch, and there was no human fertility hormone in the urine. Imaging showed a multifaceted adnexal mass.

(El Laboudy, A. 2013) [19] Over the last several decades, there has been a notable rise in the prevalence of ectopic pregnancy. A higher prevalence of pelvic inflammatory illness and assisted reproductive methods are partially to



blame for this. For such patients, as well as individuals who often go to the emergency room in the first trimester with pregnancy-related problems, ultrasound has historically been the most commonly used imaging modality. This is because it is widely accessible, does not need the use of perhaps hazardous ionizing radiation, and enables real-time imaging.

(Katta, R., 2023) [20] The oviduct, also known as the fallopian tube or fallopian tube, bears the name Gabrielis Fallopius, the first person to provide a precise description of the tubes. It is among the most often received surgical specimens in the laboratory of histopathology. It is the most frequent cause of infectious diseases and infertility. Fallopian tube cancer is an uncommon occurrence. The goals of the current investigation were to assess the fallopian tube's histological patterns in surgically removed tissues and ascertain if they were associated with ovarian or uterine disease. Between October 2016 and September 2018, 309 Fallopian tube specimens were taken from patients undergoing pan excision with the salpingectomy and salpingo-oophorectomies at Assam Medical College and Centre.

(Ahmad, A., 2023) [21] The most prevalent cause of Uterine Fibroids (UFs), which are also referred to as leiomyomas or mimosa, is cancer that affects the uterus's smooth muscle. It often affects women who are fertile. Benign monoclonal growths called uterine fibroids originate from both fibroblasts and the myometrium, the smooth muscle cells of the uterus. Symptoms of urinary fibroids include fatigue, persistent vaginal discharge, and discomfort during periods, and irregular menstrual flow that results in anaemia. Additional symptoms include an enlarged belly, discomfort during sexual activity, bladder/bowel dysfunctions resulting in incontinence or retention of urine, pain, and nausea. It is also linked to problems with reproduction, such as decreased fertility, difficulties becoming pregnant, and unfavourable obstetric outcomes.

(Louis, F., 2020) [22] Prior to the introduction of 3D ultrasound, hysteroscopy was thought to be the best method for reliably diagnosing intracavitary structural abnormalities. In these circumstances, 3D ultrasound was thought to be a replacement that might minimize the need for hysteroscopy. Selecting the appropriate modality in a variety of clinical scenarios may be challenging for clinicians. These two resources provide insightful details on a variety of clinical issues, including

neoplastic disorders, irregular uterine bleeding, infertility, and repeated miscarriages.

### III.METHOD

In this retrospective observational research, which took place between January 2010 and January 2022, we compared radical surgical surgery (salpingectomy) with medicinal therapy with methotrexate [23, 24]. The hospital database had the proceedings of all the individuals who had ectopic pregnancy presentations. We were able to locate all the individuals who had medical care of the ectopic pregnancy, and these dockets were evaluated for the research.

Then, using a system of at random numbers assigned to the proceedings of all patients who had therapeutic care of the ectopic pregnancy, we chose 19 patient dockets at random to serve as controls [25]. In order to identify all instances of surgical conservative treatment (linear the procedure itself) for uncultured ectopic, we also examined the operations registry in the main operating room for all ectopic patients [26].

We chose that time frame since it was the height of the operation's popularity. Although we were able to obtain just 19 proceedings (90.5% case identification), we were able to identify 21 individuals who had this procedure throughout this time [27]. Additionally, these individuals were contrasted with those receiving methotrexate therapy. Telephone interviews were conducted with every single individual in the therapeutically treated arm and all participants in the minimally treated arm who could be reached by phone in order to evaluate the treatment's effects on reproduction and patient satisfaction.

They were questioned about if they started getting pregnant after starting therapy, whether it was an intrauterine or repeat ectopic pregnancy, and whether they had ever had secondary infertility following medication for their unwanted pregnancy. They were also questioned whether they were happy with the course of therapy and the results [28].

For each arm of the study, the odds ratio, P-values, and Confidence Intervals (C.I) have been determined for the following: the degree of surprise, the presence of free fluid on an ultrasound, gestational diabetes sac size above four cm, the presence of heart activity on ultrasound, satisfaction among patients, need for surgery, the future pregnancy, and repeat ectopic birth after



treatment; null parity; abdomen compassion, rebound tenderness, and adnexal tenderness; gestational age less than 7 weeks; gestational age less than 10 weeks; and gestational age less than 7 weeks or 10 weeks.

#### IV.RESULTS

Methotrexate therapy for ectopic pregnancies was administered in 19 cases. Each of the 19 patients only got one dosing regimen. 9470 births and 563 ectopic pregnancies occurred throughout the time period (ectopic rate: 1:16.8). Thus, in 3.4% of ectopic deliveries, medical intervention was required.

A baseline quantitative blood  $\beta$ hCG was measured in every patient who was given the option to receive methotrexate medication. Of them, eleven experienced stomach soreness and thirteen had abdominal pain; none of them had rebound tenderness [28, 29].

Prior to beginning healthcare, each of these patients had either diagnostic laparoscopy or ultrasonography, or a combination of the two. Of these patients, 17 underwent ultrasound, five had both diagnostic laparoscopy and ultrasonography, and one underwent diagnostic laparoscopy alone. The use of ultrasound was performed on seventeen individuals in order to rule out pregnancy during pregnancy. Twelve of the seventeen patients who received ultrasound had their gestational sac sizes remarked upon; all of the sac sizes were smaller than 4 cm.

From two to eleven days were spent in the hospital starting on the day the methotrexate medication was started. Before starting methotrexate medication, all patients had benchmark complete blood counts performed. Renal and hepatic function tests were performed on 14 of the 18 individuals, and the results were normal before docetaxel was started.

Before starting therapy, one patient had a renal blood test completed but not a liver function test, and three patients had neither a renal nor a liver function test completed before starting methotrexate treatment. After receiving therapy, only two individuals had a retest of their liver and kidney functions. This was done correctly on day seven of methotrexate treatment, and the results were normal.

Five patients (or 26%) required a salpingectomy as a result of their therapy failing. Four patients had a prolonged ectopic on ultrasound due to a growing  $\beta$ hCG, and one patient experienced shock after ineffective medical intervention. During laparotomy, 16 out of the 18 controls had salpingectomy. Two patients had laparoscopic salpingectomy and one patient underwent salpingectomy during laparotomy.

Patients receiving medical care had a median age of 28 (range: 21–36). Patients receiving surgical care had a median age of 31 (range: 22–42 years). For ectopic pregnancies treated with methotrexate, the general success rate was 68%. The surgically corrected (the salpingectomy) controls had a 100% success rate. The group that had a salpingectomy had higher rates of rebound and adnexal discomfort. Pain in the lower abdomen, haemorrhaging from the vagina, null parity, indigestion. Tenderness, shock, a gestational age under 7 weeks or over 10 weeks, ultrasound evidence of cardiac activity, free fluid, or gestational sac size greater than 4 cm, however, did not show a statistically significant difference between any groups.

Regarding patient satisfaction, future pregnancy, and future ectopic pregnancy, there was no statistically significant difference seen between the two groups (Table 1).

**Table 1** An analysis of the physiological and analytical results in patients undergoing surgery (salpingectomy) vs medication (methotrexate) for ectopic pregnancy.

Variable	Medical	Surgical	Odd ratios (CI)	P-values
Nulliparous	13/19 (63.2%)	5/11 (23.3%)	5.69 (1.14-1.927)	0.169
Abd pain	14/12 (56.3%)	16/12 (52.3%)	2.69 (1.69-2.96)	0.497
Bleeding	14/12 (2.36%)	12/12 (5.36%)	15.6 (25.3-2.69)	0.594
Abd pain bleeding	12/13 (23.6%)	12/2 (2.36%)	14.5 (2.65-6.35)	1.492
Abdominal tenderness	12/10 (2.31%)	14/2 (5.36%)	15.6 (25.6-2.89)	0.597
Rebound tenderness	10/1 (2.36%)	14/12 (2.69%)	12.6 (2.36-5.79)	0.791
Rebound tenderness	10/14 (2.36%)	14/15 (6.69%)	14.6 (6.39-6.32)	0.795



<b>Adnexal tenderness</b>	8/14 (23.3%)	14/15 (6.98%)	16.9 (6.35-5.98)	0.246
<b>Free peritoneal fluid</b>	8/14 (26.3%)	12/14 (5.36%)	25.6 (5.96-7.58)	0.591
<b>Shock</b>	1/18 (42.3%)	1/16 (2.66%)	0.14 (0.149-0.89)	0.497
<b>Gest sac size &gt;4cm</b>	2/14 (12.6%)	12/6 (5.36%)	5.69 (1.23-3.6)	0.169
<b>Cardiac activity</b>	1/8 (2.36%)	12/2 (23.2%)	2.69 (1.96-5.69)	0.481
<b>Surgery</b>	5/7 (23.6%)	2/6 (2.69%)	5.69 (5.36-9.36)	4.691
<b>Satisfaction</b>	5/78 (26.3%)	5/8 (5.36%)	8.69 (9.67-1.59)	2.036

The clinical presentation results of individuals undergoing salpingectomy, a conservative surgical procedure, were similar to those of patients receiving methotrexate therapy (Table 2). During the period, there were 9571 births and 390 ectopic pregnancies, of which 21 (5.4%) required conservative surgical intervention.

Ectopic births to normal births were 1:24. This group's age range was 20 to 38, with a median age of 28. Of the 19 patients, 5 had a history of ectopic pregnancy and all had undergone a salpingectomy before. Fourteen individuals tested positive for pregnancy, but no quantifiable  $\beta$ hCG was provided at that time.

A culdo-centesis test revealed non-clotting blood in three of the patients. An ultrasound scan revealed a mass at the adnexal area (size not reported) in fourteen instances, and

an empty uterus in thirteen cases, suggesting an ectopic pregnancy. Six patients had laparoscopies, and all of them revealed the uncultured ectopic pregnancy. All patients had an uncultured abnormal pregnancy at the time of surgery, and a linear salpingectomy was carried out.

Diathermy was employed in 6/19 instances and vasopressin in 7/19 cases for haemostasis. In 10/19 individuals, the incision was closed; in 9/19, it was left open. None of those patients had a reoperation after a failed surgery. The typical hospital stay was four days, but it may be as long as five. No discernible changes were seen when a comparison with the individuals receiving medical treatment was summarized (Table 2).

**Table 2** An analysis of the clinical and biochemical results in ectopic pregnancy patients treated with conservative medicine (methotrexate) against conservative surgery (salpingectomy).

<b>Variable</b>	<b>Medical</b>	<b>Surgical</b>	<b>Odd ratios (CI)</b>	<b>p- values</b>
<b>Nulliparous</b>	13/19 (63.2%)	5/11 (23.3%)	5.69 (1.14-1.927)	5.691
<b>Abd pain</b>	14/12 (56.3%)	16/12 (52.3%)	6.9 (1.36-23.6)	0.169
<b>Bleeding</b>	14/12 (2.36%)	12/12 (5.36%)	8.9 (9.36-7.65)	0.497
<b>Abd pain bleeding</b>	12/13 (23.6%)	12/2 (2.36%)	8.97 (2.16-4.37)	1.497
<b>Abdominal tenderness</b>	12/10 (2.31%)	14/2 (5.36%)	8.49 (8.85-4.69)	0.497
<b>Rebound tenderness</b>	10/1 (2.36%)	12/1 (5.38%)	12.6 (2.36-5.79)	0.426
<b>Rebound tenderness</b>	3/26 (2.34%)	2/14 (2.49%)	14.6 (6.39-6.32)	0.497
<b>Adnexal tenderness</b>	5/8 (5.36%)	8/9 (13.3%)	16.9 (6.35-5.98)	0.426
<b>Free peritoneal fluid</b>	8/12 (5.69%)	5/7 (14.6%)	25.6 (5.96-7.58)	1.597
<b>Shock</b>	9/4 (5.36%)	9/14 (15.6%)	0.14 (0.149-0.89)	1.490
<b>Gest sac size &gt;4cm</b>	2/14 (12.6%)	14/12 (25.6%)	5.69 (1.23-3.6)	5.697
<b>Cardiac activity</b>	1/8 (2.36%)	2/14 (29.6%)	2.69 (1.96-5.69)	0.492
<b>Surgery</b>	5/7 (23.6%)	13/6 (26.3%)	5.69 (5.36-9.36)	2.569
<b>Satisfaction</b>	5/78 (26.3%)	14/2 (23.66%)	8.69 (9.67-1.59)	1.498

## V.DISCUSSION

The results of this investigation showed that single dose treatment had a lower success rate than previously documented in the literature [29, 30]. Compared to the

80%–90% stated, the single dose methotrexate success rate was 68%.

The higher failure rate among medically managed patients in this study may have resulted from loose adherence to the criteria for medical handling, since 13





out of 19 and 10 out of 19 medically treated patients, respectively, experienced abdominal pain and tenderness, which could have been early indicators of rupture.

Treatment failure occurred in one study when the patient had stomach discomfort but no abdominal soreness. Treatment failure was linked to the occurrence of vaginal bleeding 56% of the time, but there was no stomach discomfort or tenderness in 17% of the cases. 53% of the time vs 16% of the cases where there was vaginal bleeding. Found, however, that treatment failure was not predicted by the existence of symptoms and signs of illness upon entrance.

In our research, the future pregnancies after salpingectomy was 50%, while the rate after methotrexate treatment for ectopic pregnancy was 28.5%. The rates of intrauterine pregnancy are greater for medical therapy and lower for salpingectomy treatment. Additionally, he discovered that the rates of intrauterine pregnancy were greater with conservative surgical therapy than with radical surgical treatment and lower with conservative surgical treatment compared to medicinal care. Because of inadequate patient follow-up, the results of our research may not be consistent with those of other studies.

Recurrence of ectopic pregnancy was 25% in the group treated with salpingectomy and 0% in the group treated medically. Treatment did not influence the incidence of recurrent ectopic pregnancy; however, it was discovered that other variables, such as the existence of tubular illness, had an impact on the risk of developing an ectopic pregnancy and the result of reproduction.

## VI.CONCLUSION

Of the 18 individuals in this investigation, only 14 got baseline testing for both liver and kidney function. Methotrexate side effects in the case of liver or kidney disease may be severe and even lethal. As a result of the small sample size in this research, there may have been fewer meaningful findings. The fact that this involved retrospective research, which is more biased and susceptible to mistake than a prospective study as a result of confounding variables, was another limiting issue. It was difficult and even impossible to get in touch with a large number of patients. However, our research shows that medicinal therapy is a good alternative for individuals who have been carefully chosen; yet, there

are still issues with treatment follow-up in our environment that need to be resolved.

According to our research, laparoscopy has a shorter duration in the hospital and a quicker recovery time than laparotomy. Minimally invasive surgery is not contraindicated even in cases of significant hem peritoneum. The widespread availability of logistical and a highly qualified staff will lower the overall price of laparoscopic surgery.

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