

Comparing Laparoscopic and Laparotomy for the Surgical Management of Ectopic Pregnancy

Shereen Pradeep Kumar

ABSTRACT

Ectopic pregnancy is the most common life-threatening emergency in early pregnancy. This complication results in not only fetal loss, but also causes significant maternal morbidity and mortality. A literature search was carried out using various search engines and the selected articles were analyzed on the outcomes, such as success of the surgery, operating time, intraoperative and postoperative complications, hospital stay, future fertility, convalescence and cost effectiveness. After having analyzed the same it can be concluded that laparoscopic surgery is safe, effective and economical when compared to open laparotomy as the surgical treatment for ectopic pregnancy, and that it should be considered as the gold standard method in managing ectopic pregnancies.

Keywords: Ectopic pregnancy, Laparoscopy, Laparotomy.

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INTRODUCTION

An ectopic pregnancy is a complication of pregnancy wherein the fertilized embryo gets implanted outside the uterine cavity.¹ A majority of ectopic pregnancies are found to be within the fallopian tube. The ampullary part of the fallopian tube has the highest incidence of ectopic pregnancies (80%), followed by the isthmus (12%), fimbrial (5%) and the cornual and interstitial part of the tube (2%).² An ectopic pregnancy is a medical emergency which is the currently the leading cause of maternal mortality in the first trimester of pregnancy.³⁻⁵ During the 19th century surviving an ectopic pregnancy was bleak, but toward the turn of the 20th century, with advances in anesthesia, antibiotics, and blood transfusions mortality has reduced significantly.¹

There are several treatment modalities for treating ectopic pregnancies, however if hemorrhage has already occurred, surgical intervention may be necessary. The preferred method of surgical management is to perform a salpingostomy or a salpingectomy. Dr John Bard, from New York, reported the first successful open surgical intervention to treat an ectopic pregnancy in 1759. Bruhart et al reported the first laparoscopic surgery for ectopic pregnancy in 1980.⁶

Innovations in the surgical field have now lead to the debate of which would be the preferred route for performing the surgery—laparoscopy vs laparotomy. Seeber stated that

laparoscopic approach has become the preferred surgical method, and that a laparotomy should be reserved for patients that are hemodynamically unstable. Laparotomy may be preferable in the likely event of extensive pelvic adhesions where it is impossible to view the ectopic or in cases of nontubal, intra-abdominal ectopic gestation, where other pelvic structures could be involved.⁷

As a result of the continual debate, this topic was chosen to review the two methods and to analyze the preferred choice surgery.

OBJECTIVE

To compare the surgical outcomes of laparoscopic and laparotomy for the management of ectopic pregnancy.

MATERIALS AND METHODS

A literature search was performed using search engines such as Google, HighWire press and PubMed. The selected papers were analyzed on the basis of the outcomes of both laparoscopy and laparotomy in the management of ectopic pregnancy.

RESULTS

One of the earliest reported comparisons between laparoscopy and laparotomy for the surgical management of ectopic pregnancies was by Brumsted et al, at the University of Vermont. The study was a retrospective case control that involved 101 cases of ectopic pregnancy, conducted between 1982 and 1987. The study compared the difference in outcomes in patients managed by both methods. Twenty-five patients were treated by laparoscopy and 76 by laparotomy. There were no guidelines used while choosing a method of surgery but only the patients who were hemodynamically unstable were treated by laparotomy. The author concluded the study with the results that patients treated by laparoscopic surgery required less operating time, decreased requirement for analgesics, shorter hospitalization and early convalescence (Table 1).⁸

Vermesh et al conceived a prospective study where the factors considered were morbidity, cost of the surgery, postoperative hospital stay and outcome of fertility following linear salpingostomy by laparoscopy vs laparotomy. The inclusion criteria included stable vital signs, hematocrit more than 30%, age over 18 years, and those

that wished salvage their fertility. All patients underwent a diagnostic laparoscopy first. Sixty patients with unruptured ectopic pregnancies of 5 cm or less were randomized equally to both laparoscopy and laparotomy. The beta-hCG levels in both groups were comparable. It was seen that there was lesser blood loss in those who had undergone laparoscopic salpingostomy, though unfortunately two patients in the laparoscopy group required laparotomy postoperatively. A hysterosalpingogram confirmed tubal patency (84% of the laparoscopy and 89% of the laparotomy). Six months following surgery, 56% of the patients that had undergone laparoscopy and 58% of those that had undergone laparotomy conceived spontaneously (Table 2).⁹

A trial conducted in Kuwait, by El-Tabbakh, from March 1999 to October 2001, involving 207 patients to compare the surgical outcome of laparoscopy vs laparotomy for surgical treatment of ectopic pregnancy. A total of 184 patients were treated by laparoscopy and 23 by laparotomy of the 207 patients that had been diagnosed with ectopic pregnancy based on clinical symptoms, history, physical examination, positive serum beta-hCG, transvaginal ultrasonography and ectopic pregnancy conformed at laparoscopy. Postoperatively, the patients were followed up with serial serum beta-hCG on days 4 and 7, there after weekly until levels less than 20 IU/l were obtained. Those patients treated with laparoscopy had an overall success rate of 98.9% with a significant lesser blood loss. Though, 23% of the patients that had undergone open surgery required blood transfusion, only 13% required it in the laparoscopically treated group. In this study all the patients had the ectopic pregnancy confirmed by laparoscopy and then the decision to proceed with operative laparoscopy or laparotomy depended on the minimally invasive surgery experience of the on call surgeon. No intraoperative complications were reported and the duration of surgery ranged from 1 hour to 72 minutes for both groups. The author thus concluded that laparoscopic surgery offered benefits superior to laparotomy with lesser blood loss. The patients experienced minimal pain and therefore decreased need for analgesia, short duration of hospital stay and early recovery (Table 3).¹⁰

Another study, conducted by Xiang in China, that consisted of 142 patients compared the resulted of laparoscopic surgery and laparotomy in the management of ectopic pregnancy. Seventy patients were treated by the conventional laparotomy and the remaining 72 by laparoscopy. It was found that of the patients who were treated laparoscopically the operating time and the postoperative hospital stay was significantly reduced. This method of treatment was also found to be more convenient to both the surgeons as well as the patients.¹¹

The results of a clinical trial, conducted between 1987 and 1989 at Sahlgrenska University Hospital in Goteborg, Sweden, were evaluated by the Mayo Clinic. The results deduced by Mayo stated that the results of both surgeries were the same but at a much lower cost.¹²

Clasen et al, conducted a Belgian study, involving 293 cases, where they adhered to only laparoscopic management and the results favored a laparoscopic approach. Unfortunately, eight laparotomies had to be performed due to intense hemorrhage and advanced gestation. Of the eight laparotomies performed, three were primary and five were converted from laparoscopy. A total of 14 cases, remained with residual disease and were treated either by methotrexate or a second surgical procedure. This study evaluated that the overall rate of spontaneous conception was 77.3% and there was a 10.6% recurrence rate of ectopic pregnancy. The author concluded that laparoscopy approach should remain the gold standard in treating ectopic pregnancy.¹³

A similar study was conducted by Murphy et al at the San Diego School of Medicine. Here the author ran a prospective study, wherein they compared laparoscopy and laparotomy in the management of hemodynamically stable patients. A total of 63 patients were included in the study of which 26 underwent laparoscopy and 37 underwent laparotomy. The results reported have been summarized in the Table 4.¹⁴

The study also stated that there was no statistical difference in the rate of subsequent intrauterine pregnancies or ectopic pregnancies. The author has concluded that in a university-based residency program, operative laparoscopy

Table 1: Summarizing the results of the Brumsted et al study

	Laparoscopy (n = 25)	Laparotomy (n = 76)
Operating time	Reduced	Relatively longer
Analgesics	Decreased requirement	More requirement
Hospital stay	Short duration	Longer duration

Table 2: Summarizing the results of the Vermesh et al study

	Laparoscopy	Laparotomy
Blood loss	Reduced	Relatively more
Positive tubal patency	84%	89%
Pregnancy	56%	58%

Table 3: Summarizing the results of the El-Tabbhak study

	Laparoscopy (n = 184)	Laparotomy (n = 23)
Operating time	66-72 mins	66-72 mins
Blood loss	13%	23%
Hospital stay	Short duration	Longer duration

Table 4: Summarizing the results of the Murphy et al study

	Laparoscopy (n = 26)	Laparotomy (n = 37)
Operating time	Comparable	Comparable
Blood loss	Significantly reduced	Significantly more
Hospital stay	Short duration	Longer duration
Analgesic requirement	Less	More
Total hospital cost	Less	More
Return to normal activity	Early recovery	Late recovery

is a safe alternative for the management of appropriately selected patients with suspected ectopic pregnancy.¹⁴

The Department of Gynaecology and Obstetrics, E. Wolfson Medical Center, Israel, designed a parallel study but on hemodynamically unstable patients. One hundred and one women with ectopic pregnancy underwent laparoscopic surgery. Of which 18 had substantial intra-abdominal bleeding and clinical signs and symptoms of hemodynamic instability. These patients underwent laparoscopic salpingectomy and only one required conversion to laparotomy. There were no major intraoperative or postoperative complications, and all the women made a full and uneventful recovery. The study was concluded with the statement that improved anesthesia and cardiovascular monitoring, combined with advanced laparoscopic surgical skills and experience, justifies operative laparoscopy for the surgical treatment of ectopic pregnancy even in women that are hemodynamically unstable.¹⁵

A French institute conducted a study where 100 ectopic pregnancies were operated on by laparoscopy. The different techniques used included salpingostomy, salpingectomy and tubal expression. There were no intraoperative complications. Though on the fourth postoperative day, one patient underwent a laparotomy due to an occlusive syndrome. Six failures, in cases of conservative treatment were observed including three after tubal expression. The length of operation and hospitalization is similar with regard to the different endoscopic procedures, and shorter than those observed after treatment by laparotomy. These results confirm that laparoscopic treatment of ectopic pregnancies is not only reliable but also significantly less expensive than treatment by means of classical surgery.¹⁶

A study by Zouves et al analyzed the intraoperative morbidity, postoperative course, postoperative hospital stay and fertility outcome in 216 consecutive tubal pregnancies treated with either laparoscopy or laparotomy. Among the 98 cases treated with laparoscopy, the procedure was successfully completed in 95 (97%). In three cases laparotomy had to be performed to conclude the procedure.

The study concludes that laparoscopic treatment of tubal pregnancy was seen to be a safe and effective alternative to laparotomy, yielding similar fertility outcomes and requiring significantly less postoperative analgesia and a significantly shorter hospital stay.¹⁷

With the introduction of laparoscopic services to the Obstetrics and Gynecology Department at South Cleveland Hospital, the department decided to review their management of ectopic pregnancies. A retrospective analysis of 210 cases of ectopic pregnancy managed over a period of 5 years, including the operative findings and surgical data were analyzed. All the patients with an ectopic pregnancy were treated surgically. One hundred and seventy-seven patients were managed successfully by laparoscopy, with no major intraoperative or postoperative complications. Thirty-three women were managed by laparotomy for various reasons. Of these 22.9% achieved a successful pregnancy and delivery. The estimated blood loss, the need for blood transfusion and the length of hospital stay following laparoscopic treatment were significantly less than those in laparotomy group. This study demonstrated that laparoscopic management of ectopic pregnancy is the most beneficial procedure with maximum safety.¹⁸

DISCUSSION

A large number of studies have been published on the management of ectopic pregnancy. They range from case reports to randomized trials, from conservative management to radical surgery. Though now it is accepted that laparoscopy should be the gold standard for the surgical treatment of ectopic pregnancies unless absolutely contraindicated.

- *Success of the surgery:* Clasen et al performed only laparoscopic approach to 194 cases of ectopic pregnancy resulting in a 97.4% success rate.¹³ Other series of studies also confirm the success rate of operative laparoscopic surgery in ectopic pregnancy between 87 to 97%.¹⁶⁻¹⁸ Some authors had performed operative laparoscopic even in hemodynamically unstable patients with good success rate.¹⁴
- *Operative time:* Gray et al conducted a randomized, prospective clinical trial to compare the efficacy of laparoscopic surgery over conventional surgical methods. Laparoscopic surgery took less time while compared to those that underwent laparotomy.¹² In fact, it actually saves time, as during a laparotomy, opening the abdomen to gain access to correct site of the affected tube takes up operating time. Other studies have supported this fact.^{16,17,19}
- *Intraoperative and postoperative complications:* The study conducted by Chatwani et al stated a statically

significant decrease in the operative blood transfusion rate in those who underwent laparoscopy. Similar were the results in several other studies.^{9,10,14,18} These articles have also showed that postoperatively the requirement for analgesics was significantly less.^{8,14}

- *Hospital stay*: All the studies here have reported a much shorter hospital stay following laparoscopic surgery and there for proves to be cost effective.^{8-11,14,17,18}
- *Fertility outcome*: The concern for future fertility poses a debate as there is a certain amount of damage to the lumen. But both methods of surgery have had comparable pregnancy outcomes.^{9,13,14,18}
- *Convalescence*: Minimal access surgery has lead to a better quality of life in term of shorter hospital stay, faster recovery, decreased need for analgesics and cosmetically better scar.^{10,14,15}

CONCLUSION

After critiquing several articles published over the past few years, the overview of literature confirms that minimally access surgery is safe, effective and economical when compared to open laparotomy as the surgical treatment for ectopic pregnancy. It should be considered as the gold standard method in managing ectopic pregnancies.

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ABOUT THE AUTHOR

Shereen Pradeep Kumar

Registrar, Lakeshore Hospital and Research Centre, NH-47 Bypass Maradu, Nettoor PO, Kochi-682040, Kerala, India, e-mail: shereenkumar@gmail.com