

# Comparison of Laparoscopy and Laparotomy in the Surgical Management of Ectopic Pregnancy

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## ABSTRACT

**Objective:** To compare the operative findings, operative procedure and complications, postoperative complications and hospital stay in patients with ectopic pregnancy managed by laparoscopy and conventional laparotomy.

**Study Design:** A cross-sectional, observational study.

**Place and Duration of Study:** Department of Obstetrics and Gynaecology, Kathmandu Medical College Teaching Hospital, Kathmandu, Nepal, from October 2009 to October 2010.

**Methodology:** All patients with ectopic pregnancy confirmed during surgery, were included in the study. Patients with pre-operative diagnosis of ectopic pregnancy but confirmed not to be so during surgery were excluded. Data regarding the studied variables were collected by interviewing patients postoperatively, reviewing the charts and operative notes and by following-up the patients till discharge.

**Results:** There were a total of 32 cases of ectopic pregnancy which was 4.4% of total deliveries during the study period. Twelve patients (37.5%) were managed by laparoscopy and 20 patients (62.5%) by laparotomy. All the patients who underwent laparoscopy and 40% patients who underwent laparotomy were haemodynamically stable pre-operatively. Laparoscopy was mostly performed for tubal abortion (40%) and unruptured ectopic pregnancy (25%) whereas laparotomy mostly for ruptured ectopic pregnancy (70%). Salpingectomy was the commonest procedure in both routes of surgery. One patient in the laparoscopy group and 4 patients (20%) in laparotomy group had complications with two of the latter requiring admission in intensive care unit.

**Conclusion:** Laparoscopy is feasible and safer than laparotomy in the surgical management of ectopic pregnancy.

**Key words:** Ectopic pregnancy. Laparoscopy. Laparotomy. Surgical management.

## INTRODUCTION

Ectopic pregnancy is one of the major causes of maternal morbidity and mortality during first trimester.<sup>1,2</sup> Delay in diagnosis and treatment puts life of a woman at risk. The incidence of ectopic pregnancy has increased substantially over the past decades with increasing trends of risk improvements in the diagnostic modalities.<sup>2</sup>

In 1759, the first successful surgical intervention was reported.<sup>3</sup> For more than next 200 years, surgical treatment was primarily by laparotomy. Laparoscopic surgery for ectopic pregnancy was first reported by Bruhart *et al.* in 1980.<sup>4</sup>

Traditionally, surgical treatment of ectopic pregnancy was done by open laparotomy, currently laparoscopy is gaining significant popularity in diagnosis and management of ectopic pregnancy.<sup>5,6</sup> The role of laparoscopy in the surgical management of ectopic pregnancy is well recognized and it has added new approaches to the diagnostic and treatment modalities.

Choice for these techniques depends on many factors like the availability of equipments, skill of surgeon, condition of patient etc. Advantage of laparoscopy over laparotomy is well recognized and reported in literature. Laparoscopy has advantage of shorter operative time, speedy postoperative recovery and lower costs.<sup>7</sup> Follow-up studies have demonstrated less adhesions while compared to laparotomy.<sup>8</sup> However, failure to retrieve trophoblastic tissue completely compared to laparotomy has been reported.<sup>9</sup> Laparotomy on the other hand, is preferred because of better visualization of tissue and increased confidence to control haemostasis.<sup>10</sup>

The introduction of laparoscopy in management of gynaecological pathology in Nepal is new and imminent. Gynaecological laparoscopic service has started only in the last few years. Though laparoscopy is the advocated route of surgery whenever possible, laparoscopic approach in ectopic pregnancy is a new experience both to the patient as well as to the operating surgeon. Therefore, the outcome of laparoscopic surgery could be different than in centres where laparoscopy has already been an established procedure.

The aim of this study was to compare the operative findings, operative procedure and complications, postoperative complications and hospital stay in patients with ectopic pregnancy managed by laparoscopy and conventional laparotomy.

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## METHODOLOGY

It was a cross-sectional, observational study conducted in the Department of Obstetrics and Gynaecology, Kathmandu Medical College Teaching Hospital, Kathmandu, during a period of one year from 15<sup>th</sup> October 2009 to 14<sup>th</sup> October 2010. All patients with ectopic pregnancy confirmed during surgery, were included in the study. This also included patients who were incidentally diagnosed to have ectopic pregnancy during surgery performed for other causes. Patients diagnosed as ectopic pregnancy clinically and by ultrasound pre-operative but confirmed not to be so during surgery were excluded. Informed consent was taken from all patients.

All the patients were managed according to the hospital protocol. The patients who were haemodynamically stable, presenting during working hours (9 am to 4 pm) underwent laparoscopic surgery after taking informed consent. On the other hand, patients presenting with shock, during evening or at night, when feasibility of staff and instruments for laparoscopy was difficult, were treated by laparotomy.

All the surgeries were performed under general anaesthesia. Laparotomy was performed using pfannenstiel incision and standard technique. Laparoscopy was performed using three ports after establishing pneumoperitoneum with high flow carbon dioxide insufflators. A 10 mm umbilical or supra-umbilical primary port and two 5 mm ipsilateral secondary ports were made. Diagnostic laparoscopy was first performed when diagnosis was made, monopolar or bipolar coagulation was used for the surgical procedure. Peritoneal washing was done at the end of the procedure with normal saline. Tissue retrieval was done from Minilap incision or using an endobag.

Patients with ectopic pregnancy were interviewed post-operatively to obtain detailed information on their clinical profile symptoms and risk factors. Charts and operative notes were reviewed to obtain all significant information. Specifically, age, parity, haemodynamic stability at time of admission, nature of ectopic pregnancy at operation, amount of haemoperitoneum, route and type of operation offered were noted. Patients were followed-up till discharge and till 7 – 10 days postoperatively when they came for suture removal. Any complications that supervened in both groups were noted. The number of days of hospital stay was also noted in both groups.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 11.5. In order to establish the statistical significance, data were compared by applying student's t-test and chi-square test. The probability 'p' value less than or equal to 0.05 was considered statistically significant.

## RESULTS

There were 32 cases of ectopic pregnancy out of the 719 total deliveries during the study period, making it 4.4% of total deliveries. Of the 32 women, 12 (37.5%) underwent laparoscopic surgery and the remaining 20 (62.5%) were managed by laparotomy.

The demographic profile, common clinical presentations, presence of risk factors and diagnostic modalities used are presented in Table I.

Most of the cases of ectopic pregnancy, managed by laparotomy, were diagnosed clinically (50%) and with the help of ultrasound (50%). In patients managed by laparoscopy, 5 cases (41.7%), were primarily diagnosed by diagnostic laparoscopy, as clinical and radiological diagnosis was doubtful. Of these, 3 patients had normal ultrasound findings; laparoscopy was performed on clinical suspicion and ectopic pregnancy was diagnosed in an unruptured state. Incidental diagnosis of chronic organized ectopic pregnancy was also made during

**Table I:** Clinical profile, risk factors and diagnostic modalities for ectopic pregnancy.

Parameters	Laparoscopy n =12	Laparotomy n= 20	p-value*
Mean age in years	28.7 ± 3.3	27.9 ± 4.1	0.57
Mean parity	2.1 ± 1.0	1.3 ± 1.0	0.03
<b>Symptoms</b>			
Amenorrhoea	5 (41.7%)	16 (80%)	
Per vaginal bleeding	9 (75%)	11 (55%)	
Pain abdomen	12 (100%)	20 (100%)	
Dizziness	3 (25%)	13 (65%)	
Vomiting	1 (8.3%)	6 (30%)	
Underwent induced abortion (MVA/medical abortion)	2 (16.7%)	1 (5%)	
<b>Signs</b>			
Shock	–	12 (60%)	
Features of peritonism	4 (33.3%)	20 (100%)	
Cervical excitation and adnexal tenderness	3 (25%)	20 (100%)	
<b>Risk factors</b>			
PID	3 (25%)	5 (25%)	
Infertility	1 (8.3%)	2 (10%)	
<b>Contraception</b>			
OCPs	1 (8.3%)	1 (5%)	
Progesterone	1 (8.3%)	1 (5%)	
Cu T	–	1 (5%)	
Tubectomy	–	1 (5%)	
<b>Pelvic operation</b>			
LSCS	–	5 (25%)	
Tubectomy	–	1 (5%)	
Previous abortions	4 (33.3%)	4 (20%)	
<b>Modes of diagnosis</b>			
Clinical diagnosis with urine βhCG	1 (8.3%)	10 (50%)	
Clinical diagnosis with urine βhCG with USG	6 (50%)	10 (50%)	
Clinical diagnosis with urine βhCG and laparoscopy	5 (41.7%)	–	

Figures in the parentheses indicate percentage; \* t-test applied for comparison of mean.

diagnostic laparoscopy done for chronic pelvic pain, where ultrasound findings were normal. Likewise, there was a case of ruptured cornual pregnancy diagnosed during laparoscopy performed for suspected uterine perforation following induced abortion.

Operative findings and procedure performed at laparoscopy and laparotomy, during surgical management of ectopic pregnancy are presented in Table II.

Laparoscopy had mostly been performed for tubal abortion (42%) and unruptured ectopic pregnancy (25%). However, laparotomy had been performed mostly for ruptured ectopic pregnancy (70%). Ampulla was the commonest site of ectopic implantation in both

the groups. Whether by laparoscopic or open approach, salpingectomy was the mainstay of treatment. There was no conversion to laparotomy in the patients operated by laparoscopy in this study.

There was no intraoperative complications during laparoscopy as well as laparotomy. The postoperative morbidity and the number of days of hospital stay are presented in Table III.

The mean pre-operative haemoglobin was  $11.5 \pm 2.6$  gm% in women undergoing laparoscopy,  $8.5 \pm 2.1$  gm% in those undergoing laparotomy. As expected, blood transfusion was needed in 70% cases that underwent laparotomy compared to 33% patients who underwent laparoscopic surgery.

In 4 (20%) patients treated by laparotomy and 1 (8.3%) patient treated by laparoscopy encountered complications. Of these complications, 2 were of serious nature requiring admission to intensive care unit (ICU); this included one case of septicaemia and another of severe blood transfusion reaction. There was no maternal mortality from ectopic pregnancy in this study.

### DISCUSSION

Ectopic pregnancy constituted 4.4% of total deliveries in the current study which is high compared to that reported in some of the other local studies, where the frequency ranged from 0.9 to 1.02%.<sup>11-13</sup> Higher incidence of ectopic pregnancy in this study could be due to comparatively lesser number of deliveries compared to gynaecological admissions at our institute during the study period. Another factor could be the availability of laparoscopic service helping us to diagnose earlier all suspected cases.

Mean age of patients was 28 years, comparable to that of the other studies.<sup>13,14</sup> The most common clinical presentation was pain in abdomen followed by amenorrhoea and vaginal bleeding which was consistent with findings of other studies.<sup>12-15</sup> Only 37.5% of all women presented with shock at admission. Some series showed fewer women presenting with shock,<sup>12-14</sup> while another showed slightly higher proportion of patients presenting with shock compared to this study.<sup>15</sup>

Major risk factors for ectopic were pelvic inflammatory disease and history of previous abortion, similar to that of another study.<sup>12</sup>

Majority of patients (84.4%) with ectopic pregnancy were diagnosed in the present study based on clinical suspicion aided with urine  $\beta$  human chorionic gonadotropin hormone and ultrasound (transabdominal and transvaginal). Similar results were reported in another study.<sup>14</sup> In this study, there were 5 (15.6%) patients who underwent laparoscopy as a diagnostic procedure due to confusion in clinical picture. Diagnostic laparoscopy

**Table II:** Operative findings and operative procedure at laparoscopy and laparotomy.

Operative findings and procedures	Laparoscopic surgery (n = 12)	Laparotomy (n = 20)	p-value**
Site of ectopic pregnancy			
Ampullary	10 (83.3%)	12 (60%)	0.49
Isthmic	-	4 (20%)	
Infundibular	1 (8.3%)	1 (5%)	
Fimbrial	-	1 (5%)	
Cornual	1 (8.3%)	1 (5%)	
Ovarian	-	1 (5%)	
Type of ectopic pregnancy			
Abortion	5 (41.7%)	3 (15%)	0.10
Ruptured*	3 (25%)	14 (70%)	
Unruptured	3 (25%)	2 (10%)	
Organized	1 (8.3%)	1 (5%)	
Amount of haemoperitoneum (ml)			
None	3 (25%)	1 (5%)	0.16
0 – 1000 ml	5 (41.7%)	5 (25%)	
1000 – 2000 ml	3 (2%)	8 (40%)	
> 2000 ml	1 (8.3%)	6 (30%)	
Type of operation			
Salpingectomy	10 (83.3%)	17 (85%)	0.83
Salpingostomy	1 (8.3%)	1 (5%)	
Partial salpingectomy	1 (8.3%)	1 (5%)	
Ovarian wedge resection	-	1 (5%)	

\* 1 case of ruptured ectopic pregnancy also had heterotopic pregnancy.

\*\* Chi-square test for comparison of the variables.

**Table III:** Postoperative morbidity in laparoscopy and laparotomy.

Postoperative morbidity	Laparoscopic surgery (n = 12)	Laparotomy (n = 20)	p-value*
Requirement for blood transfusion	4 (33.3%)	14 (70%)	0.04
Complications	1 (8.3%)	4 (20%)	0.37
Mild transfusion reaction	1 (8.3%)	-	
Severe transfusion reaction	-	1 (5%)	
Septicaemia	-	1 (5%)	
Wound infection	-	1 (5%)	
Spontaneous abortion (heterotopic pregnancy)	-	1 (5%)	
Mean number of days of hospital stay	4.3 ± 1.7 days	5.4 ± 2.3 days	0.16

\* t-test applied for comparison of mean and chi-square test for comparison of other variables

helped in their diagnosis incidentally. Hence, diagnostic laparoscopy seems to have helped in making early diagnosis and also in avoiding misdiagnosis. Additionally, all the patients diagnosed as ectopic by laparoscopy were surgically treated in the same sitting by laparoscopy which was an advantage to the patients.

Of the 32 women with ectopic pregnancy, 12 (37.5%) underwent laparoscopic surgery and remaining 20 (62.5%) underwent laparotomy. Greater proportion of patients was treated by laparotomy because more number of women in this study had presented with haemoperitoneum (87.5%) and shock (37.5%). And also laparoscopy is still new to many of us as well as to our institute. The proportion of cases of ectopic pregnancy treated by laparoscopy ranges from 1.5% to 97% in different studies.<sup>16-20</sup> The incidence of laparoscopy in this study was 37.5%, which was comparable to that of other studies.<sup>18-19</sup> Laparoscopy was instituted only in haemodynamically stable patients in this study. Similar preference of patients was seen in another study where haemodynamic stability of patients was the influencing factor for opting for laparoscopy.<sup>17</sup> However, with trained surgeons, skilled anaesthetist and supportive staff, laparoscopy is still possible even with massive haemoperitoneum after resuscitation of patient as shown in a study.<sup>21</sup> Even in this study, about 75% of patients treated by laparoscopy had haemoperitoneum with further 33% of them having haemoperitoneum more than one litre. Despite this, laparoscopic surgery was successfully performed without conversion to laparotomy.

With reference to the operative findings, different types and sites of ectopic pregnancy were also reviewed. Even cornual ectopic pregnancy and organized type of ectopic pregnancy which are difficult to be managed surgically were also managed by laparoscopy. Therefore, laparoscopy could be as feasible as laparotomy in the management of ectopic pregnancy though the present sample is too small to make a universal recommendation. In either routes of surgery, salpingectomy was the mainstay of treatment. Conservative surgery with salpingostomy was performed in one patient each with laparoscopy and laparotomy. Partial salpingectomy was performed for cornual pregnancy, one case each by laparoscopy and laparotomy. Current recommendations favour conservative surgery with tubal preservation.<sup>22</sup> Contrary to this, salpingectomy was common in the study. The decision to perform salpingectomy as opposed to salpingostomy is often made intraoperatively. In cases with severe tubal damage or rupture, tubal conservation is, however, not indicated.<sup>23</sup> The proportion of women with tubal rupture and tubal abortion was high (90% in laparotomy and 75% in laparoscopy group) in this study, which was the reason for opting for a more radical operation in both routes of operation. The approach of the surgery did not

affect the type of operation, conservative or radical as shown in other study,<sup>24</sup> where conservative surgery was higher in laparoscopy group. Conservative surgery was performed in nulliparous women in this study.

No major complication occurred in laparoscopic surgery in this study despite the fact that laparoscopy is newly introduced. One patient had mild transfusion reaction in laparoscopy group. However, 4 patients undergoing laparotomy (20%) developed complication of which two were serious nature (septicaemia and severe haemolytic transfusion reaction) requiring admission to intensive care unit. Higher rate of complication in women undergoing laparotomy could be because of inclusion of more serious patients like haemodynamically unstable patients, patients with severe anaemia due to massive haemoperitoneum in the laparotomy group. Slightly higher perioperative complication in the laparotomy group was also reported in another study.<sup>24</sup> Other studies reported no major difference in intraoperative and postoperative complications in laparoscopy and laparotomy groups.<sup>7,25,26</sup> Therefore, laparoscopy is also safe in the management of ectopic pregnancy.

Larger number of women required blood transfusion in laparotomy group compared to laparoscopy group (70% versus 33%). Similar reports were shown in another study. However, in this study, inclusion of more patients with haemoperitoneum and shock in laparotomy group was the reason for this.

Total number of hospital stay was comparatively shorter in laparoscopy group compared to laparotomy group. Similar results are shown in different studies and this was noted as an advantage.<sup>7,18,24,27</sup>

## CONCLUSION

Laparoscopy is feasible and safe as laparotomy in the surgical management of all types of ectopic pregnancy. Additionally, laparoscopy has a great role in diagnosis of clinically suspicious cases. Therefore, laparoscopy should be opted whenever possible. However, larger studies with larger number of sample is needed to draw conclusion.

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