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Laparoscopy: An emerging modality of management of ectopic pregnancy in a low resource setting

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Abstract
Aims and objectives: The main aim of the present study is to analyze the role of operative laparoscopy in ectopic pregnancy in a developing country, to study the clinical profile of patients and procedures done for ectopic pregnancy and to analyze the safety of procedure for patients by assessing the complications and the duration of stay in hospital after surgery.
Materials and methods: This retrospective observational study was conducted in the department of Obstetrics and Gynaecology, Pt. BD Sharma PGIMS, Rohtak on all laparoscopies conducted in cases of ectopic pregnancies in 5 years.
Observations: Out of 553 laparoscopic surgeries, 59 patients were managed laparoscopically for ectopic pregnancy. Mean age was 26.63±4.73 years. Most common presenting complaint was pain (98% cases). Ampullary region of fallopian tube being most common site in 44 cases (76.75%). 17 patients (29%) were managed with conservative surgery, i.e. salpingostomy. Salpingectomy was done in 38% of patients. Twelve patients (20%) required conversion to laparotomy. Mean length of hospital stay was 4.36±2.05 days.
Discussion: The most common EP location is in the fallopian tube, predominantly the ampullary region of the fallopian tube. The laparoscopic approach is emerging as the gold standard for the management of ectopic pregnancy. Even though it is tough to manage all ectopic pregnancies laparoscopically, unnecessary laparotomies can be avoided by increasing the training of consultants, registrars and postgraduate students. Timely diagnosis at an early stage and management with laparoscopy reduces the patient morbidity and short hospital stay can reduce the burden of cost of treatment in low resource settings.

Keywords: Laparoscopy, ectopic pregnancy, salpingectomy, salpingostomy

Abbreviations: Ectopic pregnancy- EP, b-HCG- Beta-Human Chorionic Gonadotropin, ART- Assisted Reproductive Technology

Introduction

Over the past decade, the role of laparoscopy in gynecological surgery has spread from simple diagnostic look surgeries and laparoscopic tubectomies to standard operative procedures of pelvis. Ectopic pregnancy is a serious obstetrical emergency with potential health risks for reproductive aged women. It is well accepted that laparoscopic treatment of ectopic pregnancies decreases postoperative pain, hospital stay, return to normal activity, and costs compared with laparotomy. Laparoscopy can be used for tubal pregnancies, either a linear salpingostomy or salpingectomy can be performed in the majority of patients [1, 4]. However, in a poor resource setting, laparotomy for ectopic pregnancy still remains the modality of choice considering the lack of required instruments for laparoscopy in emergency and lack of special training in registrars and postgraduate students. In developing countries, the demands of laparoscopic surgery on the entire operating team are indeed heavy because of high population load and increasing awareness but a balance has to be maintained considering the safety, efficacy and cost effectiveness of procedure chosen for the management.
The main aim of the present study is to analyze the role of operative laparoscopy in ectopic pregnancy in a developing country, to study the clinical profile of patients and procedures done for ectopic pregnancy and to analyze the safety of procedure for patients by assessing the complications and the duration of stay in hospital after surgery.

Materials and Methods

This study was a retrospective observational study of all ectopic pregnancies laparoscopically treated for the duration of five years at our hospital, Pt. BD Sharma PGIMS, Rohtak.

Out of total 553 laparoscopic surgeries carried out over a 5-year period, 59 laparoscopic surgeries (10%)were done for ectopic pregnancies diagnosed by various means like history, examination, serial b-HCG estimations, and ultrasound. The following patient characteristics were recorded: age, demographic characteristics, parity, gestational age of ectopic pregnancy, presenting complaints and quantitative beta-HCG level.

Inclusion criteria for selection of laparoscopic management of ectopic were as follows

1. Patient who were kept for medical management but experienced a failure of medical management.
2. Patients who had contraindications to methotrexate therapy (leucopenia, thrombocytopenia, or high concentrations of liver enzymes or serum creatinine)
3. Clinically stable patient with a unruptured ectopic pregnancy or when there was an indication for a concurrent surgical procedure, such as tubal sterilization or removal of hydrosalpinx when a patient was planning to undergo subsequent *in vitro* fertilization.

Exclusion criteria were

1. Hemodynamic instability
2. Symptoms of an ongoing ruptured ectopic mass (such as persistent pelvic pain), or signs of intraperitoneal bleeding.

Laparotomy was done in emergency operation theatre when a patient was exhibiting any of the above features.

The following outcome information was collected from operative records: site of ectopic gestation, procedure performed, operative complications, rate of conversion to laparotomy and reasons for that. Postoperative complications and length of hospital stay were also noted.

The SPSS Version 21 statistical tool was used to calculate the mean and standard deviation (SD) figures.

Results

Total laparoscopic surgeries done were 553 done for various indications like infertility, adnexal masses, mullerian abnormalities, endometriosis, pelvic pain, abnormal uterine bleeding, misplaced CuT and ectopic pregnancy.

Out of them, 59 (11%) were done for ectopic pregnancy (Figure 1).

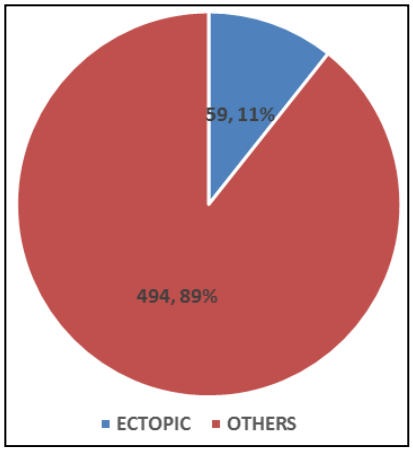

Fig 1: Frequency of laparoscopic surgeries done for ectopic pregnancy in five years

Baseline parameters

Baseline parameters of patients are described in Table 1. Mean age was 26.63±4.73 years (Range was 25 to 35 years). 76% were from lower middle strata of society. 14 patients (23.7%) were primigravida and 45 (76.2%) were multigravida. Mean gestational age at the time of presentation was 6.36±2.87 weeks. Mean b-HCG levels were 4454.7± 794.8 mIU/ml. The most common presenting feature was pain (98%).

Table 1: Baseline parameters at the time of presentation.

Serial no.	Baseline Parameters	Values
1	Mean age(years)	26.63±4.73
2	Nulliparity(n)	14 (23.7%)
3	Multiparity (n)	45(76.2%)
4	Mean Gestational Age(weeks)	6.36±2.87
5	Mean beta HCG (mIU/ml)	4454.7± 794.8
6	Abdominal pain at presentation(n)	58 (98%)

Site of ectopic pregnancy

The most common site of tubal ectopic pregnancy was the fallopian tube, ampullary region being most common in 44 cases (76.75%), followed by the isthmic (2 cases) and cornual (1 case) [table 2]. Five (8 percent) cases were chronic ectopic. The detailed frequency of location of the ectopic pregnancy is shown in figure 2.

Table 2: Frequency of site of Ectopic Gestation

Site of Ectopic	No. Of Patients (n-55)	Percentage (%)
Ampulla of tube	44	74.5
Isthmus of tube	2	3.3
Cornual ectopic	1	1
Ovarian ectopic	3	5.08
Chronic ectopic	5	8.4

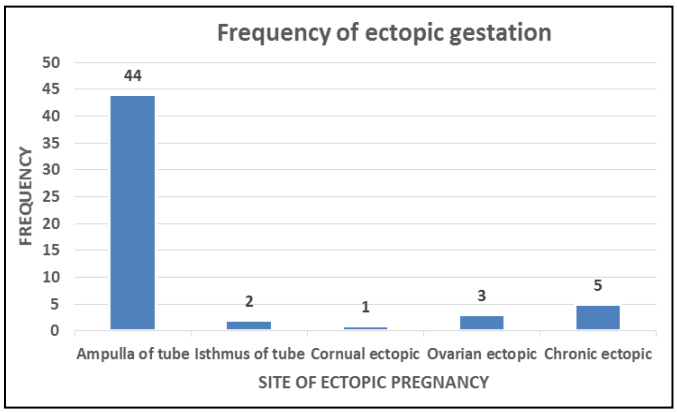

Fig 2: Bar Diagram showing sites of ectopic gestation.

Surgical procedure

Table 3 enlists the details of per operative findings and the procedure done during laparoscopy. Out of 59 patients, 17 patients (29%) were managed with conservative surgery, i.e. salpingostomy. Salpingectomy was done in 38% of patients. Adhesionolysis was done in 7 patients. 3 patients were having ovarian ectopic pregnancy for which partial oopherectomy was done. 12 patients required conversion of laparoscopic surgery to laparotomy for various reasons. Six patients had massive hemoperitoneum, two patients had pelvic adhesions and other reasons being pelvic hematocoele and chronic ectopic mass with dense adhesions.

Table 3: Per operative findings and modes of surgical management of tubal ectopic pregnancy

Serial no.		No. of cases	Percentage
A)	**Per operative details**		
1	Ampullary Tubal Ectopic	44	74.5
2	Isthmic Tubal Ectopic	2	3.3
3	Cornual Tubal Ectopic	1	1
4	Ovarian Ectopic	3	5.08
5	Pelvic Hematocoele	5	8.4
6	Hemoperitoneum	7	11.8
7	Tubal Abortion	3	5.08
8	Negative Laparoscopy	4	6.7
B)	**Procedure done**		
1	Salpingostomy	17	28.8
2	Salpingectomy	23	38.9
3	Adhesionolysis	7	11.8
4	Partial Oophorectomy	3	5.08
5	Pelvic Hematocele Drainage	5	8.4
6	Conversion to Laparotomy	12	20

Length of hospital stay

All patients were discharged after surgery in healthy state. Mean length of hospital stay was 4.36±2.05 days.

Complications

Only one patient developed pelvic abscess after laparoscopy which was managed by posterior colpotomy along with broad spectrum antibiotics. Twelve patients required conversion to laparotomy during laparoscopic procedure. None of the patients required revision surgery after primary procedure. There was no mortality in the present study.

Discussion

Ectopic pregnancy is the implantation of the blastocyst outside the uterine cavity which is not lined by the endometrium and uterine musculature. The overall rate of EP is 1–2% in normal population and 2–5% among patients who have undergone assisted reproductive technology (ART) [5, 6]. Ruptured EPs account for up to 6% of all maternal deaths in normal population and a mortality rate of 31.9 deaths per 100,000 pregnancies ART-associated EPs [5, 7].

The most common location for EP is the fallopian tube, predominantly the ampullary region of the fallopian tube, others being the cervix, ovary, myometrium, abdominal cavity, interstitial (i.e., intramuscular/proximal) portion of the fallopian tube or coincidentally with an intrauterine pregnancy (in less than 10% of EPs) [8]. In the present study also the maximum number of ectopic pregnancies were tubal ectopic, mostly in ampullary part of the tube.

The diagnosis of ectopic pregnancy can be made by combined approach using clinical examination and investigations i.e. pregnancy tests (in urine and serum) and transvaginal sonography. These have been integrated in reliable diagnostic algorithms in literature. These diagnostic algorithms, the increased awareness and knowledge in population and early antenatal visit done by the patients along with high index of suspicion in clinicians, have enabled an early and accurate diagnosis of ectopic pregnancy. As a consequence, the clinical presentation of ectopic pregnancy has been modified from life threatening disease necessitating emergency surgery to a more benign presentation. This, in turn, has resulted in the availability of a multiple options for therapeutic management of ectopic gestation [9, 15]. Thus, therapeautic intervention is now possible before the patient's condition has deteriorated and before tubal integrity is lost, thereby improving clinical outcome and reducing costs associated with emergency surgery. Furthermore, advances in laparoscopic surgery have enabled a laparoscopic approach in the majority of patients with ectopic pregnancy [16].

Late presentation or diagnosis are associated with catastrophic events either leading to detrimental consequences or emergency laparotomy and resuscitation thereby, increasing the patient morbidity. A high index of suspicion, basic clinical skills, investigations at the early gestation and confirmation of diagnosis by ultrasonography in a young female with history of amenorrhoea, abdominal pain and irregular bleeding plays a pivotal role in prompt diagnosis and management specially in low resource settings avoiding unnecessary diagnostic laparoscopies (which are not easily available in emergency department).

The introduction of laparoscopic treatment for ectopic pregnancy was a major advance in its management. The first laparoscopic salpingectomy was reported by Shapiro in 1973 and the first report of laparoscopic salpingostomy was published by Bruhat in 1978. A number of studies have now clearly demonstrated the advantages of the laparoscopic approach compared with laparotomy. Laparoscopy results in smaller surgical incisions, improved cosmetic appearance, reduced operative blood loss, lower febrile morbidity, less postoperative analgesic requirements, shorter convalescence and a reduction in health care costs [17]. The benefits of laparoscopy were also quoted in a systematic Cochrane database review of 35 randomized trials that compared laparoscopic salpingostomy with the open surgical approach [18]. However, laparotomy still remains the most common surgical approach at many hospitals in poor resource settings. Among the reasons for the slow uptake of laparoscopic surgery as a routine modality of management are lack of required infrastructure in emergency, capital cost of equipment and need for advance hands on training and courses for mastery in laparoscopic surgeries in developing countries.

The Royal College of Obstetricians and Gynaecologists guideline had emphasized that salpingectomy is the preferred standard surgical approach for tubal EP. This preference was based on the small risk of haemorrhage in the immediate postoperative period, no need for further treatment for persistent trophoblast tissue as may be required after conservative surgery and the possibility of a repeat EP in the conserved tube [19]. Moreover, salpingectomy is preferred because it is easier to perform and more quickly done than a salpingostomy. Our study demonstrated that laparoscopic salpingectomy was successfully done in 39% of patients. Salpingostomy has become an option in

patients desiring future fertility to save tubal integrity to maintain reproductive capacity. In present study, cases in which salpingostomy was performed (29% of all patients), products were removed using hydrodissection and hemostasis was achieved with bipolar coagulation. The decision to proceed to salpingectomy was done when bleeding continued even after applying various hemostatic methods or the fallopian tube was damaged irreparably or the patient had completed her family. No patient in our study required relook surgery or any treatment for persistent disease.

Patients undergoing laparoscopic treatment of an EP generally require less than two days of hospitalization whereas those undergoing laparotomy need three to five days of inpatient care [20, 21]. Present study also demonstrated the mean hospital stay of 4.36±2.05 days. Recuperative costs after surgery include the lost income by the patient or her employer and the cost of care given to the patient until the patient is able fully to function and return to work postoperatively. Azziz *et al*. demonstrated that in patients undergoing pelvic surgery by laparoscopy, the return to work time was 4.0 ± 2.6 days [22]. By permitting the patient to return rapidly to full activities, employee sick payer lost income and the need for additional care for the patient are also reduced. This is significantly less than the standard 4 to 6 weeks of postoperative rest usually recommended after any laparotomy procedure. Considering this, introduction of laparoscopy in developing countries for ectopic pregnancy greatly reduces the hospital inpatient burden and also indirectly covers the lost earnings of patients owing to their prolonged recovering time after laparotomies.

Intraoperative and postoperative complications during the laparoscopic management of ectopic pregnancies have also been quoted in the literature [23].

However, in the present study only one patient developed pelvic abscess which was managed with posterior colpotomy and antibiotics. Common indications for conversion of laparoscopy to laparotomy are extensive adhesions, persistent bleeding during attempted laparoscopic management, obesity and lack of operator ability. In present study, most of the patients in whom conversion to laparotomy occurred had torrential haemorrhage during procedure.

All the laparoscopies were performed by consultants well trained in laparoscopy in our institute in elective surgeries, however, the need for special “hands on” trainings of registrars and students cannot be overlooked in a poor resource setting when most of the cases report in emergency and are to be managed in emergency operation theatres. These training programmes should emphasise on three essential aspects for laparoscopic surgery in developing countries, i.e. the safety, economy and care of instruments as these are inter-connected. Safety ensures complication-free surgery, which further ensures economy by decreasing morbidity. Economy ensures the growth and spread of laparoscopic surgery further in our part of the world too.

In summary, a higher percentage of ectopic pregnancies can be managed laparoscopically if minimal access experience is introduced in the emergency department. Even though it is tough to manage all ectopic pregnancies laparoscopically, unnecessary laparotomies can be avoided by increasing the training of consultants, registrars and postgraduate students. Timely diagnosis at an early stage and management with laparoscopy reduces the patient morbidity by giving small surgical scar, early convalescence of the patient and furthermore, short hospital stay and short recovery time reducing the burden of cost of treatment too in low resource settings.

Conclusion

Laparoscopic management of ectopic pregnancy is a beneficial procedure in a low resource setting with maximum safety and efficiency when appropriate training and instruments are available too in emergency operating theatres. A strong referral system and diagnosis at an early gestation using noninvasive serum tests and pelvic ultrasound play an important role for consideration of patient for laparoscopic management further predicting the success of laparoscopic surgery.

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