

## Evaluation of Postsurgical Pain in Single Port versus Three-Port Laparoscopic Surgery for Ectopic Pregnancy: A Preliminary Study

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Rec date: 19 Dec, 2014; Acc date: 28 Dec, 2014; Pub date: 30 Dec, 2014

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### Abstract

**Objective:** To retrospectively compare the postsurgical pain after single-port laparoscopic surgery and conventional laparoscopic salpingectomy for the surgical treatment of tubal pregnancy.

**Methods:** The cases of two groups of patients with ectopic pregnancies were reviewed: those who had undergone a single-port laparoscopic surgery (n=6) and those who had undergone a conventional multi-port laparoscopic surgery (n=20). We compared these groups' surgical outcomes, including operative time, blood loss, use of analgesics, and complications.

**Results:** There was no significant difference between the two groups regarding the surgical time, blood loss during surgery, or analgesics use after laparoscopic surgery. There were no serious complications and no need for conversion to conventional laparoscopy or laparotomy in both groups.

**Conclusion:** Our present findings suggest that single-port laparoscopic surgery is feasible and practical for the surgical treatment of ectopic pregnancies. However, the results also indicate that the reduction of the number of laparoscopy ports did not offer further pain relief in these patients.

**Keywords:** Ectopic pregnancy; Single-port laparoscopic surgery; Laparoscopic salpingectomy; Post-surgical pain; Analgesics; Feasibility; Safety; Cosmesis

and conventional multi-port laparoscopic surgery for the treatment of ectopic pregnancies.

### Introduction

The frequency of ectopic pregnancy has gradually increased over the past 20 years [1,2]. The Fallopian tubes are the implantation site, in approx. 98% of the cases, usually in the ampullary region [2]. Both medical and surgical treatments are available for ectopic pregnancies. To date, laparoscopy is the standard surgical approach [3]. Ectopic pregnancy patients managed laparoscopically have less blood loss, fewer postoperative adhesions, less postoperative pain and less need for analgesics, and earlier recoveries compared to laparotomy [4-8].

Laparoscopy was introduced in the early 1990s, and in the ensuing two decades the development of laparoscopic skills and instruments has enabled surgeons to perform almost scarless surgery. In addition to better cosmetic consequences, the minimization of scar formation has provided less postoperative pain, faster recovery, shorter hospital stays, fewer wound complications [4-8]. Transumbilical single-port laparoscopic surgery is carried out through the umbilicus, resulting in a virtually invisible abdominal scar [9]. Transumbilical single-port laparoscopy was introduced as a laparoscopic surgery for ectopic pregnancy and found to be a feasible procedure [10].

The aim of the present study is to evaluate whether the reduction of port number can reduce the postsurgical pain by comparing postsurgical analgesics use between single-port laparoscopic surgery

### Materials and Methods

Twenty-six women who were diagnosed as having a ectopic pregnancy between September 2013 and April 2014 were treated with laparoscopic surgery at Oita University Hospital. Six patients underwent single-port laparoscopic surgery, and the other 20 patients underwent conventional laparoscopic surgery with three ports.

The patients were treated by single-port laparoscopic surgery or conventional three-port laparoscopic surgery based on the patient's desire and the availability of single-port endoscopic equipment. For the single-port laparoscopic surgery group patients, entry through a single port was established by a 3-cm umbilicus incision with a wound retractor (Lap Protector, Hakko, Tokyo, Japan). A 10-mm 30-degree laparoscope and two 5-mm disposable rigid forceps were used during the procedure. To remove the ectopic pregnancy, either a linear salpingotomy or salpingectomy was performed with standard techniques. Postsurgical pain was controlled with an intramuscular injection of pentazocine (30 mg) and atropine sulfate (0.5 mg), or diclofenac sodium suppositories (50 mg), depending on the patient's request.

The following patient data were collected from medical records: age, weeks of gestation, marital status, history of parturition, laterality, site of pregnancy, rupture of fallopian tube, Chlamydia infection,

surgical method, operative time, blood loss, and times of analgesics use.

Statistical analyses were performed using Mann-Whitney U test and  $\chi^2$  test.

## Results

Table 1 shows the clinical data of the two groups of patients. There were no significant differences between the single-port laparoscopy group and the conventional three-port laparoscopy group regarding the patients' age, marriage status, history of parturition, gestational age at laparoscopic surgery, laterality, rupture of fallopian tube, presence of intra-abdominal hemorrhage (>100 mL), or surgical method. Whereas, conventional three-port laparoscopy group contain more multigravid patients and ampulla pregnancy ( $p < 0.05$ ,  $\chi^2$  test).

All six patients in the single-port laparoscopy group and 19 of the 20 patients in the conventional three-port laparoscopy group underwent a salpingectomy. There was no significant difference between these two groups regarding the surgical time, blood loss during surgery, or times of analgesics use after laparoscopic surgery. No serious complications occurred during the surgical procedures or during the postoperative period in both groups. There was no need for conversion to conventional laparoscopy or laparotomy in either group.

## Discussion

We compared the postsurgical pain between patients who had undergone a transumbilical single-port laparoscopic surgery and those who underwent a conventional three-port laparoscopic surgery for the treatment of ectopic pregnancy. We found that there was no significant difference in the analgesics use after laparoscopic surgery between these two groups. Since laparoscopic surgery itself is minimally invasive, the number of ports did not affect the postsurgical pain in these patients. Other clinical data have revealed that single-port laparoscopic surgery is feasible and safe for the treatment of ectopic pregnancy.

Efforts to further enhance the advantages of laparoscopy over open surgery for the treatment of ectopic pregnancy have been bolstered by the recent improvements in laparoscopic surgical equipment and the development of surgical skills and techniques [11]. For example, minimizing the size and/or decreasing the number of ports has been done to reduce abdominal wall trauma [4-8].

Kumakiri et al. [12] and Yoon et al. [10] indicated that single-port laparoscopic surgery is feasible and safe in the treatment of ectopic pregnancy. Recently, Kim et al. [13] confirmed the feasibility and safety of single-port laparoscopic surgery for ectopic pregnancy by a prospective case-control study. Such single-port laparoscopy is nearly scarless, as it produces a single scar at the umbilicus, which can be concealed structurally. The potential benefits of gynecologic single-port laparoscopic surgery over conventional laparoscopic surgery include; faster recovery, shorter hospital stays, fewer perioperative complications, less pain, decreased analgesic requirements, improved cosmesis, and improved quality of life [14]. However, as demonstrated in the present study, single-port laparoscopic surgery is not effective to reduce the postsurgical pain in comparison with conventional multi-port laparoscopic surgery. Our findings suggested that, since the laparoscopic approach itself has already achieved almost painless postsurgical recovery,

Clinical parameter	Single-port group (n=6)	Multi-port group (n=20)
Age [yr, mean $\pm$ SD (range)]	29.3 $\pm$ 6.2 (21.4-37.7)	31.2 $\pm$ 5.4 (23.5-44.4)*
<b>Marriage status**</b>		
Single	2 (33.3%)	7 (35.0%)
Married	4 (66.7%)	13 (65.0%)
<b>History of conception***</b>		
Yes	2 (33.3%)	17 (85.0%)
No	4 (66.7%)	3 (15.0%)
<b>History of parturition**</b>		
Yes	2 (33.3%)	6 (30.0%)
No	4 (66.7%)	14 (70.0%)
Gestational age [wk, mean $\pm$ SD (range)]	6.3 $\pm$ 1.2 (4.0-7.3)	7.2 $\pm$ 1.3 (5.1-9.6)*
<b>Site of implantation***</b>		
Ampulla	2 (33.3%)	13 (65.0%)
Isthmus	4 (66.7%)	6 (30.0%)
Ovary	0 (0%)	1 (5.0%)
<b>Laterality**</b>		
Right	5 (83.3%)	9 (45.0%)
Left	1 (16.7%)	11 (55.0%)
<b>Rupture of fallopian tube**</b>		
Yes	1 (16.7%)	1 (5.0%)
No	5 (83.3%)	19 (95.0%)
<b>Intra-abdominal hemorrhage (&gt;100 mL)**</b>		
Yes	2 (33.3%)	1 (5.0%)
No	4 (66.7%)	19 (95.0%)
<b>Surgical method**</b>		
Salpingectomy	6 (100%)	19 (95.0%)
Partial oophorectomy	0 (0%)	1 (5.0%)
Surgical time [min, mean $\pm$ SD (range)]	59 $\pm$ 21 (26-91)	64 $\pm$ 17 (25-96)*
Blood loss [mL, mean $\pm$ SD (range)]	55 $\pm$ 112 (0-280)	13 $\pm$ 45 (0-200)*
Times of analgesics use [mean $\pm$ SD (range)]	1.2 $\pm$ 0.4 (1-2)	1.1 $\pm$ 0.6 (0-2)*
*not significant (Mann-Whitney U test), **not significant ( $\chi^2$ test), *** $p < 0.05$ ( $\chi^2$ test)		

**Table 1:** Clinical data of the 26 patients with ectopic pregnancy treated by laparoscopic surgery

the reduction of the number of laparoscopy ports does not add significant benefits regarding the need for post-operative analgesics.

The limitations of the present study are the small patient number, retrospective evaluation, and the utilization of two different treatment schedules, which probably do not guarantee a sufficient study power.

In summary, our present findings suggest that single-port laparoscopic surgery is feasible and practical for the surgical treatment of ectopic pregnancies. However, the reduction of the port number did not offer further pain relief. Further studies are necessary to evaluate the usefulness of single-port laparoscopic surgery from the view of cosmetic advantage.

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