

## SINGLE PORT VERSUS DOUBLE PORT LAPAROSCOPIC STERILIZATION IN REMOTE AREAS

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**Abstract**

**Background:** Laparoscopic sterilisation is a commonly performed procedure for family planning, and optimising surgical approaches in remote and resource-limited settings is crucial. This prospective comparative study evaluated the efficacy and feasibility of single-port laparoscopic sterilisation (SPLS) versus double-port laparoscopic sterilisation (DPLS) in such settings. **Materials and Methods:** From April 2022 to March 2023, 464 cases were included in the study, with 232 cases in each group (SPLS and DPLS). Female patients aged 22-45 years, seeking permanent sterilisation via laparoscopic tubal ligation, and willing to participate and provide informed consent were eligible for inclusion. Outcome measures were assessed, including operative time, postoperative pain scores, complication rates, cosmetic satisfaction, open surgery conversion, hospital stay length, and patient satisfaction. **Result:** The SPLS group showed shorter operative times than the DPLS group ( $p < 0.05$ ). Both groups reported minimal postoperative pain scores, with no statistically significant difference. Complication rates were similar in both groups, with sound perforation, false passage, and omental prolapse being the most common complications observed. Cosmetic satisfaction was higher in the SPLS group, and there was one case in the DPLS group that required conversion to open surgery due to dense adhesions from previous surgeries. Patient satisfaction was generally better in the SPLS group. **Conclusion:** Single-port laparoscopic sterilisation is feasible and time-efficient in remote, resource-limited settings. Comparable outcomes in pain and complications, with improved cosmetic satisfaction, emphasise its potential benefits in remote family planning camps.

## INTRODUCTION

Laparoscopic sterilisation has become a preferred method for family planning and optimising surgical approaches in remote and resource-limited settings due to its minimally invasive nature and excellent efficacy. As surgical techniques have developed, single-port and double-port laparoscopic sterilisation have become widely used. The introduction of single-port and double-port methods has improved laparoscopic sterilisation.<sup>[1-4]</sup>

In recent years, surgeons have developed the use of single-incision laparoscopic surgery to reduce the number of skin incisions and ports necessary and to increase the utility of the laparoscopic technique. Wheeler,<sup>[5]</sup> first reported single-incision laparoscopic surgery in 1976 for the tubal ligation technique, and it has developed with technological advancements. For female sterilisation, there are numerous methods. Sterilisation through surgery is a reliable, secure, and successful method. Laparoscopy, mini-laparotomy, or hysteroscopy are

all surgical sterilisation techniques that can be used. With a speedier recovery time and simplicity of use, laparoscopy is a widely used procedure.<sup>[1-4]</sup>

Multiple studies and meta-analyses have now demonstrated that Single-port or Single-incision laparoscopic surgery (SPL) is superior to Multi-port laparoscopic surgery (MPL), particularly regarding postoperative pain and cosmetic outcome. Laparoscopic procedures have been proven superior to open abdominal surgery in recent years, particularly when treating benign disorders. The length of the postoperative hospital stays, postoperative pain, and intraoperative problems have all been observed to be decreased. However, the evidence for this still lacks meaningful long-term data because most research only records outcomes up to 12 months after surgery.<sup>[2,6-8]</sup> Thus, in this prospective comparative study, we evaluated the efficacy and feasibility of single-port laparoscopic sterilisation (SPLS) versus double-port laparoscopic sterilisation (DPLS) in such settings.

## MATERIALS AND METHODS

This prospective comparative study was conducted from April 2022 to March 2023. Four hundred sixty-four cases were included in the study, with 232 cases of single ports and 232 cases of double ports (SPLS and DPLS). Ethical approval and informed consent were obtained before the study started.

### Inclusion Criteria

Female patients aged 22-45 years, seeking permanent sterilisation via laparoscopic tubal ligation, and willing to participate in the study and provide informed consent were included.

### Exclusion Criteria

Known contraindications to laparoscopic procedures, prior abdominal or pelvic surgery may affect the surgical approach, and pregnancy or suspected pregnancy were excluded.

### Surgical Procedure

#### a. Single Port Group (SPLS)

Participants who chose the single-port approach underwent laparoscopic sterilisation using a small incision single 10mm supraumbilical port. In both SPLS and DPLS, the Falope ring is applied with the ring applicator. Laparoscopic instruments were introduced through the single port for tubal ligation, and the procedure were follow established guidelines for single-port laparoscopic sterilisation.

#### b. Double Port Group (DPLS)

Participants who chose the double-port approach underwent laparoscopic sterilisation using two small incisions, 5mm supraumbilical port and one in the lower abdomen 7mm side port. In both SPLS and DPLS, the Falope ring is applied with the ring applicator. Laparoscopic instruments were introduced through the ports for tubal ligation, and the procedure were follow established guidelines for double-port laparoscopic sterilisation.

## Outcome Measures

Outcome measures, including operative time, postoperative pain scores, complication rates, cosmetic satisfaction, conversion to open surgery, length of hospital stay, and patient satisfaction, were assessed.

Data were collected prospectively for each participant and recorded in a standardised case report form. The collected data included demographic information, surgical details, and outcome measures.

### Statistical Analysis

The collected data were analysed using appropriate statistical methods, such as independent t-tests, chi-square tests, or non-parametric equivalents. Statistical significance was set at  $p < 0.05$ .

## RESULTS

In the present study, we have reported minimal postoperative pain scores in both groups. The SPLS group demonstrated shorter operative times than the DPLS group (3 to 5 minutes vs 5 to 8 minutes,  $p < 0.05$ ). Complication rates were comparable in both groups, with sound perforation in 2 patients, the false passage in 1, and Omental Prolapse in 1 in the SPLS group whereas sound perforation in 3 patients, false passage in 1, Omental Prolapse in 1, subcutaneous emphysema in 1, wound infection 1 in DPLS group. Cosmetic satisfaction was higher in the SPLS group, and there was one case in the DPLS group that required conversion to open surgery due to dense adhesions from previous surgeries. Patient satisfaction was generally better in single-port surgeries. The length of hospital stay was two days for both groups. All surgeries are done under direct vision, without monitor [Table 1].

**Table 1: Clinical features of single port versus double port**

	Single Port Group	Double Port Group
Cases done	232	232
Postoperative Pain	No pain	No pain
Procedure Time	3-5 minutes	5-8 minutes
Sound Perforation	2	2
False Passage	1	1
Omental Prolapse	1	1
Subcutaneous Emphysema	-	1
Wound Infection	-	1
Cosmetic Satisfaction	Yes	-
Conversion to Open Surgery	0	1
Length of Hospital Stay	Two days	Two days
Patient Satisfaction	Better	-

## DISCUSSION

In recent years, the field of minimally invasive surgery has seen the introduction of the very novel SPLS procedure.<sup>[2]</sup> Even though Ghezzi et al.<sup>[9]</sup> successfully performed a salpingectomy using the SPLS approach in 2005, and the SPLS technique has been reported to be used to execute tubal ligation for the first time in the 1970s, the use of SPLS

technology has not been widely adopted due to its technical difficulties.<sup>[9,10]</sup> Fortunately, the implementation of SPLS has become more widespread thanks to the development of new operational procedures and equipment to deal with these challenges.<sup>[11]</sup> Laparoscopic-assisted vaginal hysterectomy and total laparoscopic hysterectomy are two surgeries several gynaecologists' groups have successfully performed using SPLS techniques.<sup>[12,13]</sup>

We performed a prospective comparative study comparing SPLS versus DPLS in remote and resource-limited settings. It was challenging to remove the grouping bias due to the non-random assignment of the patients in our study. This could result in different clinical characteristics between the two groups. According to our data, the clinical features between the two groups did not differ significantly. The SPLS group demonstrated shorter operative times compared to the DPLS group. There was no statistically significant difference in postoperative pain scores between the groups. Sound perforation, false passage, and omental prolapse were the most typical problems, with similar complication rates in both groups. The SPLS group had a greater rate of cosmetic satisfaction. However, one case in DPLS required conversion to open surgery because of extensive adhesions from prior procedures. In general, the SPLS group had higher patient satisfaction.

Reducing incisions and, consequently, scarring was the main justification for developing single-incision or single-port laparoscopy. This was primarily done to increase patient satisfaction by reducing postoperative pain and enhancing the overall cosmetic result while maintaining a comparable complication risk. This was not only motivated by the surgical stimulus for technical and medical innovation or by the industry's interest in promoting new devices and instruments. Regarding cosmesis and postoperative discomfort, SPL has already been demonstrated to be superior to MPL in several trials.<sup>[8,14-17]</sup> These studies only present follow-up data for 12 months or less.

According to a recent meta-analysis by Haueter et al., patients were much more satisfied with the scar after SPL, and their cosmetic and body image scores also improved clinically somewhat too significantly.<sup>[7]</sup> Therefore, as it did not affect the operative outcomes in our investigation, we consider the difference in pathology types between the two groups to be minor. In remote, resource-limited settings, single-port laparoscopic sterilisation is feasible and time-efficient. Its prospective advantages in far-off family planning camps are highlighted by comparable outcomes in pain and problems and enhanced cosmetic satisfaction. Our short-term follow-up, however, could not confirm any differences in long-term complications between the two groups. This is the major limitation of our study, and it can be will deliberate in future research.

## CONCLUSION

Single-port laparoscopic sterilisation is feasible and time-efficient in remote, resource-limited settings. Comparable outcomes in pain and complications,

with improved cosmetic satisfaction, emphasise its potential benefits in remote family planning camps.

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