

**A COMPARATIVE STUDY OF TWO-PORT VERSUS THREE-PORT
LAPAROSCOPIC APPENDICECTOMY IN UNCOMPLICATED CASES
OF APPENDICITIS AT TERTIARY CENTRE**

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ABSTRACT

Background and objectives: Nowadays, minimally invasive surgery is the recommended course of care. In this study, we have attempted to reduce minimal access by eliminating one port during a laparoscopic appendicectomy. We have also compared the safety, effectiveness, length of surgery, complications before and after the procedure, and length of hospital stay between two and three port laparoscopic appendicectomy procedures.

Materials and Methods: A prospective comparative randomized clinical study was conducted in Navodaya Medical College Hospital and Research Centre, Raichur. A total of 100 patients who were clinically and sonographically diagnosed with appendicitis were included in the study. Equal patients were operated via two-port laparoscopic surgery (group 1=50) and three-port laparoscopic surgery (group 2=50)

Results: In our study, mean hospital stay among group 1 patients was 1.76 ± 0.716 days and among group 2 patients was 4.82 ± 1.063 days. The mean days of return to work among group 1 patients were 9.60 ± 3.251 days and among group 2 patients was 13.54 ± 2.93 days. This difference was statistically highly significant when t-test was applied ($p < 0.001$). There was no difference in mean duration of surgery between two groups ($p > 0.05$).

Conclusion: In terms of hospital stay and return to work, two-port laparoscopic appendectomy was superior to three-port laparoscopic appendectomy in a patient who was well prepared and chosen.

Keywords: Two port, Three port, Laparoscopic appendectomy.

INTRODUCTION

One of the most frequent surgical emergencies is acute appendicitis, for which laparoscopic appendectomy is becoming more and more popular since it has several benefits over open surgery.¹⁻³ Its exploratory nature offers both diagnosis as well as treatment. Up until 1981, the McBurney technique was the gold standard for treating acute appendicitis. However, in 1983, German gynaecologist Kurt Semm carried out the first laparoscopic appendectomy^{4,5}

According to recent guidelines published by the European Association of Endoscopic Surgery (EAES), laparoscopic appendectomy has a few minor but significant advantages over open appendectomy, including reduced post-operative pain, fewer post-operative complications, shorter hospital stays, earlier mobilisation, an earlier return to work, and better cosmesis.^{2,6,7}

There is constant research being done to make laparoscopic procedures even less intrusive and more aesthetically pleasing in this day of limited access surgery. Mini-laparoscopy and laparo-endoscopic single site surgery (LESS) procedures like Single-incision laparoscopic surgery (SILS) and Natural orifice trans luminal endoscopic surgery (NOTES) are the results of these attempts. They are expensive and come with their own set of issues, which is why they are still not considered conventional procedures.

Laparoscopic appendectomies have produced better results than open ones during the last ten years due to reduced discomfort, less postoperative complications, shorter hospital stays, faster mobilisation, earlier return to work, and improved cosmesis.¹⁻³ Nevertheless, despite these benefits, attempts are still being undertaken to reduce the amount of abdominal incision and scarring during laparoscopy.

The field of natural orifice trans-luminal endoscopic surgery (NOTES) has emerged as a result of recent research. Before NOTES is widely used in clinical settings, there are a number of challenges that must be resolved. These include issues with consequences such as failing sutures, opening of hollow viscera, a lack of properly established instrumentation, and the requirement for trustworthy cost-benefit evaluations.^{8, 9} Because the intra-abdominal

entry locations are concealed by natural camouflages, the procedure leaves hardly any scars behind. Compared to the more recent modalities, this procedure has a shorter learning curve since it mimics the intraperitoneal view and operative approach of a typical laparoscopic appendicectomy without the additional need for costly specialised equipment.

The goal of the current study is to evaluate the outcomes of three-port laparoscopic appendicectomy with two-port laparoscopic appendicectomy with respect to hospital stay, preoperative and postoperative problems, safety, and effectiveness of the surgical procedure.

MATERIAL AND METHODS

This prospective comparative randomized clinical study was carried out in Navodaya Medical College Hospital and Research Centre, Raichur. A total of 100 patients who were clinically and sonographically diagnosed with appendicitis were included in the study. Equal patients were operated via two-port laparoscopic surgery (group 1=50) and three-port laparoscopic surgery (group 2=50).

For all the selected cases, thorough history was taken and complete examination was done. Using a two- or three-port method and the Standardised approach for the trocar insertion, laparoscopic procedures are carried out under general anaesthesia. Every patient was monitored during the postoperative phase until their discharge, and they were then checked on again in the outpatient department after three and six weeks. Between the two processes, the following metrics were noted.

1. Duration of surgery
2. Hospital stay
3. Return to work
4. Postoperative pain [graded from 0 to 4(visual analogue scale)]
5. Cosmetic benefit
6. Postoperative morbidity and complications.

RESULTS

The study included 100 patients in total, who were randomly allocated into two groups:

Group 1: Two-port laparoscopic surgery

Group 2: Three-port laparoscopic surgery

The mean age for group 1 was 28.7 ± 10.43 years and that of group 2 was 30.16 ± 11.25 years ($P > 0.05$). Table 1 shows the baseline characteristics of study groups. The study groups were comparable in terms of age, gender, symptoms and USG findings. [Table 1]

Table 1: Baseline characteristics of study groups.

		Group 1	Group 2	P value
Age	<20 years	18 (36%)	11 (22%)	0.067
	21 to 30 years	14 (28%)	20 (40%)	
	31 to 40 years	11 (22%)	5 (10%)	
	41 to 50 years	7 (14%)	14 (28%)	
Gender	Males	17 (34%)	18 (36%)	0.054
	Females	33 (66%)	32 (64%)	
Symptoms	Nausea and Vomiting	30 (60%)	33 (66%)	0.679
	Fever	23 (46%)	19 (38%)	0.544
	Past h/o pain	36 (72%)	31 (62%)	0.287
USG	Inflamed appendix	36 (72%)	34 (68%)	0.66

Majority of patients in Group 1 had no post-operative (60%) and Group 2 had severe pain (42%). This was statistically highly significant when chi-square test was applied ($p>0.05$). Post-operative vomiting (48%), post-operative wound infection (22%) and post-operative fever (22%) was more common among group 2 patients compared to group 1 patients. This was not statistically significant when chi-square test was applied ($p>0.05$). [Table 2]

Table 2: Post-operative characteristics of study groups

Post-operative characteristics		Group 1	Group 2	P value
Post-operative pain	I (No pain)	30 (60%)	2 (4%)	<0.001
	II (Mild pain)	16 (32%)	12 (24%)	
	III (Moderate pain)	2 (4%)	15 (30%)	
	IV (Severe pain)	2 (4%)	21 (42%)	
Post-operative complications	Vomiting	15 (30%)	24 (48%)	0.065
	Wound infection	6 (12%)	11 (22%)	0.183
	Fever	9 (18%)	11 (22%)	0.617

The mean hospital stay among group 1 patients was 1.76 ± 0.716 days and among group 2 patients were 4.82 ± 1.063 days. This difference was statistically highly significant when t-test was applied ($p<0.001$). The mean days of return to work among group 1 patients

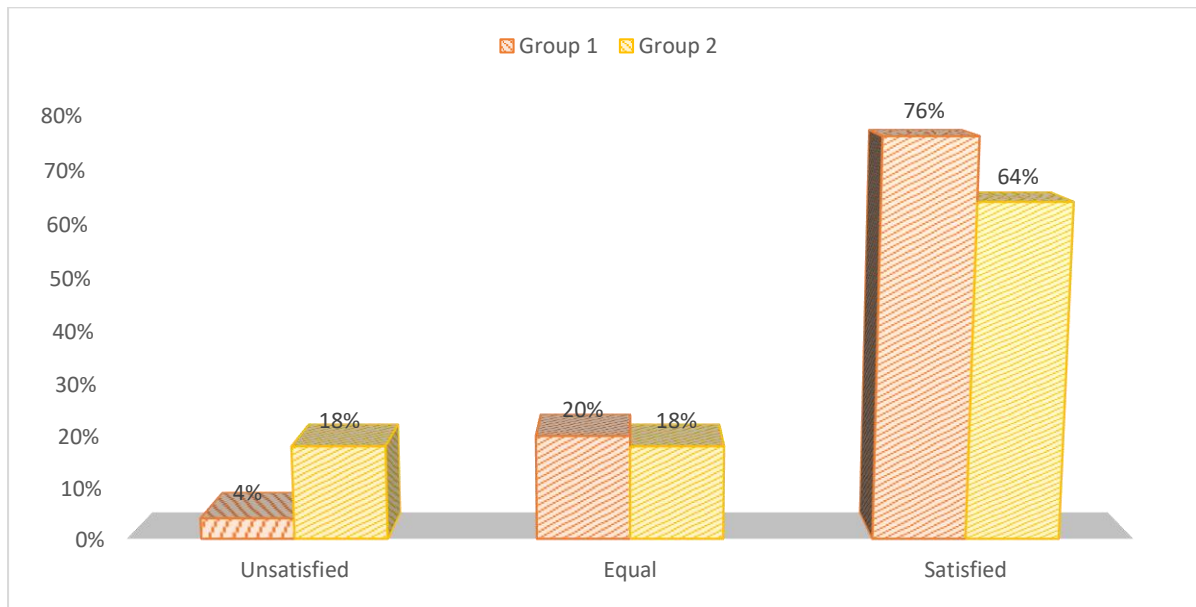
were 9.60 ± 3.251 days and among group 2 patients were 13.54 ± 2.93 days. This difference was statistically highly significant when t-test was applied ($p < 0.001$). There was no difference in mean duration of surgery between two groups ($p > 0.05$) [Table 3]

Table 3: Distribution of post-operative outcome in two groups

	Group 1	Group 2	T- test
Hospital stay (days)	1.76 ± 0.716	4.82 ± 1.063	F= 3.04, p<0.001
Return to the work (days)	9.60 ± 3.251	13.54 ± 2.93	F= 1.749, p<0.001
Duration of surgery (min)	34 ± 11.82	31.80 ± 9.73	F= 2.343, p=0.312

Figure 1 shows that majority of patients in Group 1 and Group 2 were satisfied regarding the cosmetic benefit (76% and 64% respectively). This was not statistically significant when chi-square test was applied ($p > 0.05$).

Figure 1: Bar graph showing cosmetic benefit in our study



DISCUSSION

Appendicectomy is the recommended course of treatment for acute appendicitis. Laparoscopic appendectomy has grown significantly in popularity recently, even if open appendectomy is still the gold standard. The use of laparoscopy for appendectomy, one of its most prevalent uses, is still debatable. Numerous researches have been carried out all around the world, some of which have favored and supported laparoscopy while others have not.

Laparoscopy is the most effective method of treating acute appendicitis. When compared to open appendectomy, laparoscopic surgery is just as safe and results in fewer post-operative discomfort and morbidity. Laparoscopic appendectomy is a helpful method for shortening the hospital stay, allowing for an early return to work, and encountering fewer

difficulties. Laparoscopy has become more common as minimum access surgery training has improved. By allowing for an earlier return to work and a shorter hospital stay, laparoscopic operations reduce the number of lost earning days. As a result, it is helpful in India, where the majority of them are day laborers. The Cochrane review and the EAES recommendations both state that laparoscopic appendectomy has a little but unquestionable advantage over open appendectomy.^{10,11} Three-port laparoscopic appendectomy is frequently carried done. In group 1 of our study, we employed the two-port approach.

In many situations, the appendix does not require any or significant dissection during laparoscopy for acute appendicitis. During the procedure, the tip could be lifted easily, the mesentery was freely mobile due to the small peritoneal cavity, and it even accidentally passed into the channel of the right port. The remainder of the treatment could be completed easily extra corporeally with peritoneal cavity deflation and excellent relaxation. However, in order to make the process go more smoothly, this might routinely be done using a 5 mm right port or a 10 mm port.

We typically administer prophylactic intravenous antibiotics prior to surgery, as previously noted. Despite the inflamed appendix coming into contact with the abdominal wall, there were no port site infections in the two-port group. We cleaned the port track after removing the appendix by soaking it in betadine solution before reinserting it. Surprisingly, 6 instances (12%) in group I developed port site infection and 11 (22%) in group II, even if the statistical significance was non-significant ($P>0.05$). This is comparable.¹² This manifested as little skin gaping and redness, which subsided after several dressing changes.

The mean operative time was 34 ± 11.82 min in group 1 and 31.80 ± 9.73 min in group 2, which is similar to that reported in other studies.¹³⁻¹⁵ In the study conducted by Panait L et al.¹⁶, the two port strategy required a little more time (64.1min.). This might be because they were still at the beginning of their learning curve for the technique. There shouldn't be a significant variation in the length of the operation between the two groups because only straightforward scenarios were chosen for each, with the exception of the time needed to open and close the third port in group 1.

The average length of hospital stay was 1.76 ± 0.716 days in group 1 and 4.82 ± 1.063 days in group 2. Other studies were favorably compared to this one.¹³⁻¹⁵ Hospital stay as short as 1 day or even less is reported in study by Panait L et al.¹⁶ Shorter stay in two port appendicectomy might be due to lesser post-operative pain to the patients.¹⁷

Patients in group 1 were likely discharged early because they were in less discomfort; this further demonstrates that the new methodology is not inferior to the traditional approach

in any manner, particularly when it comes to hospital stay duration. Although the lack of a third port wound alone cannot account for this difference, it can be explained in part by the shorter pneumoperitoneum period (resulting in less shoulder pain after surgery) and the extracorporeal nature of the procedure, which requires less intestinal manipulation.

When performing a three-port appendicectomy, the utilisation of 5–10 mm ports in the left iliac fossa, right hypochondrial, and umbilical and RIF areas frequently causes in scarring that is clearly visible. We have shown that two-port appendicectomy is a safe and practical technique when a loop retractor is used in place of the RIF trocar and a suprapubic trocar is appropriately positioned below the hairline. Other benefits include the ability to hold the appendix and the mesoappendix simultaneously with a loop retractor, which allows for more stable manipulation and countertraction than is possible with conventional forceps, and the reduced risk of iatrogenic perforation of the appendix or an uncontrolled tear in the mesoappendix following this procedure. Although the right iliac fossa has been mentioned as the location of the needle loop retractor, placement must be flexible and is best selected after an intraoperative evaluation of the pathology. The needle loop retractor can simply be placed in another area of the abdomen to better accommodate the pathology and the surgeon from an ergonomic and cosmetic standpoint. By inserting another trocar, a surgeon can quickly change a two-port treatment into a standard three-port procedure if necessary. This makes it possible to maintain the patient's safety. Our method also removes one peritoneal invasion site, which lowers the risk of adhesions.

Many surgeons have tried to use fewer and smaller ports in laparoscopic appendicectomy procedures in an effort to decrease incisional morbidity and improve cosmetic outcomes.^{13-15,18-20} Moving laparoscopic incisions to blend in with natural camouflages like the suprapubic hairline and improve cosmesis was documented by Kollmar et al.²¹ Additionally, studies in the literature suggest that mini-laparoscopic appendectomies using one 12-mm port and 2-3 mm or even smaller instruments reduce pain and enhance cosmetics.^{18,22,23} Recent investigations by Ates et al. and Roberts et al. have detailed different iterations of a single-port intracorporeal sling laparoscopic appendicectomy with positive clinical outcomes.^{24,25}

Our opinion is that two-port appendicectomy is a safe, workable operation that, although not as appealing visually, has financial benefits and serves as a perfect stopgap until SILS or even NOTES appendicectomy becomes standardised, accessible, and well-liked. Though it is challenging to make firm conclusions about the process from a study with a

small sample size, the process most certainly merits more analysis in studies with larger sample sizes.

CONCLUSION

Technically, a two-port laparoscopic appendectomy is nearly identical to a three-port procedure and offers all of its benefits. Additionally, it is more cost-effective because only two ports are required, saving money on the third one, and because base ligation and loop formations are accomplished using ordinary sutures rather than endoloops and endostaplers.

In terms of hospital stay and return to work, two-port laparoscopic appendectomy was superior to three-port laparoscopic appendectomy in a patient who was well prepared and chosen.

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