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Original Research Article

An observational study to compare single incision laparoscopic appendectomy with conventional multiport laparoscopic appendectomy

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ABSTRACT

Background: Appendicitis is the most common intra-abdominal condition requiring emergency surgery and it is approached by laparoscopic procedures. Innovative methods were developed that reduce tissue trauma and offer improved cosmetic results, one of such being the single-incision laparoscopic surgery (SILS) with advantages of reduced postoperative morbidity and almost invisible scar.
Methods: 60 patients were included in the study after meeting inclusion criteria and divided into two groups 30 each. One group had undergone single incision laparoscopic appendectomy and other with multiple port laparoscopic appendectomy. Preoperative, intraoperative and postoperative parameters were collected. Data involving patients' demographics, operative time, length of hospital stay and both intraoperative and postoperative complications were collected.
Results: The mean duration of surgery in multiple appendectomy was lesser compared to single port appendectomy and values are insignificant (p =0.1844) when compared between the two groups. None of the patients in both the groups did not have any intraoperative complication. Only one patient in single port appendectomy converted to open surgery. The mean postoperative pain VAS score was 2.00 in multiport appendectomy group which was significantly more as compared to 1.60 among single port appendectomy group after 24 hrs. The postoperative complications and the duration of stay in hospital were almost similar in both the groups. The complications observed during follow up in both the cases were minimal and statistically insignificant.
Conclusions: The major advantage of SILS is cosmetic satisfaction, while the disadvantages of SILS are longer operative time and higher conversion rate.

Keywords: Single incision, SILS, Multiport laparoscopy, Appendectomy

INTRODUCTION

Acute appendicitis is the most common surgical emergency and carries lifetime risk of 8%.[1] Appendectomy has been the primary treatment of choice for acute appendicitis, and although antibiotics have established some use but surgery remains the treatment of choice. Open surgery, laparoscopic appendectomy and now single port surgery for appendicitis has become routine approach.

Laparoscopic surgery also called minimally invasive surgery (MIS), is a modern surgical technique in which operations in the abdomen are performed through small incisions (usually 0.5-1.5 cm) as opposed to the larger incisions needed in laparotomy and considered as gold standard treatment for acute appendicities.[2-4] This technique has many advantages over open procedure like reduced pain due to smaller incisions and hemorrhage, and shorter recovery time. But this technique had a limitation of scars after surgery hence a novel technique has evolved called single incision laparoscopic surgery (SILS), preferably in the navel, with advantages of

reduced postoperative morbidity and almost invisible scar.

The purpose of the study is to compare the effectiveness of single incision laparoscopic appendectomy with conventional multiport laparoscopic appendectomy in terms of duration of surgery, intra operative complications, postoperative morbidity and pain at port site, conversion of type of surgeries and evidences of scar.

METHODS

After approval from institutional ethical committee this observational study was carried out in department of surgery, LTMMC, Mumbai during a period of May 2011-May 2013. After taking written informed consent form 60 patients of aged between 15-40 years, hemoglobin with >8 gm%, patients presenting with symptoms like pain in right iliac fossa, nausea, vomiting, fever, anorexia, malaise and signs like tenderness in RIF, rebound tenderness in RIF, tachycardia, with increased WBC count and confirmed appendicitis diagnosed through ultrasonography, CT scan were included in the study. Exclusion criteria were with morbid obesity (BMI >35), age <15 to >40years and systemic diseases like heart disease, tuberculosis, diabetes mellitus. 60 patients were divided into two groups. Of these 30 had undergone single incision laparoscopic appendectomy and 30 with conventional multiport laparoscopic appendectomy.

Pre operatively parameters like age, sex, body mass index, hemoglobin, total leucocytes count, platelet count, BUN/serum creatinine, total bilirubin, chest x-ray, barium meal follow through was assessed. Intraoperatively time required for the surgery, presence of adhesions, complications like bowel or bladder injuries, vessel injury, conversion to open, whether drains kept or not were collected and post operatively VAS score, ileus, duration of hospital stay, postoperative nausea, vomiting, fever and comparison of the scar were made.

A 10 cm visual analogue pain score (VAS) (78) with options ranging from 0 (no pain) to 10 (worst pain imaginable) was recorded by the patients post operatively at about 12 hours, at 24 hours, at 36 hours. Injection Tramadol 50mg was given postoperatively till the patient is discharged from the hospital, thrice a day at about 6 am, 2 pm and 10 pm. Later follow up was done at 1st time in 1 week and 2nd time at 2 weeks for presence or absence of port site infection, pelvic abscess. Later follow up was made after one and six months- cosmesis by patient and observer using self-assessment scale (POSAS) was noted. The instruments used for appendectomy was given in Figure 1.

Statistical analysis

The demographic data, duration of surgery, postoperative pain score, duration of stay in hospital, mean cosmesis by POSAS was compared between the two groups by using students't' test. Intra and postoperative complications, comparisons for requirement of drain and conversion to open surgeries and follow ups for 1st and 2nd time were done by Chi square test. P values <0.05 were considered significant.

Figure 1: Instruments used for conventional multiport and single incision laparoscopic appendectomy.

RESULTS

The demographic data like age and gender was compared between the groups. No significance (P >0.05) was observed among the groups as given in Table 1.

Table 1: Demographic data.

Parameters	Multiport appendectomy	Single port appendectomy
No. of cases	30	30
Age in years (mean±sd)	23.37±04.44	22.77±05.71
Gender (%) Male:Female	09 (30.0): 21 (70.0)	09 (30.0): 21 (70.0)

The mean duration of surgery in multiple appendectomy was lesser compared to single port appendectomy and values are insignificant (p = 0.1844) when compared between the two groups as shown in Table 2.

In this study none of the patients in both the groups did not have any intraoperative complication and thus the difference was not statistically significant when compared as seen in Table 3.

Table 2: Duration of surgery among study groups.

Groups	Duration of surgery (mean±sd)
Multiport appendectomy (n=30)	48.47±12.30
Single port appendectomy (n=30)	53.60±16.92

None of the patients in both the groups required drains after completion of laparoscopic surgery. Patients underwent multiple appendectomy did not have conversion to open appendectomy where as one patient in single port appendectomy converted to open surgery and this difference was not significant.

The mean postoperative pain score (VAS) was assessed between the two groups. It was observed that after 24 hrs, mean postoperative pain VAS score was 2.00 in multiport appendectomy group which was significantly more as compared to 1.60 among single port appendectomy group as seen in Table 5.

Table 3: Comparison of intraoperative complication among study groups.

Complication	Multiport appendectomy (N = 30)		Single port appendectomy (N = 30)	
	Yes No. %	No No. %	Yes No. %	No No. %
Vessel injury	- -	30 100.0	- -	30 100.0
Cecal injury	- -	30 100.0	- -	30 100.0
Bladder injury	- -	30 100.0	- -	30 100.0
Other injury	- -	30 100.0	- -	30 100.0

Table 4: Comparison of drain and conversion to open surgeries among study groups.

Parameter	Multiport appendectomy (N = 30)		Single port appendectomy (N = 30)	
	Yes No. %	No No. %	Yes No. %	No No. %
Drain	- -	30 100.0	- -	30 100.0
Conversion to open surgery	- -	30 100.0	01 3.3	29 96.7

Table 5: Comparison of VAS scores among the study groups.

Duration in hours	Mean post-operative pain VAS score (mean±sd)		P value
	Multiport appendectomy (N = 30)	Single port appendectomy (N = 30)	
12	04.97±0.67	04.90±0.71	0.6959 (NS)
24	02.00±0.74	01.60±0.77	0.0451
36	00.50±0.63	00.40±0.56	0.5194 (NS)

The postoperative complications were almost similar in both the groups. Only the number of patients experiencing nausea in single port appendectomy was slightly more compared to multiple port appendectomy and this difference was not significant (p =0.5186) as given in Table 6.

Table 6: Comparison of postoperative complications among study groups.

Complication	Multiport appendectomy (N = 30)		Single port appendectomy (N = 30)	
	Yes No. %	No No. %	Yes No. %	No No. %
Fever	05 16.7	25 83.3	05 16.7	25 83.3
Nausea	05 16.7	25 83.3	07 23.3	23 76.7
Vomiting	01 03.3	29 96.7	01 03.3	29 96.7
Ileus	- -	30 100.0	- -	30 100.0

The time required for mean duration of stay for both the groups are similar and difference was not significant as given in Table 7.

Mean cosmesis by POSAS scale from patients and observer was collected and the difference between the two groups was significant with each other as given in Table 8.

Table 7: Comparison of duration of stay among the study groups.

Groups	Mean duration of stay (mean±sd)	P value
Multiport appendectomy (N= 30)	02.07±0.25	0.5614
Single port appendectomy (N= 30)	02.03±0.18	

Table 8: Comparison of mean cosmesis by POSAS scale from patients and observer.

Groups	Mean cosmesis by POSAS scale obtained from patients (mean±sd)	Mean cosmesis by POSAS scale obtained from observers (mean±sd)
Multiport appendectomy (N =30)	09.67±1.99	09.63±1.73
Single port appendectomy (N = 30)	09.40±1.61	09.77±1.94

Table 9: Comparison of follow ups among the study groups.

Group		First follow up						Second follow up					
		Seroma formation		Pelvic abscess		Port site infection		Seroma formation		Pelvic abscess		Port site infection	
		No	%	No	%	No	%	No	%	No	%	No	%
Multiport appendectomy (N = 30)	Yes	03	10.0	-	-	02	6.7	-	-	-	-	1	3.3
	No	27	90.0	30	100	28	93.3	-	-	30	100	29	96.7
Single port appendectomy (N = 30)	Yes	7	23.3	-	-	02	6.7	-	-	-	-	2	6.7
	No	27	76.7	30	100	28	93.3	-	-	30	100	28	93.3
P value		0.1659		1		1		-		1		0.554	

The complications during first follow up and second follow up were given as in Table 9. In first follow up the occurrence of seroma formation was higher in single incision appendectomy compared to multiport appendectomy and the difference was not significant statistically. In second follow up port site infection was seen in both the groups and the difference was not significant.

DISCUSSION

In earlier days, laparoscopic appendectomy failed to gain unambiguous acceptance by the surgical community. But today, it is a commonly practised and accepted emergency procedure.[4] Although claims of enhanced recovery and pain as well as blood loss and complication reduction as compared with conventional laparoscopic and open procedures have yet to be proved demonstrably, single port/incision laparoscopic procedures are increasingly being performed.[5-7]

Reduced scarring is the most evident advantage of single incision laproscopic surgery (SILS). Optimal cosmetic results are obtained through intraumbilical incision as the scar will be concealed within the umbilicus but a major concern may be injury to the epigastric vessels.[8] Advantages to infraumbilical or suprapubic incisions include safety and reduced risk of incisional hernia.[9] Also laparoscopic appendectomy is unquestionably the method of choice for women of child bearing age.

Problems inherent to singleport include concerns over accidental tears when manipulating friable appendices, resulting in abdominal contamination, and port site contamination, given that the inflamed appendix makes direct contact with the wound (especially with 'hybrid' methods).[10] Navigating instruments in obese patients, in whom the umbilicus ceases to function as a useful landmark for distance to target organ, can further increase the difficulty of the procedure.[11]

In the present study intra and postoperative complication rates obtained from SILS appendectomy appear similar to conventional laparoscopic and the results obtained are similar to the earlier studies.[4,12-18] But the successive rate of SILS technique can be confirmed by prospective clinical trial but no study was found yet.

The observations of the present study were consistent with the findings done by Frutos et al. He observed no significant difference in demographic data between the 2 groups for age, weight, sex, body mass index, and removed appendix type. Operating time was longer with the single-port approach: 38.13 ± 13.49 versus 32.12 ± 12.44 minutes (P = 0.02). Significant differences were observed for postoperative pain, which was measured on the visual analog scale, with less pain reported in the single-incision group: 2.76±1.64 versus 3.78±1.76 (P <0.001). There were no significant differences between the 2 groups for early and late complications and lengths of hospital stay measured in postoperative hours.

Laparoscopic appendectomy in expert hands is now quite safe and effective, and is an excellent alternative for patients with acute appendicitis. The public needs to be educated as to its advantages. With better training in minimal access surgery now available, the time has arrived for it to take its place in the surgeon's repertoire.

CONCLUSION

The transumbilical single-port approach is seen as a feasible technique for performing appendectomy. It does not increase the rate of complications and represents a possible alternative to conventional laparoscopic appendectomy. The major benefit of SILS is cosmetic satisfaction, while the disadvantages of SILA are longer operative time and higher conversion rate. However, this technique may have few disadvantages that the true benefit of the technique remains to be shown by the on-going randomized controlled trials.

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