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A comparative study of single port laparoscopic appendicectomy with conventional three port laparoscopic appendicectomy in management of 100 cases

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Abstract
Aims: To study cases of appendicitis, their management and postoperative complications and mean hospital stay among patients operated by single port or three port laparoscopic appendicectomy.
Material and method: In this study, 50 patients of appendicitis were divided into two groups, Group A(25 patients) were treated with conventional three port laparoscopic appendicectomy and Group B(25 patients)treated with single port laparoscopic appendicectomy with conventional instruments. After the treatment, patients were followed up immediate postoperatively for pain, fever, wound infection; and after 3 month and 6 month for port site complication, scar formation and port site hernia.
Observation and results: Patients of group B those operated by single port laparoscopic appendicectomy had less post operative pain and all of them were ambulated on the day of surgery as compared to group A patients in which 50% of them were ambulated on 1st pod and 50% on 2nd pod. Patients of group B, had less pain and discomfort at 3 months follow up period compared to that of group A which is statistically significant ($p<0.05$).The parameter of scar formation was statistically significant ($p<0.05$) meaning that patients of group B had no visible scar at 6 month follow up period.
Conclusion: From our study and observations we can conclude that incidence of post operative pain, discomfort and complications are less in single port laparoscopic appendicectomy as compared to conventional laparoscopic appendicectomy. So single port laparoscopic appendicectomy is superior between two techniques.

Keywords: laparoscopic appendicectomy, single port, three port, complications

1. Introduction
The Vermiform appendix is considered by many to be a vestigial organ; its major importance in surgery results only its propensity for inflammation, which results in the clinical syndrome known as acute appendicitis. Appendicitis is more common in young girls. The rapid uptake of minimally invasive techniques has affected many area of surgery including management of acute appendicitis [1].
Laparoscopic appendicectomy is a standard and recognised technique for acute, sub acute, chronic appendicitis and it is now accepted as the gold standard for treatment of acute appendicitis in many centres [2]. The laparoscopic approach has been demonstrated to have lower wound infection rates postoperatively, as well as having significant gains in terms of length of hospital stay and return to normal function [1]. Laparoscopic appendicectomy is also associated with a lower rate of adhesional bowel obstruction compared with the open approach for appendicitis. Some surgeons mainly advocate a primarily laparoscopic approach to all patients presenting with appendicitis [3].
Initial fears regarding the possibility of increased rates of postoperative complications seem to have been dispelled with improved instrumentation, techniques and growing experience both from the surgeon and ancillary staff [2].
Single incision laparoscopic surgery (SILS) is a new technique through which laparoscopic surgery takes place through a single umbilical incision without the need for additional laparoscopic ports[4]. This new method has been used for a variety of laparoscopic operations including tubal ligation, hysterectomy, appendicectomy, cholecystectomy, sleeve gastrectomy, colectomy and nephrectomy [4]. The single incision technique has the possible advantages of reduced postoperative pain, faster return of normal function, reduced port site complication, improved cosmesis and patient satisfaction[5].

2. Material & Method
The study was conducted over a period of 2 year. Patients with age 10 to 70 years with acute, subacute and chronic appendicitis posted for laparoscopic appendicectomy were included in this study. Patients with previous history of laparotomy, Pregnancy, Cardiovascular disease, Anaesthetic risk grade 3 & 4, Chronic obstructive pulmonary disease were excluded.Total 50 patients participated in study. Patients were divided into two groups (25 patients in each group), Patients in group A were treated with conventional three port laparoscopic appendicectomy and those were in group B treated with single port laparoscopic appendicectomy with conventional instruments. After treatment patients were followed up immediate postoperatively for pain, fever, wound infection, ambulation; and after 3 month and 6 month for pain, discomfort, port site complication, scar formation and port site hernia.
This is a comparative study of single port laparoscopic appendicectomy with conventional three port laparoscopic

appendicectomy in management of 100 patients of acute, subacute or chronic appendicitis.

Conventional three port appendicectomy

Patient is placed in the supine position and given a general anaesthesia. A 1.5cm vertical or transverse skin incision is made with in the umbilical stalk, the fascia is retracted, a small nick in fascia is made, a verres needle used to achieved pneumoperitoneum, and a 10mm port placed through an introducer sheath and abdomen is insufflated to 12 to 15 mmhg with carbon dioxide gas. Diagnostic laparoscopy performed, inspection of stomach, gallbladder, colon, small intestine, and pelvis [6]. If a diagnosis other then appendicitis is made such as a pelvic inflammatory disease, sigmoid diverticulitis, cecal diverticulitis, chrohn's disease, the patient is excluded from the study and treated appropriately. Additional 5 mm ports are placed in left lower quadrant and right iliac fossa [7]. The port can be placed in right and left inguinal region or in midline of umbilicus and pubic symphysis as per surgeon's preference. A camera usually pass through an umbilicus port but it can be transferred to the left lower quadrant port site and the appendix is exposed and retracted anteriorly. The mesoappendix may be divided with Endo GIA staplers, ligature, cautery and clips, or Harmonic scalpel. The base of appendix may be ligated with Endo GIA staplers or endo loop[5]. Then appendix is removed through an umbilicus port after first placing it into an endocatch bag. Minimal irrigation is used; perforated cases are treated with suctioning of intra abdominal pus and postoperative antibiotics. Blood loss is estimated. Umbilicus port is closed with vicryl absorbable suture. Port site skin is anesthetized with sensorcaine and closed with non absorbable ethilone suture. Aseptic dressing applied [6].

Sils appendicectomy technique

Patients are placed in the supine position and general anaesthesia is given. The base of umbilical stalk is everted by two penetrating towel clamps placed either side of the midline. A 'V' shape umbilical skin incision is made, fascia is retracted, and verres needle is inserted into peritoneum and abdomen is insufflated to 15 mmhg with carbon dioxide gas. The incision is retracted anteriorly and conventional 10 mm port inserted in to the incision using a shoe horn maneuver with modified open hassen's technique [6]. Another 5 mm trocar is placed in the port, after which the trocars are repositioned into a staggered elevation. Diagnostic laparoscopy is performed with inspection of stomach, gallbladder, colon, small intestine, and pelvis. If a diagnosis other then appendicitis is made such as a pelvic inflammatory disease, sigmoid diverticulitis, cecal diverticulitis, chrohn's disease, the patient is excluded from the study and treated appropriately[7]. An epidural needle with prolene loop is inserted in RIF. An assistant hold the tip of appendix with prolene loop and gives adequate traction to keep appendix in upright position. The mesoappendix may be divided with EndoGIA staplers, ligature, cautery and clips, or Harmonic scalpel. The base of appendix may be ligated with EndoGIA staplers or endo loop. When stapler are used, one of 5 mm trochar replaced by 10 mm trochar. Then appendix is removed through an umbilical port after first placing it into an endocatch bag[8]. Minimal irrigation is used; perforated cases are treated with suctioning of intra-abdominal pus and postoperative antibiotics. Blood loss is estimated. Umbilicus port is closed with vicryl absorbable suture. Port site skin is anesthetized with sensorcaine and closed with ethilone non absorbable suture. Aseptic dressing is applied.

Thus in our method we have done a little modification in SILS. In SILS trocar for camera port and instruments are inserted through a single umbilical incision of 1.5 to 2 cm and laparoscopic instruments and forceps used are angled in required manner, while in our study we inserted two port through single 'V' shape umbilical incision with two entry points of about 0.5 cm each into the sheath which significantly reduces the chances of port site hernia and conventional laparoscopic instruments are used which does not increase the cost of surgery [9].

3. Observation and Results

The study was conducted over a period of 2 years and following observation were recorded.

Age: Age wise distribution of patients in study is as follows

Table 1

Age (Years)	No. of Patients	Percentage
10-19	39	39%
20-29	41	41%
30-39	14	14%
40-49	06	06%
50-59	00	00%
60-69	00	00%
TOTAL	100	100%

In the present series age ranges from 10-69 years. Peak incidence is seen in 2nd and 3rd decades of life.

Sex: Sex Wise Distribution of patients is as Follows

Table 2

Sex	No. Patients
Female	43%
Male	57%
Total	100%

Henceforth there is an increased incidence of appendicitis in male than female.

Immediate Postoperative Period

Patients were examined in immediate postoperative periods for various parameters like postoperative pain, fever, wound infection, orally allowed from postoperative day and ambulation from postoperative day in both groups and following observations were made.

Table 3

Parameters		Group a (%)	Group b (%)	P value	Inferance
Pain		32%	12%	0.0283	Significant
Fever		10%	06%	0.7150	Not significant
Port site complication		0%	0%		
Wound infection		0%	0%		

Ambulation from	On day of surgery	50%	100%	<0.0001	Extremely significant
	1st pod	100%	0%	<0.0001	Extremely significant
	2nd pod	0%	0%		
Orally allowed from	On day of surgery	100%	100%	<0.0001	Extremely significant
	1st pod	0%	0%		
	2nd pod	0%	0%		

P value of less than <0.05 is considered as significant.
The parameters of post operative wound infection and port site complication were not seen in any of 50 patients of group A and group B**.** The parameters of post operative pain and ambulation were statistically analysed by application of Chi- Square test. For these parameters p value is significant (p<0.05) means that patients of group B those operated by single port laparoscopic appendicectomy had less post operative pain and all of them were ambulated on the day of surgery as compared to group A patients in which 50% of them were ambulated on 1st pod and 50% on 2nd pod.

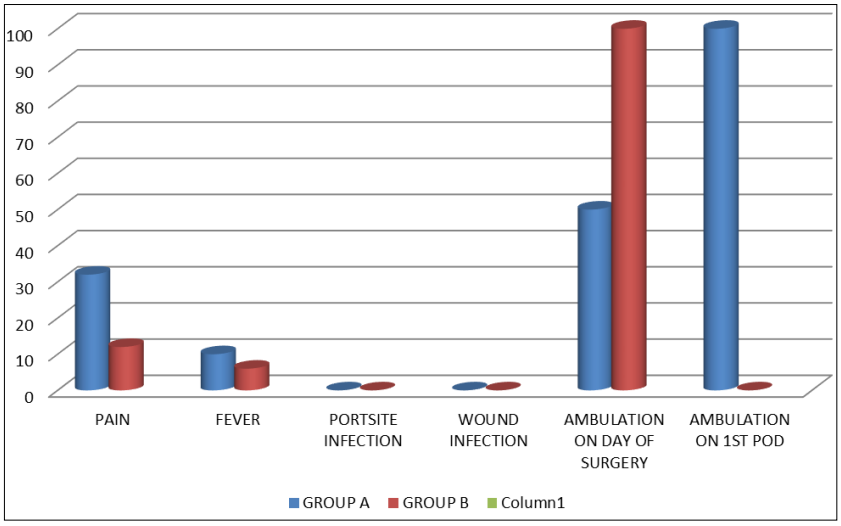

Fig 1

Postoperative Hospital Stay

Table 4

Postoperative hospital stay	Conventional three port laparoscopic appendicectomy	Single port laparoscopic appendicectomy with conventional instruments
01	00	50
02	13	00
03	37	00

Thus single port laparoscopic appendicectomy is day care surgery in which patients is discharged within 24 hours of surgery. So patients operated by single port laparoscopic appendicectomy can return to their work after 24 hours of surgery which is usually not seen with patients operated by conventional three port laparoscopic appendicectomy.

3. Months Follow Up

Patients were examined at 3 month follow up period for parameters like pain, discomfort, port site hernia and scar formation.

Table 5

Parameters	Group A	Group B	p value	Inference
Pain	20%	06%	0.0026	Very significant
Discomfort	06%	06%		
Scar	100%	0%	<0.0001	Extremely significant
Port site hernia	0%	0%		Not significant

The parameters of pain, discomfort and scar formation were statistically analysed by using chi square test. For this parameters p value is significant (p<0.05). meaning that patients of group B ; those who were operated by single port laparoscopic appendicectomy had less pain and discomfort at 3 month of follow up period compared to that of group A.
All patients who were operated by conventional laparoscopic appendicectomy had scar formation in right iliac fossa and left inguinal region or in middle between umbilicus and pubic symphysis depending on port placement. While there was no visible scar formation in group B at 3 month follow up period.

6 Months Follow UP

The parameters of pain, discomfort, scar formation and port site hernia were studied at 6 month follow up period.

Table 6

Parameters	Group A	Group B	p value	Inference
Pain	00%	00%		Not significant
Discomfort	00%	00%		Not significant
Scar	100%	0%	<0.0001	Extremely significant
Port site hernia	0%	0%		Not significant
Patients acceptance	24%	76%	<0.001	Extremely significant

The Parameters of pain, discomfort and port site hernia were not statistically analysed. The parameter of scar formation was statistically analysed by using chi square test. p value of this test is significant ($p<0.05$) meaning that patients of group B operated by single port laparoscopic appendicectomy had no visible scar at 6 month follow up period, while all the patients of group A who were operated by conventional three port laparoscopic appendicectomy had a scar formation in right iliac fossa and left inguinal region or in midline between umbilicus and pubic symphysis depending on port placement.

4. Summary and Conclusion

In conventional laparoscopic appendicectomy, we use three ports, one 10 mm umbilical port, one 5 mm port in right iliac fossa and another 5 mm port in left inguinal region or in midline between umbilicus and pubic symphysis. It would lead to more pain, more chances of port site complications post operatively and scar formation over three sites depending on port placement.

In single port laparoscopic appendicectomy with conventional instruments, we use two ports only, one 10 mm and one 5 mm, both are inserted through single 'v' shape umbilical skin incision and two entry points of about 0.5 cm into the sheath. An epidural needle with prolene loop, which is inserted in right iliac fossa, is used to hold appendix vertically straight. It is a modification of SILS technique in which 1.5 to 2.0 cm umbilical incision is kept for port insertion and instruments used are angled in required manner. Thus in our technique which is actually a single incision two port laparoscopic appendicectomy, there is less post operative pain, less chances of port site complications and port site hernia and no scar formation without increase in cost of surgery.

From cosmetic point of view, single port laparoscopic appendicectomy with conventional instruments is superior between these two techniques. There is little difference in the operative time, postoperative stay and complications rates between these techniques. Post operative pain and incidence of port site infection are less in single port laparoscopic appendicectomy as compared to conventional laparoscopic appendicectomy.

From our study and observations we can conclude that single port laparoscopic appendicectomy with conventional instruments is the best method for treatment of appendicitis.

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