

What is gold standard for Appendicectomy? Open or laparoscopic

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Abstract

Introduction: Appendicectomy is one of the most common acute surgical emergency. Laparoscopic appendicectomy was first reported well before laparoscopic cholecystectomy, the market penetration is very poor. Role of laparoscopic appendicectomy remains controversial even after 30 years of inception. The present study is designed to assess these conflicts. **Methods:** 60 patients admitted in department of surgery with diagnosis of acute appendicitis, recurrent appendicitis and those kept for interval appendicectomy were randomly divided into two groups A and B. The patients in group A were subjected to laparoscopic appendicectomy and patients in group B underwent open appendicectomy. **Results:** Mean duration of surgery in LA was 41.78 ± 13.55 mins, in OA was 61.66 ± 25.25 and 102 ± 3.54 mins for converted group. Postoperative pain was significantly less in patients operated with laparoscopic technique (3.18 ± 1.09) as compared to OA (4.76 ± 2.03) group as evident by number of analgesic requirement. Mean length of stay was shortest in LA group 2.5 ± 1.07 days, followed by OA 4.833 ± 2.11 days and 8.5 ± 3.54 in converted group. **Conclusion:** Laparoscopic appendicectomy is having less complications as compared to open appendicectomy. Hence laparoscopic appendicectomy also decreases the morbidity associated with operative procedure, wound infection, paralytic ileus and prolonged hospitalization.

Keywords: Appendicectomy, Laparoscopic, Open.

Introduction

Appendicectomy remains one of the most common acute surgical emergencies. Obstruction of the lumen is the dominant cause of acute obstruction. The first successful appendicectomy was reported by Amyand in 1736 [1]. McBurney advocated early operative intervention and for next 100 years appendicectomy remained the gold standard for patients of acute appendicitis. Till Kurt Semm performed the first laparoscopic appendicectomy in 1983 [2]. Subsequently in 1987 Phillipe Mouret in France performed the first laparoscopic cholecystectomy. Over the last ten years laparoscopic cholecystectomy has become the gold standard for management of cholelithiasis. Considering that laparoscopic appendicectomy was first reported well before laparoscopic cholecystectomy, the market penetration of laparoscopic appendicectomy is very poor. It has been 30 years since its inception, yet the

role of laparoscopic appendicectomy remains controversial. Several studies have been performed but no clear consensus has emerged. While some studies document decreased complications in laparoscopic appendicectomy, others show no advantage over open appendicectomy. The present study is designed to assess these conflicts.

Materials and methods

The present study was conducted in department of surgery. It included 60 patients admitted with the diagnosis of acute appendicitis, recurrent appendicitis and those kept for the interval appendicectomy. Patients were randomly divided into two groups: A and B each consisting of 30 patients. The patients in group A were subjected to laparoscopic appendicectomy and patients in group B underwent open appendicectomy. All patients irrespective of age and sex were included in study. Pregnant patients, those having appendicular

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abscess and coagulation disorders were excluded from the study.

A detailed clinical evaluation of each case was done including proper history, physical findings, investigations, pre-operative, operative and post operative findings. Procedure was explained to the patients and in patients of group A, possibility of conversion to open surgery was explained and a separate consent was taken.

Results

In this study of 60 patients, 34 patients were operated for acute appendicitis, 18 for recurrent appendicitis and 8 patients were operated upon as interval appendicectomy. 30 patients underwent open appendicectomy, 28 patients underwent laparoscopic

appendicectomy and 2 patients were started laparoscopically but converted to open procedure. The age group was 28 ± 11.05 years of LA and 23.3 ± 9.63 years for OA. The male to female ratio was 1:3, in LA group and 1:0.304 in OA group. Mean duration of surgery in LA was 41.78 ± 13.55 mins, in OA was 61.66 ± 25.25 and 102 ± 3.54 mins for converted group. There is statistical significant difference in the mean duration of surgery between LA and OA. Postoperative pain was significantly less in patients operated with laparoscopic technique (3.18 ± 1.09) as compared to OA (4.76 ± 2.03) group as evident by number of analgesic requirement.

Mean length of stay was shortest in LA group 2.5 ± 1.07 days, followed by OA 4.833 ± 2.11 days and 8.5 ± 3.54 in converted group.

Table-1: Showing preoperative complications/difficulties

Sr. No.	Complications	LA		OA	
		No. of patients	Percentage	No. of patients	Percentage
1.	Veress needle injury	Nil	Nil	-	-
2.	Trocar injury	Nil	Nil	-	-
3.	Pneumoperitoneum -Hypotension -Bradycardia	Nil	Nil	-	-
4.	Bowel injury	Nil	-	1	3.3
6.	Bleeding - Mesoappendix - Portsite - Major vessel	2 - -	6.67 - -	1 - -	3.3 - -
7.	Difficulty in locating appendix	2*	6.67	3	10
8.	Spillage of pus	2	6.67	2	6.67
9.	Dislodgement of Faecolith	3	10	-	-
10.	Rupture of Appendix	1	3.3	1	3.3
11.	Extraction of appendix(port replacement/incision enlargement)	1	3.3	3	10

Table-2: Showing Postoperative complications

Sr. No.	Complications	No. of Patients		No. of Patients	
		LA	Percentage	OA	Percentage
1.	Wound Infection Seroma/Abscess	1	3.5	8	26.67
2.	Urinary Retention	0	-	2	6.67
3.	Vomiting	2	7.14	0	-
4.	Chest infection/Sore throat	4	14.28	1	3.3
5.	Paralytic ileus	0	-	1	3.3
6.	Superficial Thrombophebitis	0	-	2	6.67

Wound infections and abscess were more common in open surgery in comparison to laparoscopic appendectomy.

Table- 3: Showing comparison of postoperative length of stay (in days)

Group	No. of Patients	Range	Mean \pm SD
LA	28	0-4	2.5 \pm 1.07
OA	30	1-9	4.83 \pm 2.12
converted	2	6-11	8.5 \pm 3.54
Total	30	30	

Statistical Analysis

Comparison	t value	p value	Significance
LA vs OA	5.245	<.01	HS

Discussion

Laparoscopic and open appendectomy have been compared several times, since the introduction of minimally invasive technique as a diagnostic as well as a therapeutic measure, in an effort to establish the supremacy of one above the other while the case has been strong enough for laparoscopic cholecystectomy for its quick and swift take over of the open cholecystectomy as the preferred method of treatment of symptomatic gallstone disease, it has not been same for laparoscopic appendectomy.

The present study too, is a comparative study between laparoscopic and open appendectomy. In present study, the age group varied from 10-58 years and there is slight predominance of appendicitis in males as compared to females (1.1428 : 1). This is comparable to the literature (M:F 1.4:1) [3].

The insertion of the Veress needle and first trocar is often considered the most dangerous step in laparoscopic surgery. These injuries are unique to laparoscopic procedure. The incidence of such ranges between 0.1% and 0.4% (Lee et al) [4]. The incidence reported by other series is as, Bailey et al – 0%, The Southern Surgeon club – 0.3%, Schirmer – 0%, Deziel – 0.14% [5,6,7,8].

Major vascular injuries are the most lethal technical complications of laparoscopic procedures [8]. Closed insertions of the veress needle and first trocar can result in severe vascular and visceral injuries (Nuzzo et al) [9]. Entry related bowel injury rate and vascular injury

rate was .04% with veress/trocar technique (Molly et al, 2002) [10].

In present study, we had no complication related to veress/ trocar injury. This may be because even after doing more than 2000 laparoscopic procedures by the surgical team, meticulous care was taken while inserting veress needle and first trocar, keeping the direction of veress needle toward the pelvis, in the midline and checking the needle position every time by saline instillation (going freely) and reaspiration (no return). Similarly 1st trocar is always inserted keeping its direction toward the air cushion and again exactly in the midline.

Pneumoperitoneum has a number of physiological and pathological effects. It decreases venous return hence decrease cardiac output. Pneumoperitoneum leads to number of CVS changes which can be prevented by lowering the insufflation pressure or evacuating the Co₂. Hypercapnia and acidosis can also occur with Co₂ due to its absorption from the peritoneal cavity. For its prevention, patient has to be hyperventilated and placed in head low, lateral decubitus position (Vernon et al) [11]. In present study, we did not have any side effects of pneumoperitoneum because of adequate hydration, ensuring good urinary output preoperatively, prevention of port slippage and extraperitoneal/ subcutaneous diffusion of Co₂.

Bowel injury can result from thermal injury, wrong trocar placement and from bowel retraction. (Deziel et al, Wolfe et al, Champault et al, Long et al) [8,12,13]. In the present study, we did not experience any bowel injury because of adequate pneumoperitoneum, gastric decompression and judicious use of cautery.

Bleeding can occur from mesoappendix, major vessels, inferior epigastric artery and port site. Linos et al (1999)

reported injury to two patients to inferior epigastric artery in two patients [15]. Brosseuk and Bathe reported two wound haematomas in open appendicectomy [16]. In present study, we experienced bleeding in two patients in LA group and one in OA group from mesoappendix. The bleeding was easily controlled by two methods : (1) No panic reaction, no panic cautery, (2) irrigation and aspiration of bleeding area, then grasp the bleeding vessel.

In the present study, we did not experience any bladder injury because we emptied bladder just before taking the patient to operation theatre. Linos et al reported bladder injury on insertion of suprapubic trocar. In present study, there was rupture of appendix in one patient in LA group and one patient in OA group, because appendix was thickened and friable. Attwood et al reported 4 cases of rupture of appendix [17]. Rupture occurred because of gangrenous and friable appendix.

In the present study there was dislodgement of faecolith in three patients in LA group and one patient in OA group. This occurred during cutting of appendix from base. All the faecoliths were removed carefully to prevent any intraabdominal abscess. Attwood et al used three endoloops, two across base of appendix and third distally to prevent spillage of luminal content of appendix [17].

In the present study, there was difficulty in extraction of appendix in one patient in LA group and 3 in open group. In LA group 5mm canula was replaced by 10mm canula. This was done to prevent contact of appendix with port site to prevent port site infection. Kum et al (1993), Cox et al (1993), Hanson et al (1996), also used plastic bags for retrieval of appendix to decreased wound infection [18,19,20]. In the laparoscopically operated group 28 patients underwent appendicectomy and 2 were converted to open procedure. The conversion rate was 6.67%. The reasons for conversion was non- visualization of appendix. It was 2.8% in study conducted by Merhoff et al and 12% in Hellberg et al study [21,22].

Various studies have reported significant higher operating time in laparoscopic appendicectomy as compared to open appendicectomy. Attwood et al (1992) reported longer period for laparoscopic appendicectomy than open appendicectomy [17]. However Kum et al had not seen much difference in operating time (43 vs 40 minutes) [18]. Duff and Dixon concluded that with significant experience, the

operation time in laparoscopic appendicectomy is no longer than open appendicectomy [23]. In the present study, mean duration of surgery was less in laparoscopic group as compared to open appendicectomy because the operating team was experienced enough for such procedures.

Patients operated with laparoscopic technique had less pain postoperatively as compared to those operated by open technique. In studies conducted by Attwood et al, Frazee et al, Nazzal et al postoperative pain was more in open technique due to less handling of the tissues, no forceful retraction of wound margins and miniscule incisions [17,24,25]. Also adhesions related complications such as intestinal obstruction and subfertility remain the main source of long term morbidity from open appendicectomy.

Attwood et al noted urinary retention in two patients in open appendicectomy group and none in laparoscopic appendicectomy. Macarulla et al (1997) reported urinary infection in laparoscopic appendicectomy group in two patients and that could be related to urinary indwelling catheter before the procedure [17,26]. In present study urinary retention occurred in two patients in open group none of laparoscopic appendicectomy group. Spinal anesthesia may also lead to urinary retention in open appendicectomy group and no patient was catheterized prior to laparoscopic appendicectomy.

McCall et al, Temple et al, Merhoff et al , Utpal et al concluded fewer wound infection in laparoscopy group than open group [27,28,21,29]. In the present study also wound infection was found to less in laparoscopic group. This may be explained by the extraction of the infected appendix through lumen of the cannula, so the inflamed organ is never in direct contact with the wound. Postoperative intraabdominal abscess is the most serious complication after appendicectomy and despite its low incidence is responsible for significant morbidity (Reid et al) [30] . Kazemier et al and Brosseuk et al reported intraabdominal abscess more in open group [31,16]. Hart et al and Long et al reported more intraabdominal abscess in laparoscopic group [14,32]. Attwood et al had stressed the importance of aspiration of blood or fluid collection in the pelvis and subdiaphragmatic spaces because fluid may shift away from operative area while patient is in Trendelenburg position [17]. In the present study, no incidence of intraabdominal abscess was noted. This may be because we had given I/V antibiotics prior to surgery in both the

groups and no residual fluid was left in the peritoneal cavity on completion of surgery.

Paralytic ileus was also found to be significantly more in open appendectomy as compared to laparoscopic appendectomy group in the present study. Similarly in other study conducted by Rohr et al showed same results [33].

Conclusion

It is concluded that laparoscopic appendectomy is a better alternative to open appendectomy as it decreases wound infection and paralytic ileus. The postoperative pain is also less in case of laparoscopic appendectomy. Laparoscopic appendectomy also decreases the hospital stay. Laparoscopic appendectomy is having less complications as compared to open appendectomy. Hence laparoscopic appendectomy also decreases the morbidity associated with operative procedure, wound infection, paralytic ileus and prolonged hospitalization.

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