Original Article

Laparoscopic Vs Open Appendectomy - A Retrospective Cohort Study

Sardar Rezaul Islam[1], Shah Alam Sarkar[2], Dababrata Paul[3], Md. Hanif[4], Sheikh Mahmood Kamal[5]

Abstract

Background: Open appendectomy (OA) has been the treatment of choice for acute appendicitis since its introduction by Mc-burney in 1884. Laparoscopic appendectomy (LA) though widely practiced, has not gained universal approval. LA was first described in 1983. Some early studies showed equivocal results about benefit of LA. So, we decided to do this study with a view to evaluate the therapeutic benefit of LA by comparing with conventional OA .

Materials and methods: We collected data of 872 appendectomies from January 2012 upto June 2017 for a period of 5 years. Out of them 410 had conventional OA and 462 had LA. e compared the mean operation time, time of first oral feeding, narcotic analgesic requirement, duration of post operative hospital stay.

Results: We found that mean operation time was 32±5.8 minute and 38± 7.5 minute in LA and OA respectively. Duration of post operative hospital stay was 1.2 days shorter in Laparoscopic group. LA required 1.1 shots of less analgesic than OA. Oral feeding was resumed 21 hours earlier following LA compared to OA. Laparoscopic appendectomy was safely performed in paediatric patient without any adverse effect. We also found that, in female patient, concurrent ovarian cysts, tubal pregnancy and endometriosis can be diagnosed and managed laparoscopically in the same sitting. LA was performed on pregnant patients in first and second trimester without any fetal loss.

Conclusion: Our study found that laparoscopic appendectomy is an effective and safe procedure irrespective of age and sex of the patient. LA has added advantage of early return of bowel movement, less post-op hospital stay and less requirement of narcotic analgesic. Incidence of surgical site infection is less than half in LA compared to OA.

Key words: Acute appendicitis, Laparoscopic appendectomy, Open appendectomy, Laparoscopic vs open appendectomy

Introduction:

Open appendectomy has been a safe and effective operation for acute appendicitis for more than a century. According to the literature, approximately 7% of the population develop appendicitis in their life time, with peak incidence between the ages of 10 and 30 years, thus making appendectomy the most frequently performed abdominal operation.[1] Recently, several authors proposed that the new technique of laparoscopic appendectomy should be the preferred treatment for acute appendicitis. However, unlike laparoscopic cholecystectomy, laparoscopic appendectomy(LA) has not yet gained popularity.[2] Laparoscopic cholecystectomy is now considered a standard method of performing cholecystectomy and has mostly replaced the old method throughout the world, while appendectomy has yet to achieve such popularity.[3] Since its introduction by Mcburney in 1884, appendectomy has been a treatment of choice for acute appendicitis.[4] For more than a century, open appendectomy remained the gold standard of treatment of acute appendicitis and for interval appendectomy. In 1981, Semm, a German gynecologist performed the first laparoscopic appendectomy.[5,6] Despite its use even before laparoscopic cholecystectomy, LA has not yet emerged as gold standard appendectomy. LA has potential advantages of shorter hospital stay, early mobilization, early return of bowel function, acceptable complication rate along with the recent enthusiasm of minimally

1. Professor and Head, Department of Surgery, Ad-din Women's Medical College Hospital (AWMCH)
2. Assistant Professor, Department of Surgery, Jahurul Islam Medical college Hospital (JIMCH)
3. Assistant Professor, Department of Surgery, Jahurul Islam Medical college Hospital (JIMCH)
4. Assistant Professor, Department of Surgery, AWMCH
5. Registrar, Department of Surgery, AWMCH.

Correspondence: Professor and Head, Department of Surgery, Ad-din Women's Medical College Hospital (AWMCH)

invasive surgery. These definite advantages have led some authors to advocate this approach as the procedure of choice for uncomplicated appendicitis. [7,8]

Patients and methods:

We conducted retrospective review of consecutive patient with appendectomy between January 2012 and January 2017 for a period of 5 years. All the operations were performed in the two surgical units of a teaching hospital.

Pre-operative diagnosis was made using history, clinical examination coupled with laboratory findings and imaging studies. In open group only appendix removed via Mcburney's incision were included in the study. All patients where midline incisions given were excluded from the study. Operating time was calculated from the time of first incision upto the placement of last stitch on the closing wound. Post-operative hospital stay, in days, was defined as the time the patient left the operation theater upto the time of discharge from the hospital. Number of shots of injectable narcotic analgesics given to the patients post-operatvely were recorded. Time of resumption of oral food, in hours, were calculated from the time of surgery.

Data were analyzed using standard statistical method. Descriptive statisticals including means, medians, standard deviation, percentages were used to describe study population on all variables. For categorical variables X^2 test and Fisher exact test were used to make comparison.

Procedure description: For the laparoscopic approach, a 10-mm trocar was placed at the umbilicus and 2 additional 5 and a 10mm trochars were inserted in the lower abdomen and right hypochondrium respectively (Fig-1) The meso-appendix was transected after applying titanium hemoclip. The base of the appendix were ligated with an endo loop constructed with a Roeder's knot on a No-1 vicryl thread.(Fig-2) The endo loop was pushed to ligate the base of the appendix with a knot pusher (Fig-3 & 4). A single endo loop was used. The specimens were removed via the umbilical port. In case of peritoneal collection only suction was used. No irrigation was used.

In open approach, we used traditional Grid –Iron incision over the Mc-burney's point. The appendix base were transfixed with a no1/0 vicryl suture. Appendix base was not invaginated.

All patients received preoperative and post operative antibiotic. A combination of 3rd generation cephalosporin and metronidazole used. In presence of severe systemic sign an aminoglyside, usually Amikacin was added. All patients were discharged on resumption of solid food and complete remission of fever.

We successfully operated on very old patient laparoscopically without any difficulty.We operated on patients above 60. But we avoided LA on patients with cardiac disease.

We operated on 2 pregnant patients laparoscopically in first and second trimester without any fetal loss. Two patients with pregnancy were operated in the open group also without fetal loss as well.

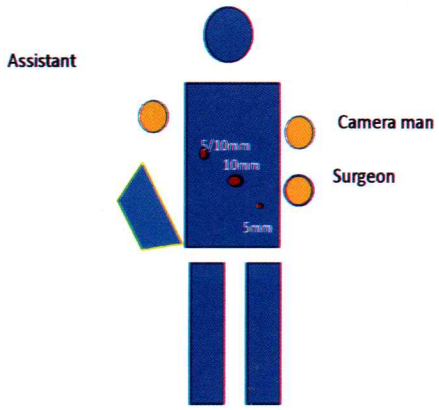

Fig.-1

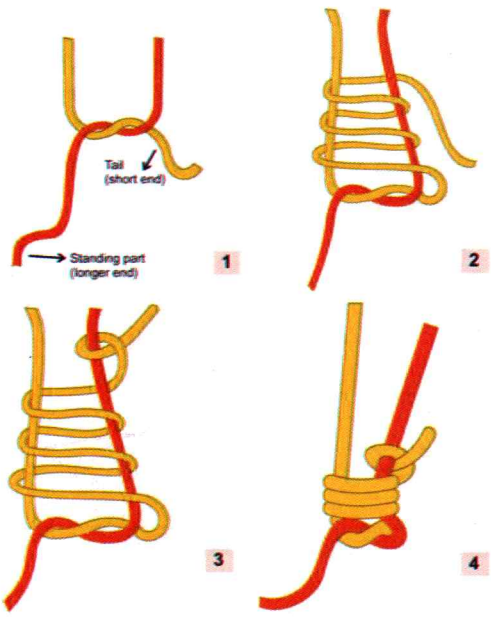

Fig.-2

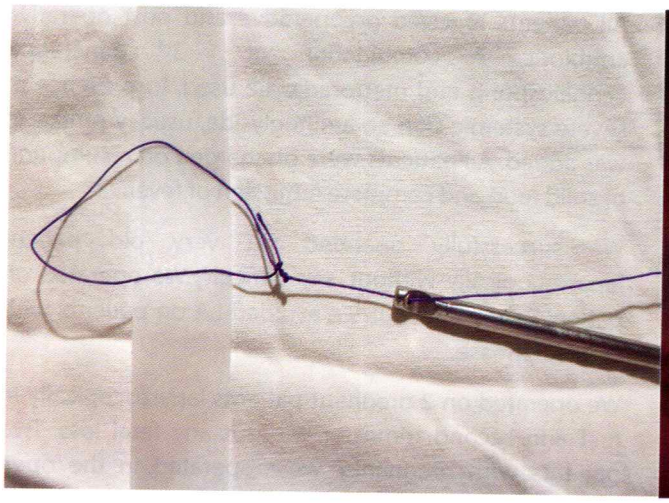

Fig.-3

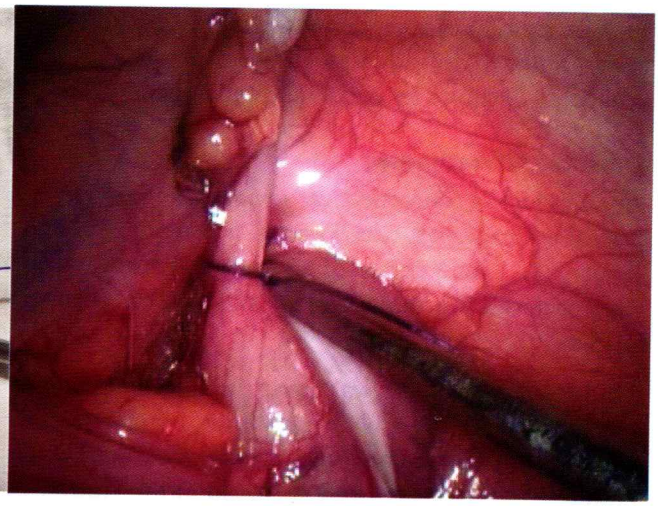

Fig.-4

Results:

In this five year period, we performed total of 872 appendectomy. Out of which 410 were open appendectomy and 462 were laparoscopic . Out of the laparoscopic group 180(39%) were adult male, 259 (56%) were adult female, 16(5%) were children. Age of the patients ranges from 2 to 72 years. There were two pregnant patient in the LA group in their first and second trimester. There were two pregnant patient in the open group also.There were no death in either group. We had converted 11(3.4%) cases. Some con-commitent pathology was managed during LA. We did 16 laparoscopic cholecystectomies, managed 4 tubal pregnancy and 21 ovarian cystectomy while doing LA. (Table-1)

We recorded the operating time from the time of incision to the last skin stich. We found the operating time in LA was 32±5.8 minute and in OA was 38±7.5 minute. LA group required 5 minutes less operating time than OA(OR-0.79,CI-95%).

We calculated narcotic analgesic doses required for both group. On average number of shots required for OA were 3.1 while LA were 2 (OR-0.30, CI 95%). So LA required 1.1 shots less than OA.First oral food was resumed after 59 hours after surgery in OA on average. and 38 hours after LA(OR-0.41, CI 95%). Mean difference were 21 hours in favour of LA.

We calculated duration of hospital stay from the time of surgery upto the time of discharge from the hospital. The post operative hospital stay was 4.4 days in OA and 3.2 in LA (OR-0.47, CI95%). LA group required 1.2 days less post op hospital stay than OA.(Table-II)

Table - I

Con-commitment pathology managed during LA

Con-commitent pathology	Number
Lap Cholecystectomy	16
Excision of tubal pregnancy	4
Lap Ovarian cystectomy	21

Table-II

Outcome comparison between LA and OA

Outcome	LA	OA	Mean difference	Odds ratio
Operating time (minute)	32±6	38±7.5	-5	0.79 CI 95%
Number of analgesic doses (narcotic)	2	3.1	-1.1	0.30 CI 95%
Resumption of oral food (Hours)	38	59	-21	0;41 CI 95%
Hospital stay (days)	3.2	4.4	-1.2	0.47 CI 95%

Discussion:

Out of our 462 patients of LA group 259 were adult female (56%).This is the group where laparoscopic approach is very much indicated. As con-commitent pelvic pathology can be diagnosed and managed very effectively. In our series we managed 4 cases of ruptured ectopic pregnancy and performed 21 ovarian cystectomy during this period in women of reproductive age group. Any patient of reproductive age having suspected appendicitis, should have laparoscopic appendectomy as any concomitant pelvic pathology can be dealt with in the same laparoscopic method. We did 16 cholecystectomies as these patents were found to have gall stones on pre operative ultrasonography. We did not insert additional trocar for this purpose. If we found that patient will have LA and cholecystectomy, we inserted conventional 4 trochar for lap cholecystectomy and did appendectomy through the same ports. We did not require to insert any trocar on the left iliac fossa.

Our 23(5%) patients belonged to pediatric (below 12 years) age group. We used the same trochar position in children also.We inserted camera trocar slightly above the umblicus in very small children.

We put intra abdominal pressure at 11 or 12mm of Hg in children. We did not encounter any difficulty while operating on children, only instruments were crowded due less intra abdominal space .No difference in mortality or major complication was observed between LA and OA among children.[9]

Our 25 patients were above 60 years. No special problem was encountered in operating on old patient. But we did not attempt LA on patients with heart failure as increased inta-abdominal pressure may compromise cardiovascular hemodynamics.[10]

We rarely found very obese patient in this rural based medical college hospital. OA in obese patient is particularly difficult through Mc Burney's incision and often requires larger incision. LA in obese patient has extra advantage in this regard.[11]

Complication following LA are also found to be less. Number of wound infection after LA is almost less than half in comparison to OA. As a result, LA has better cosmetic result. But it has slightly higher rate of residual absecess.[12,13,14] But one study has shown that the rate is higher only if appendix is perforated (9% vs 2.6%). In acutely inflamed or gangrenous appendicitis there is no significant difference in rate of intra abdominal abscess formation.[15,16]

During the early part of our study we were inserting double ligature at the base of the appendix to secure the stump. As I came across a study which concluded that there was no difference in post operative mortality and morbidity between the use of single loop and double loop in LA.[17] Since then I have been using single loop to secure the appendicular stump. As a result operation time was reduced by few minutes.

When we came across to perforated appendix and pus collection,we used suction only to clean the pus from the peritoneal cavity. We did not use irrigation at all. A prospective randomized trial was published in the literature, which concluded that there is no significant difference in outcome between suction and irrigation combined and suction alone during LA in case of perforated appendicitis.[18] In this study the incidence of residual abscess was found to be same in both group with perforated appendicitis. Duration of hospital stay was also not different.

Adhesion formation is now one of the common complication following intra abdominal operation. A study has shown that rate of adhesion is about 80% in OA compared to 10% in LA when the patient was laparoscoped three months after the surgery.[19]

Regarding the indication of LA we may conclude that indication of laparoscopic appendectomy include female of reproductive age group, doubtful diagnosis of appendicitis, recurrent appendicitis, high working class, obese patient, cirrhosis of liver, sickle cell disease and immuno-compromized patient.

General anesthesia and pneumoperitoneum required for laparoscopic procedure poses risks to certain group of patients with cardio-respiratory compromise. So LA is not recommended for patients with COPD or cardiac disease. LA should also be avoided in previous lower abdominal surgery, generalized peritonitis and stump appendicitis.

Laparoscopic appendicectomy in pregnancy is associated with a low rate of intra-operative complications in all trimesters. However, LA in pregnancy is not associated with a significantly higher rate of fetal loss. Rate of preterm delivery appears to be similar or slightly lower following a laparoscopic approach. Laparoscopic appendectomy appear to be safe for pregnant women.[20]

Conclusion:

Our study clearly demonstrates that laparoscopic appendectomy is superior to open appendectomy. LA

has comparable operative time with OA. LA is also clearly associated with less postoperative analgesic use and early resumption of oral food compared to OA. Postoperative hospital stay is also shorter in LA. Concomitant gallstone can be operated in the same sitting without making two incision. In female patient concomitant ovarian cyst, tubal pregnancy can be diagnosed and managed laparoscopically. We believe that LA is the procedure of choice for most patients regardless of age, sex and BMI.

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