

## Laparoscopic Appendectomy in a Developing African Country

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**Background:** The wide spread introduction of laparoscopic surgery to surgical practice in Nigeria is a relatively new development. The benefits of laparoscopic appendicectomy are controversial. Laparoscopic appendicectomy (LA) has always generated controversy due to its cost and time consuming nature and the multiple trocar points required which arguably approximates to the length of the incision in open appendicectomy. The purpose of this study is to describe the unit experience in a developing country.

**Method:** This is a retrospective study conducted by the laparoscopic surgery unit of the department of surgery. The study includes all patients who consented to laparoscopic appendicectomy over a period of eighteen months.

**Results:** Thirty patients out of a hundred consented to laparoscopic appendicectomy with a male female ratio of 1:1.5. The mean operating time was 62 minutes. The duration of post-operative admission ranged from 1 to 7 days with a mean of 2.2 days. There was 1(3.3%) conversion and 1(3.3%) pelvic collection. There was no readmission over three months of follow up.

**Conclusion:** Laparoscopic appendicectomy is safe and allows early discharge. The low incidence of cholecystectomy in Nigeria compared with the high incidence of appendicitis in Nigeria supports the adoption of surgery for a different disease entity apart from cholecystectomy for training (hand and eye coordination). The level of safety demonstrated in the initial cases of laparoscopic appendicectomy supports adopting LA as a procedure of choice in acquisition of basic laparoscopic surgery skills.

## Introduction

The advent of laparoscopic surgery has been a turning point for surgical access in various surgical conditions. One of the earliest far-reaching changes was the adoption of laparoscopic cholecystectomy as the gold standard for the treatment of cholecystitis in many developed countries. Consequently laparoscopy is now a preferred surgical approach in numerous surgical conditions<sup>1</sup>. The advantages of laparoscopic surgery include a shorter hospital stay, early return to normal lifestyle and reduced post-operative analgesic requirements. Correspondingly complications associated with prolonged bed rest are reduced as well as better Cosmesis<sup>2</sup>. Appendicitis is one of the commonest intra-abdominal indications for emergency surgery<sup>3</sup>. The first laparoscopic appendicectomy (LA) was performed in 1983<sup>4</sup>.

Despite these advantages many surgeons still continue to perform open appendectomy (OA) on the basis that it combines therapeutic efficacy with low morbidity and mortality rates. The benefits of laparoscopic appendicectomy are controversial. Laparoscopic appendicectomy (LA) has always generated controversy due to its cost, time consuming nature and the multiple trocar points required which arguably approximates to the length of the incision in open appendicectomy. In recent times there have been encouraging results from many centers in developing countries<sup>5</sup>.

This study audits the unit experience and challenges with LA over eighteen months.

## Patient and Methods

Our hospital is the premier teaching hospital in Nigeria. The surgical department consists of several sub specialties in surgery with general surgery and pediatric surgery inclusive. This was a retrospective study conducted by the laparoscopic surgery unit of the department of surgery in the hospital. All patients above 10 years with a clinical diagnosis of uncomplicated appendicitis who voluntarily consented to LA were included in the study. The method of anesthesia (general anesthesia/regional) was determined by the anesthetists. The cost of surgery was borne by the health insurance or the patients. However the hospital charges the same price for OA and LA. All other causes of acute abdomen with ruptured appendix inclusive were excluded from this study. The study included patients undergoing (LA) in our hospital from September 2011 to February 2013.

The medical records of the patients were reviewed for demographic data, intra-operative findings, duration of surgery, post-operative complications and the duration of admission. The operative time was calculated as time from incision to wound dressing. All the patients had peri-operative antibiotics consisting of Ciprofloxacin (200 mg) and Metronidazole (500mg) at induction of anesthesia. The analgesic regimen was parenteral opioids in the first 12 hours after surgery which was subsequently converted to non-steroidal anti-inflammatory drugs when the patient was fully awake. Pneumo-peritoneum was created by the open approach. The laparoscopic approach consisted of a 10mm umbilical port for the telescope and two 5 mm ports in the left iliac fossa and suprapubic region respectively.

The appendix was identified following which the mesoappendix was coagulated with the bipolar diathermy and divided with the laparoscopic scissors. The base of the appendix was secured and divided between two PDS Roeder's knots. The specimens were retrieved through the 10 mm port while simultaneously withdrawing the telescope. We did not use a retrieval bag. Adhesiolysis was performed using a monopolar scissors while ovarian cyst drilling was performed with the hook dissector. The peritoneal cavity was inspected on reinsertion of the telescope prior to the removal of the two 5 mm ports. The fascia in the umbilical port was repaired with two stitches of 'O' prolene and the skin with 3'0' chromic suture, while the two 5 mm ports had only the skin approximated with 3'0' Chromic suture.

The follow up period was between two and six months. The procedures were performed by only two surgeons who operated together. The two surgeons had trained for laparoscopic surgery both within and outside Nigeria with a few years' experience in basic laparoscopic procedures.

## Results

There were seventy appendicectomy procedures performed in patients with uncomplicated appendicitis in the stipulated period. Thirty patients consisting of 12 male and 18 female (Male: Female ratio of 1: 1.5) consented to LA within the period study. All the operations were done on the next elective list after admission (within 36 hours of presentation). The patients were commenced on parenteral ciprofloxacin and metronidazole at presentation while awaiting surgery. The age range was 10 years – 61 years with a mean age of 25.6 years. All the female patients had pre-operative abdominal ultrasound scan prior to surgery. The intraoperative findings included a grossly inflamed appendix in 29(96.6%) of the patients with a normal appendix in one female patient. Additional findings at surgery were bilateral ovarian cysts and intra-peritoneal adhesions in two female patients (Table 1). These patients

with additional findings at surgery had laparoscopic ovarian drainage and adhesinolysis respectively. The duration of surgery ranged from 37 minutes to 150 minutes. The mean duration of surgery was 62+/- 26.2 minutes. The commencement of oral intake ranged from the day of surgery (day 0) to the third post-operative day (day 3). The mode however was the first post-operative day. The duration of admission from surgery to discharge ranged from 1-7 days with a mean of 2.2 days. There was one conversion to open appendicectomy which was due to a morbidly adherent appendix to the caecum. Two of these patients had hypertension and two had uncontrolled diabetes. These were treated appropriately both intra-operatively and post-operatively. There were three recorded morbidities namely; spinal headache 1(3.3%), pelvic abscess 1(3.3%) and umbilical port-site infection. The average follow up period was three months.

**Table 1.**

S/No	Sex	Age (Years)	Associated Morbidity	Duration of Surgery (minutes)	Complications	Duration of Admission (days)
1	M	29	Nil	85	Nil	2.00
2	F	49	Hypertension	65	Nil	2.00
3	F	16	Nil	45	Nil	2.00
4	M	42	Nil	150	Nil	3.00
5	F	20	Nil	130	Nil	2.00
6	M	24	Nil	59	Nil	1.00
7	F	13	Nil	50	Nil	1.00
8	M	30	Nil	90	Nil	3.00
9	F	48	Diabetic	55	Nil	2.00
10	F	22	Nil	75	Nil	3.00
11	M	17	Nil	75	Converted	7.00
12	M	14	Nil	75	Nil	3.00
13	F	17	Nil	40	Spinal Headache	3.00
14	F	16	Nil	38	Nil	1.00
15	F	28	Nil	43	Nil	1.00
16	M	20	Nil	55	Nil	1.00
17	F	10	Nil	40	Nil	1.00
18	M	12	Nil	49	Nil	1.00
19	F	21	Nil	95	Nil	2.00
20	F	13	Nil	55	Nil	2.00
21	M	20	Nil	75	Nil	2.00
22	F	23	Nil	75	Pelvic Abscess	4.00
23	M	12	Nil	55	Nil	3.00
24	F	10	Nil	40	Nil	3.00
25	M	43	Nil	50	Nil	2.00
26	F	22	Nil	37	Port site Infection	1.00
27	F	43	Nil	45	Nil	2.00
28	F	61	Diabetic	55	Nil	2.00
29	M	30	Nil	40	Nil	1.00
30	F	45	Hypertension	45	Nil	1.00

## Discussion

The controversy of whether laparoscopic appendicectomy decreases the length of hospitalization remains over the past decade. The duration of admission declined dramatically in the recent years with the differences between open and laparoscopic cases being marginal. The duration of stay is now mainly determined by the pathological status of the appendix and the clinical status of the patient, rather than the open or laparoscopic access used for the procedure<sup>6</sup>. Both OA and LA have advantages<sup>7</sup>. However LA is associated with less post-operative analgesic requirement, early recovery, shorter hospital stay and less scarring<sup>8</sup>. It is readily being adopted as the gold standard for acute appendicitis in developed countries with increasing safety, whether performed by surgeons or trainees<sup>9</sup>. The exigency of the increased incidence of appendicitis in our geographical region<sup>3</sup> necessitates a more rapid adoption of international standards albeit with our modification for resource poor countries.

The results in our audit are comparable with other centers in the developing world<sup>10</sup>. Our mean duration of surgery (62 minutes) is similar to other centers<sup>11</sup>. In the patient with an operating time of 150 minutes there were six periods of power disruption. After each power outage we had to spend time restarting and recalibrating our systems. However a further analysis based on chronological sequence reveals a mean duration of 45 minutes for the last fifteen cases compared with a mean duration of 79 minutes in the first fifteen cases. The mean operation time in other centers ranges between 20 and 37 minutes<sup>8</sup>. These are high volume centers where thousands of cases are operated annually. With volume our operation time will be on the decline.

The mean duration of admission was 2.2 days after surgery. Nine patients (30%) were discharged home on the first post-operative day with adequate pain control with none coming back for readmission. One patient with ultrasonographic diagnosis of pelvic abscess of 50mls had a prolonged admission of seven days before he was considered fit for discharge. This single episode of post-operative abscess translates to 3.3% comparable with other centers<sup>12</sup>. Despite the short time of availability of LA, the conversion rate was 1 in the 30 cases done (3.3%). Although the volume of cases done was small this is a part of our learning curve where conversions and complications tend to be relatively higher. In high volume centers conversion rates may be as high as 9%<sup>9,13</sup>. Other morbidities were spinal headache (3.3%) and wound infection (3.3%). The wound infection rate was 3.3% i.e. one patient which is higher than 1.4%<sup>11</sup> but similar to 4%<sup>14</sup>. Two additional procedures (bilateral laparoscopic ovarian drainage and adhesiolysis) could only have been done via a laparoscopic approach.

Despite our comparable results there are challenges in laparoscopic surgery. These include the cost of consumables, support staff, reliable electricity/power and patient acceptance. The initial experience with power instability necessitated the acquisition of an uninterrupted power system (UPS). It is an established fact that laparoscopic surgery is expensive. However to reduce the cost of surgery a reusable bipolar dissector was used to coagulate the appendicular artery before dividing thus eliminating the need for titanium clips. Secondly the division of the appendix base was done between Roeder's knots which were constructed by the surgeon or his assistant. This further eliminates the need for more expensive clips and staplers. Finally the retrieval system of the appendix through the 10mm port eliminates the need for a retrieval bag. Lastly we needed to instruct the nurses on instrument handling during some of the procedures because a significant number of the nursing staff were not used to laparoscopic instrumentation. Patients are also apprehensive of the relatively new

procedures. Consequently only thirty of one hundred patients consented to laparoscopic appendicectomy.

## Conclusion

Laparoscopic appendicectomy tends to reduce the length of hospital stay and analgesic requirements. The complication rates are minimal with appropriate patient selection. Diagnostic accuracy is further enhanced by the laparoscopic approach. Additional surgical procedures can be performed without any modification of surgical incisions. Safety, development and dexterity in laparoscopic surgery paralleled the wide acceptance of laparoscopic cholecystectomy. Gall bladder diseases are relatively of a lower incidence in Nigeria than in developed countries. With the level of safety demonstrated in the initial cases done laparoscopic appendicectomy may be the procedure of choice in acquisition of basic laparoscopic surgery skills( hand eye coordination and orientation) in Nigeria because of the low incidence of cholecystitis<sup>15</sup>. One of the major limitations to LA is the cost of surgery. Surgeons need to develop indigenous ways to reduce the cost of surgery in developing countries.

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