Original Article

Laparoscopic Surgery in a Nigerian Teaching Hospital for 1 Year: Challenges and Effect on Outcomes

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ABSTRACT

BACKGROUND: Laparoscopic surgery has developed rapidly in developed nations within a relatively short time to become a major method of treating surgical diseases, with increasing application across specialties. However this is not the situation in developing countries like Nigeria. This may be as a result of local challenges to the performance of laparoscopic procedures. It is important to identify what these challenges are.

METHODOLOGY: We prospectively studied problems encountered during the performance of laparoscopic procedures, and their effects on the procedure in a Nigerian teaching hospital for a year. Demographic information, laparoscopic procedure, problems encountered and effect on procedure, and outcomes were analyzed using descriptive statistics.

RESULTS: Our sample consisted of 21 patients who had laparoscopic procedures performed by the authors; 12 (57%) were therapeutic procedures. Average age was 34.1 years (range 18-50 years) and majority (61.9%) were female. Problems encountered included non functioning/malfunctioning equipment (76.2%), power outages (33.3%), and dead light source bulbs (14.3%). There were 5 (23.8%) conversions to open surgery as a result of problems encountered; another conversion (4.8%) was to tackle an ascending colon tumour discovered at laparoscopy.

CONCLUSION: The performance of laparoscopic procedures in a Nigerian public hospital is affected largely by inadequate and often malfunctioning equipment, and attention to these may reduce rates of conversion to open surgery.

KEY WORDS: Laparoscopic procedures,

Date Accepted for Publication: 19th March, 2013
NigerJMed 2013: 134-137

INTRODUCTION

Laparoscopic surgery has developed rapidly in a relatively short time. It has become an important method of treatment of surgical diseases. Some advantages especially for the patient include reduced blood loss, less pain and discomfort, reduced adhesions and early mobilization and discharge from the hospital.[1] The disadvantages are more for the surgeon and include lack of depth perception, asynchrony with camera operator, smaller visual field and uncomfortable working positions with restricted movements of instruments. While laparoscopic surgery has rapidly altered the concept and perception of surgery in developed countries with increasing application to virtually every field and specialty, its impact in surgery in Nigeria appears to be less impressive. Laparoscopy has been available in Nigerian Teaching Hospitals but until recently was mainly limited to diagnostic laparoscopy popularized by gynaecologists[2, 3, 4, 5]. Challenges to laparoscopic surgery in developing countries include its high cost (equipment and procedure), erratic power supply and limited manpower[6] and lack of awareness. Although these challenges appear obvious and are often inferred, their effect on performing laparoscopic procedures in a public teaching hospital in Nigeria requires study. It is also important to determine what other factors may be involved. In this study we prospectively assessed the laparoscopic procedures carried out in one year at the Jos University Teaching Hospital to determine factors which affect the performance of laparoscopic surgery.

Materials and Methods

Laparoscopic surgeries performed by the authors at the Jos University Teaching Hospital were prospectively collected from 25/5 /2011 to 8/5/2012. Data collected over this period included age, gender, preoperative diagnosis, procedure, problems encountered, and solutions, findings, conversion and reason for conversion, and the development of complications. Within the study period 21 laparoscopic surgery procedures were performed. Laparoscopic procedures performed in JUTH without the involvement of the authors were not included. Patients who provided informed written consent for the study were included. There were times within the study period when laparoscopic procedures could not be performed for consenting patients because of non functioning equipment. All the laparoscopic procedures were performed under general anaesthesia and pneumoperitoneum was achieved with carbon dioxide usually through an open technique via umbilical cicatrix tube[7] except for patients with previous midline incisions involving the umbilicus. The number of ports used was determined by the type of laparoscopic procedure being carried out. Demographic and other data related to procedure and outcomes were analyzed using descriptive statistics.

RESULTS

A total of 21 laparoscopic procedures were performed during this period. Thirteen (61.9%) of the patients were Female. Average age of the patients was 34.1 years (range 18-50 years). The indications for the laparoscopic

procedures are shown in table 1.

Table 1. Indications for surgery

Indication	No of cases (% of total)
Acute appendicitis	7 (33.3)
Acute cholecystitis	2 (9.5)
Bilateral undescended testes	2 (9.5)
Intra-abdominal malignancy	4 (19.0)
Diagnostic evaluation	6 (28 6)

Laparoscopic procedures performed are shown in table 2.

Table 2. Laparoscopic procedures performed

Procedure	Number (%)
Laparoscopic appendicectomy	7 (33.3)
Laparoscopic adhesiolysis	3 (21.25)
Laparoscopic cholecystectomy	2 (17.50)
Laparoscopic biopsy	4 (19.0)
- Liver	- 2
- Advanced GIST	- 1
- TB abdomen	- 1
Diagnostic laparoscopy	5 (23.8)
- Intraabd malignancy	- 1
- Benign gynecological conditions	- 1
- Cholestatic jaundice	- 1
Bilateral undescended testes	2

The problems and difficulties encountered were documented as well as the resultant effect on outcome of surgery (Table 3).

There were 5 (23.8%) conversions to open surgery as a result of the problems encountered. All the patients made uneventful recovery and there were no post operative wound infections.

DISCUSSION

Laparoscopic surgery has radically altered the way surgery is performed. It has rapidly become the standard of care for some procedures and is challenging established paradigms of traditional open surgery. Laparoscopic procedures are very popular in developed countries and some procedures like cholecystectomy are performed almost entirely by laparoscopic surgery.[8] In contrast, a ten year review of cholecystectomy in a teaching hospital in the country showed that the 18 cases seen were treated with open cholecystectomy.[9] Another teaching hospital more recently performed 24 laparoscopic cholecystectomies in carefully selected consecutive patients in period of a year and a half, but the number of patients not selected for the laparoscopic procedure was not mentioned.[10] The limited role of laparoscopic procedures in Nigerian surgery may be due to unique challenges different from those faced by more advanced countries. Although some of these problems have been mentioned in other reports, like cost of set up

Table 3. Problems encountered, effect on surgery and limitations.

Problem	No. of cases (% of total)	Effect on surgery	Solution	Limitation
Non functioning suction/irrigation device	10 (47.6)	Nil conversion except in severe bleeding see above	Replace	Replacement unavailable
Power outage	7 (33.3)	Increased duration of surgery Contributed to loss of bulbs	Stable power supply Use of UPS	Power supply is currently erratic No UPS dedicated to laparoscopic equipment
Gas leak from malfunctioning port	4(19.0)	Encouraged conversion in 2 cases	Replacing port	Limited number of ports
Death of bulb	3 (14.3)	Conversion in 1 case	Replace bulb	Spare bulb or light source unavailable in one case
Haemorrhage from appendicular artery	2 (9.5)	Conversion in 1 case	Control haemorrhage, conversion if severe. Visibility essential for laparoscopic control	Bleeding was severe in one case. Suction/irrigation device faulty
Non functioning clip applicator/ absence of knot pusher or endoloop	1 (4.8)	Conversion during a cholecystectomy	Functioning clip applicator or use of extracorporeal knots	None available
Malfunction of diathermy during surgery	1	Conversion	Replace or use another energy source	Non available

and consumables, as well as training [6, 11] a deliberate study of the factors responsible and how they affect laparoscopic surgery is necessary.

Our study shows that the performance of laparoscopic surgery in a public teaching hospital in Nigeria is affected by a number of factors. A study of table 3 reveals that poor and inadequate equipment is a major underlying factor that affects the performance and outcome of laparoscopic surgery in our institution. The diagnostic procedures were easier to perform and required less operative time. Obviously they require less skill and equipment.

A large number of the cases(47.6%) were performed without a functioning suction-irrigation device, this was mitigated by the use of other equipment with suctioning capability e.g. spatula. However when substantial haemorrhage was encountered these were insufficient, and irrigation to improve visibility was missed resulting in conversion. Power outages were relatively frequent(33.3%) and sometimes occurred multiple times in a single procedure. The power outages tended to increase procedure time and damage some equipment especially bulbs. In all but one case the presence of alternative light sources and bulbs meant that most times, the procedures could continue. However, the effect of frequent power outages on durability of laparoscopic equipment was not assessed.

Malfunctioning ports associated with gas leaks led to conversion in 2 cases. Maintenance of pneumoperitoneum was difficult with these ports and lack of replacements meant the procedures had to be converted. During a laparoscopic cholecystectomy after dissection of the Calot's triangle at the point of application of clips to the cystic arteries, we discovered that the clip applicator was not functioning. Lack of a knot pusher among the instruments meant that use of extracorporeal knots was not an available option. This resulted in conversion of the procedure to an open one. Subsequently the authors procured a knot pusher which has proved invaluable in the performance of other laparoscopic procedures especially appendicectomies. It is a cheaper though more technically demanding alternative to endostaplers, preformed loops and clips. It is important to mention that in none of the procedures was an endostapler used. This was as a result of availability and cost.

Laparoscopic surgical dissection and haemostasis is achieved largely by the use instruments utilizing energy sources, these include traditional diathermy, ultrasonic energy and bipolar sealing devices.[12] We have only diathermy available and malfunction resulted in a conversion. Of the six conversions 5 were as a result of technical issues related to malfunctioning equipment. Only in one case, (a young man with an ascending colon tumour discovered at laparoscopy) was the conversion performed to tackle the tumour. Even in this case, it can be argued that with the availability of better equipment a laparoscopic right hemicolectomy could have been performed.

Laparoscopic surgery is technologically driven and equipment requires meticulous care and attention to detail. Our instruments are mainly reusable to reduce cost and make the procedures more affordable, [13] although this makes sterilization and care of the instruments more difficult.[14] Also for reusable instruments to function optimally repeatedly, they must be carefully maintained. We observed that care and maintenance of the equipment by untrained personnel contributed to some of the problems encountered during surgery. A relatively underdeveloped indigenous technology makes us reliant on importation (or donation) of virtually all equipment required for the performance of laparoscopic procedures. Another effect of this underdeveloped local technological know-how is the dearth of biomedical engineers or technicians to repair damaged equipment. This resulted to situations in the study period when laparoscopic procedures could not be performed. The bureaucracy involved in the repair or purchase of equipment by public hospitals aggravates this situation.

It is possible that our study only reveals the generally well known problems associated with the Nigeria as a country, especially its healthcare delivery system.[15, 16] However, even if these problems are not specific to laparoscopic surgery, they also affect the performance of laparoscopic procedures.

This study provides information on the challenges surgeons practicing laparoscopic surgery in a Nigerian public hospital encounter. An awareness of these challenges is necessary as more institutions in the country attempt to provide laparoscopic surgery services, and may result in the development of more functional laparoscopic centres. Some of these problems may be general to practicing minimal access surgery in a developing country. However, in contrast an earlier study in the performance of laparoscopic surgery in a private hospital in Jos was characterized by a lower conversion rate of 4.1% (1 out of 24 procedures) and equipment malfunction was not a major problem.[17] This may be reflection of the difference in the models that characterize healthcare delivery in the different hospitals.

A major limitation of this study is the small sample size. However despite this, the challenges encountered were numerous and obvious for study. Issues like power outages and poor equipment in public hospitals are

pervasive across the country.
It would be necessary to know whether other hospitals in the country including private ones encounter similar challenges in the performance of laparoscopic surgery. Further studies are also needed to determine whether these problems exist in local high volume laparoscopic centres, if such exist in Nigeria.

In conclusion, our study shows that performance of laparoscopic surgery in a public hospital in Nigeria is faced by several challenges. These include poor malfunctioning equipment, recurrent power outages, paucity of trained personnel and limited technology. These problems may not be specific to laparoscopic surgery alone and addressing the problems of healthcare in Nigeria will be helpful.

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