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Laparoscopic Surgery in a Governmental Teaching Hospital: An Initial Experience from Ayder Referral Hospital in Northern Ethiopia

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Background: ***Laparoscopic surgery has long been practiced in western countries, but the practice is relatively new in Ethiopia. Documented practices of laparoscopic surgery in public hospitals are, to the best of our knowledge, nonexistent in Ethiopia. The objective of our study is to give an account on the practice of laparoscopic surgery in a resource limited setting in Ethiopia.***
Methods: ***A retrospective cross-sectional study was done. Records of 100 patients who underwent laparoscopic abdominal surgery from January 2013 to February 2014 were included in the study. Parameters like the type and duration of surgery, the operating and assisting surgeon, postoperative hospital stay and early postoperative complications were evaluated. A pretested designed questionnaire was used to obtain data.***
Results: ***Of the 100 procedures 73 were cholecystectomy, 12 were appendectomies, five were diagnostic laparoscopies, and four were hernia repairs. There were also two drainages, two orchidectomies, one perforated PUD repair and one salphigoopherectomy. Male: Female ratio was 1:1.6. There was no conversion, but 20% of them were difficult. There were two trocar site infections. Ninety two percent of the surgeries were done by local surgeons.***
Conclusion and Recommendation: ***Laparoscopic surgery is feasible in resource-limited areas like Ethiopia. We suggest that it should be expanded to the other hospitals with short-term surgeon trainings.***

Key words: laparoscopic surgery, resource-limited areas, government hospitals

Introduction

The laparoscopic approach is a technique used in abdominal surgery by gaining minimal access into the abdomen to achieve the same surgical result as an open laparotomy. This type of surgery is also referred to as minimal access surgery and is a procedure evolving in the surgical field[1-2]. Advanced and radical surgeries which once were believed to be hard to be done with open surgery are now being operated laparoscopically in many centers with better outcome [3].

Studies revealed that laparoscopic surgery has advantages over conventional open surgeries. To mention some of the advantages; there is less pain after laparoscopic surgery, resuming early normal day to day activity after surgery, and reducing tissue damage [4-6]. But it has also its own shortcomings like high running cost due to expensive consumables and the need for additional training required to perform successful laparoscopic procedures because the traditional surgical dictum 'see one, do one, teach one' doesn't apply for laparoscopy[7-9].

One of the most exciting aspect of laparoscopic surgery is the day-to-day discovery and introduction of materials which are supposed to "make life easy" but their exorbitant cost and the need for high investment to establish the service and for the disposable materials used during the surgery makes it less practical in developing countries[10]. In Sub Saharan Africa, for example, there are only few places where laparoscopic surgery is well established, though many newer centers are also emerging despite all the challenges[11-12]. In Ethiopia, there are only few

private hospitals, in the Capital city Addis Ababa, which are practicing laparascopic Surgery regularly[13].

In fact, these challenges like the sky-high costs, may be decreased by using reusable instruments and improvised equipment while maintaining good results[11]. Most of the complications can be prevented by proper training of surgeons on their skill and by identifying high risk patients preoperatively[14].

The aim of this study is to describe the outcomes of laparoscopic surgery done in a governmental hospital, with limited resource, in Ethiopia 780 Km away from Addis Ababa.

Patients and Methods

The study was conducted in Ayder Referral Hospital which is located 780 km North of Addis Ababa, the capital city of Ethiopia. Ayder Hospital commenced rendering its referral and specialized medical services in 2008 to a nearly 8 million population in its catchment areas. It stands as the second largest hospital in the nation with total capacity of about 500 inpatient beds in four major departments and other specialty units. It is also used as a teaching hospital for the College of Health Sciences, Mekelle University. Currently, there are three surgeons doing the laparoscopic surgery. It started giving laparoscopic service in January 2013.

A retrospective cross-sectional study design was done. The records of all 100 consecutive patients who underwent laparoscopic abdominal surgery from January 2013 to February 2014 were evaluated. The data were collected using a checklist. Completeness and accuracy of data were checked every day by the principal investigator. Data were cleared, entered and processed using Epi Info Version 3.5.1 and analyzed through SPSS version 20. Frequency distribution and proportions were used to describe the data. Tables were used to present the result. The study was conducted after getting a full approval from Mekelle University, College of Health Sciences Ethical Review Committee. Patient confidentiality was respected.

Results

The medical records of 100 consecutive patients who had undergone a range of laparoscopic surgical procedures within a fourteen month period was reviewed. Sixty-two of the patients (62%) were females with male to female ratio of 1:1.6.. The median age of the patients was 38.0 years with Inter-Quartile Range (IQR) being 18.75 (28, 46.75).

We used locally made reusable drapes, gowns, ports, and camera cases. The working instruments were re-used after sterilization. The tower we had was an ordinary Storz with single chip camera unit and a non HD screen. We had to bring CO_2 from the main city (780kms away). One surgeon took a short-term training initially started the procedure. The other surgeons got local training with the help of visiting surgeons from abroad.

Seventy-three (73%), patients had a laparoscopic cholecystectomy; twelve (12%) patients had a laparoscopic appendectomy for acute appendicitis. In three of the five diagnostic laparoscopies, biopsies were taken. Four hernia repairs were done: two were the Trans-Abdominal Pre-Peritoneal (TAPP) and the remaining two were Totally Extraperitonial (TEP) repairs. Drainage of liver abscess was done in two patients while there were two unilateral orchidectomies for undescended testis. One patch repair of perforated PUD repair and one salphingoopherectomy for torsion of the ovary was performed. The complication rate was five percent. Ninety two (92%) of the surgeries were done by local staff surgeons, while 8 of them were done by guest surgeons. Seventy four (74%), of the procedures was performed by a surgeon who had a formal short term training in laparoscopic surgery. (Table 2).

Table 1. Types of the laparoscopic procedures performed among the 100 patients.

Types of procedure	Number
Cholecystectomy	73
Appendectomy	12
Diagnostic laparoscopy	5
Hernia repair	4
Liver abscess drainage	2
Orchidectomy	2
Perforated PUD repair	1
Salphingoopherectomy	1

Table 2: Number of laparoscopic procedures done by different surgeons among 100 patients in Ayder referral Hospital from January 2013 to February 2014

Operation Done by	Number of Operations done
Guest Surgeon	8
Formally Trained staff surgeon	74
Staff surgeon with informal training	18
Total	**100**

Table 3: Materials used to secure ligation in the laparoscopic procedures done among 100 patients in Ayder referral Hospital from January 2013 to February 2014

Materials used to secure ligation	Type of operation			
	Cholecystectomy	Appendictomy	Hernia repair	Others
Staples	68	2	0	0
Extracorporal suture	5	9	0	1
Intracorporal suture	0	1	2	4
None	0	0	2	6
Total	**73**	**12**	**4**	**11**

Residents, local surgeons, scrub nurses, and surgeons from abroad assisted 38%, 32%, 18% and 12% of the procedures, respectively. In 94 % of cases, there was a need for ligation and we used staples in 70% of the cases, and extracorporal and intracorporal ligation in 15% and seven percent of the cases respectively, and electrocoagulation in two percent of them.(Table 3). In 20 of the cases the procedure was difficult. The causes of the difficulties were adhesion, stone impacted at the neck, acutely inflamed gallbladder with edematous surrounding, bleeding from an aberrant cystic artery, and/or lack of proper instruments. The complications were tackled laparoscopically and there was no conversion to open laparotomy.

Operation time ranged from 20 minutes to 120 minutes, depending on the type of procedure with the median time of 45.0 minutes. While post-operation hospital stay ranged from one to twelve days with a median of 2 days.(Table 4)

Table 4: Average Time Spent for the Operation and Post operative Stay.

	Variables	Operation type			
		Cholecystectomy	Appendictomy	Hernia repair	Others
Average time spent for the operation	<=30 minutes	6	2	0	3
	31-60min	53	9	0	7
	>60 minutes	14	1	4	1
Post operation stays	<=3 days	61	7	4	9
	4-6 days	6	3	0	2
	>6 days	6	2	0	0

After discharge, patients were seen for at least three visits: on the 5th- 7th day, one week after, and then one month later. During the early post-operative period, there were only five complications; two trocar site infection, two prolonged epigastric trocar site pain and post-operative fluid collection. The first trocar site infections were on the right most lateral port and the umbilical port. They were empirically treated and responded to broad-spectrum antibiotics. The prolonged epigatric trocar site pain, i.e. for a month post-operative, was managed by oral analgesics. The fifth patient had an abdominal pain on the 2nd post op day with tenderness on examination; ultrasound showed moderate amount of fluid collection more on the right subdiaphragmatic and subhepatic space. With the impression of bile leak diagnostic laparoscopy was done, there was only bile stained saline but no biliary leak from the cystic duct stump or the liver bed. Fluid was sucked, and patient was followed in the ward, discharged improved.

Discussion

Currently laparoscopic surgery is not widely introduced in Ethiopia except in private hospitals, mainly in the capital city Addis Ababa. Prior to this study, there was only one report on laparoscopic cholecystectomy in a private hospital, but none from a public hospital[13].

The service was not widely practiced in public hospitals mainly due to the huge initial investment needed for its implementation. In addition, most developing countries focus more on funding the preventive medicine than spending on such technologies in tertiary hospitals. Despite this, some developing countries manage to expand minimal access surgery through 'local adaptation and improvisation.[15]

The fact that we used re-usable instruments instead of disposable has reduced the cost significantly. Studies also show that re-usables are better because they are cost effective and environmental friendly[16,17]. The cost of surgery for open and laparoscopy was the same , which was 50 Ethipian Birr (2.5 USD) as the service was new and we wanted to create awareness about the advantages of laparoscopic surgery. Although it was difficult and beyond the scope of this paper to deduct the total cost breakdown of the procedure, the average expense of a patient for uncomplicated laparoscopic cholecystectomy or appendectomy ranged from 800 to 1100 Ethiopian birr (40 -55 USD). This is including all the consumables and hospital stay fee.

The other factor why minimal access surgery is not widely practiced in developing countries is the lack of skill and negative attitude of general surgeons towards laparoscopic surgery. It was,

however, possible to manage it with only short-term training of general surgeons and the outcome was comparable.

Like many other studies, the most common procedure done was laparoscopic cholecystectomy. It could be due to the lesser learning curve needed to do it compared to other advanced procedures[18]. The second common procedure done was an appendectomy (12% of all the cases). We need to do the procedure in particular cases when there is a diagnosis uncertainty or when the patient is overweight[19]. Though the number of our cases is limited, the variety of the procedures is a witness that even in places like ours laparoscopy can be utilized in diversified surgical conditions.

As our hospital is a teaching center, most of the surgeries (38%) were assisted by surgical residents and 18% of them by scrub nurses. This creates the advantage of exposing the resident to laparoscopic surgery. It also adds to the fact that there is a need for an intensive and frequent training of scrub nurses. Though we used staples for most of the laparoscopic cholecystectomies, we had to use extracorporal and intracorporal suturing in some (22%) of the cases when we ran out of staples. These techniques are mandatory for set ups like ours where we don't get consumables timely.

Adhesion was the commonest cause of difficulty (20%) which is similar to some studies from Africa. The outcome of our procedures is promising. There was no conversion unlike the other reports from Africa[13,20,21]. Operation time ranged from 20 minutes to 120 minutes with the median time being 45.0 minutes. While post operation hospital stay ranges from one to twelve days with a median of two days. This is comparable with a previous study done in Ethiopia though it was done only for laparoscopic cholecystectomy[13]. During the early postoperative period, there were two trocar site infections and one post operative collection which was reoperated and the finding was reactive fluid. There was no mortality. It is difficult to compare our results with the previous Ethiopian study as the duration and number of our cases is relatively small. But compared to other African studies, still the complication rate is much smaller[20].

Conclusion and recommendation

Though it doesn't significantly advance knowledge to the field of minimal access surgery, our results show that abdominal laparoscopic surgery is feasible in resource-limited areas like ours once the basic infrastructure is established. The continuity of the service can be realized by "adaptation and improvisation" without compromising the proved advantage of laparoscopic surgery to our patients. We suggest that it should be expanded to the other hospitals with short-term hands- on trainings for surgeons and the operation theatre staff. Though the number of cases in this review does not allow us to draw a conclusion based on statistical significance, our findings can serve as a witness and encouragement for most surgeons working in setup like ours to strive for realization of abdominal laparoscopic surgery. Besides it can serve as a baseline data for future studies.

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