



# **Laparoscopic Surgery in a Developing Country in East Africa: An Audit at the Initial Part of a Surgeons' Learning Curve**

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## **Author's contribution**

*The sole author designed, analysed, interpreted and prepared the manuscript.*

## **Article Information**

DOI: 10.9734/JAMMR/2020/v32i1930672

### Editor(s):

(1) Dr. Ashish Anand, GV Montgomery Veteran Affairs Medical Center, University of Mississippi Medical Center & William Carey School of Osteopathic Medicine, USA.

### Reviewers:

(1) Ashfaq Chandio, Luton and Dunstable University Hospital, England.

(2) Siddartha Kasula, Krishna Institute of Medical Sciences, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/62424>

**Received 15 August 2020**

**Accepted 20 October 2020**

**Published 02 November 2020**

**Original Research Article**

## **ABSTRACT**

**Background:** In many surgical conditions, laparoscopic surgery has been used for surgical access. In the West, laparoscopic cholecystectomy is the gold standard treatment for cholecystitis. On the other hand controversy has been generated with laparoscopic appendectomy due to the cost, time consuming nature of the procedure, together with many trocar sites which in all approximate to the length of an open appendectomy incision. The purpose of this study is to audit the initial laparoscopic units experience in a developing country in East Africa.

**Methods:** This was a retrospective study conducted in the Department of Surgery. All patients that consented to laparoscopic cholecystectomy and laparoscopic appendectomy over the initial period of 13 months were included in this study.

**Results:** A total of thirty (30) patients consented to having laparoscopic surgery; Ten (10) patients consented to laparoscopic cholecystectomies with a male:female ration of 1:2.33 and twenty (20) patients consented to laparoscopic appendectomies with a male:female ratio of 1:1.2. The mean operating time was 58.5 minutes for laparoscopic cholecystectomy and 40.45 minutes for laparoscopic appendectomy. The duration of post-operative admission ranged from 3 days to 5

days with a mean duration of 4.2 days for laparoscopic cholecystectomy and from 2 days to 5 days with a mean of 2.65 days for laparoscopic appendicectomy. No complications were reported apart from spinal headache in 2 patients (2.6%) out of the total laparoscopic procedures. There were no readmissions over the one month of follow up.

**Conclusions:** Laparoscopic cholecystectomy and laparoscopic appendicectomy allows for early discharge and is safe. In Uganda, the low incidence of cholecystitis compared to the higher incidence of appendicitis, supports the adoption of laparoscopic appendicectomy compared to cholecystectomy for hand and eye coordination training. The surgeons' initial cases of laparoscopic procedures have demonstrated an adequate level of safety which supports laparoscopic appendicectomy to acquire the basic laparoscopic surgery skills.

*Keywords: Laparoscopic; appendicectomy; cholecystectomy.*

## 1. INTRODUCTION

In many surgical conditions, laparoscopic surgery has been used for surgical access. The advantages of laparoscopic surgery include an early return to normal lifestyle, shorter hospital stay and a reduced postoperative analgesia requirement. Other benefits of laparoscopic surgery include better cosmesis and reduced complications from prolonged bed rest [1,2,3]. One of the commonest intra-abdominal surgical emergency is appendicitis [2,3,4,5]. In 1983 the first laparoscopic appendicectomy was successfully carried out by Kurt Semm on the 13<sup>th</sup> September 1980, a German gynaecologist [5,6].

In East Africa, laparoscopic appendicectomy has been controversial due to the fact that the three trocar sites which approximate to the length of an open appendicectomy incision together with its time consuming nature and cost. However, recently encouraging results from hospitals in developing countries are being reported [7,8]. Less complications post-operatively have been reported with laparoscopic appendicectomy compared to open appendicectomy in particular less wound infections (1.8% versus 1.2%) however the incidence of pelvic abscess appears to be slightly higher with laparoscopic appendicectomy [9,10,11].

In developed countries in the West the gold standard treatment of cholecystitis has been laparoscopic cholecystectomy. The first laparoscopic cholecystectomy was carried out by Professor Erich Muhe of Boblingen, Germany on the 12<sup>th</sup> September 1985. The German Society rejected Muhe after performing the first laparoscopic cholecystectomy however he eventually received the German Surgical Society Anniversary Award in the year 1992 [12,13].

Early cholecystectomy within 72 hours of symptoms of cholecystitis is routinely practised in the West which results in a shorter hospital stay without any increase in complications or conversion rates [14,15,16,17]. In East Africa, laparoscopic cholecystectomy is performed in a few regional referral hospitals which are referred from primary health centres. However, in our environment there are challenges which result in delays in carrying out laparoscopic cholecystectomy. These include absence of on-site endoscopic retrograde cholangiopancreatography (ERCP) services which result in a delay or no preoperative clearance of bile duct stones. A delay in obtaining preoperative ultrasound scan and availability of theatre time are other challenges experienced.

The most serious complications of laparoscopic cholecystectomy are bile duct leaks and bile duct injuries with an incidence of between 0.38% to 0.5% [18]. Anatomical variations as well as anatomical distortion due to inflammation are risk factors for common bile duct injury. Prior to ligation of the cystic duct and cystic artery a critical view of safety is needed and together with the use of intraoperative cholangiography, these measures tend to minimise the risk of common bile duct injury.

This study was an audit on the experience of the laparoscopic unit and challenges faced with laparoscopic procedures in the first 13 months in a regional referral hospital setting in East Africa.

## 2. METHODOLOGY

This was a retrospective study conducted by the Department of Surgery of our hospital from December 2018 to December 2019. All patients above 10 years of age with a clinical diagnosis of acute appendicitis or symptomatic gallstones (acute/chronic cholecystitis, biliary colic or

gallstone pancreatitis) and who consented voluntarily to have laparoscopic surgery were included in the study. Other causes of acute abdomen that were diagnosed with diagnostic laparoscopy and had an open procedure were excluded.

The clinical case files of patients were reviewed for intra-abdominal findings, post-operative complications, duration of surgery and duration of admission. The duration of admission was calculated from the days of operation to the day of discharge from hospital. The operative time was calculated from the time of wound incision to the time of wound dressing. All patients undergoing laparoscopic appendicectomy and laparoscopic cholecystectomy had perioperative antibiotics consisting of 2g iv ceftriaxone and iv metronidazole 500mg at induction of anaesthesia. The analgesia postoperatively given was opioid analgesia in the first day after surgery and a combination of paracetamol and non-steroidal inflammatory drugs afterwards.

### **2.1 Approach Used for Laparoscopic Appendicectomy**

The laparoscopic approach first consisted of placing a 10mm subumbilical port for the laparoscope and a diagnostic laparoscopy carried out after creating a pneumoperitoneum with carbon dioxide. Then under vision two 5mm ports in the suprapubic region and left iliac fossa were placed.

The appendix was first identified and the mesoappendix was coagulated with forceps diathermy and divided with laparoscopic scissors. Two vicryl Roeder's knots were placed at the base of the appendix and the appendix was divided between the knots. Any adhesiolysis if necessary was carried out with monopolar scissors. Any suction/irrigation of serosanguinous peritoneal fluid was then carried out. All ports were removed under direct vision and the pneumoperitoneum was then released. The rectus sheet fascia was closed with nylon no.1 suture and skin of the 10 mm port and two 5 mm ports were closed with vicryl no.2/0 subcuticular suture.

### **2.2 Approach Used for Laparoscopic Cholecystectomy**

For a laparoscopic cholecystectomy a 10mm subumbilical port was placed and a pneumoperitoneum was created via an open approach. The gallbladder was visualised and

the fundus of the gallbladder was retracted upwards and towards the right shoulder. The critical view of safety was identified and the anterior and posterior leaves of peritoneum were dissected from Calot's triangle to expose the cystic duct and cystic artery. The cystic duct was ligated and divided with endoclips and scissors and the cystic artery was ligated and divided with endoclips and scissors. The gallbladder was then dissected from the liver bed using hook diathermy. Haemostasis was ensured by coagulating the liver bed with hook diathermy. The serosanguinous fluid was suctioned/irrigated and eventually the pneumoperitoneum was released. The rectus sheet was closed with nylon no.1 and all skin wounds were closed with subcuticular vicryl no.2/0.

The follow up period was for one month for both laparoscopic appendicectomy and laparoscopic cholecystectomy. The procedures were performed by one surgeon who had a surgical resident, intern doctor or medical student as assistant. The surgeon had trained with a few years' experience in laparoscopic surgery.

## **3. RESULTS**

A total of thirty (30) procedures; Twenty (20) were laparoscopic appendicectomy and ten (10) were laparoscopic cholecystectomies.

### **3.1 Results for Laparoscopic Appendicectomy**

Amongst the 20 patients that presented with acute appendicitis; 9 were male and 11 were female giving a male:female ratio of 1:1.2 who consented to have laparoscopic appendicectomy surgery in the study period. The operations were mainly done on elective operating theatre lists. At induction of anaesthesia all patients undergoing laparoscopic appendicectomy had ceftriaxone and metronidazole intravenously. The age of patients for laparoscopic appendicectomy ranged from 22 years – 65 years with a mean age of 39.65 years. Not all female patients had a preoperative ultrasound prior to surgery and all patients had a diagnostic laparoscopy prior to laparoscopic appendicectomy. A grossly inflamed appendix was found in 18 out of 20 cases (90%). Other findings included ruptured ovarian cysts and peritoneal adhesions in two female patients. The duration of surgery ranged from 24 minutes to 60 minutes. The mean duration of surgery was

**Table 1. Demographics, duration of surgery and outcomes of laparoscopic appendicectomies**

Procedure	Procedure	Age	Sex	Morbidity	Duration of surgery	Postoperative complications	Duration of admission
1	Lap. App.	45	M	Nil	60 min	Nil	3 days
2	Lap. App.	24	M	Nil	45 min	Nil	3 days
3	Lap. App.	55	F	Nil	40 min	Nil	3 days
4	Lap. App.	65	M	Nil	60 min	Nil	3 days
5	Lap. App.	60	F	Nil	60 min	Nil	3 days
6	Lap. App.	32	F	Nil	40 min	Spinal headache	3 days
7	Lap. App.	35	F	Nil	45 min	Nil	3 days
8	Lap. App.	38	F	Nil	50 min	Spinal headache	5 days
9	Lap. App.	40	M	Nil	45 min	Nil	3 days
10	Lap. App.	25	M	Nil	45 min	Nil	2 days
11	Lap. App.	31	F	Nil	40 min	Nil	2 days
12	Lap. App.	34	M	Nil	40 min	Nil	2 days
13	Lap. App.	22	M	Nil	35 min	Nil	2 days
14	Lap. App.	48	F	Nil	45 min	Nil	3 days
15	Lap. App.	51	F	Nil	30 min	Nil	2 days
16	Lap. App.	52	F	Nil	35 min	Nil	2 days
17	Lap. App.	42	F	Nil	35 min	Nil	2 days
18	Lap. App.	48	F	Nil	30 min	Nil	2 days
19	Lap. App.	34	F	Nil	25 min	Nil	2 days
20	Lap. App.	29	M	Nil	25 min	Nil	2 days

*Proc No. = Procedure number**Lap. App. = Laparoscopic Appendicectomy***Table 2. Demographics, duration of surgery and outcomes of laparoscopic cholecystectomies**

Procedure number	Procedure	Age	Sex	Morbidity	Duration of surgery	Postoperative complications	Duration of admission
1	Lap. Cho.	42	M	Nil	70 min	Nil	4 days
2	Lap. Cho.	53	M	Nil	60 min	Nil	5 days
3	Lap. Cho.	64	F	Nil	45 min	Nil	4 days
4	Lap. Cho.	66	F	Nil	63 min	Nil	5 days
5	Lap. Cho.	54	F	Nil	60 min	Nil	4 days
6	Lap. Cho.	60	F	Nil	62 min	Nil	4 days
7	Lap. Cho.	58	F	Nil	60 min	Nil	4 days
8	Lap. Cho.	52	F	Nil	60 min	Nil	4 days
9	Lap. Cho.	64	M	Nil	60 min	Nil	5 days
10	Lap. Cho.	48	F	Nil	45 min	Nil	3 days

*Proc. No. = Procedure number**Lap. Cho. = Laparoscopic cholecystectomy*

40.45 minutes. Oral intake postoperatively ranged from 0 to 3 days. The duration of admission from surgery to discharge ranged from 2 days to 5 days with a mean of 2.65 days. There was one conversion from laparoscopic appendicectomy to open appendicectomy due to an adherent appendix to the caecum and dense adhesions in the ileocaecal area. No patients had co-morbidities. There were two (2) patients (10%) that developed spinal headache out of the total

number of laparoscopic appendicectomies, however none developed wound site infection or pelvic abscess Table 1. The follow up period was for 1 month post-operatively.

### 3.2 Results for Laparoscopic Cholecystectomy

Amongst the 10 patients that presented with acute cholecystitis; 3 patients were male and 7

patients were female giving a male:female ratio of 1:2.33 who consented to have laparoscopic cholecystectomy surgery in this study period. The operations were mainly done on elective operating theatre lists. At induction of anaesthesia all patients undergoing laparoscopic cholecystectomy had ceftriaxone and metronidazole intravenously. The age of patients for laparoscopic cholecystectomy ranged from 42 years – 66 years with a mean age of 56.1 years. The duration of surgery ranged from 45 minutes to 70 minutes. Mean duration of surgery was 58.5 minutes. An inflamed gallbladder was visualised in all cases with acute uncomplicated cholecystitis. The duration of admission from surgery to discharge ranged from 3 days to 5 days with a mean duration of 4.2 days. There were no conversions to open cholecystectomy Table 2. No patients developed post-operative complications following laparoscopic cholecystectomy. The follow up period was for one month.

#### 4. DISCUSSION

In the recent years the duration of admission with laparoscopic appendicectomy declined dramatically. However, it is the clinical status of the patient and the pathological status of the appendix that determines the hospital stay duration rather than whether an open or laparoscopic approach to surgical access is used [19]. There are advantages with both laparoscopic appendicectomy and open appendicectomy [20]. Early recovery, shorter hospital stay, less postoperative analgesia and less wound scarring are associated with a laparoscopic appendicectomy compared to an open appendicectomy [21]. In developed countries, laparoscopic appendicectomy has been declared the gold standard treatment for acute appendicitis. In East Africa, the incidence of appendicitis is increasing and therefore there is an exigency for international standards to be adopted rapidly taking in to account the resource constraints of poor developing countries.

The results of this audit are fairly comparable with results from developed Western countries [22]. In one patient who had an operating time of 70 minutes having uncomplicated cholecystitis there was a power disruption. The time spent restoring and recalibrating the laparoscopic tower accounted for the long waiting time. The mean operative time duration was for 49 minutes in the first 10 cases of laparoscopic

appendicectomy and 31.9 minutes in the last 10 cases of laparoscopic appendicectomy. In other centres the mean operating time has ranged from between 20 minutes and 37 minutes [21]. Our hospital is a high volume centre as it is a regional referral hospital. With the increased volume of cases seen in regional referral hospitals in Uganda, the operating in our laparoscopic unit will be on the decline.

The mean duration of admission in hospital was 2.65 days after laparoscopic appendicectomy. On the second postoperative day, 11 patients (55%) were discharged with adequate analgesia and none came back for readmission. Following laparoscopic appendicectomy none of the patients developed a pelvic abscess. Other centres have shown a postoperative pelvic abscess rate of 3.3% showing that the results from our hospital are better [23]. Only one patient undergoing laparoscopic appendicectomy required conversion to open surgery, despite some cases being complicated and requiring adhesiolysis. A relatively small number of cases were done during the study time period and this is part of the surgeons' learning curve where the complications and conversions tend to be relatively higher. A conversion rate of up to 9% has been reported in busy high volume hospitals with laparoscopic appendicectomy [24,25]. Complications included spinal headache which was 2.6% in all the laparoscopic procedures which was comparable to that found in other studies.

In acute cholecystitis patients who have had a cholecystectomy within 72 hours from the onset of symptoms have had good results [26,27]. Delays in cholecystectomy are associated with recurrent symptoms whilst early cholecystectomy may result in more conversions to open surgery [28,29]. Early cholecystectomy has been associated with longer operation times, reduced total hospital stay and no difference in postoperative morbidity or conversion rates in a meta-analysis [17]. The majority of our patients fall in to the delayed laparoscopic cholecystectomy category due to the circumstances in our local health care system. In this study, only one patient with a diagnosis of acute cholecystitis presented in 72 hours whilst all the other patients had their laparoscopic cholecystectomy after 8 weeks of their acute episode. There were no complications reported and patients who presented with obstructive jaundice had an open cholecystectomy with CBD

exploration rather than a laparoscopic cholecystectomy. The patients who had a laparoscopic cholecystectomy in this study wither had uncomplicated cholecystitis or gallstone pancreatitis.

However, our unit has experienced challenges with laparoscopic surgery despite the good results achieved. Patient acceptance, nursing and anaesthetic staff, cost of consumables and an unreliable power supply are some of the challenges experienced. Laparoscopic surgery is expensive in a developing country and this required the acquisition of a power stabiliser to account for the power cuts experienced. In order to eliminate the use of titanium clips in laparoscopic appendectomy, a diathermy using a reusable petelan's forceps was used to coagulate the appendicular artery. In order to remove consumable expenses due to staplers and clips, Roeder's knots were constructed by the surgeon and the appendix base was divided between the knots. Elimination of the appendix through a 10mm port essentially eliminates any need for a retrieval bag hence reducing the expenses of consumables. Although in all the laparoscopic cholecystectomies retrieval bags were used to retrieve the gallbladder from the abdomen which is costly.

Being a relatively new procedure a few patients have been apprehensive about undertaking a laparoscopic procedure and therefore prefer an open procedure. Training nurses on instrument handling was also extensive as many of these nursing staff had no experience with laparoscopy. Anaesthetists also had little experience handling these laparoscopic procedures and therefore they had to be trained.

## 5. CONCLUSIONS

In Uganda there is a relatively lower incidence of gallstone disease compared to developed countries. The initial cases which were mainly laparoscopic appendectomies have demonstrated an adequate level of safety and therefore this may be the laparoscopic procedure of choice for the East African surgeon to acquire orientation and hand eye co-ordination skills due to the low incidence of cholecystitis in this part of the world [30]. In East Africa, surgeons need to develop techniques to reduce the cost of the surgery given that one of the major limitations in laparoscopic surgery is the

cost of the consumables used in these procedures.

## CONSENT

The author declares that written informed consent was obtained from all the patients that underwent laparoscopic procedures in this study.

## ETHICAL APPROVAL

As per international standard or university standard ethical approval has been collected and preserved by the authors.

## ACKNOWLEDGEMENTS

The author wishes to thank the Hospital Director and Senior Consultant Surgeon, Mr. Nathan Onyachi for his help in setting up the training environment necessary to carry out laparoscopic procedures. The author also thanks nursing staff, medical officers and anaesthetists who worked in the surgery theatres. Finally the author thanks the hospital administration for giving clearance to carry out research in laparoscopic surgery.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

## REFERENCES

1. Zapf M, Denham W, Borrera E, Butt Z, Carbray J, Wang C. Patient-centered outcomes after laparoscopic cholecystectomy. *Surgical endoscopy*; 2013.
2. Esther Westwood, Balaram Malla, Jeremy Ward, Roshan Lal, Kamal Aryal. The impact of a laparoscopic training course in a Developing country. *World J. Surg.* 2020; 44:3284-3289.
3. Alexander Buia, Florian Stockhausen, Ernest Hanisch. *Laparoscopic Surgery: A qualified systematic review.* *World J. Methodol.* 2015;26;5(4):238-254.
4. Afuwape O, Ayandipo O, Abdurrazzaaq A. Laparoscopic appendectomy in a Developing country. *East and Central African Journal of Surgery.* 2014;19(1).
5. Utpal De. Laparoscopic versus open appendectomy: An Indian perspective. *J. Minim. Access Surg.* 2005;1(1):15-20.

6. Ahmed H. Risks of Laparoscopic Surgery. *Obstet. Gynaecol. Int. J.* 2015;3(4): 00089.
7. Steven M. Strasberg. A perspective on the ritual view of safety in laparoscopic cholecystectomy. *Ann. Laparosc. Endosc. Surg.* 2017;2:91.
8. Muhamed Hamid Majid, Babak Meshkot, Haseeb Kohar, Sherif El Masry. Specimen retrieval during elective laparoscopic cholecystectomy: Is it safe to use a retrieval bag? *BMC Surg.* 2016;16:64.
9. Aamna Nazir, Sarash Afzal Farooqi, Noman A. Chaudhary, Hamza Waqar Bhatti, Mahnoor Waqar, Abdullah Sadiq. Comparison of open appendectomy and laparoscopic appendectomy in perforated appendicitis. 2019;11(7):e5105. DOI: 10.7759/cureus.5105
10. Cox MR, McCall JL, Wilson TG, Padbury RT, Jeans PL, Toouli J.. Laparoscopic appendectomy: A prospective analysis. *Aust. N. Z. J. Surg.* 1993;63(11): 840-7.
11. Jason M. Jennings, Philip CH Ng. Laparoscopic appendectomy for suspected mesh – induced appendicitis after laparoscopic transabdominal preperitoneal polypropylene mesh inguinal herniorrhaphy. *J. Min. Access Surg.* 2010; 6(1):19-21.
12. Adisa AO, Arowolo OA, Salako AA, Lawal OO. Preliminary experience with laparoscopic surgery in Ile-Ife, Nigeria. *African Journal of Medicine and Medical Sciences.* 2009;38(4):351-6.
13. Oguntola AS, Adeoti ML, Oyemolade TA. Appendicitis: Trends in incidence, age, sex and seasonal variations in South-Western Nigeria. *Annals of African Medicine.* 2010; 9(4):213-7.
14. Semm K. Endoscopic appendectomy. *Endoscopy.* 1983;15(2):59-64.
15. Barkhausen S, Wullstein C, Grass E. Laparoscopic versus conventional appendectomy – A comparison with reference to early postoperative complications. *Zentralbl Chir.* 1998;123(7): 858-62.
16. Litynski GS. Highlights in the History of Laparoscopy. Frankfurt, Germany: Barbara Bernert Verlag; 1996; 165-168.
17. Siddiqui T, MacDonald A, Chang PS. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: A meta-analysis of randomised clinical trials. *The American Journal of Surgery.* 2008;195(1): 40-7.
18. MacFadyen JrB, Vecchio R, Ricardo A. Bile duct injury after laparoscopic cholecystectomy. *Surgical Endoscopy.* 12(4):315-21.
19. Pederson A, Peterson O, Wara P, Ronning H, Qvist N, Laurberg S. Randomised clinical trial of laparoscopic versus open appendectomy. *British Journal of Surgery.* 2001;88(2):200-5.
20. Liu Z, Zhang P, Ma Y, Chen H, Zhou Y, Zhang M et al. Laparoscopy or not: a meta-analysis of the surgical effects of laparoscopic versus open appendectomy. *Surgical laparoscopy, endoscopy and percutaneous techniques.* 2010;20(6):362-70.
21. Koluh A, Delibegovic S, Hasukic S, Valjan V, Latic F. Laparoscopic appendectomy in the treatment of acute appendicitis. *Medianski archive.* 2001;64(3):147-50.
22. Adisa AO, Alatise OI, Arowolo OA, Lawal OO. Laparoscopic appendectomy in a Nigerian teaching hospital. *JLSL: Journal of the Society of Laparoendoscopic Surgeons.* 2012;164(4):576-80.
23. Nataraja RM, Bandi A, Clark SA, Haddad MJ. Comparison of intra-abdominal abscess formation following laparoscopic and open appendectomy in children. *Journal of laparoendoscopic and advanced surgical techniques Part A.* 2010;20(4): 391-4.
24. Kapischke M, Tepel J, Bley K. Laparoscopic appendectomy is associated with a lower complication rate even during the introductory phase. *Langenbeck's archives of surgery and Deutsche Gesellschaft fur Chirurgie.* 2004; 389(6):517-23.
25. Emmanuel A, Byrne J, Wilson I, Balfe P. Is laparoscopic appendectomy a safe technique in a peripheral hospital setting? *Irish Medical Journal.* 2011;104(9):276-8.
26. Stevens KA, Chi A, Lucas LC. Immediate laparoscopic cholecystectomy for acute cholecystitis: No need to wait. *The American Journal of Surgery.* 2006; 192(6):756-61.
27. Lo-CM, Liu CL, Fan ST. Prospective randomised study of early versus delayed

- laparoscopic cholecystectomy for acute cholecystitis. *Annals of Surgery*. 1998; 227(4):461.
28. Sanjay P, Fulke JL, Exon DJ. "Critical view of safety" as an alternative to routine intraoperative cholangiography during laparoscopic cholecystectomy for acute biliary pathology. *Journal of Gastrointestinal Surgery*. 2010;14(8):1280-4.
29. Avgerinos C, Kelgiorgi D, Touloumis Z. One thousand laparoscopic cholecystectomies in a single surgical unit using the "critical view of safety" technique. *Journal of Gastrointestinal Surgery*. 2009; 13(3):498-503.
30. Rahman GA. Cholelithiasis and cholecystitis: Changing prevalence in an African community. *Journal of the National Medical Association*. 2005;97(11): 1534.

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