

Gold standard of Appendicectomy in Acute Appendicitis: Laparoscopic vs. Open.

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ABSTRACT

Aim and Objective: To compare open and laparoscopic methods of appendectomy as treatment for Acute Appendicitis in this era of evidence based practice and if necessary encourage new guidelines.

Materials and Method: Retrospective cohort study of data from theatre record of a tertiary hospital in Nigeria on Appendicectomy from 2003-2009(6 years) were statistically analyzed. Review of randomized clinical trials comparing Laparoscopic Appendicectomy (LA) vs. open Appendicectomy (OA) from Cochrane library was done. A MEDLINE search of abstracts with search word “laparoscopic appendectomy” with a total of 1592 articles reviewed. Selection for further study was based on comparison of LA vs. OA for treatment of Acute Appendicitis. Relevant journals in a Laparoscopic Research Institute library in India were reviewed along the same line.

Results: During the six-year period studied, 313 cases were operated on for a clinical diagnosis of Acute Appendicitis. Of these 168 were female and 142 male, the sex of 3 was unspecified giving M: F ratio of 1:1.2. The incidence of appendectomy was more in the second and third decades. No LA, all were by OA. Literature search showed LA had unique advantages over OA of improved diagnosis, cosmesis, reduced post-operative pain, adhesions, wound infection and shorter hospital stay. OA has advantages of lower cost, shorter learning curve and anaesthesia/operation time.

Conclusion: Laparoscopic Appendicectomy with its benefits of shorter hospital stay, less post-operative pain, improved diagnosis is recommended especially in fertile women, the gainfully employed, obese and immunocompromised patients for treatment of Acute Appendicitis. Appropriate training and equipment, though expensive, are needed for its wide practice.

Keywords:

Acute appendicitis, Laparoscopic vs. Open Appendicectomy.

Background:

Acute Appendicitis is the commonest abdominal emergency worldwide¹. Open Appendectomy (OA) has been the traditional method for its treatment since its description by McBurney (1894)². Laparoscopic Appendectomy (LA) has evolved since the first performed by Kurt Semm (1981)³. Technological advances of the past two decades especially the introduction of three-chip camera have contributed to improved outcome of laparoscopic surgeries⁴. Presently there is wide acceptance and practice of LA worldwide however this is not a common practice yet in Nigeria.

Aims and objective:

To compare open and laparoscopic methods of appendectomy as treatment for Acute Appendicitis in this era of evidence based practice and if necessary encourage new guidelines.

Materials and Method:

A retrospective cohort study of data from theatre record of a tertiary hospital in Nigeria on Appendectomy for Acute Appendicitis from 2003-2009(6 years) were statistically analyzed. Variables were age, sex and method of operation-open (traditional) vs. laparoscopic. Review of meta-analysis of randomized clinical trials comparing Laparoscopic Appendectomy (LA) vs. open Appendectomy (OA) in Acute Appendicitis from Cochrane library was done. Also a MEDLINE search of citations with search word as "laparoscopic appendectomy" performed, a total of 1592 citations reviewed with further selection based on comparison of LA vs. OA for treatment of Acute Appendicitis. Finally relevant journals in a Laparoscopy Research Institute library in India were studied and related to original data where appropriate.

Results:

During the six-year period studied, 313 cases were operated on for a clinical diagnosis of Acute Appendicitis. Of these 168 were female and 142 male, the sex of 3 was not specified. M: F ratio of 1:1.2. The incidence of appendectomy was

more in the second and third decades. The most affected age group was 21-30years [n=129 (41%)] followed by 11-20yrs [n- 85(27%)] with the extremes of age least affected, 1-10 years [n=18(5.7%)] and >60years [n=3(0.9%)].

Age for a case was unspecified. A mean age of 25.5years was calculated. All the operations done during the study period in this Nigerian tertiary hospital were by open method.

Table 1

Pattern of Appendicectomy for Acute Appendicitis in University of Port-Harcourt Teaching Hospital (UPTH) Nigeria

Year of Study	Male (%)	Female (%)	Not specified	Total
Jun 2005-May 2006	8(36%)	22(64%)	-	30
Jun 2006-May 2007	30(42%)	40(56%)	1(2%)	71
Jun 2007-May 2008	34(45%)	40(53%)	2(2%)	76
Jun 2008-May 2009	34(52%)	31(48%)	-	65
Jun 2009-May 2010	36(51%)	35(49%)	-	71
Total	142	168	3	313

Table 2

Age distribution for Appendicectomy cases following Acute Appendicitis in UPTH (2005-2010)

Age distribution	Male	Female	Unspecified	Total
1-10yrs	6	12	-	18
11-20yrs	33	51	-	84
21-30yrs	52	77	-	129
31-40yrs	19	31	1	51
41-50yrs	15	3	-	18
51-60yrs	4	4	-	8
>60yrs	1	2	-	3
Unspecified	1	1	2	2
Total	142	169	3	313

Meta-analysis of prospective randomised controlled trials comparing OA vs. LA in Acute Appendicitis showed laparoscopic appendicectomy has advantages of improved diagnosis, less post-operative pain, shorter hospital stay, less wound

infection, postoperative adhesion and better cosmesis over OA. Drawbacks of LA include higher cost, longer anaesthesia time and learning curve with loss of tactile feedback⁵.

Discussion:

Acute Appendicitis is the most common cause of surgical abdomen^{6, 7}. The incidence is increasing in developing countries likely due to socio-economic advancement and adoption of low residue diet¹. Appendicectomy for Acute Appendicitis is the most common emergent surgical procedure performed worldwide. Over the years it was done by the open method using grid-iron or Lanz incisions for uncomplicated case. Recent advances in laparoscopic surgery led to its wide acceptance with LA now a common practice in specialized centres.

Female predominance of Acute Appendicitis is seen in this study as documented in one previously done in same institution (Table 1)⁸. The second and third decades of life are most affected as shown in this study with reasonable loss in work hours (Table 2). The extremes of age are least affected mostly due to the size of the lumen with less likelihood of obstruction leading to inflammation. In females the peak age incidence coincides with the fertile population with added differential diagnosis of pelvic pathologies. Laparoscopic Appendicectomy, usually preceded by a diagnostic laparoscopy, reduces unnecessary appendicectomies. Study reveals a misdiagnosis rate of 8% in males and 41% in females of reproductive age group⁹. Disease entities like Amyand's hernia, Meckel's diverticulitis, diverticulosis and Inflammatory bowel disease are more easily diagnosed and treatment offered with LA than OA, however mucinous cystadenoma of the caecum may be missed^{10, 11}.

Confirmation of the diagnosis of Acute Appendicitis is by post-operative pathological examination. Appendices appearing normal during operation may demonstrate acute inflammation after pathological examination and vice versa^{12, 13}. Many surgeons as a routine remove normal looking appendix at surgery¹⁴. A case for its preservation is use in reconstructive surgeries like Appendico-vesicostomy (Mitrofanoff procedure) and hepatopertoappendicostomy after removal of choledochal cyst¹⁵. The major criticism against leaving the appendix in

place is that mucosal inflammation might be overlooked since only serosa can be inspected^{16, 17}. Previously there was doubt on the color reliability of the image of inflamed appendix on the monitor, but the advent of the three chip camera with color reliability of image of inflamed appendix at laparoscopy has a diagnostic sensitivity of 92%⁴.

Cosmesis is a major reason for the wide acceptance of LA. "A reward for the longer operation and anaesthesia time compared to OA". Hellberg et al observed reduced post-operative pain with improved quality of life after a follow-up of 2-weeks¹⁸. Metabolic response to surgical trauma is less with LA, thereby shorter hospital stays, lower hospital cost and early return to work in comparison to OA^{19, 20, 21, 22, 23}. Overall complication rates were comparable, but wound infections were definitely reduced after laparoscopic appendicectomy (2.3%LA to 6.1%OA)²⁴. There are varied reports on intraabdominal abscess in favour of OA^{25, 26, 27}. This calls for careful patient selection suggesting specific indications for each method. Post operative adhesion is less with LA²⁸. Conversion rates from LA to OA vary from 2.1 to 12% with surgeon experience, difficult anatomy and presence of an abscess being the main reasons for conversion^{29, 30}.

Specific disease conditions such as Cirrhosis, Sickle cell anaemia with compromised physiological state are canvassed to be indications for LA when surgery is inevitable³¹. HIV positive patients with acute abdomen undergoing LA can achieve correct diagnosis with least surgical trauma and reduction of risks of transmission of virus to theatre personnel due to less contact with patient's body fluids. A study compared morbidly obese and normal anaesthetized patients in Trendelenburg, reverse Trendelenburg and supine positions. Obese patients who tolerate the induction of anesthesia and supine positioning are likely to tolerate pneumoperitoneum and Trendelenburg /reverse Trendelenburg position as well since the main detrimental factor was increased weight not positioning³². The fat laden subcutaneous layer in the obese is bypassed by long instruments in LA. Laparoscopy is safe, effective and is the procedure of choice for healthy obese patients³¹.

Contraindications to LA include severe COPD and cardiac diseases, grade II & III shock, generalised peritonitis, previous extensive abdominal surgery,

bleeding disorder, advanced stages of pregnancy and suspected malignancy³¹. Cost of procuring expensive laparoscopic equipment is a drawback in the wide practice of LA. Lack of adequately trained personnel was responsible for the large number of OA in this study. The specialized virtual reality surgical training for laparoscopic surgery devoid of tactile feedback lengthens the learning curve. This is a surmountable drawback with multiple laparoscopy training centres across the world and the rising number of young surgeons more adaptable to technological advancements of the present age. It is hoped that all stakeholders will rise up to the challenge of this new technique of surgery.

Conclusion:

Laparoscopic Appendicectomy with its benefits of improved diagnosis, cosmesis, less post-operative pain and shorter hospital stay is recommended especially in fertile women, the gainfully employed and specific disease entities like the immunocompromised for treatment of uncomplicated Acute Appendicitis. Appropriate training and equipment, though expensive, are needed for its wide practice.

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