COMPARISON OF POSTOPERATIVE WOUND INFECTION IN OPEN VERSUS LAPAROSCOPIC APPENDICECTOMY
YOUSAF JAN, WAQAS, AHMAD DIN, MUHAMMAD IMRAN KHAN

ABSTRACT

Introduction: The value of laparoscopy in appendicitis is not established. Our aim was to compare the efficacy and benefits of laparoscopic versus open appendectomy in a prospective randomized controlled trial.

Objective: To compare the efficacy of laparoscopic appendectomy and open appendectomy in the treatment of acute appendicitis in terms of post operative wound infection.

MATERIAL AND METHODS: In this randomized trial patients were divided between two groups. Only patients with acutely inflamed appendix were included in this study. During their post operative time they were assessed for the development of wound infection in ward till second post operative day, then followed in OPD for assessment of SSI. Hence efficacy of the procedure determined by the patients who maximally determined SSI.

Results: The mean age and gender in both the groups were insignificant with (P=0.077) and (P=0.3321) respectively. The overall rate of SSI in LA minimum (3% versus 11.68% in the laparoscopic and open groups Respectively), which was statistically significant (P=0.03). There was some degree of pain perceived by patients in both the groups, in group LA 37 (48.05%) perceived pain of variable degree and in OA group 77(100%) perceived pain (P=0.001).

Conclusions:
Laparoscopic access has provided a new dimension in the diagnosis and treatment of acute abdominal disorders. In these instances, an extensive abdominal incision is avoided and treatment usually rendered through the small puncture wounds of laparoscopic access.

KEY WORDS: Laparoscopic appendectomy, open appendectomy, surgical site infection, randomized controlled trial
INTRODUCTION:
Appendicitis is the most common surgical condition of the abdomen. Despite technological advances, the diagnosis of appendicitis is still primarily on the patient’s history and the physical examination, prompt diagnosis and surgical referral may reduce the risk of perforation a preventable complications. The mortality in non perforated appendicitis is rare event, but it may be more significant in very young and elderly patients, in whom diagnosis may be delayed, thus making perforation more likely. Appendectomy may be performed by laparotomy and laparoscopy. Diagnostic Laparoscopy may be helpful in equivocal cases or in women of child bearing age, while Laparoscopic appendectomy is becoming preferred approach for any kind of appendicitis. The Laparoscopic intervention has the advantage of decreased post operative pain, fast recovery early return to normal activity and better early Cosmetic results. This benefit has been shown through all age groups, but elderly patients in particular experience have an advantage with the Minimal invasive approach \(^{1,2}\). Since its initial description by Semm\(^3\) in 1983, laparoscopic appendectomy (LA) has struggled to prove its superiority over the open technique. Open Procedure in appendicectomy has been a well known procedure for years. Laparoscopic appendicectomy has appeared for the open appendicectomy, but some authors still state that laparoscopic appendicectomy is still not superior to open appendicectomy considering operating time which is longer in laparoscopic appendicectomy, post operative complications and cost benefits. The rate of wound infection was 4% in case of laparoscopic appendicectomy in 2 cases and 16% in 8 cases in open Appendicectomy.\(^{4-6}\) The rationale behind doing this study was if laparoscopic appendectomy was found safe in terms of wound infection, then we will suggest other surgeons who had adequate skills in doing laparoscopic procedures to do laparoscopic appendectomy as a regular procedure as it is associated with less wound infection, less wound pain, short length of hospital stay, quick recovery and superior cosmesis.
OBJECTIVES:
This study was designed to compare the efficacy of the two the procedures carried out to treat acute appendicitis in terms of wound infection

HYPOTHESIS:
Efficacy of laparoscopic appendicectomy is better for the management of acute appendicitis as compared to open appendicectomy.

MATERIAL AND METHODS:
After getting permission from Ethical committee for carrying out the study, this randomized control trial study was carried out over 154 patients in Hayatabad medical complex peshawar from Jan 2010 to Jan 2011. Patients with suspected appendicitis were included in the study through OPD. The diagnosis of acute appendicitis made on the basis of history of right iliac fossa pain, nausea and vomiting and on clinical examination showing rebound tenderness and with supporting evidence of leucocytosis greater than 10,000. The purpose and benefits of study was explained to the patients, the patients were well informed about risks and benefits of both the procedure and a written and informed consent was taken. After ascertaining complete history, thorough clinical examination was done and a complete set of routine investigations sent. Patients were randomly allocated in two groups by lottery method. Patients in group ‘LA’ were treated by laparoscopic appendicectomy and patients in group ‘OA’ were treated by open appendicectomy. Both the procedures were performed by a senior consultants equally skilled in both the procedures and patients were assessed on 2nd, 5th and 7th postoperative day for wound infection in ward as well as in outpatient department to conclude the safety and pain was assessed for efficacy. Patients with perforated gangrenous appendix, previous abdominal surgery due to adhesions, distorted anatomy and more chances of conversion to open appendicectomy, appendicular lump, immunocompromised, on steroids, with malignancy, HIV /AIDS (diagnosed on history and medical records) were excluded from the study. All the observations were recorded by me on the predesigned Performa. Bias and confounders were controlled by strictly following exclusion criteria.
RESULTS:

In this study a total of 154 patients were analyzed. The patients were equally divided into two groups, A and B. Group A patients were subjected to LA while group B patients underwent OA. The mean age of patients in LA group was 28.11 years ± 8.89 SD and in the OA group the mean age was 25.63 years ± 8.40 SD, which was statistically insignificant, \((P=0.77)\). Table 1

There were 45 males and 32 females with M: F ratio of 1.4:1 in LA group compared to OA group in which there were 39 males and 38 females (M:F 1:02) which was also statistically insignificant. \((P=0.3321)\)

The mean operating time was 42 minutes ±15 SD in LA group compared to 29 minutes ±13 SD OA group which was significant \((P=0.0421)\). Table 1

Assessment of surgical site infection shows that at 2\(^{nd}\) day it was insignificant where at 5\(^{th}\) and 7 day it was significant in both the groups. Table 2

Assessing the overall pain perception by the patients there was some degree of pain experienced by patients in both the groups. Pain was assessed using visual analogue scale. In OA group 77 out of 77 patients experienced pain (100\%) and in LA group only 37 complained of pain (48.05\%) of variable degree, proving to be statistically significant for over all pain perception, \((P=0.0001)\). Table 3
Table 1
Patient Demographics

<table>
<thead>
<tr>
<th></th>
<th>LAPAROSCOPIC APPENDICECTOMY</th>
<th>OPEN APPENDICECTOMY</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean±SD)</td>
<td>28.11±8.89</td>
<td>25.63±8.40</td>
<td>0.077</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>45(58.44%)</td>
<td>39(50.64%)</td>
<td>0.3321</td>
</tr>
<tr>
<td>Female (%)</td>
<td>32(41.56%)</td>
<td>38(49.35%)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 2
Assessment of Surgical Site Infection (SSI) on follow up

<table>
<thead>
<tr>
<th>SSI</th>
<th>GROUP LA</th>
<th>GROUP OA</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY 2\textsuperscript{nd}</td>
<td>0(0%)</td>
<td>2(15%)</td>
<td>.4967</td>
</tr>
<tr>
<td>DAY 5\textsuperscript{th}</td>
<td>2(3%)</td>
<td>9(11.68%)</td>
<td>0.03</td>
</tr>
<tr>
<td>DAY 7\textsuperscript{th}</td>
<td>1(1.2%)</td>
<td>7(9.09%)</td>
<td>.033</td>
</tr>
<tr>
<td></td>
<td>GROUP LA</td>
<td>GROUP OA</td>
<td>P VALUE</td>
</tr>
<tr>
<td>----------------</td>
<td>----------</td>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>No pain</td>
<td>40(51.95%)</td>
<td>0(0.00%)</td>
<td>0.001</td>
</tr>
<tr>
<td>MILD</td>
<td>28(36.36%)</td>
<td>33(42.86%)</td>
<td></td>
</tr>
<tr>
<td>MODERATE</td>
<td>6(7.79%)</td>
<td>28(36.36%)</td>
<td></td>
</tr>
<tr>
<td>SEVERE</td>
<td>3(3.90%)</td>
<td>16(20.78%)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>77(100.00%)</td>
<td>77(100.00%)</td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSIONS:

It is estimated that more than 27 million surgical procedures are performed annually in the United States. Surgical site infection (SSI) continues to be a major source of morbidity following operative procedures. The aging of the population means that not only will the number of operations likely increase, but the National Nosocomial Infections Surveillance (NNIS) Risk Index, which standardizes the risk of SSI for an aging population, will be greater. Despite many decades of the application of refined surgical techniques, environmental changes in the operating room (OR), and the use of preventive antibiotics, infection at the surgical site remains a too common event. The NNIS report for 1986-1996 described an SSI rate of 2.6% for all operations at the reporting hospitals. It seems likely that overall SSI rates are likely to be greater than reported.

The overall costs of SSI to society can be staggering. In a study of hospital-associated infections in Massachusetts, the cost of such infections in 2006 was $223,000,000 to $275,000,000. A 1% incidence of SSI was projected to generate national costs of over $900,000,000 per year for in-hospital costs alone and a total of $1.6 billion in excess costs overall (SCD-7). Such figures may account for only 10% of overall costs when including indirect social costs such as time off work and loss of job. They also do not include potential costs for malpractice litigation and less tangible items such as loss of companionship. The economic cost is not the only cost. In an NNIS survey of 387,000 patients with nosocomial infections, an organ/space infection contributed to the death in 89% of the patients so afflicted (SDC-8). In another study involving 288,906 patients of which 11.9% had an SSI.

Almost no surgical procedure is free of the risk of surgical site infection despite advances in surgical techniques, use of antibiotic prophylaxis and efforts to control infection.

The majority of comparative nonrandomized studies favored laparoscopy. These should be analyzed with great caution because of their inherent bias. A total 154 were included in this study requiring treatment for acute appendicitis, out of which 2(3%) in LA group develop SSI and 9(11.68%) in group OA developed SSI which was statistically significant (P=0.03). All the cases of superficial SSI were treated with wound toilets, povidone iodine packs, oral antibiotics and daily dressings with uneventful recovery. There was no organ space infection in either group. Those who developed SSI were incisional in both the
groups. There was no deep or organ infection found in either group. Patient in both the group develop SSI right lower quadrant (RLQ).

The major purpose of this study was to compare the outcome in the post operative period in the patients who were going for LA verses OA in terms of development of SSI to see the efficacy of both the procedures. A meta-analysis of prospective randomized trials, comparing LA and OA, found significant difference between the two modalities in terms of SSI. Upon further configuration it was found that, there was a significant difference in development of SSI in OA group than in LA group. Surgical site infection has been traditionally used to compare the two modalities of treatments for acute appendicitis. It may not be a serious complication on its own but may hamper patients’ convalescence time and quality of life with the deep SSI proving to be life threatening in many a patients.

Huang et all in their study showed that OA group rendered greater wound complication rate and ileus then did LA and Nla group, but the difference did not detected between three categories. The current study showed there is a significant length of time required for LA than for OA that is 80 mins versus 60 minutes yielded by others, but that can be overlooked keeping in view the benefit by the procedure to the patients. The longer duration can be explained in terms of single laparoscopic unit available in our set up, sterilization, setup time, viewing other parts of abdomen. Duration has been a center of discussion among experts whenever laparoscopic and open appendectomies are compared.

Some feel that in addition to less postoperative pain, early recovery, shorter hospital stay and good pain control, diagnostic laparoscopy, especially in doubtful cases, is one of the main advantages of laparoscopic approach and the ultimate benefit of LA will not be the operative duration, but the above mentioned advantages.

The pitfalls of this study was the single laparoscopic unit available in our setup ,longer time required for sterilizing the instrument

CONCLUSIONS:
Like other minimally invasive procedures, laparoscopic appendectomy offered a significant advantage over open appendectomy in all studied parameters. This should be the procedure of choice for the treatment of acute appendicitis.

Laparoscopic appendectomy is a safe procedure and has its own diagnostic and therapeutic values, shorter post operative stay, superior cosmesis and almost no wound infection, better visualization of other parts of the abdomen.
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