Clinically monitored delay- A valid option in cases with doubtful diagnosis of acute appendicitis

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Received: 6 November 2009 / Accepted: 31 January 2010
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Abstract

Aim To evaluate the effect of delayed surgery after a period of observation in patients with doubtful diagnosis of acute appendicitis in the form of improvement in negative appendectomy rates and the incidence of complications.

Materials and methods One hundred twelve patients operated with the diagnosis of acute appendicitis between May 2008 to June 2009 were included in this retrospective study. They were divided into two groups based on timing of surgery after admission. These two groups were studied in respect to age, sex, Alvarado score at presentation, ultrasound findings, operative findings, histopathology and postoperative complications. Proportions of negative appendectomies, and complicated appendicitis were analysed statistically.

Results Group wise age and sex distribution was comparable. The mean Alvarado score in the group 1 was 7.9 (range,

6–10) where as in those operated later than 12 hours (group 2), it was 4.5 (range, 3–8). Normal appendectomies were significantly ($p < 0.05$) less in group 2 (1 out of 40) as compared to group 1 (4 out of 72). The number of complicated appendicitis were higher in group 1 (14/72) as compared to group 2 (4/40) but not significantly ($p > 0.06$). The number of postoperative complications was also high in group 1 (11 vs 2 in group 2).

Conclusion It is better to wait in cases with doubtful initial diagnosis of appendicitis on admission in order to decrease negative appendectomy rates. These patients need to be continuously monitored clinically to prevent complications.

Keywords Appendicitis · Delayed surgery

Introduction

Appendicitis is one of the most common abdominal surgical emergencies. Appendicitis can rapidly progress to gangrenous appendicitis which is associated with increased morbidity and mortality. Therefore surgeons, at times, resort to an early surgical intervention even when the diagnosis is not certain [1]. This is especially true when there is problem with availability or affordability of investigation modalities like Computerized Tomography. Early surgery at such an instance may lead to a normal appendectomy whereas delay in surgery in cases of a missed diagnosis will lead to a rise in complication rates [2, 3]. It is common practice to admit and observe patients with an uncertain diagnosis of acute appendicitis. This has been known to avoid unnecessary appendectomies as well as correctly identify those cases

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whose diagnosis at presentation was uncertain [4–8]. The delay in surgery, in theory, increases the chances of complications in the peri-operative period; but it has been shown that delay in the patient presentation is the main contributing factor in development of complications rather than delay at the physician's end [8]. Furthermore, recent reports have suggested that the early management of acute appendicitis with fluid and antibiotic treatment is safe [9]. In our present study we have attempted to evaluate the effect of delayed surgery after a period of observation in patients with doubtful diagnosis of acute appendicitis in the form of improvement in negative appendectomy rates and the incidence of complications.

Materials and methods

One hundred twelve patients operated with the diagnosis of acute appendicitis between May 2008 to June 2009 in Manipal Teaching Hospital, Pokhara, Nepal, were included in this retrospective study. These patients were examined clinically and were scored according to Alvarado score at presentation in the emergency department by the attending surgeon. Ultrasound examination of the abdomen was done wherever possible. The ultrasound findings were categorised as: (1) thickened, visualised appendix suggestive of appendicitis, (2) suspicious findings like free fluid or probe tenderness or (3) normal scan. They were divided into 2 groups based on timing of surgery after admission. The first group comprised of patients the patients who had definite features of acute appendicitis and underwent surgery within 12 hours of their presentation in the emergency room (ER). The second group comprised of patients who had doubtful diagnosis of appendicitis on admission and were operated between 12–36 hours of presentation. All the patients received antibiotics in the form of cephalosporin and metronidazole. These 2 groups were studied in respect to age, sex, Alvarado score at presentation, ultrasound findings, operative findings, histopathology and postoperative complications. Operative findings were considered to categorize the case as complicated appendicitis (perforation, gangrene) and the histopathological findings were considered to be the gold standard for the diagnosis of appendicitis and all slides were evaluated at the department of pathology of the same hospital. Systemic as well as local postoperative complications occurring within 30 days of the surgery were also noted. Duration from onset of symptoms and delay in presentation to the ER was not studied. Statistical analysis was done to compare the proportions of negative appendectomies in each group and the incidence of complicated appendectomies and postoperative complications. The statistical test used was the Z test for standard errors of proportions, to compare the proportions of these parameters.

Results

There were 112 patients who we operated with the diagnosis of acute appendicitis from May 2008 to June 2009. Out of these 72 patients (group 1) were operated within 12 hours (mean time 6.5 hours) and 40 patients (group 2) were operated within 12–36 hours (mean time 21.9 hours). There were total 76 male patients and 36 female patients. The male to female sex ratio was 2.1:1. Patients between the ages of 20–40 years accounted for the maximum number of cases (Fig. 1). Group wise age and sex distribution was comparable.

All patients were scored according to the Alvarado score. We noted that 68 patients had Alvarado score above 7 and in 44 had scores of 6 or less (Fig. 2). The mean Alvarado score in the group 1 was 7.9 (range, 6–10) where as in those operated later than 12 hours (group 2), it was 4.5 (range, 3–8).

Of the 112 patients Ultrasonographic examination was done in 94. Ultrasound findings were suggestive of appendicitis in 70 patients, whereas 11 patients had normal sonological findings. There were 7 patients with probe tenderness in the right iliac fossa (RIF) and 6 patients who had free fluid in the RIF. The group division of each of the findings is given in Table 1.

The surgical approach employed was according to the surgeon's preference. There were 16 laparoscopic appendectomies, 94 open appendectomies and 2 cases of conversion from laparoscopy to open approach. Two out of the 94 open appendectomies were through a midline approach due to the presence of peritonitis at presentation. The intraoperative findings were recorded based on the operative records and it was observed that 86 patients had

Table 1 Group wise ultrasonography findings

Ultrasonography findings	Group 1	Group 2
USG		
Not done	10	8
Acute appendicitis	51	19
Probe tenderness	4	3
Free fluid	3	3
Normal	2	9

Table 2 Group wise distribution of complicated appendicitis

Complications	Group 1	Group 2
Perforation	8	0
Gangrene	4	2
Peritonitis	1	0
Abscess	2	0
Lump	0	1

inflamed appendix and there were 9 and 6 patients with perforation and gangrene respectively. Out of the 9 patients with perforation one had peritonitis. A normal appearing appendix was seen in 8 patients where as abscess was noticed in 2 patients and 1 patient had lump formation. The group wise division of the complicated appendicitis is given in Table 2. Group 1 had more number of complicated appendicitis but it was statistically not significant ($p > 0.05$) (Table 3). The age wise distribution of the complicated appendicitis is shown in Fig. 1.

The histopathology reports were evaluated with respect to the presence or absence of features of appendicitis. There were five negative appendectomies in total. In group 1 we found that the histopathology report was suggestive of appendicitis in 68 patients and four had normal reported appendix. In groups 2 which was operated between 12–36 hours following admission and observation, only one was reported as a normal appendix on histopathology. This difference was statistically significant ($p < 0.05$) (Table 3). Out of these five negative appendectomies two were males

Fig. 1 Age distribution of number of patients and complicated appendicitis

Fig. 2 Alvarado scores in study groups

Table 3 Statistical analysis

Parameter	Group 1	Group 2	Z value	p score
Negative appendectomies	4/72	1/40	2.5	<0.05
Complicated appendicitis	14/72	4/40	1.89	>0.05

and three were females. But this finding was not statistically significant ($p > 0.05$).

There were thirteen postoperative complications in total, one patient had developed features of sepsis due to delay in presentation and the other twelve had wound complications. There were eight mild wound infections in the form of wound discharge and 4 patients had developed severe wound infections in the form of burst wound. Of these 4 patients one had gangrenous appendix and three had perforated appendix on presentation. The postoperative complications were more in group 1. Groups 2 had only 2 cases of mild wound infections.

Discussion

Appendicitis has always been approached with two things in mind – minimising negative appendectomies and preventing complications. To make an accurate diagnosis is the most challenging. Clinical examination has always been the forerunner to make the diagnosis of appendicitis [10]. But studies have shown a better outcome in the form of decreased negative appendectomy rates by using diagnostic scoring systems [11, 12]. The Alvarado score is a 10 points scoring system for the diagnosis of appendicitis based on clinical signs and symptoms and a differential leukocyte count. In his original paper [11] Alvarado recommended an operation for all patients with a scores of 7 or more and observation for patients with scores of 5 or 6. Similarly imaging studies such as ultrasound have an average sensitivity and specificity of around 85–90% [13, 14]. Thus incorporating repeated clinical examination, using diagnostic scoring systems and use of imaging has resulted in better diagnostic outcome [15]. The rates of misdiagnosis and negative appendectomy have been more in females [3] and rates of complications has been more in elderly people [8]. In the present study the rate of negative appendectomy was 4.4% and complications were 16.1% in the form of perforations, gangrene and abscess formation. Negative appendectomies were significantly ($p < 0.05$) less in the groups 2. Females had more incidences of negative appendectomies but this finding was not significant probably due to less number of cases. Delay in surgery has been a matter of controversy regarding development of complications. Some studies [2, 16] have shown an increased incidence of complications and perforation with delays, whereas others [8, 17] have shown no effect of short term delays and physician's delay. In the present study there was no significant increase in

the complicated appendicitis or postoperative complications in the patients with delay in surgery most probably because these patients had low Alvarado on presentation, received antibiotics and most importantly they were continuously monitored by the concerned surgeon. In this study the incidence of complications was higher in group1 probably because of severity of the disease at presentation. As this study is a retrospective study with small number of patients a larger prospective study is required to further substantiate these findings.

Conclusion

It is better to wait in cases with doubtful initial diagnosis on admission in order to decrease negative appendectomy rates. Although various scoring systems and imaging studies help in making a diagnosis the importance of clinical judgement cannot be overemphasized. These patients have to be regularly examined clinically by the surgeon to detect any worsening of their signs in which case surgeon has to operate immediately so as to minimise complication rates.

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