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# Elderly versus young patients with appendicitis 3 years experience

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## KEYWORDS

Elderly complications;  
Perforated appendix;  
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**Abstract** *Background:* Appendicitis in the elderly continues to be a challenging surgical problem. Patients continued to present late with atypical presentations. Results might improve with earlier consideration of the diagnosis in elderly patients with abdominal pain, followed by prompt surgical operation. We aimed to present our experience with a series of elderly patients with acute appendicitis who were subjected to appendectomy to find out the difference in the course and outcome of acute appendicitis in elderly patients.

*Patients and methods:* We reviewed medical records of elderly patients (aged > 60 years) who underwent appendectomy for acute appendicitis at our hospital. Variables selected for analysis included age, sex, presenting symptoms, operative approach, operative findings, duration of hospitalization. Patients were compared to a control group, less than 31 years admitted during the same period.

*Results:* Twenty-three patients' records aged > 60 years with acute appendicitis were compared to a group of 40 patients aged < 30 years. There were significant differences between the two groups with regard to duration of symptoms preoperative hospital stay and total hospital stay. All young patients group had an uneventful postoperative recovery only two cases (5%) had wound infection. There was one death in the elderly group thus mortality rate was 4.3%. These two groups of patients showed significant differences in relation to the stage of disease at operation and postoperative complications. Elderly group of patients had perforated appendix in 16 cases (69.5%) while in group II patients eight cases (20%) had perforated appendix.

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**Conclusion:** Acute appendicitis in the elderly remains a challenge for practicing surgeons and continues to be associated with high morbidity and mortality. Results might improve with earlier consideration of the use of CT abdomen for diagnosis in elderly patients with abdominal pain, followed by prompt surgical operation.

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## 1. Introduction

Acute appendicitis is a common surgical disease and a potentially dangerous condition. If the inflamed appendix is not attended to urgently, it will proceed to gangrene and perforation, and result in peritonitis or abscess formation. While acute appendicitis is primarily a disease of the younger population, with only 5–10% of cases occurring in elderly persons, the incidence of appendicitis in older patients seems to be increasing with an increase in life expectancy. Morbidity and mortality rates are greater in older patients who often have delayed and atypical presentations, leading to increased frequency of perforation and intra-abdominal infection. Diagnostic studies may cause further delays in definitive management, and associated illnesses increase operative risks.<sup>1–3</sup>

The symptoms of appendicitis overlap considerably with other clinical conditions, which include gastro-enteritis, urinary tract infection, and pelvic inflammatory disease. There is no single diagnostic test that can accurately diagnose appendicitis in all cases. The definitive treatment of acute appendicitis is emergency appendectomy. Acute appendicitis, the most common cause of abdominal surgical emergency, shows a different pathogenesis, clinical course and outcome in the elderly. Age-specific factors are effective on preoperative clinical diagnosis and on the stage of this infectious disease.<sup>4–7</sup> We aimed to present our experience with a series of elderly patients with acute appendicitis who were subjected to appendectomy to find out the comparison of course and outcome of acute appendicitis with young patients.

## 2. Patients and methods

We reviewed medical records of elderly patients (aged > 60 years) who underwent appendectomy for acute appendicitis at Khamis Mushate General Hospital, Aseer, Saudi Arabia, between December 1, 2007 and May 31, 2010. Variables selected for analysis included age, sex, presenting symptoms, diagnostic studies, operative approach, operative findings, duration of hospitalization (total and preoperative), and morbidity and mortality rates. Comparison of course and outcome of acute appendicitis with young patients, less than 30 years admitted during the same period. Statistical analysis was per-

formed using commercial software SPSS 17, *t* test for continuous variables and Chi square ( $\chi^2$ ) test with the Yates correction for categorical variables.  $P > 0.05$  was considered statistically significant.

## 3. Results

Twenty-three patients' records with a discharge diagnosis of acute appendicitis confirmed by histopathology above 60 years of age were included in this study, they were compared to a group of 40 patients aged below 30 years. Table 1 shows demographic data of both groups. All patients presented with abdominal pain (lower abdominal, periumbilical, or epigastric). Some had other associated complaints such as fever, vomiting, diarrhea, constipation, or dysuria. Tenderness of the right lower abdomen was the most common physical finding in all cases of the control group (group II) while generalized abdominal tenderness was recorded in the entire elderly group (group I).

There were significant differences between the two groups with regard to duration of symptoms preoperative hospital stay and total hospital stay (Table 2). In group I patients it was noted that they had prolonged duration of symptoms only 8.7% of cases had onset of symptoms below 2 days and 95.7% below 5 days while in group II 90% of cases present within one day of onset of symptoms and only four cases (10%) present within two days. Abdominal CT scan was done for 13 cases (56.5%) of group I within 6 h from admission with diagnostic accuracy of 92.3% while no abdominal CT done for any of the group II cases and we found no delay for appendectomy with the use of abdominal CT versus non-CT patients.

All patients of group II had an uneventful postoperative recovery except two cases (5%) had wound infection. There was one death in group I because of multi-organ failure; the mortality rate was thus 4.3%. These two groups of patients showed significant differences in relation to the stage of disease at operation and postoperative complications ( $P < 0.01$ ; Chi square test) (Table 3). Following surgery all group II patients were hospitalized for less than 3 days while in group I patients 30.4% of cases were hospitalized for less than 4 days, 91.3% of cases were hospitalized for less than 14 days and only two cases stayed for more than two weeks because of complica-

**Table 1** Demographic data of both groups.

	Group I (elderly, $n = 23$ )	Group II (young, $n = 40$ )	<i>P</i> value
Mean age $\pm$ SD (years)	74.87 $\pm$ 9.36	23.22 $\pm$ 4.15	< 0.001
Range (years)	60–100	17–31	
Sex			
Males (%)	11(47.8)	29(72.5)	< 0.001
Females (%)	12(52.2)	11(27.5)	

**Table 2** Duration of symptoms, preoperative hospital stay and total hospital stay in both groups.

	Group I (elderly, <i>n</i> = 23)	Group II (young, <i>n</i> = 40)	<i>P</i> value
Duration of symptoms mean $\pm$ SD (days)	3.7 $\pm$ 1.02	1.1 $\pm$ 0.30	<0.001
Range (days)	2–6	1–2	
Preoperative hospital stay mean $\pm$ SD (hours)	24 $\pm$ 11.3	7.45 $\pm$ 4.2	<0.001
Range	8–48	4–24	
Total hospital stay mean $\pm$ SD (days)	7.2 $\pm$ 4.6	2.2 $\pm$ 0.46	<0.001
Range (days)	4–22	2–4	
Main clinical finding	Generalized abdominal tenderness 22/23(95.7%)	Localized right iliac fossa tenderness 38/40(95%)	<0.001

tions, one case among them was the only in hospital death in this group. Group I patients had perforated appendix in 16 cases (69.5%) while in group II patients eight cases (20%) had perforated appendix.

Fortunately no major postoperative complications (such as thromboembolism, ileus nor chest problems) were recorded only wound complications (Table 3) were found. Four patients need re-operation for abdomen or wound closure.

#### 4. Discussion

Acute appendicitis remains the most common indication for emergency operation. It is a common cause of abdominal pain for which prompt diagnosis is rewarded by a marked decrease in morbidity and mortality. The decision for surgical intervention is still primarily based on precise clinical criteria. Acute appendicitis in the elderly is associated with significant morbidity.<sup>8</sup> There is usually a delay in the diagnosis because abdominal laxity may hide the clinical signs. Progression to perforation is rapid with significant increase in morbidity and mortality. It was estimated that the perforation rate is about 30% at 60 years of age.<sup>9</sup>

Patients with appendicitis may not be able to recognize the implications of their initial symptoms, and they may attribute the symptoms to 'stomach flu' or to gastro-enteritis. Elderly patients are commonly late in seeking medical treatment.<sup>10</sup> The results of this study show that delayed onset of symptoms at presentation and delayed surgical treatment is the most significant factor associated with advanced stage appendicitis and postoperative complications. This finding is not surprising, as failure to diagnose appendicitis early in elderly patients would certainly cause a substantial delay in appendectomy. In uncertain cases, delay of surgery and repeated assessment are commonly practiced to achieve a more precise diagnosis. De-

lay in treatment is regarded as the main cause of perforation and complications, but there are controversies as to whether pre-admission or post-admission delay is more important.<sup>11</sup> All these factors may contribute to diagnostic or therapeutic delays in the management of acute appendicitis specially in the elderly in our study there were no delays beyond 24 h in diagnosing acute appendicitis in the elderly group while less than 12 h in younger age group. Nevertheless, failure to diagnose appendicitis early is still a leading cause of increased perforation and complications (complication rate 3.4–33%).<sup>6</sup> Fortunately, death due to acute appendicitis is now rare (mortality rate in elderly range from 2% to 32%).<sup>1,12–18</sup> in our study death rate was 4.3% within the range and a little bit toward the lower side than others because of advance in diagnosis and rapid management. This study showed that patient delay in presentation to an A&E department results in a more advanced stage of disease at surgery. However, it was difficult to estimate this time interval accurately "we only depend on patient history" in this retrospective study. To reduce patient delay and thus improve the outcome, health education to increase public awareness – especially in the elderly of the symptoms and risks of appendicitis may be helpful. The most useful clinical tools in assessing acute appendicitis are still a good history and physical examination, serial abdominal examinations,<sup>1,6</sup> and a high index of suspicion. Migrating pain from the epigastric or periumbilical area to the right lower quadrant is the classical and most discriminating historical feature, which has high sensitivity and specificity. It has been suggested that the presence of right lower quadrant tenderness is the most sensitive physical finding in early appendicitis.<sup>14</sup> The disease process is consistently more advanced in elderly persons. Although most patients underwent operation within 24 h of hospital admission, the frequency of appendiceal perforation (15 patients [65.5%]) is similar to observations of other authors.<sup>3</sup> The

**Table 3** Operative time, incision type and postoperative complications in both groups.

Item	Group I (elderly, <i>n</i> = 23)	Group II (young, <i>n</i> = 40)	<i>P</i> value
Mean operative time	86 $\pm$ 26	56 $\pm$ 18	0.044
Range	50–160	35–110	
<i>Incision type</i>			
Right lower paramedian	11(47.8)	0	0.0001
McBurney	12(52.2)	40(100)	0.0001
Perforated appendix (%)	16(69.5)	8(20)	0.0003
Wound sepsis (%)	4(17.3)	2(5)	0.24
Wound dehiscence (%)	2(8.7)	0(0)	0.25
Burst abdomen (%)	2(8.7)	0(0)	0.25

reasons for delay in presentation may include problems of access to medical care, communication, or fear of hospitalization. Some believe that the physiology differs in the elderly and that the progression to perforation is more rapid owing to decreased lymphoid tissue or blood supply.<sup>9</sup> The wider application of CT for patients with suspected appendicitis has been shown to improve diagnostic accuracy and decrease the negative appendectomy rate,<sup>4-6</sup> although one study has shown that routine use of CT may lead to delay in definitive management. Abdominal CT scan has become the main diagnostic tool for patients with acute appendicitis with high sensitivity and specificity. Scanning of patients with suspected acute appendicitis has been shown to shorten the admission to operating theater interval, reduce overall admission cost, and reduce the number of non-therapeutic appendectomies.<sup>10</sup> In the present study scanning was done for 13 cases (56.5%) of group I within 6 h from admission with diagnostic accuracy of 92.3%.

Elderly people often present to hospitals in an advanced stage of the disease. In young people, the perforation rate of acute appendicitis is less than 20% while this can be 70% or even as high as 90% in elderly people. The reasons behind this could be explained by late presentation, age-specific physiological alteration, atypical presentation and delay in diagnosis. In our series, elderly group of patients had perforated appendix in 16 cases (69.5%) while in group II patients eight cases (20%) had perforated appendix at a rate which is similar to what is found in literatures.<sup>17-20</sup>

The overall complication rate of 15.9% in our series is a little bit lower than previous reports of 28–60%.<sup>1,5,12,18,20</sup> The mortality rate in elderly patients with acute appendicitis is between 4% and 10%.<sup>18-20</sup> Death is often directly related to intra-abdominal sepsis and in most cases to septic complications from perforation augmented by associated severe comorbidities.<sup>6,12</sup> In our series, the mortality rate was 4.3% due to septic complications and multiple organ failure.

In conclusion, acute appendicitis in the elderly remains a challenge for practicing surgeons and continues to be associated with high morbidity and mortality. With increasing life expectancy, more such cases are likely to be encountered in the future. Results might improve with earlier consideration of the use of CT abdomen in the diagnosis of elderly patients with abdominal pain, followed by prompt surgical operation.

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