ORIGINAL ARTICLE

Impact of delay in acute appendicitis

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Abstract

Objective: To determine the rate and risk factors for perforation in acute appendicitis.

Study design: Retrospective study.

Setting: Surgical "C" Unit, Department of Surgery, Khyber Teaching Hospital, Peshawar from September 2008 to December 2009.

Materials and Methods: A total of 150 patients were included in the study. Data regarding age, gender, patient interval, hospital stay, operative findings, and histopathology report were recorded in a proforma. Peroperatively appendix was divided into 5 types as normal, cattahral, phlegmonous, gangrenous, and perforated which were confirmed by histopathology report.

Results: Out of the total 150 patients there were 87 (58%) males and 63 (42%) females. The mean age of the patients was 23.94 years with a range of 10 to 60 years. The rates of negative appendecectomy and perforation were 6.7% and 10% respectively. Mean patient interval in the perforated group was 71.33 hours while mean hospital interval was 6.61 hours in the perforated group.

Conclusion: Age and patient interval are significant factors for perforation in acute appendicitis.

Key words: Acute appendicitis, perforated appendix, patient interval, hospital interval.

Introduction

Appendicitis is the most common cause of surgical abdomen in all age groups[1, 2]. Almost 10% of the general population develops acute appendicitis with maximal incidence in the second and third decades of life[3]. Late diagnosis and surgical intervention is regarded as an important cause of morbidity in acute appendicitis[2]. Acute appendicitis can proceed to gangrene and perforation if not readily diagnosed and attended to[4]. Different factors are responsible for perforation in acute appendicitis at different age groups and this can be explained by the difference in immune status and aetiologies of appendicitis[5, 6].

Perforation in acute appendicitis is responsible for increased morbidity (6% to 17%), mortality, prolonged hospital stay and financial burden on the patient[4]. Therefore, many surgeons advocate an early appendecectomy at the cost of diagnostic accuracy to prevent perforation in acute appendicitis[7]. Recently, however, reports of successful conservative management of acute appendicitis in children with intravenous antibiotics and fluids negate this popular notion of early appendecectomy[6].

Early appendecectomy precludes perforation but certainly increases the morbidity, hospital stay and cost of treatment of the patients. Majority of the patients in our setup belong to lower socioeconomic group. This study will help determine if time factor plays a role in disease progression in acute appendicitis and appropriate steps be taken, in light of results of this study, to decrease the morbidity, mortality and financial

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cost of treatment in patients with acute appendicitis.

Material and methods

A retrospective analysis was performed, after approval from the Medical Ethics Committee, on 150 consecutive patients who underwent emergency appendecectomy for acute appendicitis at surgical "C" unit of Khyber Teaching Hospital from September 2008 to December 2009. Patients' data regarding age, gender, duration between development of symptoms and admission in hospital, duration between hospital admission and appendecectomy, operative findings and histopathology report was retrieved from patients' hospital record and recorded on a proforma. Patients without documented onset of symptoms or deficient record were excluded from the study. Duration between first onset of symptoms and admission to hospital was regarded as patient interval and expressed in hours. Similarly duration between hospital admission and appendecectomy was denoted as hospital interval which was also expressed in hours. Peroperatively appendix was grouped into five types, normal appendix (negative appendecectomy), catarrhal appendicitis, gangrenous appendicitis, phlegmonous, and perforated appendicitis. The peroperative criteria for different grades of inflammation were hyperaemia, edema, dilated blood vessels, and gangrenous patches in the wall of appendix with or without perforation. Pre and peroperative diagnosis of acute appendicitis and the grade of inflammation were confirmed by histopathogy report by a pathologist.

Data analysis was carried out using Statistical Package for Social Sciences (SPSS version 10). Frequency and percentages were computed for categorical data like gender, operative finding and continuous data like age, patient interval, and hospital interval were presented as mean ± SD. Chi square test was used to compare frequencies of categorical variables and t test was used to compare the means for continuous variables. A p value of less than 0.05 ($p < 0.05$) was taken as significant.

Results

A total of 150 patients who underwent appendecectomy for acute appendicits justifying the selection criteria were included in the study. There were 58% (n=87) males and 42% (n=63) females with a male to female ratio of 1.3:1. The mean age of the patients was 23 ± 9.4 years with a range of 10 to 60 years as shown in figure 1. The mean age of male patients was 21.89 ± 8.71 years compared to 24.31 ± 10.17 years for females. An accurate histopathology proved that diagnosis of acute appendicitis was made in 93.3% (n=140) of the patients with 6.7% (n=10) being the negative appendecectomy rate. The rates and gender distribution of different grades of inflammation according to histopathology report are shown in table 1. According to table 1, appendix in males was cattahral in 44%, phlegmonous in 2.6%, gangrenous in 0.6%, perforated in 8.6% and normal in 2%. The corresponding figures in females were 35%, 0.6%, 0%, 1.3% and 4.6% respectively. Negative appendecectomy was common in females 70% (n=7) compared with males 30% (n=3). The final diagnosis in patients with negative appendecectomy was Meckel's diverticulitis (n=2), ureteric colic (n=3), ruptured ovarian cyst (n=4) and ectopic pregnancy (n=1). As shown in Table 1, the rate of perforation was 10% (n=15). The mean age of the patients with perforated appendicitis was 30.20 ± 15.63 years compared with 22.09 ± 8.46 years for the group having appendicitis without perforation (p value = 0.002). Frequency of perforation in males and females in different age groups is shown in table 2. Perforation was common in males 86.66% (n=13) than females 13.33% (n=2), sig-

Figure 1: *Age distribution in acute appendicitis*

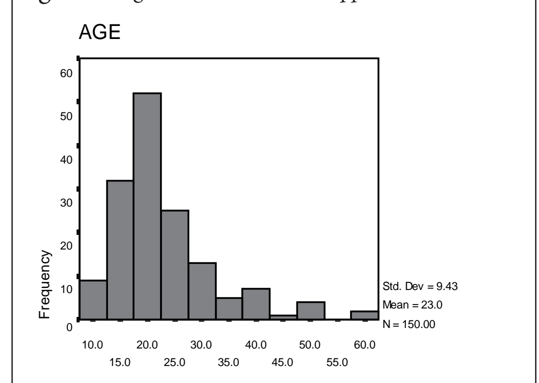

Table 1: *Gender distribution in operative findings*

	Operative Findings					
	C	P	G	Pr	N	Total
Gender	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Male	66 (44)	4 (2.6)	1 (0.6)	13 (8.6)	3 (2)	87 (58)
Female	53 (35)	1 (0.6)	0 (0)	2 (1.3)	7 (4.6)	63 (42)
Total	119 (79)	5 (3.2)	1 (0.6)	15 (10)	10 (6.6)	150 (100)

C=Cattahral appendicitis; G=Gangrenous appendicitis; N=Negative appendecectomy; P=Phlegmonous appendicitis; Pr=Perforated appendicitis

Table 2: *Age and Gender stratification in perforated appendicitis*

	Perforated appendicitis (%)		
Age group	Male (n)	Female (n)	Total (n)
11-20 years	4 (80%)	1 (20%)	5 (33.33%)
21-30 years	5 (100%)	0 (0%)	5 (33.33%)
31-40 years	1 (100%)	0 (0%)	1 (6.66%)
41-50 years	2 (66.66%)	1 (33.33%)	3 (20%)
Above 50 years	1 (100%)	0 (0%)	1 (6.66%)

Table 3: *Patient interval in different grades of inflammation of appendicitis*

Duration of time before admission	Cattahral	Phlegmonous	Gangre-nous	Perfo-rated	Total
	n (%)	n (%)	n (%)	n (%)	n (%)
Less than 24 hrs	103 (94.4)	3 (2.7)		3 (2.75)	109 (77.8)
24-48 hrs	7 (50)	2 (14.2)	1 (7.14)	4 (28.5)	14 (10)
48-72 hrs	4 (50)			4 (50)	8 (5.7)
More than 72 hrs	5 (55.5)			4 (44.4)	9 (6.4)
Total patients	119 (100)	5 (100)	1 (100)	15 (100)	140 (100)

Negative appendectomy excluded.

Table 4: *Hospital interval in different grades of inflammation*

Duration b/w admission and appendecec-tomy	Cattahral	hlegmonous	Gangre-nous	Perfo-rated	Total
	n (%)	n (%)	n (%)	n (%)	n (%)
Less than 6 hrs	37 (80.4)	1 (2.1)		8 (17.3)	46 (32.8)
6-12 hrs	79 (88.7)	4 (4.4)	1 (4.4)	5 (5.6)	89 (63.5)
12-24 hrs	3 (75)			1 (25)	4 (2.8)
More than 24 hrs				1 (100)	1 (0.7)
Total	119 (100)	5 (100)	1 (100)	15 (100)	140 (100)

Negative appendecectomy excluded.

nificant (p value = 0.001), with a male to female ratio of 6.5:1. Mean patient interval in the perforated group was significantly longer (71.33 ± 44.69 hours) than interval in the non-perforated group, 26.67 ± 24.60 hours, (p value < 0.001). Patient interval in different grades of appendicitis is stratified in table 3, which shows that 8 patients (53.3%) waited more than 48 hours before arriving at hospital. Mean hospital interval was 6.61 ± 2.46 hours in the patients without perforation compared with 13.60 ± 29.51 hours for patients with perforation in appendicitis (p value > 0.05). As shown in table 4, depicting hospital interval, more than 96% patients were operated within 12 hours of admission.

Discussion:

During the past 25 years, there has been a slight change in the epidemiology of acute appendicitis with the disease becoming almost equally prevalent in males and females with a recent male to female ratio of 1.2:1. The present study also shows that there was not a substantial difference in the prevalence of appendicitis in the two genders with the male to female ratio of 1.3:1. Almost comparable results (male to female ratio of 0.94:1) were yielded by another study[3]. A study from Rawalpindi General Hospital reported a higher male to female ratio of 1.94:1 in 150 patients presenting with acute appendicits[8]. In a retrospective review of 140 patients of appendecectomy, 52 females developed acute appendicitis with a male to female ratio of 1.7:1[4]. Higher male to female ratio of appendicitis is encountered in teens and the results of this study were fairly in accordance with the generally accepted figure[3].

The mean age of the patients presenting with acute appendicitis in this study was 23 years. This observation is consistent with findings in other national studies[3, 8]. The mean age of patients having appendicitis is reported to be 33 and 31 years in studies from Hong Kong and Sweden respectively, which is quite high as compared to our results[4, 9]. Acute appendicitis occurs sparsely in infants and there is highest incidence in the second and third decades of life as expressed by results of this study[10].

Although it is simple and straightforward to treat appendicitis, the main difficulty lies in diagnosing it. Clinical presentation of acute appendicitis may mimic other abdominal and chest inflammatory conditions and the classical symptoms of migrating right lower quadrant pain, fever, anorexia, nausea and vomiting may be evident in only 50 to 60% of the patients making it difficult to diagnose correctly and in time[4]. In our study

a total of ten (6.7%) patients were misdiagnosed as confirmed by histopathology. Women of reproductive age group (due to gynaecological pelvic diseases), consistent with the findings of this study, elderly and children (atypical presentation) are most likely to be misdiagnosed[3,4]. Ali N et al reported a very high rate of 24% of negative appendectomy compared to our results[11]. A study from Hyderabad[12], in contrast to our study, showed lower rate of 3.78% while, in contrast to our results, studies from Iran and Sweden reported almost two times the rates of negative appendecectomy, 14%[13] and 13.6%[7], respectively. In patients with atypical clinical features, diagnostic laparoscopy should be the first line option instead of CT, U/S or observation in view of the excellent diagnostic results of laparoscopy and low yield of U/S and CT in equivocal cases[14].

Luminal obstruction of the appendix may be due to external or internal factors causing an increased mucus production and stasis with increased wall tension, above perfusion pressure, leading to necrosis and perforation[6]. Delay in diagnosis and treatment is an important factor leading to perforation as it explains well above the time dependent mechanism. The principal finding in this study was that patients with perforated appendicitis had a significant pre hospital interval (2.67 times longer) in contrast to patients having appendicitis without perforation. This finding has previously been reported in several other studies which show that pre admission delay is highly associated with the risk of perforation in acute appendicitis[2,4,6,7,9]. Fahim F et al found that patient interval did not severely affect the outcome in acute appendicitis contrary to our findings[3]. Hospital interval has little influence on perforation in acute appendicits[15] and a similar finding was determined in this study. Our finding was supported by previous data[7,9], although others believe that prolonged hospital interval due to repeated observations is responsible for perforation[3,16].

In the present study, perforation occurred more frequently in males as compared to females, which is in accordance with previous reports[9,17]. The difference in immune response between males and females may be responsible for this difference in the rate of perforation. The mean age of patients with perforated appendicitis was 30.20 years with 26.66% patients > 40 years and 33.33% patients < 20 years of age. One shortcoming in this study was that children below 10 years were not included as they scarcely get operated in our unit. This study does not show an increased rate of perforation at extremes of ages and it is well distributed throughout different age groups. Previous studies reported a perforation rate of 37%[9]and 48%[17] for patients with age more than 50 years. There are also articles which suggest that increased rates of perforation occur in younger children which can be attributed to the atypical presentation of appendicitis in this age group[15].

Conclusion

This study concludes that patients' age, male gender and delayed presentation to hospital are significant factors which lead to perforation in acute appendicitis. These findings confirm that there is a definite need to educate the patients to seek early heath care in situations of abdominal pain, and also to determine the factors which cause delayed presentation of the patients to a hospital facility.

References:

1. Zhang Y, Zhao YY, Qiao J, Ye RH. Diagnosis of appendicitis during pregnancy and perinatal outcome in the late pregnancy. Chin Med J 2009; 122(5):521-4.
2. Ozguner IF, Buyukayavuz BI, Savas MC. The influence of delay on perforation in childhood appendicitis. A retrospective analysis of 58 cases. Saudi Med J 2004; 25(9):1232-6.
3. Fahim F, Shirjeel S. A comparison between presentation time and delay in surgery in simple and advanced appendicitis. J Ayub Med Coll Abbottabad 2005; 17(2):37-9.
4. Chung CH, Ng CP, Lai KK. Delays by patients, emergency physicians, and surgeons in the management of acute appencdicits: retrospective study. Hong Kong Med J 2000; 6(3):254-9.
5. Bekele A, Mekasha A. Clinical profile and risk factors for perforation of acute appendicitis in children. East Afr Med J 2006; 83(8):434-9.
6. Ditillo MF, Dziura JD, Rabinovici R. Is it safe to delay appendectomy in adults with acute appendicitis? Ann Surg 2006; 244(5):656-660.
7. Temple CL, Huchcroft SA, Temple WJ. The natural history of appendicitis in adults: A prospective study. Ann Surg 1995; 221(3):278-281.
8. Bhopal FG, Ahmed BSH, Ahmed M, Ahmed M, Khan JS, Mehmood N, et al. Role of TLC and C-reactive protein in the diagnosis of acute appendicitis. J Surg Pak Jun 2003; 8(2):14-7.
9. Hansson LE, Laurell H, Gunnarsson U. Impact of time in the development of acute appendicitis. Dig Surg 2008;

25(5):394-399.
10. Klingensmith ME, Amos KD, Green DW, Halpin VJ, Hunt SR. The Washington Manual of Surgery. Fifth ed. St Louis: Lippincott Willams & Wilkins; 2005.
11. Ali N, Sadiq M, Bacha J, Hadi G. Correlation of clinical and histological diagnosis of acute appendicitis. J Postgrad Med Inst 2003; 17(2):254-7.
12. Soomro AG, Siddiqui FG, Abro AH, Abro S, Shaikh NA, Memon AS. Diagnostic accuracy of Alvarado scoring system in acute appendicitis. J LiaquatUni Med Health Sci 2008; 7(2):93-6.
13. Salari AA, Binesh F. Diagnostic value of anorexia in acute appendicitis. Pak J Med Sci 2007; 23(1):68-70.
14. Ahmad N, Abid KJ, Khan AZ, Shah STA. Acute appendicitis-incidence of perforated appendicitis. Ann King Edward Med Coll 2004; 10(4):356-8.
15. Ponsky TA, Huang ZJ, Kittle K, Eichelberger MR, Gilbert JC, Brody F, et al. Hospital and patient level characteristics and the risk of appendiceal rupture and negative appendectomy in children. JAMA 2004; 292(16):1977-82.
16. Von Titte SN, McCabe CJ, Ottinger LW. Delayed appendectomy for appendicitis: causes and consequences. Am J Emerg Med1996; 14(7):620-2.
17. Hale DA, Molloy M, Pearl RH, Schutt DC, Jaques DP. Appendectomy: A contemporary appraisal. Ann Surg 1997; 225(3):252-61.

ERRATA

Aftab S, Nur-ul-Haq S, Hassan JA, Ara A. Postdural puncture headache: Comparison of 26G quincke with 25G Whitacre needle for elective caesarian section. Pak J Surg 2009; 25(4): 257-61.

The sequence of authors on page 257 be read as
Sadqa Aftab, Syed Nur ul Haq, Jehan Ara Hassan, Anjum Ara

The heading of second table on page 259 be read as “Table II: Characteristic of subarachnoid block & PDPH”.

The editor regrets the error.

Malik KA, Jawaid M. Incidental Gallbladder Carcinoma in patients undergoing cholecystectomy for cholelithiasis. Pak J Surg 2009; 25(4): 262-65.

The heading of Table I on page 263 be read as “Age group of the patients suffering from carcinoma gallbladder (n=16)”.

The editor regrets the error.