

Evaluation Of Risk Factors In Perforated Acute Appendicitis In Al-Kindy Teaching Hospital

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ABSTRACT

Background: Appendectomy is still one of the most commonly performed emergency surgical procedures worldwide. Avoiding delays in the diagnosis in these patients may play a role in reducing observed morbidity.

Aim of study: To analyze the clinico-pathological profile and outcomes of patients undergoing emergency appendectomies to determine risk factors influencing complications.

Type of the study: A prospective analytic study

Patients and Methods: The study involves 108 patients underwent emergency appendectomies at Al-Kindy teaching hospital from April 2014 to March 2015. Appendicitis was categorized into two groups perforated and non-perforated appendicitis. A comparison between them was made in regard to Gender, Age, clinical presentation, investigations (White blood cells count), patient's delay, hospital delay, anatomical location of the appendix, presence of fecolith.

Results: Five factors were predicted that influence appendiceal rupture, the patient's pre-hospital time delay was the most important risk factor for perforation. The male are slightly more affected than female in a percentage of (60 male) 55.55% and (48 female) 44.44%. The most common appendix anatomical location for complicated appendicitis was pelvic 16 out of 32 (50%). The presence of fecolith in the lumen of appendix

was considered significant risk factor for perforation 23/32 (71.875%). In the *perforated* group 28 patients out of 32 had high White blood cells count (87.5%) compared to patients in the non-perforated group 36 (47.39%).

Conclusions: Young age group, male gender, pelvic anatomical location of the appendix, presence of fecolith in the lumen of the appendix and prehospital time delay were found to be the most important risk factors.

Keywords:

Risk factors, complicated (perforated) appendicitis, non-complicated (non-perforated) acute focal / acute suppurative) appendicitis.

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The appendix varies considerably in length and circumference, the average length is between 7.5 to 10 cm, the lumen is irregular, being encroached upon by multiple longitudinal folds of mucous membrane lined by columnar cell intestinal mucosa of colonic type⁽¹⁾. While appendicitis is clearly associated with bacterial proliferation within the appendix, no single organism is responsible⁽²⁾. A mixed growth of aerobic and anaerobic organisms is controversial. Obstruction of the appendix lumen has been widely held to be important, and some form of luminal obstruction, either by a fecolith or stricture is found in the majority of cases^(1,2). A fecolith (sometimes referred to as an appendicolith) is composed of inspissated fecal material, calcium phosphate, bacteria and epithelial debris; rarely a foreign body is incorporated into the fecolith. A fibrotic stricture of the appendix usually indicates previous appendicitis that resolved without surgical intervention. Obstruction of the appendiceal orifice by tumor, particularly carcinoma of the caecum, is an occasional cause of acute appendicitis in middle-aged and elderly patients. Intestinal parasites, particularly enterobius vermicularis (pinworm), can proliferate in the appendix and occlude the lumen^(1,2,3). Obstruction of the appendiceal lumen seems to be essential for the development of appendiceal gangrene and perforation. Yet, in many cases of early appendicitis, the appendix lumen is patent despite the presence of mucosal inflammation and lymphoid hyperplasia.⁽¹⁾ Occasional clustering of cases among children and young adults suggests an infective agent, possibly viral, which initiates an inflammatory response. Seasonal variation in

the incidence is also observed⁽¹⁾. Lymphoid hyperplasia narrows the lumen of the appendix, leading to luminal obstruction^(1,2). Once obstruction occurs, continued mucus secretion and inflammatory exudation increase intraluminal pressure, obstructing lymphatic drainage. Edema and mucosal ulceration develop with bacterial translocation to the submucosa. Resolution may occur at this point either spontaneously or in response to antibiotic therapy. If the condition progresses, further distension of the appendix may cause venous obstruction and ischaemia of the appendix wall. With ischaemia, bacterial invasion occurs through the submucosa and muscularis propria, producing acute appendicitis. Finally, ischaemic necrosis of the appendix wall produces gangrenous appendicitis, with free bacterial contamination of the peritoneal cavity. Alternatively; the greater omentum and loops of small bowel become adherent to the inflamed appendix, walling off the spread of peritoneal contamination, and resulting in a phlegmonous mass or paracaecal abscess. Rarely, appendiceal inflammation resolves, leaving a distended mucus-filled organ termed a 'mucocoele' of the appendix^(1,2). Acute appendicitis is still the commonest abdominal surgical emergency with a lifetime incidence of 7%⁽³⁾. Appendicitis is known to be the disease of the younger age groups with only 5-10% of cases occurring in the elderly population. However, the incidence of the disease in this age group seems to be rising due to recent increase in the life expectancy^(2,3,4). Furthermore, the often atypical presentation and delay in seeking medical help have been associated with delay in diagnosis and treatment

resulting in high morbidity and mortality rates^(4,5). The prognosis of uncomplicated appendicitis in both young and old age groups is nearly equal. However, perforation worsens the condition dramatically resulting in higher rates of morbidity and mortality^(4,5).

Patients and Methods: A prospective analytic study that involves 108 patients underwent emergency appendectomies at Al-kindy teaching hospital from April 2014 to March 2015.

In all patients with a clinical diagnosis of acute appendicitis who were admitted and operated on at Al-kindy teaching hospital the following data were collected: age, gender, clinical presentation, white blood cells count, anatomical location of the appendix, presence of fecolith, and pathological finding.

Patients with acute appendicitis were divided in two groups : perforated and nonperforated based on their pathological reports.

Patients underwent routine investigations (white blood cell count, general urine analysis) and selective investigations (Pregnancy test, blood urea nitrogen, Random Blood Sugar, erect chest-X-ray), given a dose of antibiotics and intravenous fluids before operation. (perioperative prophylactic cefotaxime 50mg/kg/day and metronidazole 7.5mg/kg/dose before the skin incision). Diagnostic laparoscopy is not available in the emergency theatre.

Exclusion criteria :

Exclusion criteria included the presence of appendicular abscess and phlegmon. Patients treated conservatively. The diagnosis of appendiceal abscess or phlegmon in suspected patients was confirmed either by ultrasonography or by examination under anaesthesia.

Operative technique : All patients received intravenous perioperative prophylactic cefotaxime 50mg/kg/day and metronidazole 7.5mg/kg/dose before the skin incision and two postoperative doses. If perforated appendicitis was encountered at the time of surgery, antibiotics were continued for at least 5 - 7 days.

The grid iron incision and muscle-splitting technique was used. Change of muscle splitting (grid iron incision) into muscle cutting was used in some case to be done with this incision when appendectomy was found to be difficult. Care was taken to avoid contamination of the subcutaneous tissue and adjacent peritoneal cavity during the procedure.

Moist packs were used to isolate the cecum and inflamed appendix. Appendectomy was performed with stump ligation . The peritoneum, internal oblique and transversus abdominus and external oblique aponeurosis were sutured by absorbable material (vicryl No.1) in layers.

Before skin closure, the wound was irrigated copiously with warm saline. Scarpa's fascia was closed with interrupted vicryl sutures. The skin and subcutaneous tissue were closed primarily by non absorbable silk or polypropylene material⁽¹⁾.

Statistical analysis : The Statistical Package for the Social Science (SPSS) version 17.0 was used to enter and analyze data. The confidence interval at 95% and the P value is significant when equal or <0.05.

Mean standard deviation (SD) and frequency distribution was calculated. Statistics were calculated using chi-square or Z score analysis for categorical variables.

Ethical Consideration: Research approval was obtained from the health authority in Al-Kindy teaching

hospital. Verbal consent was taken from each patient included in the study.

The patients were informed about the study's objective and that collected data were used only for the stated research purpose.

Results: Of all the risk factors studied, the patient's pre-hospital time delay was the most significant risk factor for perforation P value <0.00001 (table No.1).

The male to female ratio in the nonperforated appendicitis group was 1.1:1 and 1.66:1 in the perforated group. Regarding the time delay for treatment and as shown in Table 1,

patients in the perforated group had a significantly longer Prehospital time delay than those in the nonperforated group (79.6 h and 47.3 h respectively) with <0.00001 p-value (statistically significant). At the same time, the table did not show a statistically significant difference between the two groups in regard to In-hospital delay (p-value 0.7923) (Table no.1). Regarding the clinical presentation, all patients were complaining of abdominal pain. However, the typical migratory pain that starts around the umbilicus and shifts later to the right lower abdomen was described only by 50 (46.296%) patients, 37 (48.648%) patients in the nonperforated and 13 (40.625%) in the perforated group.

Anorexia was present in 75 (69.44%) of all patients but it could not differentiate perforated from nonperforated groups.

Nausea and vomiting were present in 60 (55.55%) of the patients and were more significantly found in the non-perforated group (Table 2).

Of all patients, 43 (39.81%) were febrile at presentation (>38°C). Fever was present more in the perforated group of patients 22 (68.75%).

Localized tenderness in the right lower abdomen was present in 82 (75.92%) of all patients with 57 (75%) in the nonperforated compared to 25 (78%) in the perforated group.

Although rebound tenderness was found in 68 (62.962%) of patients, it did not differentiate between both groups (Table 2).

Increased white blood cell count > 13*⁶/L was seen in 64 (59.259%) of all patients at presentation. In the perforated group, 28 (87.5 %) patients had high white blood cells count compared to 36 (47.368%) patients with the nonperforated group.

Appendicitis most commonly affect patients between the age of (10-19)y, 46 (42.59%) patients as showing in figure 1 .

The male are slightly more affected than female 60 males (55.55%) and 48 females (44.44%) as shown in table 3 .

The most common appendix anatomical location for perforated appendicitis was pelvic 16/32 (50%).

The presence of fecolith in the lumen of appendix considered significant risk factor for perforation 23/32 (71.875%) as shown in figure 2.

Table 1:Show the relation between Pre-hospital delay, hospital delay, Post-operative hospitalstay and complication of acute appendicitis

*N.S=not significant

Variable	perforated	NonPerforated	p-value
Surgical Treatment			Mean delay in
Pre hospital delay	79.6 ± 6.4 hr	47.3 ± 4.7 hr	0.00001
Hospital delay	7.1 ± 3.3 hr	15.1 ± 5.3 hr	0.7923
Post op. hospital stay	5.4 ± 3.3 days	2.2 ± 1.1 days	N.S

Table 2: Show the clinical presentation,white blood cells count in relation to the study group

Variables	Total 108(100%)	Perforated 32(29.629%)	Non perforated 76(70.37%)	P-value <0.05
Migrating pain	50(46.296%)	13(40.625%)	37(48.684%)	N.S
Anorexia	65(69.44%)	22(68.75%)	43(56.578%)	N.S
Nausea & vomiting	60(55.55%)	18(56.25%)	42(55.26%)	N.S
Tender right lower abdomen	82(75.92%)	25(78.125%)	57(75%)	N.S
Rebound Tenderness	68(62.962%)	23(71.875%)	45(59.21%)	N.S
Fever > 38°C	43(39.814%)	22(68.75%)	21(27.63%)	<0.05
WBC count	64(59.259%)	28(87.5%)	36(47.368%)	0.00001

*Z score used to calculate Pvalue. *significant p value <0.05

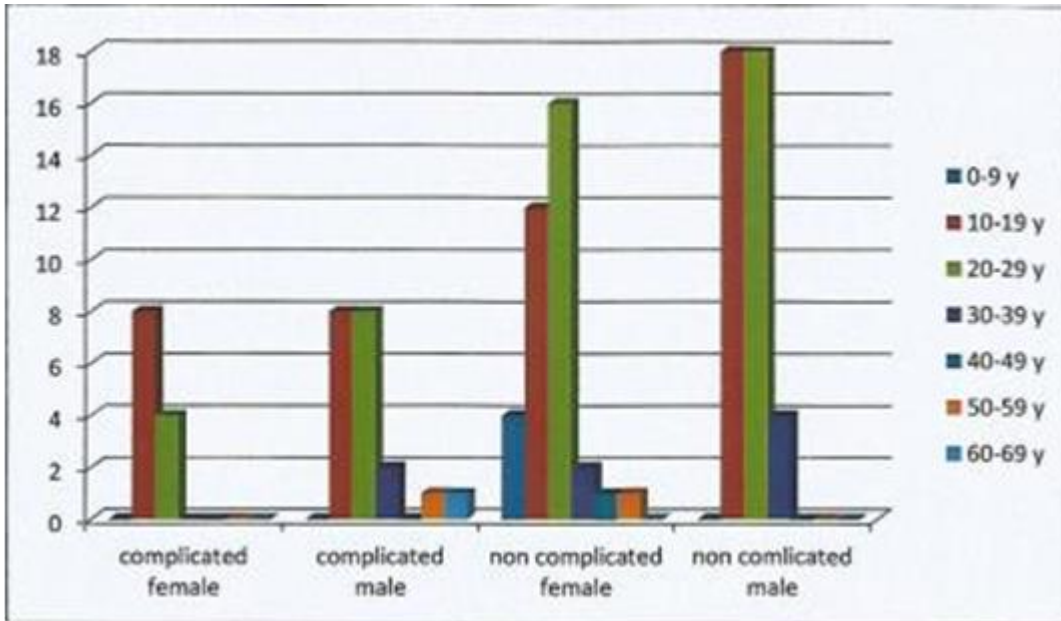


Figure 1: Show the age group in decade, gender and study groups

Table 3: Show the relation of gender and the incidence of acute appendicitis

	Male	Female	Total No. of Patients	%	P-Value
					<0.05
Perforated Appendicitis	20	12	32	29.62%	0.0455
Nonperforated Appendicitis	40	36	76	70.37%	0.00001
Total No. of Pt.	60	48	108		

*Z score analysis used to calculate P value

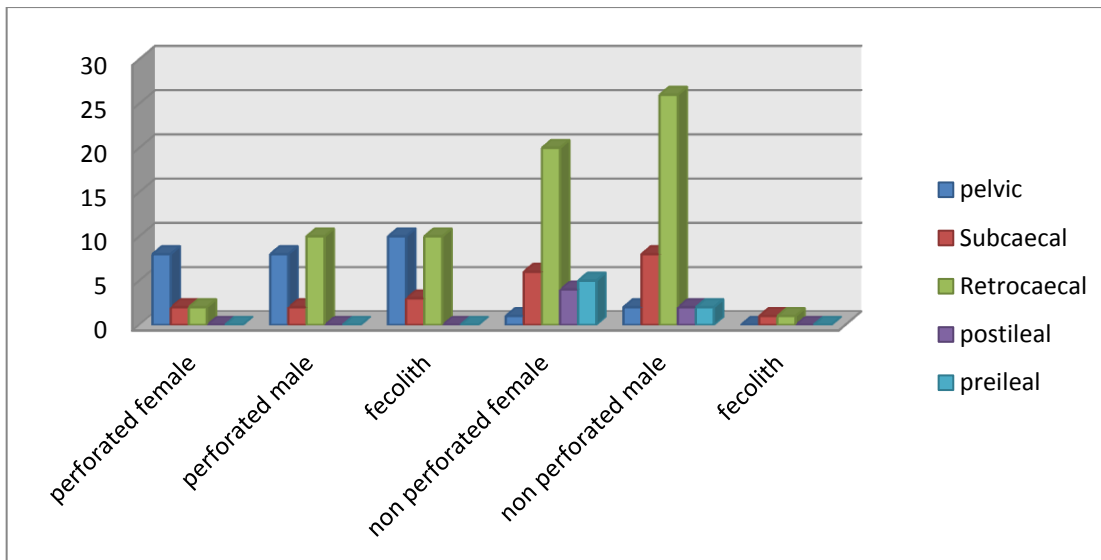


Figure 2: Show the relation between Anatomical position of appendix, fecolith & acute appendicitis

Discussion : Acute appendicitis continues to be the commonest cause of surgical abdominal emergency. It was often thought to be the disease of the young but as a result of recent increases in lifetime expectancy, the incidence of acute appendicitis also increased in the elderly^(1,6,7)

The incidence of appendiceal perforation in acute appendicitis is estimated to be in the range of 20-30% which increases to 32-72% in patients above 60 years of age⁽⁷⁻⁹⁾. The reasons behind this high rate were postulated to be due to the late and atypical presentation, delay in diagnosis and surgical intervention, and to the age specific physiological changes^(10,11).

In our study, perforated appendicitis was found in (29.62%) patients, a result that lies within the range reported by many other reports^(3,12-14)

This study showed that gender predilection was for male more than female for perforation (1.66:1); 40 (62.5%) patients were males and 36 (37.5%) were females.

Delay in presentation was found by many authors to be the reason behind the higher rate of perforation seen in the population^(1,2,15,16). Our study showed that perforation rate correlated well with delayed presentation (pre-hospital delay 79.6±6hr.) but did not correlate with the hospital delay^(3,17).

The triad of right lower abdominal pain and tenderness, fever, leukocytosis is reported to be present in 25 (78.13%) of perforated patients⁽¹⁸⁾.

In our study, all patients presented to the hospital with abdominal pain. However, the classical migratory pain of appendicitis was present in only 50 (46.296%) of them. Localized tenderness in the right lower abdomen which is considered to be the most constant diagnostic physical sign for appendicitis^(2,18) was present in 89 (82%) of cases.

Both features (migratory pain and localized tenderness) were seen more often in the unperforated rather than in the perforated group. This finding may be explained by the fact that patients with perforated appendix would show poor localization of pain as well as more generalized lower abdominal tenderness and guarding⁽⁷⁾.

Fever (>38°C) was present in 43 (39.81%) of all patients in this study and was much higher in the perforated group 22 (68.75%), a result which is in agreement with the findings of other studies^(3,5,7).

WBC was found elevated in 59.26% of all our patients with values higher in the perforated group as 87.5% of cases^(19,20).

Appendix in pelvic anatomical position (50%) is more liable to perforate^(1, 2, 21) and presence of fecolith (71.875%) is highly correlated to perforation^(1,2).

When comparing our result with a previous study that was done in the same region 10 years ago⁽²²⁾, we found that the incidence of appendiceal perforation did not decrease over the past ten years in spite of improved health care programs and diagnostic facilities. We think that this failure was due to the underestimation of the seriousness of the abdominal pain in this age group by both the patient and the primary health care⁽²²⁾.

Conclusions : Young age group, male gender, pelvic anatomical position of the appendix, presence of faecolith in the appendix lumen and prehospital time delay are found to be the most important risk factors.

Recommendations:

- Using scoring systems like Alvarado score to assist diagnosis of acute appendicitis and prevent the complications.
- In suspected cases of acute appendicitis better to admit the patient to hospital as the clinical signs might not appear all in the same patient and needs to develop sequentially, so U/S and C-T scan done to prove or disprove the diagnosis.

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