

Acute Appendicitis in North of Jordan- A 10 year Survey

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Abstract

Objective: The study aimed to study the demographic features, rates of negative appendectomies and rates of perforation in all patients submitted to appendectomy in a 10 -year period.

Methods: A retrospective review of 3894 patients submitted to appendectomy in the period 1997-2006, in three teaching hospitals in north of Jordan was conducted. The analysis included the variables: age, sex, presence of inflammations, perforation or other pathological findings.

Results: The negative appendectomy rate was 23.2%. It was more in females (30.4%) compared to males (16.3%). The perforation rate was 14.5%, which was found to be higher in males (16.5%) compared to that in females (12.1%), and was high in elderly patients (38.2%) and children below 11 years (21.7%).

Conclusion: Our negative appendectomies and perforations are considered high (although it compares with many studies in literature). This reinforces the need to rely more in ultrasonography, computerized tomography and laparoscopy.

Keywords: Acute Appendicitis, Negative Appendectomy, Demographic features, Survey, Perforation.

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Introduction

Appendicitis is one of the most common reasons for emergent surgery with nearly 7% lifetime cumulative incidence.¹ Diagnosis of acute appendicitis is mainly clinical, but the overall accuracy of the clinical examination in diagnosing acute appendicitis has been reported to be 70% to 87%; being by that less in children and women of child-bearing age.²

Approximately, 20-33% of patients suspected of having acute appendicitis present with atypical findings.³ To improve the accuracy of the diagnosis, ultrasonography and computerized tomography evaluations are used in some centers and proved to be useful particularly in women and children.^{2,4}

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Others have argued that imaging is not without costs in terms of resource utilization, radiation exposure, operative delay and a potential for increasing the perforation rate.^{2, 5} Some adopt protocols based on clinical evaluation with selective use of imaging and get low rate of negative appendectomies.⁶

Active observation before the decision to operate is safe and effective in patients with equivocal features.⁶ Diagnostic laparoscopy have been advocated in those cases with uncertainty in diagnosis, particularly in women of child-bearing age.⁷ Laparoscopic appendectomy is as safe as open appendectomy and allows quicker recovery. Its best indication is when diagnosis is questionable, particularly in women and obese patients.⁸

Perforation of the appendix forms the single most important factor in the mortality and morbidity of the disease. The fear of perforation leads sometimes to aggressive surgical approach with unacceptably high negative appendectomy rate especially in young women.⁷ Unnecessary appendectomies are associated with the waste of resource and the risk of adhesive small bowel obstruction.^{9, 10}

Surgeons and other physicians must achieve a balance between premature operation with a high negative appendectomy rate and a delayed diagnosis with a higher perforation rate.¹¹

In the north of Jordan, there is a lack of studies on appendicitis and its distribution. Therefore, this study was conducted to determine the distribution of appendicitis by age and gender, the rate of negative appendectomy, the rate of perforation in addition to any other pathological finding in the appendectomy specimens removed in the main teaching hospitals in the north of Jordan in a 10- year period.

Patients and Methods

We reviewed the pathological files of all patients who underwent appendectomy for acute

1997- June 2006, in the main three teaching hospitals in the north of Jordan; Princess Basma Teaching Hospital, King Abdullah University Hospital, and Princess Rahma Teaching Hospital. The three hospitals are attached to the medical college in Jordan University of Science and Technology and all pathological specimens from these hospitals are sent to the same pathology department in the medical college and are studied by the same team.

The routine policy in the management of acute appendicitis was almost the same in the three hospitals. The patient used to be operated upon as soon as possible when the clinical picture was highly suggestive. A routine Complete Blood Count (CBC) and urine analysis used to be done in almost all patients. In equivocal cases, the patients used to be submitted to observation, reevaluation, and more selective investigations like ultrasonography. Computerized Tomography Scan (C.T Scan) was rarely used.

The trend was to operate earlier in equivocal cases when the patient is a child or a woman. Most patients were operated by using the open method, while only few cases had undergone laparoscopic appendectomy. Most of the operations were done by residents in training supervised by senior residents or consultants.

Specific data were collected; these included age, gender, operative diagnosis, pathological diagnosis, and whether the appendix was normal, acutely inflamed, or perforated.

Acute appendicitis was considered positive when there was trusmaral inflammation of the appendix or the presence of pus in the lumen of appendix. The appendix was considered normal when the histopathological examination was normal with or without the presence of faecolith, entrobius, or fibrosis.

Data were collected by researchers from the pathological files and filled in special data sheets designed for this purpose. Frequencies and percentages were reported, Chi-square test was

appendicitis over a 10-years period from June

A p-value of less than 0.05 was considered statistically significant. Also, Statistical Package for Social Science (SPSS) was used to analyze data.

Results

A total of 3894 patients (914 males and 1980 females) had appendectomy operation with a preoperative diagnosis of acute appendicitis in the period from June 1997 to June 2006. About 75% of patients aged between 11 and 30 years.

Of the total, 2976 (76.4%) patients (1651 males and 1325 females) had a positive pathological diagnosis of acute appendicitis. The proportion of males with positive appendicitis (83.4%) was significantly higher than that of females (69.0%), $p < 0.0005$. The rate of false positive diagnosis of acute appendicitis was not significantly associated with age in males and females. The distribution of positive acute appendicitis by age and gender is shown in table (I).

used to analyze data.

A total of 14 patients had other pathological diagnosis (2 patients with endometriosis, 7 patients with shistosomiasis and 5 patients with carcinoid tumor). Histologically, appendices were diagnosed as normal in 904 patients (23.2%). Of these, 322 patients (16.3%) were males and 582 (30.4%) were females, $p < 0.0005$. In reviewing the pathological reports of specimens diagnosed as normal, 250 patients (27.6%) were completely normal, 140 patients (15.5%) had follicular hyperplasia, 48 patients (5.3%) with serositis, 86 patients (9.5%) with entrobium vermiculavis, 280 patients (30.9%) with faecolith, and 100 (11.1%) with fibrosis in the wall of the appendix.

Of the total 2976 specimens, 432 (14.5%) were perforated. The rate of perforation was significantly higher for males (16.5%) compared to that for females (12.1%), $p = 0.001$ (table II). The rate of perforation was different according to the age groups for males and females. Overall, the perforation rate in the first decade (21.7%) decreased until it reached the lowest (9.8%) in the third decade. Then, the rate increased until it reached the highest (38.2%) for those who aged above 60 years (table II). This difference in the rate of perforation by age was noticed in both males and females.

Table (I): The distribution of positive acute appendicitis by age and gender in north of Jordan.

Age /years	Female (N=1325)n (%)	Males (N=1651)n (%)	Total(N=2976)n (%)
0-10	22 (1.7)	38 (2.3)	60 (2.0)
11-20	579 (43.7)	648 (39.2)	1227 (41.2)
21-30	432 (32.6)	591 (35.8)	1023 (34.4)
31-40	185 (14.0)	220 (13.3)	405 (13.6)
41-50	52 (3.9)	82 (5.0)	134 (4.5)
51-60	40 (3.0)	32 (1.9)	72 (2.4)
>61	15 (1.1)	40 (2.4)	55 (1.8)

Table (2): The rate of perforation of Appendix according to age and gender.

Age/ Years	Females			Males			Total		
	N	n	%	N	n	%	N	n	%
0-10	22	4	18.2	38	9	23.7	60	13	21.7
11-20	579	63	10.9	648	97	15.0	1227	160	13.0
21-30	432	36	8.3	591	64	10.8	1023	100	9.8
31-40	185	30	16.2	220	50	22.7	405	80	19.8
41-50	52	12	23.1	82	25	30.5	134	37	27.6
51-60	40	10	25.0	32	11	34.4	72	21	29.2
>61	15	5	33.3	40	16	40.0	55	21	38.2

Total	1325	160	12.1	1651	272	16.5	2976	432	14.5
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Discussion

Acute appendicitis is the most common surgical emergency seen in surgical units.¹² In this study, acute appendicitis was present in 2976 with the male-to-female ratio of 1.25:1 and the majority of cases were seen in second and third decades. This finding is consistent with that reported in other studies.^{1, 11, 13}

Optimal management of acute appendicitis is controversial.¹⁴ The diagnosis in most centers is clinical with a variable range of negative appendectomies (20-40%).^{4, 13} A protocol based on clinical evaluation with selective use of imaging adopted by Kosloske et al. reduced the rate of negative appendectomies to 5%.¹⁵

In this study, the overall negative appendectomy rate was 23.2%; being relied on clinical evaluation, CBC, urine analysis and selective use of imaging particularly ultrasound in equivocal cases. This rate is in the range reported by others.^{4, 13} WBC is considered by some authors a good predictor in identifying patients with likelihood of appendicitis.^{2, 16}

The use of ultrasound in our patients was selective. It was used in equivocal cases and in females with suspected pathology in pelvic organs. In some studies the use of ultrasonography, particularly in children and women, has proved useful with a sensitivity of 87% and specificity of 75%.⁴

Abdominal C.T Scan was rarely used in our cases. In one study, the use of abdominal C.T decreased the rate of negative appendectomies from 25% to 6%,⁴ and in another study it was reduced to 2%,³ but it is still argued that low rates of negative appendectomies can be achieved without the routine use of imaging with its potential costs and radiation exposure.¹⁵

The finding that negative appendectomy rate was higher in females (30.4%) compared with males

right iliac fossa pain,¹⁷ and it also reflects the fear of surgeons to have a perforated appendix in females with its consequences in female pelvic organs.⁷ Out of the 904 appendices which were reported histologically normal, 654 (72.3%) had other findings like faecolith, follicular hyperplasia, fibrosis in the wall, entrobius. This finding may suggest that the presence of such conditions may cause right iliac fossa pain which may be misdiagnosed as acute appendicitis, and there are some studies suggesting a role of these conditions in causing right iliac fossa pain.^{18- 20} Further studies on the role of such conditions should be encouraged.

The perforation rate in the present study of 14.5% compares favorably with studies which reported a range of perforation of (17-28%).^{13, 15} The perforation rate in females was 12.1% compared to 16.5% in males (p=0.001) which reflects the tendency to operate earlier in females to avoid the more serious consequences of perforation in females.⁷

In this study, the perforation rate was high in the first decade (21.7%), it decreased in second and third decades and then it increased in a linear fashion till it became high (38.2%) above 60 years of age. The high rate of perforation in the first decade was reported in many studies and our rate compares favorably with other large paediatric series which report a range of perforation in this age group from 15.5% to 47%.²¹

High rate of perforation in elderly is reported by many studies which attribute the high rate of perforation to delay of presentation to hospital, atypical presentation, reduction of sensitivity to pain and inadequate communication in elderly patients.²²

The rate of other positive pathologies in the appendices other than acute bacterial appendicitis like carcinoid, schistosomiasis and endometriosis was 0.36% that is lower when compared with

(16.3%), is similar to that reported in other studies.^{4, 13} It reflects the presence of other gynaecological conditions which present with This can be explained by the selection of patients in this study which included only the patients with preoperative diagnosis of acute appendicitis and did not include incidental appendectomies and appendices removed in other intrabdominal operations.

In conclusion, acute appendicitis was more common in males and more common in the second and third decades of life for both males and females. Relying on clinical evaluation and selective use of imaging, negative appendectomy rate was high particularly in females, the perforation rate in the first decades and elderly patients is still high, and judicious use of imaging and laparoscopy may help to reduce the incidence of negative appendectomies and perforations.

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إلتهاب الزائدة الدودية في شمال الأردن- مراجعة على مدى عشر سنوات

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الملخص

الهدف: معرفة نسبة الإلتهاب الحقيقية في الزوائد المتأصلة، ونسبة الانفجار، ومدى فعالية أساليبنا التشخيصية.

الوسائل: تمت مراجعة ملفات 3894 مريضاً أجريت لهم العملية في الفترة من 1997-2006 في ثلاثة مستشفيات تعليمية في شمال الأردن، وشملت المراجعة: عمر المريض، الجنس، وجود إلهاب أو انفجار في الزائدة، أو وجود أية إصابات أخرى.

النتائج: كانت نسبة الزوائد الطبيعية المتأصلة 30.4% عند الإناث، و 16.3% عند الذكور، والنسبة الكلية 23.2%. أما نسبة الانفجار فكانت (12.1%) عند الإناث، و (16.5%) عند الذكور، وكان (38.2%) عن مجموعة الأعمار فوق سن 60، و(21.7%) عند الأطفال تحت سن 11 عاماً وكانت نسبة الانفجار الكلية (14.5%).

الخاتمة: تتفق هذه النتائج مع الدراسات العالمية مع ملاحظة إرتفاع نسبة الزوائد الطبيعية المتأصلة ونسبة الإنجار، وهذا يحفزنا للإعتماد أكثر على الوسائل التشخيصية الحديثة أكثر كالأموح الصوتية والتصوير الطبقي وتنظير البطن الجراحي.

الكلمات الدالة: إلهاب الزائدة الدودية الحاد، عملية إستئصال الزائدة الدودية، معالم ديمغرافية، مسح، إنفجار.