

Original Paper

The Incidence of Negative Appendectomy in a Teaching Hospital in Jordan, a Universal Concern

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Abstract

Background: Appendicitis is considered as one of the most common abdominal conditions requiring surgical intervention. The appendectomy, like most surgical procedures, has its own complications and therefore should only be done when indicated. Case series have reported the incidence of negative appendectomy in many different parts of the world including western nations. A high rate of negative appendectomy is unacceptable. At the same time, surgeons should aim to prevent perforation at all costs. For this reason, considerable efforts are now being made to improve diagnostic accuracy and prevent unnecessary appendectomies.

Methods: All case files of patients who underwent appendectomies at Al-Karak Teaching Hospital in Jordan between January 2014 and December 2015 were reviewed. Demographic data, symptoms, signs on presentation, intra-operative findings, and histological reports on the excised vermiform appendixes were extracted from the case files and analyzed.

Results: The incidence of negative appendectomy in our study was 18% with no difference in incidence between genders.

Conclusion: The incidence of negative appendectomy observed at Al-Karak Teaching Hospital is near or around that reported by most studies. This alarming figure clearly indicates the need for accurate diagnostic procedures to confirm the diagnosis of acute appendicitis. Further studies and evaluations are warranted.

Keywords

negative appendectomy, negative appendectomy rate, appendicitis, appendicitis diagnostic accuracy, Jordan

1. Introduction

Acute appendicitis is the most common surgical emergency in developed countries. Although incidence of appendicitis has fallen over the last three decades, about one in every six of the population undergo an appendectomy. It is rare to occur before the age of 2 years, but its maximal incidence is in childhood and declines over time.

Appendicitis is inflammation which is initiated by luminal obstruction, secondary to either lymphoid hyperplasia, which in turn is a response to a viral infection, or obliteration of the lumen by a fecalith. Obstructive appendicitis can also be caused by tumors of the appendix or caecal pole. The extent of inflammation varies from mild to the point of perforation. Fecaliths are found in 30-40% of appendectomies and in these cases, gangrene is twice as common reaching 75-80% (Hoffmann & Rasmussen, 1989).

Progression of inflammation to perforation and peritonitis is more likely if the appendix is not removed but not inevitable. Perforation occurs in 25% of patients with a history of pain for a duration of less than 24 hours and in 35% with a duration exceeding 48 hours (Paterson-Brown & Vipond, 1990). The morbidity and mortality of appendicitis greatly increases when perforation occurs. It is clear that the surgeon should aim to prevent perforation at all costs but a high negative appendectomy rate is utterly unacceptable. After an appendectomy, patients can suffer late complications such as adhesive intestinal obstruction resulting in more serious complications. Considerable efforts are now being made to improve diagnostic accuracy and prevent unnecessary appendectomies (Andersson, Hugander, & Thulin, 1992; Barnes, Behringer, Wheelock, & Wilkins, 1962; Temple, Huchcroft, & Temple, 1995).

1.1 Objective

The main aim of this study is to determine the incidence of negative appendectomy in Al Karak Teaching Hospital, Jordan, 2015, where all operations were carried out by consultant surgeons. Other aims are to describe the cases by age groups, gender, and clinical features. In the end we hope to highlight how important this issue is and the need for safe and reliable measures to be used around the world to accurately diagnose acute appendicitis in time in order to prevent perforation but also decrease negative appendectomies.

2. Methodology

All appendectomies carried out at Al-Karak Teaching Hospital in Jordan from January 2014 to December 2015 were studied retrospectively. The case files of the patients were retrieved from the medical records library and analyzed. All clinic- demographic data relating to clinical signs, symptoms, gender, laboratory investigations, age, operative procedures, findings and postoperative follow-up were

obtained. All specimens were examined and reported on by two pathologists to be sure that there aren't any errors. The histopathological reports of all the patients were also reviewed. A diagnosis of positive appendicitis was made when the histopathological report confirmed appendicitis, while the diagnosis of negative appendectomy was made in patients who presented with clinical features of appendicitis but were found to have normal and unremarkable appendices at histology. The results were analyzed using simple tables.

3. Result

The total number of subjects enrolled in the study was 100; ages ranging from 15-60, 54% of subjects were under 20 years old and 56% were males; the mean age was 28 years as shown in Table 1.

Table 1. Distribution of Appendicitis Cases, Al-Karak Teaching Hospital, 2015 by Age Group and Gender

Age group	Sex		Total
	Male	Female	
<20	28	26	54
20-39	14	8	22
40-49	10	8	18
50-59	4	2	6
TOTAL	56	44	100

Out of 100 cases diagnosed clinically with acute appendicitis, 18% were found to not have any remarkable findings. These represent falsely diagnosed cases of appendicitis as shown in Figure 1.

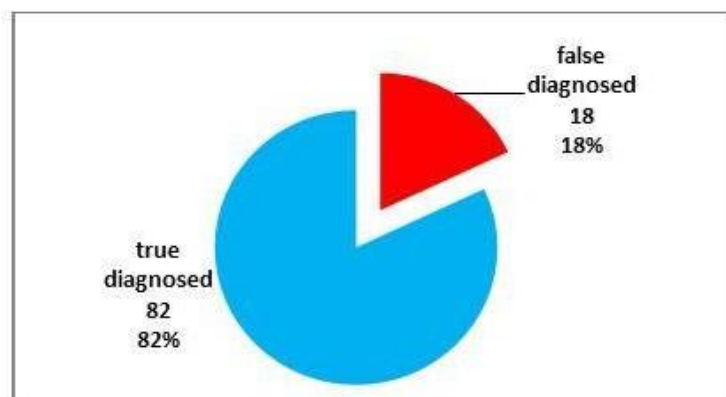


Figure 1. Distribution of Appendicitis Cases, Al-Karak Teaching Hospital, 2015 by Accuracy of Diagnosis of Appendicitis

Additionally, among all the patients that had a negative appendectomy, there was no significant difference in incidence between genders, 44% of the males (8) and 56% of females (10). Additionally, 99% of patients have migratory pain to the right iliac fosse (RIF) and rebound, 98% have tenderness, and 87% have nausea or vomiting as shown in Table 2.

Table 2. Distribution of Appendicitis Cases, Al-Karak Teaching Hospital, 2015 by Signs and Symptoms

Sign and Symptoms	Frequency	Percent
Migratory pain	99	99
Rebound	99	99
Tenderness	98	98
Nausea	87	87
Vomiting	87	87
Anorexia	41	41
Previous attack	9	9

By calculating Alvarado Score, it was found that 76% of cases were probable, 8% possible, and 16% were unlikely, but interesting enough none were definite as shown in Table 3.

Table 3. Distribution of Appendicitis Cases, Al-Karak Teaching Hospital, 2015 by Alvarado Score

Alvarado Score	Frequency	Percent
9-10 Definite	0	0
7-8 Probable	76	76
5-6 Possible	8	8
1-4 Unlikely	16	16
Total	99	100

4. Discussion

Our study shows that the rate of negative appendectomy in a teaching hospital in the South of Jordan was 18% with no significant difference in incidence between genders. If we compare to the study done by Okobia, Osime and Aligbe (1999) in Benin City, Nigeria reported an incidence of 32.2% with equal representation in both males and females. On the other hand, Ogbonna, Obekpa, Momoh, Ige and Ihezue (1993) reported negative appendectomy rate of 29.7% in males and 47% in females over a five year period in Jos Nigeria. Kakande, Kavuma and Kayondo (1978) in Uganda reported a negative appendectomy, a rate of 29.5 over a five year period. Chang, Hogle and Welling (1973) reviewed 184 cases of acute appendicitis in Taiwan and found 79% diagnostic accuracy rate in men as opposed to

54% in women. In this case series, acute appendicitis was misdiagnosed in about 33 %.

Gilmore in England reported a negative appendectomy rate of 22% (Gilmore, 1974). According to one study, females have consistently higher rates incidence of negative appendectomies (Ahmad, Abid, Khan, & Shah, 2002). And the main causes for higher incidence of negative appendectomy in females is due to gynecological disorders especially in the second and third decade of life, such as pelvic infection, ruptured ovarian cyst, and ectopic pregnancies. In our present study, the range of ages of females diagnosed with acute appendicitis is from 15-35. This finding is in keeping with other studies on negative appendectomy rates in females (Gibney, Ajayi, Leader, & Bouchier-Hayes, 1992).

The morbidity and mortality that sometime could accompany negative appendectomy is reported to be significant by some authors (Ali, Sadiq, Bacha, & Hadi, 2011). At the same time, there may be a significant loss of staff hours and financial resources (Flum & Koepsell, 2002).

The use of detailed clinical history, examination, and active observation of the patient has also been suggested (Jones, 2001; Senbanjo, 1997). Some studies have also shown that the rate of negative appendectomy can be decreased if the patients are examined by a senior registrar and consultant before a decision for surgery is taken (Jahn et al., 1997; Langenscheidt, Lang, Püschel, & Feifel, 1999).

It has been nearly 110 years since Reginald Heber Fitz was able to consolidate a fragmented surgical philosophy regarding the pathophysiology and treatment of appendicitis with his now famous paper, yet appendicitis continues to be a paradox (Fitz, 1886). Although considered one of the presentations, perforation regularly confounds the diagnostic acumen of even the most experienced of surgeons. Investigation of this dilemma traditionally has been accomplished through compressive reviews of appendectomy that typically have been based on retrospective analyses of approximately 1000 cases (Andersson, 2011; Babcock & McKinley, 1959; Lewis, Holcroft, Boey, & Dunphy, 1975; Maxwell & Ragland, 1991; Mittelpunkt & Nora, 1966; Pieper, Kager, & Näsman, 1982; Silberman, 1981). Perforation rate done recently by Babcock was reported at 26%. In another study by Mittelpunkt, the rate of perforation was noted to be 24%. A study done by Lewis et al on 100 patients shows a rate of perforation at 21%. Another study by Silberman on 1113 patients, gave a rate of 13%.

Recent evidence indicates that perforation is followed by surgical evaluation in the majority of cases which implies that reduction of perforation rate will have to be addressed through encouraging earlier evaluation, accurate and non-invasive methods of diagnosis, and greater access to care (Hale et al., 1997). Kpolugbo, Njoku and Osime (2004) in Benin city reported a reasonable correlation between neutrophils and acute appendicitis. The use of various scoring systems has been advocated. However, while some authors found them to be very useful in reducing the rate of negative appendectomies, others haven't found similar results (Ijaz et al., 2000). Perforation continues to disproportionately affect those individuals at the extremes of age. This is mostly due to delays in presentation and diagnosis related to an inability to communicate in younger population. Perforation rate of 20-30% has been reported consistently over the past 70 years, despite the technological advances over this time period (Arnbjörnsson, 1982; Berry Jr. & Malt, 1984).

5. Conclusion

Despite efforts at reduction, negative appendectomies continue to rise across the world. The rates of perforation and negative appendectomy have been relatively stagnant over the past 60 years despite dramatic advances in technology. In regards to negative appendectomy, essentially this is a reflection of the fact that these technological advances haven't produced clinically useful objective tests possessing high degrees of sensitivity, specificity, and accuracy. Studies conducted around the world have demonstrated this and so has ours. This upsetting information clearly indicates the need for diagnostically accurate procedures to confirm the diagnosis of acute appendicitis and to diagnosis it early on in the course of the disease to prevent perforation. Further studies and evaluations are thus warranted to better refine our approach in treating patients presenting with signs and symptoms of acute appendicitis ,a world-wide problem.

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