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Original Research Article

A review of appendectomy cases at a single teaching hospital, Baghdad, Iraq

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ABSTRACT

Background: Appendectomy is one of the most commonly performed operations. Accurate preoperative diagnosis has long been a great challenge, even to experienced surgeons. To determine the pattern of presentation and rate of atypical pathological presentation of appendicitis.
Methods: This is a cross-sectional study in which patients who underwent appendectomy for presumed acute appendicitis from June 2012 to June 2016 were recruited. Incidental appendectomy was excluded. Patient demographics, pathological findings, and surgical outcomes were collected.
Results: It was found that the median age of the patients with acute appendicitis was 29 (male 27.3, female 30.7; range (4-67) years. The median length of hospital stay was 2 (range, 1-22) days. There were 184 (75%) patients with clinically and pathologically confirmed acute appendicitis. Out of the 243 patients, 47 appendices were normal, making the overall negative appendectomy rate (NAR) 19.3%; 14.0% in males and 24.6% in females (P<0.001).
Conclusions: Appendectomy continues to be a very common surgical procedure. We suggest a more liberal utilisation of preoperative imaging in females of reproductive age, and patients at the extreme age.

Keywords: Appendicectomy, Atypical, Pathological, Pattern

INTRODUCTION

Acute appendicitis is the most common cause of acute abdominal pain and appendectomy is the most frequently performed emergency surgery in the world.[1,2] Although acute appendicitis mortality is low, morbidity remains high.[3,4] The complication rate is related mainly with appendiceal perforation.[3] and increases 10 times after appendiceal perforation.[2,5,6] Diagnosis of acute appendicitis is established primarily on patient's history and physical examination supported by laboratory and imaging exams.[7-10] Delay in the diagnosis and treatment is by far the main cause of appendiceal perforation.[11-16]

Several factors have been considered to influence the incidence of negative appendectomy. The experience of the surgeon is of great importance. Some investigators have also considered the availability of various diagnostic tests (abdominal ultrasonography and CT) as being very useful in minimizing the incidence of negative appendectomy.[17]

Certain unexpected/unusual lesions of the appendix may warrant further clinical attention or follow-up. Data about incidence of appendicitis and related pathological presentation is lacking from Iraq, especially with lack of proper documentation. This study reviewed appendectomies for presumed acute appendicitis over a 4-year period, and entailed auditing of all such surgeries performed in our hospital. By this means we set out to determine the incidence of various pathological findings to different demographic characteristics.

METHODS

Patients in this study were admitted to Al-Karama teaching hospital. The records of all those who underwent appendectomy from 1st of June 2012 to 31st of May 2016 for presumed acute appendicitis were retrieved from the hospital database. All those who had appendectomy performed on a non-emergency basis or as a part of other surgical procedures (e.g. right hemicolectomy for carcinoma of the caecum and incidental appendectomy) were excluded. the records of 243 patients were retrieved in this retrospective study and all the medical notes, operative records, and pathology reports were reviewed.

The diagnosis of acute appendicitis was confirmed if there was infiltration with polymorphs in the muscular is propria of the appendix in some suspected cases, otherwise was confirmed by clinical intraoperative findings. Perforation was defined either intra-operatively by the surgeon, or described in the pathology report. Peri-appendicitis, fibrous obliteration, and serositis were regarded as negative appendectomies. Study defined the reproductive age-group as females aged 11 to 50 years, and the extremes of age as being less than 11 or greater than 70 years. Statistical analysis was performed using the Statistical Package for the Social Sciences (Windows version 10.0; SPSS Inc, Chicago [IL], US). Categorical Results with P value of less than 0.05 were considered statistically significant.

RESULTS

During the 4-year period, there were 243 emergency appendectomies. The number performed each year remained similar and the average number performed annually was around 60. There were 184 patients with clinically and pathologically confirmed acute appendicitis; 95 were male and 89 were female, giving a sex ratio of 1.067 to 1. The median age of the patients with acute appendicitis was 29 (male27.3, female 30.7; range (4-67) years. The median length of hospital stay was 2 (range, 1-22) days.

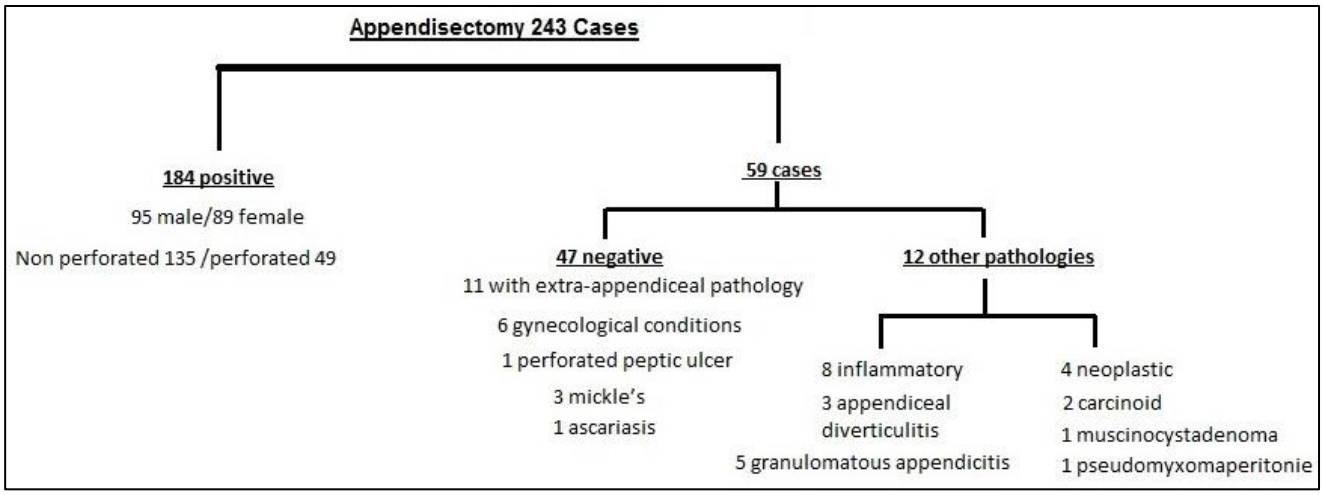

Figure 1: Summary of the study outcomes.

Table 1: Comparison of selected clinical parameters between Acute and negative appendeciectomy.

Criteria	Negative appendectomy	Acute appendicitis and other appendiceal pathologies	P value (univariate)
Sex (male:female)	1:1.88	1.07:1	<0.001
White blood cells* (x10^9 /L)	12.4-13.5	14.2-14.8	<0.001
Temperature† (ºC)	37.1-37.3	37.3-37.4	0.209
Pulse‡ (beats/min)	90-95	90.0-92.7	0.445
Duration of symptom§= (days)	2.0-2.6	2.1-2.5	0.741
Preoperative imaging (yes vs no)	16.6% vs. 19.2%	83.4% vs. 80.8%	0.205
Age‖	28.7% vs. 11.5%	71.3% vs. 88.5%	<0.001

Figure 1 summarizes the results of the study. Out of the total 243, 47 appendices were normal, making the overall NAR 19.3%; 14.0% in males and 24.6% in females (P<0.001).

Notably, female patients of reproductive age (11-50 years) had a higher NAR than those in the non-reproductive rate was 22.5% (24.8% in males versus 20.1% in females; P=0.68).

When study compared the perforation rate in different age-groups, patients at the extremes of age were more likely to have a perforation (25.2% versus 16.3%; P=0.002). On performing analyses, patients with a normal appendix tended to have a lower mean preoperative white cell count (P<0.001). Patients with a perforated appendicitis tended to have higher body temperatures and pulse rates on admission (P=0.004 and 0.003, respectively). Preoperative imaging was not associated with a lower NAR or perforation rate (p=0.205 and 0.218).

Table 2: Comparison of selected clinical parameters between perforate and non-perforated appendicitis.

Criteria	No perforation	Perforation	P value (univariate)
Sex (male:female)	1:1.14	1.32:1	0.003
White blood cell* (x 109 /L)	13.8-14.3	14.4-15.5	<0.001
Temperature† (ºC)	37.2-37.3	37.4-37.6	<0.001
Pulse‡ (beats/min)	88.8-91.4	95.6-100.6	<0.001
Duration of symptoms§ (days)	2.0-2.5	2.2-2.7	<0.001
Preoperative imaging (yes vs no)	83.2% vs 81.9%	16.8% vs 18.1%	0.218
Agexx	83.7% vs 74.8%	16.3% vs 25.2%	0.003

The 30-day mortality rate for patients who underwent appendectomy was negligible.

Appendiceal pathology other than acute appendicitis was found in 12 patients, making an overall percentage of 4.9%. The majority of these were inflammatory appendiceal lesions (8/12, 66.6%); 3 of them had appendiceal diverticulitis and 5 had granulomatous appendicitis. Of the 4 neoplastic appendiceal lesions, 3 were in males, and their ages ranged from 19,48 and 61years, 2 of neoplastic appendiceal pathology were carcinoid tumour, (0.8% of all appendectomies), and mucinous cystadenoma, pseudomyxomaperitonei were each found in one patient.

In 47 patients with a normal appendix, extra-appendiceal pathology was found in 11 (4.5% of all appendectomies); 6 (6.7% of all female patients) had a gynaecological pathology, including: ovarian cysts, endometriosis and pelvic inflammatory disease.

Meckels diverticulitis was found in three of the patients. one of the patients was found to have a perforated peptic ulcer and other patient was found to have ascariasis of the terminal ileum.

DISCUSSION

This study showed that the incidence of acute appendicitis remained similar throughout the 4-year period, which is consistent with the study performed.

Negative appendectomy and perforation of an inflamed appendix are the two main adverse outcomes in managing suspected acute appendicitis. They are usually the result of a low operative threshold and prolonged observation, respectively. Although this is a simple logic, the decision to operate or not is always a challenge even to a senior surgeon. The quoted NAR was 15 to 25%, but could be as high as 40% in female patients.[18]

The NAR in this study was 18.2%, which was within the expected range. Since the appendix is in close proximity to the reproductive organs in females, many common gynaecological conditions like dysmenorrhoea and ovarian cyst complications can masquerade as acute appendicitis, thus accounting for their higher NAR.[19,20]

Patients of extreme age are more likely to have a delayed diagnosis due to atypical presentations and less efficient communication.

Preoperative imaging has been advocated so as to minimise the chance of a negative appendectomy. Some studies even suggested that routine preoperative imaging could reduce the NAR, but others were contradictory.[21-23]

Routine preoperative imaging is not practical because (1) it could never replace taking a thorough history and physical routine preoperative examination; (2) it may overload the radiology department with abdominal pain patients, and (3) it could lead to delayed treatment and hence increased chance of perforation.

Study suggest preoperative imaging be offered more liberally to the two patient groups that we have discussed.

In this study demonstrates limited role of preoperative imaging in reducing the NAR and perforation rate, A properly designed prospective study in collaboration with

radiologists to standardise imaging and reporting could be helpful.

The appendectomy mortality rate in our study was negligible comparable to that in a Swedish study, in which 117, 424 patients were recruited and the average 30-day mortality was 0.19%.[24]

In this cohort, 4.9% of the patients had atypical appendicular pathology; some of whom required further clinical attention and surveillance. It is important that surgeons have some idea of how to deal with such atypical findings.

Prevalence of appendiceal diverticulitis was 1.2% lower than around 2% as quoted in the literature.[9] Many authorities consider appendiceal diverticulitis to be no different from ordinary appendicitis, although the former usually affects older subjects. In our series, the mean age of patients with appendiceal diverticulitis was 10 years older than those with acute appendicitis. The onset of abdominal pain could be more sub-acute and intermittent, and the respective perforation and mortality rates are 4 and 30 times more than those in the acute appendicitis.[25]

Granulomatous appendicitis was another inflammatory lesion encountered in this series, though the quoted point prevalence in western countries is 2%, it includes infection by fungi, Yersinia pseudotuberculosis, mycobacterium tuberculosis, parasites, Crohn"s disease, foreign body reactions, and sarcoidosis.[26]

After exclusion of these causes, idiopathic granulomatous appendicitis is a benign disease. However, follow-up is suggested because the differentiation of appendiceal Crohn"s and granulomatous appendicitis is difficult, and there are reports that granulomatous appendicitis may be a forerunner of Crohn's disease.[27]

Concerning the neoplastic appendiceal lesions, carcinoid tumour was the most common and contributed to 0.8% of the cases in this study, which is also comparable to the rate quoted in the literature (0.3-0.9%).[19,20] Most studies agree that appendectomy is the only required procedure in patients with carcinoid tumours of less than 2 cm in diameter, as they generally have a favourable prognosis. Right hemicolectomy should be considered if the tumour diameter exceeds 2 cm, there is evidence of mesoappendiceal extension and lymphovascular permeation, the tumour involves the base of appendix or caecum with positive margins, there is a high mitotic index and Ki67 levels, or goblet cell carcinoid is present.[28]

Nonetheless, laparotomy and right hemicolectomy are procedures associated with morbidity. Surgeons should therefore have a higher operative threshold for patients with advanced age and high operative risks in view of low recurrence rate, and the smoldering nature of carcinoid disease.[29]

In cases of appendiceal carcinoma and other non-carcinoid tumours, oncological resection with right hemicolectomy is the treatment of choice regular colonoscopic surveillance for metachronous tumour is recommended in patients with primary neoplastic appendiceal diseases, including carcinoid tumours.[30]

Concerning the pseudomyxomaperitonei, it is a rare condition secondary to the release of mucinous tumour cells from the appendix, usually by means of a ruptured mucocele.[26] Its treatment includes radical peritonectomy and hyperthermic intra-peritoneal chemotherapy.[31]

CONCLUSION

Appendectomy continues to be a very common surgical procedure. Study suggest a more liberal utilization of preoperative imaging in females of reproductive age, and patients at the extreme age.

Long-term follow-up should be offered to patients with granulomatous appendicitis and neoplastic appendiceal diseases, as there may be a potential for development of Crohn"s disease and carcinoma.

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REFERENCES

1. Penfold RB, Chisolm DJ, Nwomeh BC, Kelleher KJ. Geographic disparities in the risk of perforated appendicitis among children in Ohio: 2001-2003. Int J Health Geogr. 2008;7:56-65.
2. Newman K, Ponsky T, Kittle K, Dyk L, Throop C, Gieseker K, et al. Appendicitis 2000: variability in practice, outcomes, and resource utilization at thirty pediatric hospitals. J Pediatr Surg. 2003;38:372-9.
3. Bickell NA, Aufses AH, Rojas M, Bodian C. How time affects the risk of rupture in appendicitis. J Am Coll Surg. 2006.203:401-6.
4. Wullstein C, Barkhausen S, Gross E. Results of laparoscopic vs. conventional appendectomy in complicated appendicitis. Dis Colon Rectum. 2001;44:1700-5.
5. Papaziogas B, Tsiaousis P, Koutelidakis I, Giakoustidis A, Atmatzidis S, Atmatzidis K. Effect of time on risk of perforation in acute appendicitis. Acta Chir Belg. 2009;109:75-80.
6. Kearney D, Cahill RA, OBrien E, Kirwan WO, Redmond HP. Influence of delays on perforation risk in adults with acute appendicitis. Dis Colon Rectum. 2008;51:1823-7.
7. Carvalho BR, Diogo-Filho A, Fernandes C, Barra CB. Leukogram, C-reactive protein, alpha-1 acid glycoprotein and erythrocyte sedimentation rate in acute appendicitis. Arq Gastroenterol. 2003;40:25-30.

8. Costa JIF, Coelho Filho JM, Lima JMC, Mota RMS, Sousa Filho VJ. Value of abdominal ultrasound with a 5 to 10 mhz multifrequency transducer in the diagnosis of appendicitis. Radiol Bras. 2002;35:85-8.
9. Vital PF, Martins JL. Current status of diagnosis and treatment of acute appendicitis in children: evaluation of 300 cases. Rev Col Bras Cir. 2005;32:310-5.
10. Zorzetto AA, Urban LABD, Liu CB, Cruz OR, Vitola MLM, Awamura Y, et al. O uso da ultra-sonografia no diagnóstico e evolução da apendicite aguda. Radiol Bras. 2003;36:71-5.
11. Gomes CA, Nunes TA. Laparoscopic classification of acute appendicitis: correlation between degrees of disease and perioperative variables. Rev Col Bras Cir. 2006;33:289-93.
12. Silva SM, Almeida SB, Lima OAT, Guimarães GMN, Silva ACC, Soares AF. Risk factors for complications after appendectomies in adults. Rev Bras Colo-Proctol. 2007;27:31-6.
13. Brenner AS, Santin J, Virmond Neto F, Boursheid T, Valarini R, Rydygier R. Appendectomy in patients older than 40 years: analysis of the results of 217 cases. Rev Bras Colo-Proctol. 2006;26:128-32.
14. Almeida MWR, João AT, Oliveira FS, Mattos HC, Silva AR, Silva MGB. Influence of age on length of hospital stay and the degree of evolution of acute appendicitis. Rev Col Bras Cir. 2006;33:294-7.
15. Lima GJS, Silva AL, Castro EG, Abras GM, Pires LJS, Leite RFG. Effectiveness and safety of video-assisted appendectomy in single transumbilical portal in adolescents and adults. Rev Col Bras Cir. 2008;35:244-51.
16. Fischer CA, Pinho MSL, Ferreira S, Milani CAC, van Santen CR, Marquardt RA. Acute appendicitis: is there a relation between the evolutionary grade, age and length of hospital stay? Rev Col Bras Cir. 2005;32:136-8.
17. Kpolugbo J, Njoku T, Osime U. A study of negative appendectomy. Sahel Med J 2003;6:72-4.
18. Seetahal, Shiva A. Negative appendectomy: a 10-year review of a nationally representative sample. Am J Surg. 2011;4:433-7.
19. Humes DJ, Simpson J. Acute appendicitis. BMJ. 2006;333:530-4.
20. Paulson EK, Kalady MF, Pappas TN. Clinical practice. Suspected appendicitis. N Engl J Med. 2003;348:236-42.
21. Wagner PL, Eachempati SR, Soe K, Pieracci FM, Shou J, Barie PS. Defining the current negative appendectomy rate for whom is preoperative computed tomography making an impact? Surg. 2008;144(2):82-6.
22. SCOAP Collaborative, Cuschieri J, Florence M, Flum DR. Negative appendectomy and imaging accuracy in the Washington State Surgical Care and Outcomes Assessment Program. Ann Surg. 2008;248:55-63.
23. Lee SL, Walsh AJ, Ho HS. Computed tomography and ultrasonography do not improve and may delay the diagnosis and treatment of acute appendicitis. Arch Surg. 2001;136:556-62.
24. Blomqvist PG, Andersson RE, Granath F, Lambe MP, Ekbom AR. Mortality after appendectomy in Sweden, 1985-1996. Ann Surg. 2001;233:455-60.
25. Stollman N, Raskin JB. Diverticular disease of the colon. Lancet. 2004;363(9409):631-9.
26. Zulfikar I, Khanzada TW, Sushel C, Samad A. Review of the pathologic diagnoses of appendectomy specimens. Ann King Edward Med Univ. 2009;15(4):168.
27. Tucker ON, Healy V, Jeffers M, Keane FB. Granulomatous appendicit. Surg. 2003;1:286-9.
28. Turaga KK, Pappas SG, Gamblin TC. Importance of histologic subtype in the staging of appendiceal tumors. Ann Surg Oncol. 2012;19(5):1379-85.
29. Bamboat ZM, Berger DL. Is right hemicolectomy for 2cmappendiceal carcinoids justified? Arch Surg. 2006;141:349-52.
30. Modlin IM, Lye KD, Kidd M. A 5-decade analysis of 13,715carcinoid tumors. Cancer. 2003;97:934-59.
31. Sugarbaker PH. New standard of care for appendiceal epithelial neoplasms and pseudomyxoma peritonei syndrome? Lancet Oncol. 2006;7(1):69-76.

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