

Histopathological Diagnoses of Appendectomy Specimens

Rayan Abudlrazaq Qassim^{1*}, Qusay Mohammad Hussein²,

¹Ministry of Health, Alkhanssa Hospital, Mosul city, Iraq

², ¹Ministry of Health, Alkhanssa Hospital, Mosul city, Iraq

*nursing@uomosul.edu.iq

ABSTRACT

This research aims to assess the different histopathological diagnoses of appendectomy specimens to identify unusual factors for appendicitis and compare them to other reports. The research was conducted at Al Khanssa Teaching Hospital in Mosul, Iraq, in the Department of Pathology. Between January 2019 and December 2020, the histopathology department collected a total of 287 appendicectomy specimens. Both emergency and interval appendicectomies for clinically suspected appendicitis, as well as incidental appendicectomies for other procedures, were included in the study. Clinical data that was relevant was recovered. It was discovered that the results were disgusting. Specimens were fixed in 10% formalin, processed with routine tissue processing and paraffin embedding, and parts of 5-micrometer thickness were obtained. The staining was done with hematoxylin and eosin. Based on the data, histopathological diagnoses were suggested. A total of 287 appendicectomy specimens were received in the pathology department for an 18-month study period. There were 171 males and 116 females among these patients, resulting in a male to female ratio of 1.5:1.]. Acute appendicitis was seen in most cases (153 out of 287), followed by recurrent appendicitis (112 cases), appendicular abscess (18 cases), and perforated appendix (10 cases) (02 cases). In the current analysis, unexpected results were found in about 4 out of 287 cases. Both pre-operative investigations yield non-specific results, and the final diagnosis is made only after histopathology. And if there is any unusual/co-existing pathology, histopathology is still used to validate the diagnosis.

Keywords

Histopathological, Appendectomy, Mosul

Introduction

The most serious general surgical emergency is acute appendicitis. Appendicitis is a 7 percent lifelong risk that most often affects adolescents and young adults. (Jat, Al-Swailmi, Mehmood, Alrowaili, & Alanazi, 2015; Kumar, Abbas, Fausto, & Aster, 2014). Every year, over 40,000 cases are recorded in the United Kingdom (Digital, 2015), and the average lifetime risk of appendicitis in the United States (Addiss, Shaffer, Fowler, & Tauxe, 1990) is 8.6% for males and 6.7 percent for females, respectively. On histopathological review, approximately 20% of patients who undergo appendicectomy are found to be free of acute appendicitis. (Rothrock, Green, Dobson, Colucciello, & Simmons, 1995) Females are more likely to experience this than males. A diagnosis of acute appendicitis is challenging to make in many patients, particularly females. Appendicitis misdiagnosis is so prevalent in nonpregnant females of childbearing age that appendicectomy (also known as appendectomy in North America) is the most commonly performed urgent abdominal surgery. (Mowla, 2021) As a result, this research aims to assess the different histopathological diagnoses of appendectomy specimens to identify unusual factors for appendicitis and compare them to other reports.

Materials and Method

The research was conducted at Al Khanssa Teaching Hospital in Mosul, Iraq, in the Department of Pathology. Between January 2019 and December 2020, the histopathology department

collected a total of 287 appendectomy specimens. Both emergency and interval appendectomies for clinically suspected appendicitis, as well as incidental appendectomies for other procedures, were included in the study. Clinical data that was relevant was recovered. It was discovered that the results were disgusting. Specimens were fixed in 10% formalin, processed with routine tissue processing and paraffin embedding, and parts of 5-micrometer thickness were obtained. The staining was done with hematoxylin and eosin. Based on the data, histopathological diagnoses were suggested.

Results

A total of 287 appendectomy specimens were received in the pathology department for an 18-month study period. There were 171 males and 116 females among these patients, resulting in a male to female ratio of 1.5:1. [Table 1] . Acute appendicitis was seen in most cases (153 out of 287), followed by recurrent appendicitis (112 cases), appendicular abscess (18 cases), and perforated appendix (10 cases) (02 cases). In the current analysis, unexpected results were found in about 4 out of 287 cases. In three of the seven cases, intraluminal parasites were found, which were consistent with *Enterobius vermicularis*. In three cases, an appendix carcinoid tumor was discovered. One of the seven patients had a Mucinous cystadenoma of the appendix, which was seen in one of the cases. Acute/Recurrent appendicitis was diagnosed preoperatively in these 7 cases with an incidental irregular diagnosis on histopathological review. As a result, the discovery of these results had a significant effect on patient care. The incidence of negative appendectomy was 9.2%, accounting for 21 cases. Clinically, these patients were diagnosed with acute/recurrent appendicitis, but histopathological testing revealed that the primary cause of acute abdominal pain was caused by another pathology. (Table 2)

Table 1.Age & gender-specific distribution in acute appendicitis patients

Age (years)	Males		Females		Total
20-29	101	60.8	65	39.16	166
30-39	44	57.1	33	42.86	77
40-49	8	57.1	6	42.86	14
50-59	12	60.0	8	40.00	20
60-69	6	60.0	4	40.00	10
Total	171	59.6	116	40.42	287

Table 2: Analysis of histopathological findings of appendectomy specimens

Clinical Diagnosis	Histopathological Diagnosis	%	Total
Acute Appendicitis	Acute Appendicitis	153	53.3
Chronic/Recurrent appendicitis	64	41.83	
Acute suppurative appendicitis	11	7.19	
Eosinophilic appendicitis	9	5.88	
Gangrenous appendicitis	8	5.23	
Perforated	15	9.80	
Enterobius vermicularis	19	12.42	
Carcinoid	17	11.11	
Negative appendectomy	10	6.54	

Total	153	100.00	
Recurrent Appendicitis			
	Acute Appendicitis	112	
Chronic/ Recurrent appendicitis	49	43.75	
Eosinophilic appendicitis	19	16.96	
Gangrenous appendicitis	13	11.61	
Enterobius vermicularis	5	4.46	39.1
Carcinoid	8	7.14	
Mucinous cystadenoma	6	5.36	
Negative appendicectomy	12	10.71	
Total	112	100.00	
Appendicitis with			
	Perforated	4	1.3
Appendicular abscess			
	Acute suppurative appendicitis	18	6.3

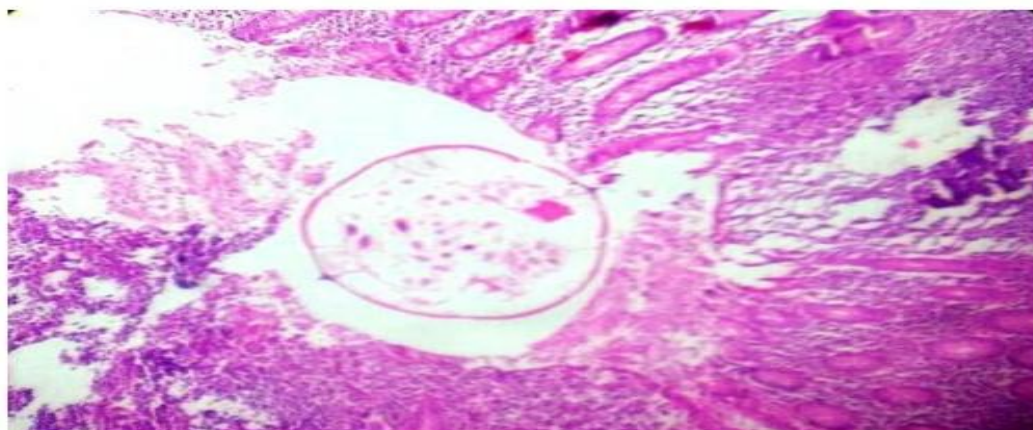


Figure 1.Microphotograph displaying enterobius vermicularis in lumen of Appendix.
(H & E, 10X)

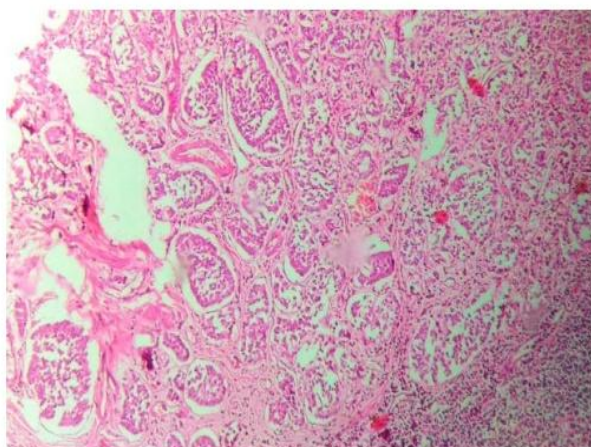


Figure 2. Microphotograph of Carcinoid tumor

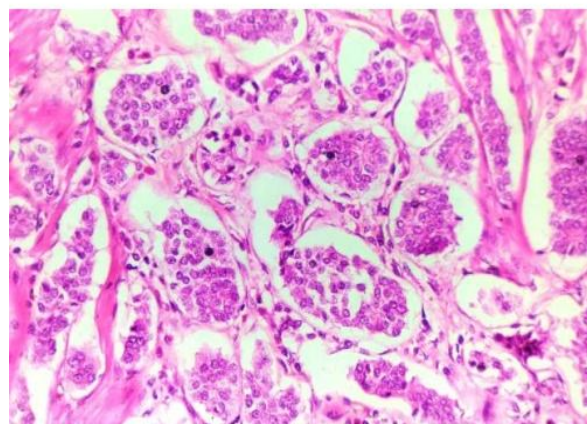


Figure 3.Microphotograph of Carcinoid tumor with individual cells showing salt and pepper chromatin and retraction of peripheral tumor cells from stroma (H & E, 40X)

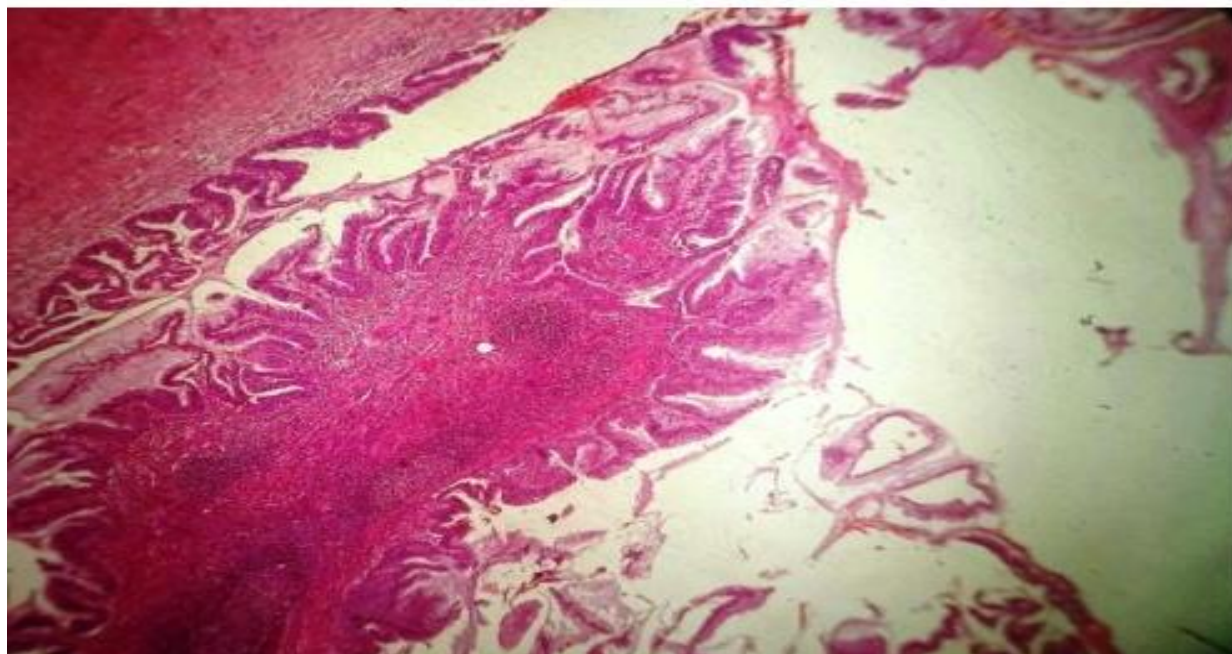


Figure 4. Microphotograph showing Mucinous Cystadenoma with glands lined by pseudostratified columnar epithelium, individual cells have basally located elongated, crowded, hyperchromatic nuclei with mild atypia and scattered goblet cells with mucin in cavity (H & E, 10X)

Discussions

Accounts for about 40% of all surgical emergencies. In Asian and African nations, it is uncommon. (Mkodo, 2020) Recent studies indicate that appendicitis is becoming more common in African countries because of the adoption of a western diet and lifestyle. Appendicitis rates vary greatly depending on country, ethnicity, age, gender, geographic area, socioeconomic status, dietary habits, and hygiene. (Farrokhyar, Swarbrick, & Irvine, 2001) Most people consider the vermiform appendix to be a vestigial organ. Its clinical significance stems from its proclivity for inflammation, which leads to the clinical syndrome of acute appendicitis. (NADU, 2017; Sujeetha, 2017) Reginald Fitz was the first to recognise acute appendicitis as a clinical entity. Charles Mc Burney identified the clinical manifestations of acute appendicitis shortly afterward, including the point of maximum tenderness in the right iliac fossa, which bears his name. (Chapter & Lu'ukia Ruidas, 2018) Luminal obstructions, such as faecolith, fibrosis, or stricture, can cause aerobic and anaerobic bacteria to proliferate. (Sujatha, Anushree, Singh, & Oncology, 2017) Lymphoid hyperplasia may also cause luminal obstruction by narrowing the lumen. Following obstruction, mucus secretion and inflammatory exudation begin, resulting in increased intraluminal pressure and lymphatic drainage obstruction (Schaefer & Schaefer, 2021) There is a disparity between the histopathological and clinical diagnosis in around 15-30% of cases diagnosed as acute appendicitis, according to studies. (Sammalkorpi, 2017) The benefit of an appendix histopathological examination is that it confirms the diagnosis of acute appendicitis. (Styrud et al., 2006) It also shows other significant pathological findings that may

not be visible on a gross examination intraoperatively but that may have an effect on the patient's clinical management. (Sen, Triana, Berglind, Godbold, & Shrivastava, 2010) Regardless of technological advancements, there is no laboratory test or analysis that has sufficient precision and sensitivity to reliably diagnose appendicitis. (Terasawa, Blackmore, Bent, & Kohlwes, 2004) Appendicitis affects about 7% of the population at some point in their lives, with the incidence peaking between the ages of 10 and 30. (Ferris et al., 2017) Emergency appendectomy was the most common reason in this report, followed by interval appendectomy (Fitzmaurice, McWilliams, Hurreiz, & Epanomeritakis, 2011). Most patients (53.5 percent) who had appendectomies were between the ages of 20 and 29 [Table 1], which matched the findings of Marudanayagam et al., who found that the majority of appendectomies (64.58 percent) were performed in the second decade of life. (Marudanayagam, Williams, & Rees, 2006) Males (60.4 percent) had more appendectomies than females (39.5 percent), which was consistent with results by Zulfikar et al., who retrospectively analyzed 323 appendectomies, of which 196 (60.7 percent) were males and 127 (39.5 percent) were females. (Zulfikar, Khanzada, Sushel, & Samad, 2009) Among 230 appendectomy specimens, 205 (89.1%) were found to be non-neoplastic lesions and only 04 (1.8%) cases were diagnosed as neoplastic lesions; the remaining 21 (9.1%) cases showed normal histology of appendix. [Table 4]. Blair et al. estimated that non-neoplastic lesions accounted for 80% of appendectomy cases, while neoplastic lesions accounted for 4% (Blair, Dosemeci, & Heineman, 1993). Normal histology of the appendix was seen in the remaining cases (8.7%), which was consistent with our findings. Many patients in this study had right iliac fossa pain, which was accompanied by generalized abdominal pain. In their research, Edino et al. found that abdominal pain was the most common presenting symptom in these patients. (Edino, Mohammed, Ochicha, & Anumah, 2004) Mucosal congestion was the most common unusual gross finding in our sample (78.2%), followed by the presence of faecolith in the appendiceal lumen (13.1 percent). This was supported by Majid et al.'s report, which looked at 250 appendectomy cases and found that mucosal congestion was the most common finding in 218 (87.2%) of them. (Majeed & Anwer, 2020) In the present study, acute appendicitis accounted for the most common histopathological lesion for which appendectomy was done and was seen in 46.5% of patients. These results were similar to those of Blair et al. and Edino et al. Chronic appendicitis was the second most common lesion, accounting for 27.8% of all cases. On the contrary, Edino et al., in their study, reported 17% cases of chronic appendicitis. Acute suppurative appendicitis was reported in 15 (6.5%) patients. Our study included 08 cases (3.5%) of eosinophilic appendicitis. A lack of neutrophils characterizes eosinophilic appendicitis, and there is eosinophilic infiltration in the muscle layer with edema supporting muscle fibers. (Aravindan, Vijayaraghavan, Manipadam, & Microbiology, 2010) It may be associated with helminth infection, e.g., Schistosomiasis, Strongyloides, or Enterobius. Many studies have revealed that Type I hypersensitivity may also trigger the condition. The findings of appendicitis with gangrene and perforation were reported in 05 (2.2%) and 03 (1.3%) cases, respectively. These findings justified the delay by patients in seeking medical care. The presence of Enterobius vermicularis in the appendix usually produces symptoms resembling acute appendicitis. In our study, we reported 03 cases (1.3%) of Enterobius vermicularis presenting with features of acute appendicitis. Interestingly, it was an incidental finding in histopathological examination. Worldwide, the reported incidence of Enterobius infection in patients with symptoms of appendicitis ranges from 0.2% to 41.8%. [Fig. 1] Three cases of carcinoid were discovered by chance, accounting for 1.3 percent of the total cases. Similarly, in their report, Hof et al. diagnosed carcinoids in just 07 (0.47 percent) cases. (Hart, 2005) Appendiceal carcinoid tumors are present in 0.3 percent to 2.27 percent of patients who have their appendix removed. These

tumors present clinically as appendicitis due to luminal obstruction and elevated levels of serotonin, histamine, and kinin, both of which are potent inflammatory mediators. seventeenth) [Figures 2, 3] In our research, an incidental diagnosis of Mucinous cystadenoma was made (0.4%), which matched the findings of Marudanayagam et al., who found mucinous cystadenoma in 0.6 percent of cases. (1.) The remaining cases (21 cases) had no pathological abnormalities and were categorized as common appendices, accounting for a 9.2% negative appendectomy average. Table 3 This was consistent with other research, which found that the incidence of negative appendectomy ranged from 6.1 to 34.2 percent, [Figure .4]

Conclusion (Times New Roman, bold, 12)

The prevalence of appendicitis is highest in the second and third decades of life. It is difficult to make an accurate macroscopic evaluation during surgery, which emphasizes the importance of sending all appendectomy specimens for routine histopathological inspection. Both pre-operative investigations yield non-specific results, and the final diagnosis is made only after histopathology. And if there is any unusual/co-existing pathology, histopathology is still used to validate the diagnosis.

References

- [1] Addiss, D. G., Shaffer, N., Fowler, B. S., & Tauxe, R. V. J. A. j. o. e. (1990). The epidemiology of appendicitis and appendectomy in the United States. 132(5), 910-925.
- [2] Aravindan, K., Vijayaraghavan, D., Manipadam, M. T. J. I. J. o. P., & Microbiology. (2010). Acute eosinophilic appendicitis and the significance of eosinophil-Edema lesion. 53(2), 258.
- [3] Blair, A., Dosemeci, M., & Heineman, E. F. J. A. j. o. i. m. (1993). Cancer and other causes of death among male and female farmers from twenty-three states. 23(5), 729-742.
- [4] Chapter, I., & Lu'ukia Ruidas, M. (2018). Chapter IX. 7. Gastrointestinal Foreign Bodies.
- [5] Digital, N. (2015). Hospital Episode Statistics, Admitted Patient Care England, 2014–15.
- [6] Edino, S., Mohammed, A., Ochicha, O., & Anumah, M. (2004). Appendicitis in Kano, Nigeria: A 5-year review of pattern, morbidity and mortality.
- [7] Farrokhyar, F., Swarbrick, E., & Irvine, E. J. J. S. j. o. g. (2001). A critical review of epidemiological studies in inflammatory bowel disease. 36(1), 2-15.
- [8] Ferris, M., Quan, S., Kaplan, B. S., Molodecky, N., Ball, C. G., Chernoff, G. W., . . . Ng, S. J. A. o. s. (2017). The global incidence of appendicitis: a systematic review of population-based studies. 266(2), 237-241.
- [9] Fitzmaurice, G. J., McWilliams, B., Hurreiz, H., & Epanomeritakis, E. J. C. j. o. S. (2011). Antibiotics versus appendectomy in the management of acute appendicitis: a review of the current evidence. 54(5), 307.
- [10] Hart, W. R. J. I. J. o. G. P. (2005). Mucinous tumors of the ovary: a review. 24(1), 4-25.
- [11] Jat, M. A., Al-Swailmi, F. K., Mehmood, Y., Alrowaili, M., & Alanazi, S. J. P. j. o. m. s. (2015). Histopathological examination of appendectomy specimens at a district hospital of Saudi Arabia. 31(4), 891.

- [12] Kumar, V., Abbas, A. K., Fausto, N., & Aster, J. C. (2014). Robbins and Cotran pathologic basis of disease, professional edition e-book: Elsevier health sciences.
- [13] Majeed, M. N. A., & Anwer, Z. M. J. I. J. o. P. S. (2020). Comparing the Efficacy of Paracetamol, Diclofenac, and Ketorolac on Post-Appendectomy Outcomes in Children and Adolescents. 29(1).
- [14] Marudanayagam, R., Williams, G. T., & Rees, B. I. J. J. o. g. (2006). Review of the pathological results of 2660 appendectomy specimens. 41(8), 745-749.
- [15] Mkodo, J. J. (2020). Predictors of poor outcome in emergency pediatric gastrointestinal surgeries at University of Dodoma affiliated teaching hospitals. The University of Dodoma,
- [16] Mowla, G. J. S. J. A. M. S. (2021). A Histopathological Study of the Appendix after Surgical Resection. 3, 381-384.
- [17] NADU, C. T. (2017). EVALUATION OF VALIDITY OF SCORING SYSTEMS IN DIAGNOSING ACUTE APPENDICITIS IN SOUTH INDIAN POPULATION.
- [18] Rothrock, S. G., Green, S. M., Dobson, M., Colucciello, S. A., & Simmons, C. M. J. T. J. o. e. m. (1995). Misdiagnosis of appendicitis in nonpregnant women of childbearing age. 13(1), 1-8.
- [19] Sammalkorpi, H. (2017). Diagnosis of acute appendicitis: diagnostic scoring and significance of preoperative delay.
- [20] Schaefer, J. L., & Schaefer, D. P. (2021). Acquired causes of lacrimal system obstructions. In Smith and Nesi's Ophthalmic Plastic and Reconstructive Surgery (pp. 521-543): Springer.
- [21] Sen, C., Triana, A. I., Berglind, N., Godbold, J., & Shrivastava, R. K. J. J. o. n. (2010). Clival chordomas: clinical management, results, and complications in 71 patients. 113(5), 1059-1071.
- [22] Styru, J., Eriksson, S., Nilsson, I., Ahlberg, G., Haapaniemi, S., Neovius, G., . . . Granström, L. J. W. j. o. s. (2006). Appendectomy versus antibiotic treatment in acute appendicitis. a prospective multicenter randomized controlled trial. 30(6), 1033-1037.
- [23] Sujatha, R., Anushree, C., Singh, N. J. I. J. o. P., & Oncology. (2017). Histopathological spectrum of appendectomy specimens-A prospective study. 4(4), 638-642.
- [24] Sujeetha, K. (2017). Evaluation of Validity of Scoring Systems in Diagnosing Acute Appendicitis in South Indian Population. Madras Medical College, Chennai,
- [25] Terasawa, T., Blackmore, C. C., Bent, S., & Kohlwe, R. J. J. A. o. i. m. (2004). Systematic review: computed tomography and ultrasonography to detect acute appendicitis in adults and adolescents. 141(7), 537-546.
- [26] Zulfikar, I., Khanzada, T. W., Sushel, C., & Samad, A. J. A. o. K. E. M. U. (2009). Review of the pathologic diagnoses of appendectomy specimens. 15(4), 168-168.