

Acute Appendicitis, Correlating Histopathological Findings with clinical - is histopathology needed for all?

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ABSTRACT

Background: Acute appendicitis is a most common presentation in general surgery department and thus appendectomy holds large number of emergency operations in the UK and most part of the world. Histopathological examination of the appendectomy specimens are routinely carried out.

Aim: To correlate the histological findings of appendectomy specimens with the clinical diagnosis of acute appendicitis and need for routine histopathology.

Methods: This is a retrospective analysis of 148 appendectomies carried out in a two tertiary care hospitals of Pakistan between January and December 2014. The Histopathology reports of appendectomy specimens were retrieved. Data was analysed using SPSS 20.0.

Results: 148 appendectomies were performed during the study period. The mean age of the patients was 31.6±11.2 years. Patients age >16 years were 82.4% and total number of female patients were 56.08%. Of the 148 resected appendix, 126(85.13%) had histopathology findings consistent with acute appendicitis. Around 3.37% of the 148 specimens were abnormal pathologies other than inflammation of the appendix. The negative appendectomy rate was 9.46%. The female sex accounted for 64.28% of the negative appendectomies.

Conclusion: Appendectomy in female gender results in high negative rate which can be overcome by judicious use of imaging studies. Unusual pathologies are rare and it can have impact on patient's outcome, but it can be surgeon's choice as per-operative findings are usually sufficient for identifying unexpected nature of condition. Through this it can not only have reduced financial burden on patients but also reduce workload of pathologists.

Keywords: Acute appendicitis, histopathology,

INTRODUCTION

Acute appendicitis is a common surgical emergency accounting for around 40000 cases in UK per year and life time risk in USA for males and female is approximately 8.6% and 6.7% respectively^{1,2}. Diagnosis is made mostly through clinical examination and appendectomy is procedure of choice. Delayed in diagnosis could result in increased morbidity and mortality and complications like perforation, peritonitis or sepsis^{3,4}. Most common presenting symptom is pain in right iliac fossa but in cases of female it could be misleading and led to increase rates of negative appendectomies⁵. There is variation in practice for sending and performing histopathological examination of surgically resected appendix. Common arguments of it is of chances of getting rare pathologies, financial implications and time constraints on the end of pathologists^{6,7}. It is common practice in our country to send all appendix

specimens for histopathological examinations, the aim of this study to correlate the histopathological findings with clinical diagnosis and its impact on patient's outcome and pathologist.

METHODS

A retrospective study was carried out from January 2014 till December 2014 from two different tertiary care hospitals of Pakistan. Patients who had appendectomies during the study period were enrolled in the study. Population characteristics and histopathological reports of appendectomy specimens were retrieved from records. Primary outcome measure was appendicitis confirmed by histopathology. Negative appendectomies were categorized as those appendix specimen which were removed in suspicion of appendicitis but histopathological findings showed normal appendix without inflammation, tumor or parasitic infestation^{8,9,10,11}. Patients without inflammation fibrous obliteration of lumen of appendix and reactive lymphoid hyperplasia were not included as abnormal findings^{9,12}. Analysis of data was carried out through SPSS 20.0.

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RESULTS

Overall, 148 appendectomies were done in the given time period. The mean age of patients was 31.6 ± 11.2 years. Patients of age greater than 16 years were found in majority and constitute to be 82.43% of study population. Females were predominated as shown in table I.

Table I. Patients characteristics that underwent appendectomies

Characteristics	n
Age (mean years)	31.6±11.2
Patient >16 years of age	122 (82.4%)
Females	83 (56.08%)
Negative appendectomy rate	14 (9.46%)
Females with normal appendix	09 (64.28%)
Patients >16 years of age with normal appendix	12 (85.71%)
Imaging studies	
Ultrasound	87 (58.78%)
CT scan	12 (8.10)

85.13% (126) patients had findings consistent with acute appendicitis on histopathological examination that includes acute suppurative appendicitis, transmural inflammation of the appendix with or without presence of fecolith and gangrenous perforated appendix. Three case were reported to have fibrous obliteration of appendix lumen. Around 3.37% of patients had unusual findings on histopathology as shown in table II. One case that reported mucinous cystadenoma had a nodule of 6 mm in maximum dimension measured. Focal dilatation of appendix lumen and mild atypical epithelium seen. Extravasation of mucin with a single gland suggestive of cystadenoma with low grade dysplasia associated with inflammation. Two case found to have carcinoid at tip of appendix with positive staining. All these patients had appendectomy as treatment of choice. Negative appendectomy rate was 9.46% and patients greater than 16 years of age represent 85.71% of it.

Table II. Histopathological characteristics of appendix specimen

Specimen	n
Acute appendicitis	126 (85.13%)
Normal appendix	14 (9.46%)
Fibrous Obliteration	03 (2.02%)
Unusual findings	05 (3.37%)
Carcinoid Tumor	02
Mucinous cystadenoma	01
Granulomatous lesion with crohn's diseases	02

87 patients had ultrasound scan performed to confirm findings of acute appendicitis and most of them were

female patients (93.10%). On ultrasound scan 8 patients had negative findings whereas 13 patients had findings that are inconclusive. Rest of them had positive ultrasound findings. Relating histopathological findings with ultrasound scan five patients with initially negative findings on ultrasound scan were found to have positive histopathology whereas, 10 patients with inconclusive findings were found to have positive of pathology findings. Out of positive scan most of them correlate well with histopathology report (96.9%). 12 patients found to have positive findings on CT scan and pathology report both increasing sensitivity of CT scan.

DISCUSSION

This study correlates the histopathological findings with imaging studies and reported negative appendectomy rate. As appendectomy is common surgical procedure performed, negative appendectomy rate varies from 6% to 40%^{9,13,14}. Suggested acceptable rate for institution worldwide is around 20%^{4,12} and the result of this study is 9.46%. The high rates of negativity relates to avoiding and missing cases of appendicitis such as perforation, peritonitis, abscess and sepsis¹². Flum and Koepsell reported that negative appendectomy rates was associated with significant stay at hospital (5.8 versus 3.6 days, $P < 0.001$), Surgical infections (2.6% versus 1.8%, $P < 0.001$) and total financial burden (\$18780 versus 10584, $P < 0.001$). Around \$741.5 million in total hospital charges were resulted from admission in which there is a negative appendectomy performed¹⁶. Thus negative rate is a measure of quality in management of acute appendicitis at any institution. Rate of negative appendectomies are declining and this is because of increased use of imaging studies especially computed tomography and laparoscopy for appendicitis¹⁹. However definitive causal relationship has not been established. CT scan has greater sensitivity (90-100%) and positive predictive value of (95-97%) and proven to be superior to ultrasound for suspected appendicitis⁴. This observation is consistent with the findings in the given article also. The role of imaging in reducing negative rates had also been reported by Raja et al. They observed significant reduction in negative rates to only 1% when CT scan is performed pre-operatively¹¹. Our study emphasizes on clinical findings, examination and imaging in selected cases to diagnose appendicitis which was always a clinical diagnosis. Also at country where economic status is not stable it is hardly bearable for common people to get funds for imaging studies like CT scan.

Negative appendectomies were reported to be on higher side in female gender which was

documented in most of studies in literature^{8-10,20,21}. Seetahal et al. reported 71.6% of negative appendectomies in female patients out of 475,651 cases¹⁷. Our study also had same findings and accounts for 64.28%. Multiple reasons had been documented and most common among them were gynecological issues¹⁷. Unusual findings in resected appendix specimen are rare. But they require gastroenterology followup, periodic surveillance, antituberculous medication, anti-helmentic treatment, colectomy and palliative care²². Findings of unusual pathologies in our study was around 3.37% consistent with literature. Studies done by Duzgun et al²⁸ have 0.7%, by Marudanayagam et al⁸ have 7%, Jones et al⁷ have 3.8%, Khan et al²⁹ have 4.2%, Chamisa found to have 8.6%, Akbulut et al.²⁴ have 1%, Chandrasegaram et al²⁷ found to have 2.5%, Emre et al²⁵ have 7%, Charfi et al⁸ have 7.4%, Karagulle et al²⁶ found to have 3.9% of negative appendectomy rate. Documented unusual pathologies in literature are endometriosis, primary or secondary adenocarcinoma, neurofibroma, lymphomas, granulomatous conditions suspicious for tuberculosis and crohn's disease, eosinophilic appendicitis, E. vermicularis and actinomycosis of the appendix^{8,22,30,31}. Whereas in our study carcinoid, mucinous and granulomas associated with crohn's disease were present. Patient with crohn's were followed up at gastroenterology clinic while remaining were put of periodic surveillance. Systemic analysis of 19 studies also highlights that incidence of unexpected findings in appendectomy specimen is low and intraoperative diagnosis alone appears sufficient for identifying unexpected disease²². Average cost of processing appendix specimen in Pakistan varies across hospital but average is around 15-40 USD (1USD= 105) and average time spent by pathologist for one specimen is around 60-90 minutes including reporting of findings. In our study 148 patients had specimen sent to pathologist and 126 of them had findings of acute appendicitis that should be picked clinically only and if it would not be sent for examination than it would have save around 1890-5040 USD. Also load on pathologist would be reduced and it could save their 11340 minutes.

CONCLUSION

To conclude, appendectomy in female gender results in high negative rate which can be overcome by judicious use of imaging studies. Unusual pathologies are rare and it can have impact on patient's outcome, but it can be surgeon's choice as per-operative findings are usually sufficient for identifying unexpected nature of condition. Through this it can

not only have reduced financial burden on patients but also reduce workload of pathologists.

Conflict of interest

Disclosure: The authors declare no conflict of interest.

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