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Original Article

Negative Appendicectomies in Young Female Patients with High Clinical Suspicion of Acute Appendicitis

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ABSTRACT

Objective: To determine negative appendicectomies, both open and laparoscopic, in young female patients with high clinical suspicion of acute appendicitis (Alvarado Score ≥7).
Study Design: Quasi-experimental study
Place and Duration of Study: Department of General Surgery, Combined Military Hospitals, Rawalpindi and Quetta Pakistan, from Oct 2021 to Nov 2023.
Methodology: A total of 150 female patients aged between 12 to 30 years, with Alvarado score ≥7 were included in the study. Baseline characteristics were documented. All patients underwent appendicectomy and retrieved appendix was sent to histopathology lab for histopathological diagnosis based on which negative appendicectomies were identified.
Results: In this study, mean age of patients was 21.50±3.16 years. Twenty-eight (18.67%) patients underwent open appendicectomy while 122(81.33%) patients underwent laparoscopic appendicectomy. Composite negative appendicectomy was seen in 37(24.67%) cases. No statistically significant association was found between type of surgery and negative appendicectomy (p=0.595).
Conclusion: In young females, even in the presence of high clinical suspicion, the rate of negative appendicectomies is relatively high.

Keywords: Appendicitis, Appendectomy, Laparoscopy.

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INTRODUCTION

Acute appendicitis is a highly common type of emergency that is frequently encountered in emergency rooms with a high reported incidence and is effectively treated by the surgical removal of the appendix through a surgical procedure named appendicectomy.[1-4]

One phenomenon which has led to increased trend towards conservative management and a decrease in the overall number of appendicectomies performed across the globe is the occurrence of negative appendicectomies, which is when a patient has their appendix removed due to a clinical suspicion of appendicitis, but the appendix is found to be normal during surgery.[5] This rise in rate of negative appendicectomies is attributed to various reasons, including lack of specificity of the clinical scoring systems (such as Alvarado score, which has <50% specificity) that have been used for decades to ascertain the diagnosis of acute appendicitis and proceed towards appendicectomy.[6] Also, the clinical manifestations of acute appendicitis, particularly in younger population, tends to deviates from the usual pattern, presenting with symptoms that resemble those of other systemic conditions which often results in incorrect diagnosis.[7] Gender may also be a factor, as the majority of times patients who have histologically normal appendix after appendicectomy are female.[8]

In developing countries like Pakistan, where surgical facilities are already overburdened and most of the population is unable to afford the cost of appropriate post-operative care, it is essential to have a clearly quantified knowledge of rate of negative appendicectomies, as this can help healthcare institutions to adopt a reformed diagnostic policy for acute appendicitis. Therefore, this study was conducted with the aim of determining negative appendicectomies in young population (particularly females) presenting with high clinical suspicion of acute appendicitis.

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METHODOLOGY

This Quasi-experimental study was conducted at the Surgical Departments of Combined Military Hospitals, Rawalpindi and Quetta from October 2021 to November 2023, after taking approval from ethical review boards of both the institutions (ERB #: 526 and CMH QTA-IERB/17/2023, respectively).

Inclusion Criteria: Females aged between 12 and 30 years who presented in the emergency surgical department with high clinical suspicion of acute appendicitis defined as Alvarado score ≥7 were included.

Exclusion Criteria: Females who had perforation of appendix at presentation, had obvious appendicular obstruction by a radiologically visible mass or fecolith, who previously were managed conservatively for acute appendicitis, ongoing menstruation and pregnant females were excluded from the study.

Using the WHO calculator, sample size was estimated assuming anticipated frequency of negative appendicectomy in females of 20.8%[9], which came to 150.

Patients in this study were recruited by using non-probability consecutive sampling technique. Informed consent was obtained from parents if age of patient was <18 years while in case of age ≥18 years, it was obtained from the patient. Once selected, all the baseline characteristics of included participants including their age, body mass index (BMI), duration of symptoms and Alvarado Score (Figure-1) were documented. High clinical suspicion was also defined based on Alvarado score and having a score ≥7 was considered consistent with high clinical suspicion.[10,11]

Alvarado score	
Feature	**Score**
Migration of pain	1
Anorexia	1
Nausea	1
Tenderness in right lower quadrant	2
Rebound pain	1
Elevated temperature	1
Leucocytosis	2
Shift of white blood cell count to the left	1
Total	**10**

Figure-1: Alvarado score

Once documented, all the patients underwent appendicectomy procedure, either open or laparoscopic, depending upon the availability of the facility. All the procedures were performed by a single team of surgeons with each having a minimum experience of over two years. All surgeries were performed under general anesthesia. One hour prior to surgery, all the patients were given a single dose of injection ceftriaxone 1g and injection metronidazole 500mg. After induction of anesthesia, standard procedure was followed for removal of appendix. For open procedure, access was gained through a McBurney incision followed by penetration of abdominal layers and grasping the appendix followed by its removal. For laparoscopic procedure, three-port technique was used. After removal, the appendix was sent to pathology lab, where after evaluation by consultant pathologist (minimum 1 year experience) identification of negative appendicectomy was performed.

Data was analyzed via Statistical Package for Social Sciences (SPSS) 22. Normality of data was checked using Shapiro-Wilk test. Quantitative data was presented using Mean±SD (for age, BMI and duration of symptoms) or median interquartile range (for Alvarado score). Qualitative data was presented using percentage and frequency. Negative appendicectomy was stratified by type of procedure and comparison was performed using Chi-square test. A *p*-value of ≤0.05 was taken as significant.

RESULTS

In this study, there were 150 female patients. Mean age of patients was 21.50±3.16 years. Mean body mass index (BMI) of patients was 19.35±1.25 kg/m2. Mean duration for which patients had symptoms of acute appendicitis was 10.72±2.56 hours. Median Alvarado score at presentation was 8(7-10). These baseline characteristics are tabulated below in Table-I.

Table-I: Baseline Characteristics (n=150)

Variable	Value Mean±SD
Age	21.50±3.16 years
BMI	19.35±1.25 kg/m2
Duration of symptoms	10.72±2.56 hours
Alvarado score (Median IQR)	8(7-10)

In this study, 28(18.67%) patients underwent open appendicectomy while 122(81.33%) patients underwent laparoscopic appendicectomy. Composite negative appendicectomy was 37(24.67%), demonstrated in Figure-2.

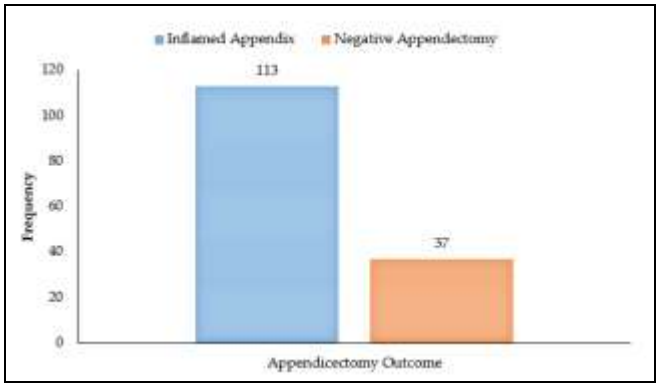

Figure-2: Frequency of Negative Appendicectomy (n = 150)

In patients who underwent open appendicectomy (n=28), negative appendicectomy was seen in 8(28.57%), while in patients who underwent laparoscopic appendicectomy (n=122), negative appendicectomy was seen in 29(23.77%) cases. Thus, no statistically significant association was found between type of surgery and negative appendicectomy, which can be observed in Table-II (p=0.595).

Table-II: Association Negative Appendicectomy by type of Appendicectomy (n=150)

	Open appendicectomy (n=28)	Laparoscopic appendicectomy (n=122)	*p*-value
Negative appendicectomy	8(28.57%)	29(23.77%)	0.595

DISCUSSION

Management of acute appendicitis is not a challenging task as there is a worldwide trend of removing the appendix, even without a radiological confirmation, based on clinical suspicion alone. This is usually done through laparoscopic appendectomy which is a gold standard intervention.[12,13] Nevertheless, research indicates that a significant number of removed appendices that are evaluated after surgery and are discovered to be entirely normal and non-inflammatory, named as negative appendicectomy.[14,15]

This study focused on females since they have an increased likelihood of having negative appendicectomy as compared to the general population, which is in line with other studies.[16] The average body mass index (BMI) of patients in our study fell in the range of thin lean to normal which synchronizes with the fact that in clinical practice, patients who have a lean body are more likely to not only have elevated intensity of symptoms of acute appendicitis, but also a higher probability to have negative appendectomy.[17]

In the current study, a large proportion of female patients were found to have undergone negative appendicectomy, which is similar to what has been reported by Oyewole *et al.*[9] In another study conducted by Pooria *et al.*,[18] and Ali *et al.*,[19] this negative appendicectomy in females of younger age was reported at 28% and 30.4% which was relatively higher as compared to present study. Contrarily, one study reported even higher rate of negative appendicectomy among females at 39.4%.[20]

Our study demonstrates that among young females from Quetta and Rawalpindi, negative appendicectomy is quite high, which suggests that pre-surgery diagnostic evaluation needs to be strengthened further to minimize its frequency. Therefore, it is recommended that a careful re-evaluation should be done to improve diagnostics so that unnecessary surgical intervention can be avoided.

LIMITATION OF STUDY

The main limitation of this study was that a detailed past history was not obtained to rule out potential confounders for negative appendicectomy.

CONCLUSION

In conclusion, among young female patients, even in the presence of high clinical suspicion, rate of negative appendicectomies is relatively high, whereas no statistically significant association exists between type of surgery and negative appendicectomy

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

UN & MWA: Data acquisition, data analysis, critical review, approval of the final version to be published.

FF & TMF: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MDY & MS: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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