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ORIGINAL ARTICLE

Frequency of obstructive appendicitis in patients undergoing open appendectomy.

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ABSTRACT… Objectives: To determine the frequency of obstructive appendicitis in patients undergoing open appendectomies for acute appendicitis. Negative appendectomy rate will also be calculated. **Study Design:** Cross-Sectional study. **Setting:** Department of General Surgery of Ayub Teaching Hospital Abbottabad. **Period:** September 2019 to February 2020. **Material & Methods:** The study population included patients of any gender, age from 10 years to 45 years found to have acute appendicitis diagnosed by clinical and ultrasound findings and confirmed by open appendectomy. Sample size of 174 was calculated, using WHO software for sample size calculation. After detailed examination and investigations, patients who underwent open appendectomy as per advice of visiting consultants were included; by filling predesigned research per forma. **Results:** Mean age of the patients was 26.33±11.177 and more than half were male i-e 106 (60.9%). Where majority i-e 93(53.4%) of appendices were of obstructed type, this wasn't statistically higher than the non-obstructed type (p=0.363). In frequency of operative findings, acutely inflamed appendix was most common with 71(40.8%) patients. While suppurative, gangrenous and perforated samples were noted in 55(31.6%), 13(7.5%) and 8(4.6%) cases respectively. Negative appendectomy was done in 27(15.5%) patients. **Conclusion:** This study concluded that obstruction was noted in more than half of the cases i-e 93(53.4%), but it was not statistically higher from the other subtype. Negative appendectomy rate was 15.5%; higher than globally set target, but was similar to the one noted in Pakistan by previous researchers.

Key words: Appendicitis, Non-Obstructive Appendicitis, Negative Appendectomy, Obstructive Appendicitis, Open Appendectomy.

INTRODUCTION

Commonest emergency presenting for emergent surgical care is acute appendicitis.[1,2] With its lifetime prevalence of about 14%.[3,4] Incidence of the disease previously documented to be 1.5–1.9/1000.[5] Acute appendicitis means acute inflammation of the appendix due to bacterial proliferation in the appendix. This bacterial proliferation is mainly precipitated by luminal obstruction of the appendix most commonly by fecolith (inspissated fecal matter, calcium phosphate, bacteria and epithelial debris) and stricture. Other causes include Ca caecum, parasites, foreign body etc. In obstructive appendicitis there is increase in intraluminal pressure due to continuous mucous secretion obstructing lymphatic drainage. This increase in intraluminal pressure and subsequent ischemia of the appendix can result in perforation of the appendix just like other risk factors for perforation like diabetes, extreme of age, immunosuppression, and previous abdominal surgery etc.[6] Percentage of obstructive appendicitis (only acute disease has been considered) is somewhere 13-14%.[7] Perforated appendicitis has a worse prognosis than non-perforated appendicitis because of its increased risk of sepsis and mortality.[8] Because of these adverse outcomes of acute appendicitis, it is necessary to diagnose acute appendicitis on time but there is no specific investigation which is gold standard for its diagnosis and so for modified Alvarado scoring system is widely used for diagnosis of acute appendicitis which includes history, clinical examination and leukocyte count.[9] Other imaging techniques used are ultrasound, CT, MRI.[10] A delay in diagnosis results

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in perforation and sepsis leading to morbidity of 10% and mortality of 1 to 5%.[11]

In USA pre-operative imaging like CT lowers the rate of normal appendectomy to 5.6%(from 20.6%) and hence lowers perforation rates, but this must be tailored against radiation risk especially in children.[12] Negative appendectomy rate of 20-40% and perforation rate of 10-30% still exists in many parts of the world but the outcome after false positive diagnosis is less life threatening than false negative diagnosis but both are associated with their own drawbacks.[13] Acute appendicitis is a common surgical emergency in this region and the socioeconomic impact of the disease is significant because most of the times several days are necessary for the patient to recover completely and resume normal work again, so this makes it essential that the study should be carried out in this region and a significant knowledge will be added to the medical sciences which will help to improve surgical health services and will decrease economic burden on the government.

With this study we aim to determine the frequency of obstructive appendicitis in patients undergoing open appendectomies for appendicitis at surgical department of Ayub Teaching Hospital Abbottabad. We will also determine the rate of negative appendectomies at the aforementioned hospital. The rationale is to have better understanding of causation of the condition and enhance the local pool of data available regarding it. Results will also give an insight on the negative appendectomies being carried out at the aforementioned facility; provoking a conscious effort to attain globally set targets.

MATERIAL & METHODS

The study was conducted in department of surgery, Ayub Teaching Hospital; Abbottabad from September 2019 to February 2020. Sample size for this cross-sectional analysis was determined by using WHO software for sample size calculation in health studies with confidence interval=95%, anticipated proportion=13%[5] and absolute precision=5%. So the sample size of 174 was determined by the aforementioned method. Medical Ethics Committee of Ayub Medical Institutions, Abbottabad approved the project on 29/08/2019. Thus by using consecutive, non-probability sampling technique sampling was completed in about five and a half months.

All the patients presenting to the above mentioned hospital that were diagnosed as appendicitis and underwent appendectomy were included in the sample. Though those who underwent appendectomy while getting operated for any other cause were excluded. All those patients having acute appendicitis were taken from surgical department of Ayub Teaching Hospital, admitted through casualty, OPD and referred from other units. Informed consent of the patient and relatives was taken after explaining the study protocol. Decision of appendectomy was made on clinical and ultrasound findings by the doctor on duty. All investigations needed were carried out such as complete blood count, S. electrolytes, urea, creatinine, chest x-rays and ECG etc. All the operative details including operative procedure, cause of obstruction and location of obstruction was recorded. Data include name, age, sex, clinical findings, diagnosis and operative findings. In non-obstructive appendicitis, the inflammation starts either in lymph follicles or mucous membrane and terminates in form of resolution, ulceration, fibrosis or gangrene.[14] While in obstructive subtype, various factors as fecaliths, parasites, foreign body, lymphoid hyperplasia, Crohn's disease, carcinoma or carcinoid syndrome are obstructing the lumen of appendix; thus initiating inflammation.[15] Intraoperative gross examination of the specimen was carried out to differentiate obstructive and non-obstructive appendicitis.[16]

Data was analyzed by the SPSS (16.0). Frequencies and percentages were computed for all categorical data including gender, obstructive appendicitis and other causes of acute appendicitis. Quantitative variable like age was described as mean± standard deviation. Data was stratified by age and gender with respect to outcome variable that is obstructive appendicitis. Post stratification chi-square test was used at 5% level of significance.

RESULTS

The study was conducted at surgical unit of Ayub Teaching Hospital Abbottabad, a total of 174 patients were selected to determine the frequency of obstructive appendicitis in patients presenting to surgical department of Ayub Teaching Hospital Abbottabad and undergoing open appendectomies for acute appendicitis. Mean age of the patients was 26.33±11.177 ranging from 10 to 45 year of age, out of total 174 patients. In frequency of gender of the patients, there were 106(60.9%) male and 68(39.1%) were female. In frequency of age group of the patients, 118(67.8%) were in age group of below 30 years, 56(32.2%) from above 30 years. Where majority i-e 93(53.4%) of appendices were of obstructed type of appendicitis, this wasn't statistically higher than the non-obstructed type (p=0.363). In frequency of operative findings, acutely inflamed appendix was most common with 71(40.8%) patients while suppurative appendix was found in 55(31.6%). Appendix was gangrenous in 13(7.5%) cases. While it was perforated in 8(4.6%). Negative appendectomy was done in 27(15.5%) patients. (Table-I).

Stage of Appendicitis	Frequency	Percent
Acute appendicitis	71	40.8
Suppurative appendix	55	31.6
Gangrenous appendix	13	7.5
Perforated appendix	8	4.6
Normal appendix (Negative appendectomy rate)	27	15.5
Total	174	100.0

Table-I. Stages of appendicitis.

Comparison of demographics for each type i-e obstructive and non-obstructive appendicitis are given in Table-II. Students t-test showed that no significant difference exist with respect to age (p=0.193). Similarly chi-square test showed that there was no significant difference in the two subgroups with respect to age groups or gender (p=0.201 & p=0.408 respectively).

Frequency distribution of stage of appendicitis with respect to type are presented in the Table-III. Inferential analysis among these variables show that there is no significant difference in values noted with obstructive and non-obstructive cases for these stages of appendicitis. (p=<0.99). Notice that during this analysis negative appendectomies were excluded.

	Obstructive Appendicitis	Non-obstructive Appendicitis	P-Value
	(n=93)	(n=81)	
Age (mean ± SD)	25.30±11.10	27.52±11.21	0.193*
Gender (male) [n (% within etiologic type)]	54 (58.1%)	52 (64.2%)	0.408ɖ
Age group (<30yrs) [n (% within etiologic type)]	67 (72%)	51 (63%)	0.201ɖ

Table-II. The demographic within the subtypes.

Statistically significant if p<0.05 * Student's t test ɖ Chi-square test

SD stands for standard deviation

	Etiological Type		Total	P-Value
	Obstructive	Non-obstructive		
Acute appendicitis [n (% within etiologic subtype)]	44 (47.3%)	27 (50.0%)	71 (48.3%)	0.99
Suppurative appendix [n (% within etiologic subtype)]	35(37.6%)	20 (37.0%)	55 (37.4%)	
Gangrenous appendix [n (% within etiologic subtype)]	8 (8.6%)	5 (9.3%)	13 (8.8%)	
Perforated appendix [n (% within etiologic subtype)]	6 (6.5%)	2 (3.7%)	8 (5.4%)	
Total [n (% of total)]	93 (100%)	54 (100%)	147 (100.0%)	

Table-III. Stages distribution within subtypes.

DISCUSSION

This study shows the frequency of gender of the patients, there were 106(60.9%) male and 68(39.1%) were female. In our study the frequency of age group of the patients, 118(67.8%) were in age group of below 30 years, 56(32.2%) from above 30 years. While in frequency of operative findings, acute appendicitis was most common with 71(40.8%) patients while suppurative appendix was found in 55(31.6%). These two stages were the most common in earlier studies.[10,11] Whereas gangrene and perforation were noted in fewer cases i-e 13 (7.5%) and 8 (4.6%) respectively.[17,18] These results are in concordance with findings of study previous studies Percentage of negative appendectomies was 15.5% i-e 27 operated cases had normal appendix. This is very close to the figure observed by another researcher in Pakistan.[19]

Comparison of demographics for each type i-e obstructive and non-obstructive appendicitis has also not shown any significant difference. Students t-test showed that no significant difference exist with respect to age ($p=0.193$). Similarly chi-square test showed that there was no significant difference in the two subgroups with respect to age groups or gender ($p=0.201$ & $p=0.408$ respectively). Distribution of stages of the disease with respect to obstructive or non-obstructive type are presented in the Table-III. As depicted in the table, chi-square test showed that the difference in frequencies depicted by Table-III is statistically not significant ($p=0.99$). It is obvious that there is a no difference in percentage among each stage with respect to etiologic subtype.

LIMITATIONS

Correct diagnosis of the condition and it etiological subtypes, preoperatively, is based on clinical scoring systems and imaging modalities. One of the recent scoring system is Appendicitis Inflammatory Response (97% sensitive and 77% specific), which was not utilized during the research. Similarly CT scan: the diagnostic imaging of choice (94% sensitive and 95% specific), was not performed in the cases studied during the project.[20]

CONCLUSION

Findings suggest that obstruction of appendicular lumen is evident in more than half of the cases of appendicitis that get operated. Comparative analysis of obstructive and non-obstructive appendicitis, primary objective, revealed that the difference was very little and not statistically significant, so further research on the topic is required. Similarly there was no significant difference found among the two subgroups with respect of age or gender. Determination of negative appendectomy rate, secondary objective, gave figures very close to the ones mentioned by previous researches in the country. But it is definitely higher than the globally set target that is globally set to be 5-10%, as evident by literature. So steps should be taken to bring down this count in our setups to the aforementioned range.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Fazli Junaid	Jointly proposed study, analyzed data and prepared the draft.	
2	Muhammad Usama	Jointly proposed study, analyzed data and prepared the draft.	
3	Syed Usman Shah	Jointly proposed study, analyzed data and prepared the draft.	
4	Musab Umair	Contributed to study design, data collection & draft review.	
5	Zain Ul Abadin Malik	Contributed to study design, data collection & draft review.	
6	Attiya Nasir Siddique	Contributed to study design, data collection & draft review.	