ORIGINAL ARTICLE

Negative Appendectomy Rate: The Imaging Impact

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ABSTRACT

Aim: To determine the rate of negative appendectomy and evaluating the value of preoperative imaging in reducing this rate.

Methods: Our study was carried out in General surgical department of King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia. Study period was from May 2013 to Feb 2014.All patients aged 12 years and above, undergoing emergency appendectomy were included in the study. Incidental appendectomies were excluded. All patients were analyzed in regards to the clinical evaluation, pre operative laboratory investigations, imaging modalities and final histopathology.

Results: Total of 100 patients was diagnosed as acute appendicitis and underwent emergency appendectomy. Pre-operative ultrasound (US) and computed tomography (CT) was performed in 48 cases (48%). Sensitivity and specificity of US was 75% and 60% respectively where as both were 100% for CT. The positive and negative prediction value for US was 92.30% and 27.27% respectively in comparison to CT, which had 100% predictive value in either case.

Conclusion: We concluded that our rate of negative appendectomy is acceptable and comparable to most studies in literature. Radiological imaging in cases with doubtful diagnosis is of immense value. CT is superior to US in sensitivity and specificity. It also carries better predictive value and should be more frequently used to reduce the rate of negative appendectomies.

Keywords: Negative, Appendectomy, imaging, CT scan

INTRODUCTION

Appendectomy is one of the commonest emergency surgical operations all over the world. Traditionally the diagnosis is clinical. Negative appendectomy is a well known entity and incidence has been ranging from 10-15% or even higher in some studies[1].

Although these rates are acceptable in order to minimize the incidence of complicated appendicitis but negative appendectomy itself has significant morbidity as well as mortality[2,3] and is also an unnecessary financial burden on patients and hospitals. Every institution needs to keep a check at the incidence of negative appendectomy in their unit and try to minimize this rate as much as possible safely. Numerous methods such as total leukocyte count, neutrophil count and C-reactive protein (CRP) have been tried to improve the diagnostic accuracy with variable success rates. Recent studies have advocated radiological imaging (US and/or CT) to reduce the incidence of negative appendecyomy[4,5].

MATERIAL & METHODS

We carried this study at our General surgical unit at King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia. All patients 12 years of age and above undergoing emergency appendectomy for a period of ten months starting May 2013 were studied. Incidental appendectomies were excluded from the study. The patients were reviewed in regards to clinical symptoms, signs, focused laboratory investigations (Total leukocyte count, Neutrophil count, CRP) and imaging techniques (US and CT). Patients presenting with clear clinical picture of acute appendicitis, supported by laboratory investigations were taken for emergency appendectomy without radiological imaging. However patients with doubtful diagnosis were further assessed by either US, CT or both. US was normally requested by emergency room surgical staff where as CT was ordered by the surgical specialist in consultation with radiologist. US were done by ultrasound technicians supervised by the radiologist. A positive criterion for appendicitis on US was non-compressible appendix with outer diameter of 6 mm or more. CT findings confirming acute appendicitis were thickened appendix of 7mm or more without contrast in lumen along with peri-appendicular fat stranding. Appendectomies were performed either by open or by laparoscopic surgery. All the specimens were sent for histopathology. Negative appendectomy rates were determined by the final histopathology results.

RESULTS

Total of 100 patients underwent emergency appendectomy after being diagnosed as acute appendicitis either clinically or with the help of

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radiological imaging. It included 62 males and 38 females with male to female ratio 1.63: 1. Mean age was 25.43 years with a range from 12-53 years. Appendectomy was performed without imaging in 52 patients (52%) after diagnosing clinically and by laboratory investigations. Rest of 48 patients (48%) had imaging either by US, CT or both to reach a diagnosis before proceeding to surgery. US were done for 37 patients (37%) and it showed a sensitivity of 75% and specificity of 60%. Positive and negative predictive values were 92.30% and 27.27% respectively (Table1). CT scan was done for 21 patients (21%) and it showed 100% sensitivity and specificity. The predictive values were also 100% in either positive or negative cases (Table 2). Total of 13 patients (8 males & 5 females) had negative appendectomy (13%). The incidence of negative appendectomy was 13.15% in females and 12.90% in males. Only 5 patients of these 13 had a pre operative US and CT was done in only 1 patient with negative appendectomies.

Table 1: Pre-operative US& final histology results for acute appendicitis

	Histology Positive	**Histology Negative**
US Positive (26)	24	2
US Negative (11)	8	3

Table 2: Pre-operative CT and final histology results for acute appendicitis

	Histology Positive	**Histology Negative**
CT Positive (20)	20	0
CT Negative (1)	0	1

DISCUSSION

Our negative appendectomy rate of 13% for the combined males and females and 13.15% for females is well within the range found in most of the literature[1,4,6-8]. However some studies have shown the combined rate to be as low as 4.7%, mainly due to the use of CT[9]. However incidence of negative appendectomy in males in our study (12.9%) is higher than reported by some others (6%)[8]. This may be attributed to well known tendency to diagnose appendicitis in male patients without imaging. Females comprised only 38.46% of the total negative appendectomies as compared to 61.54% males that is in contrast to most studies that show higher number of negative appendectomy in females. Our lower number is because of lesser number of females (38%) in our study. As regards incidence of negative appendectomies in females, our study also showed it to be higher than males as is found in the literature[4,8]. We performed US in 37% patients where as CT was done in 21%. The sensitivity and specificity of CT (both 100%) was more than US (75% & 60% respectively) as is found in most of the literature [4], except that the specificity of US was found a bit low by us[10]. US has limitations especially in obese patients, bowel distention and retrocaecal appendix. More over it is operator dependent. CT has advantage in all these respects with the added advantage of picking other pathologies. CT is now widely recommended in diagnosis of acute appendicitis and reducing the incidence of negative appendectomies[4,5,9].

CONCLUSION

Negative appendectomy rate at our institution is comparable to others studies found in literature. US and CT are of immense value in reducing the incidence of negative appendectomies. CT carries a better predictive value with higher sensitivity and specificity than US and should be used more frequently if the diagnosis of acute appendicitis is in doubt.

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