



NEGATIVE APPENDECTOMY : AN AUDIT OF RESIDENT- PERFORMED SURGERY IN A TERTIARY CARE CENTRE

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ABSTRACT In current surgical practices, negative appendectomy remains a major concern. We analyzed the data of appendectomies during last 5 years but data from developing world is scarce. Interval and incidental appendectomies were excluded. A proforma was prepared to record demographic details, presenting complaints, clinical signs and investigations performed. Six hundred and eighty-five were performed during this period. On histopathological examination, 185 patients have normal appendix. Sixty-seven patients were excluded with incidental or interval appendectomies. Thus, 118 patients had appendectomies performed erroneously. Resident doctors had performed these appendectomies on presumed diagnosis of acute appendicitis. Records of 17 patients could not be received. Most common symptom was abdominal pain (100 percent) and commonest sign was right iliac fossa tenderness (93.1%). USG was the most common investigation done. Diagnostic laparoscopy or CT scan was not done in any of the patients. The negative appendectomy rate was 17.2% (12.4 % in males and 33.3% in females). Female aged 11-20 years (66.7%) had highest incidence of negative appendectomy. The rate of negative appendectomy at our institute is comparable with world statistics. For making clinical diagnosis of acute appendicitis, we need to be more clinically vigilant. The use of additional investigations such as, C-reactive protein and CT scan decreases the negative appendectomy rate.

KEYWORDS : Appendicitis. Acute appendicitis. Negative appendectomy. Diagnostic error.

INTRODUCTION

Appendicitis is one of the most common causes of abdominal surgeries and appendectomy is frequently performed surgical procedure [1-3]. It also probably is the first abdominal surgery resident performs during his surgical training. Although clinical suspicion of appendicitis appears straightforward with well-known symptoms and signs. However, these signs and symptoms are also closely related to the other abdominal conditions, which contributes the increased incidence of negative appendectomy [4-6]. The reported negative appendectomy rate (NAR) varies from 4 to 45 %, with the highest incidence in women of the reproductive age group [7-9]. Negative appendectomy candidates are reported to present increased hospitalization cost and duration, owing to the greater incidence of morbidities and mortalities in these patients. [10-11] Furthermore, female gender, young age, decreased polymorph nuclear cells [12-13], normal white blood cells count, and inaccessibility of the CT scan are the contributing factors to negative appendectomy [10,14,15]. Furthermore, delayed diagnosis and associated complications such as, peritonitis and sepsis also contribute to the need to abrupt diagnosis and thereby, increases the risk of negative appendectomy [16,17]. A number of studies have been conducted to audit and to decrease NAR, we took this as opportunity to look at our NAR and compare it with published literature.

DISCUSSION

Unnecessary removal of appendix imposes adverse effects of surgical complications and anesthesia-associated adverse effects among the patients [18]. Improper diagnosis, unavailability of the resources and poor clinical judgment can expose patients to needless surgical incision [19-21].

In order to overcome these problems, we need to decrease NAR. As features of acute appendicitis closely resembles many medical and surgical diseases, it is not infrequent to misdiagnose Acute Appendicitis [22-24]. One has to use all his judgement to strike the fine balance between misdiagnosing Acute Appendicitis and not delaying surgery to a patient of Acute Appendicitis as timely intervention is prudent to avert the complication of an acutely inflamed appendix.

Our NAR is comparable to other studies [25-28]. We recorded that highest incidence was found in young girls aged 11-20 years. Various authors have reported highest incidence of NAR occurs in female of reproductive age group (15-49 years) [24,29,30,31].

Detailed history and examination remain the corner stone in making Histopathological findings of appendectomy specimens. Histopathological findings of appendectomy specimens in diagnosis of Acute Appendicitis. Raised TLC and CRP are the biochemical investigations found to be associated with Acute Appendicitis,

however in our study only 59.3% patients have raised TLC. TLC alone is not a consistent and reliable predictor of Acute Appendicitis [32-33]. The combination of TLC and CRP however correlates better than any of these investigations alone [23,24,32,34]. In our emergency department facility of CRP is not available at present.

With the help of various clinical and biochemical parameters, we have various decision-making tools including clinical algorithms, checklists and scoring system to reach the diagnosis of Acute Appendicitis [35,36].

While USG, CT, MRI Scan have been advocated to improve accuracy of diagnosing Acute Appendicitis, the benefits of these modalities in clinical trials have not been realized in general practice [37,38,39]. USG was performed in 75.2% of our patients and some features suggestive of Acute Appendicitis were documented in nearly 90% of them, still NAR in our study was 18%, suggesting that ultrasound also is not reliable. In some cases, appendix was not visualized due to overlying bowel gas.

All patients were operated by residents having at least two years of surgical experience. The safety of surgery performed by residents has been supported by other studies [40,41]. 90% of the patients had one or the other findings suggestive of Acute Appendicitis while 10% of the patients had undergone appendectomy even in the absence of operative findings suggestive of Acute Appendicitis. We assume that either these findings could have been part of more generalized inflammatory process which was missed by operating surgeon or he/she may have been biased in reporting these findings.

To our disappointment we fail to recover the records of 17 patients. Clinical information from these records would have further strengthened our study.

CONCLUSION

NAR in our study is comparable to present literature. Careful history and examination is required in making clinical diagnosis of Acute Appendicitis. Use of CRP and CT Scan in selected cases further decrease the NAR.

RESULTS

General Data and Demography

One thousand one hundred fifty-six patients underwent appendectomy during the 5-year period (867 males and 289 females; sex ratio 3:1). Most patients were 20-30 years of age. The average number of appendectomies performed each year was 275 with variation from a minimum of 147 in 2017 to a maximum of 288 in 2019. Appendiceal pathology was confirmed in 872 patients (Table 1) while 284 patients

had a normal appendix on histopathologic examination. Of all the normal appendices, 76 belonged to patients with either interval or incidental appendectomies; thus, in 208 patients, the appendix was removed wrongly. This comprised 125 males and 83 females (sex ratio 1.5:1), with males mostly in the age group 21–30 years (n=37) and females in the age group 11–20 years (n=40). Overall NAR was 18 % (14.4 % in males and 28.7 % in females). However, the NAR in females aged 11–20 years was 71.4 % (Table 2). Presenting Complaints, the most common symptom was abdominal pain (100 %), followed by anorexia (70 %), vomiting (59.1 %), and fever (45.7 %). Only 45.3 % of patients reported shifting of pain. Other symptoms reported were diarrhea (18 cases), constipation (24 cases), and dysuria (21 cases). The mean duration of symptoms was 92 h (range 2 h to 8 days). Vital Parameters and Examination Findings Tachycardia was documented in 35 % while 13.6 % had fever at presentation. Right iliac fossa (RIF) tenderness was present in 93 % and rebound tenderness in 79 % of patients. In 5.9 %, the pain was generalized to the whole of the lower abdomen. Seven patients presented with shock. Investigations Among the patients, 59.3 % exhibited leukocytosis (counts >12,000/mm3). X-ray of the chest and/or abdomen was performed in 23 %; however, the findings were unremarkable pertaining to acute abdomen. Urine pregnancy test done in 17 % was negative in all except in one lady who presented in her late first trimester. USG abdomen was done in 75.2 % of patients. The commonest findings were probe tenderness in RIF (34.7 %) and peri appendiceal fluid (25.3 %); however, the appendix was not visualized in 25.7 % of patients. In 10 % of patients, the appendix was reported normal. Out of 208 patients with negative appendix, USG abdomen was performed in 122. Probe tenderness was reported in 83, peri appendiceal fluid was detected in 14, and the appendix was not visualized in 25 patients. CT scan, MRI scan, and diagnostic laparoscopy (DL) was not performed in any patient. Specialist Referral Gynecological referral was sought in 57.1 % of female patients, and in most of them, a gynecological cause for acute abdomen was ruled out. Treatment All patients underwent emergency appendectomy under general or spinal anesthesia by surgical residents. In most of the patients, gridiron incision was used except in three who presented with generalized pain in the lower abdomen, where a lower midline laparotomy incision was used for exploration. In ten patients, either the incision was extended to a muscle cutting one or a lower midline laparotomy was performed owing to operative difficulty.

Operative Findings - In nearly 90 % of patients, one or more of gross inflammation of the appendix, peri appendiceal fluid, surrounding bowel/ omental adhesions, or pus/fibrinous flecks were recorded in operative notes. In 10 % of patients, the appendix was not grossly inflamed and there were no other findings suggesting an intra-abdominal acute inflammatory process.

Outcome - The postoperative period of all patients was uneventful, and most of them were discharged on the third postoperative day (range 3–6 days).

Age, sex distribution, and NAR in patients with negative appendectomy

Gender	Age	Appendectomy (n) Total	Appendectomy (n) Negative	NAR (%)
MALE	0-10	42	10	23.8
	11-20	304	24	7.8
	21-30	315	37	11.7
	31-40	154	22	14.2
	41-50	30	17	56.6
	>61	15	11	73.3
FEMALE	0-10	7	4	57.1
	11-20	18	6	33.3
	21-30	56	40	71.4
	31-40	78	15	19.2
	41-50	69	8	11.6
	>61	22	6	27.2
	51-60	24	4	16.6
	>61	22	4	18.2

Histopathological findings of appendectomy specimens

Appendiceal pathology	Number of patients (n=872)
Acute appendicitis	850
Granulomatous appendicitis	22

Mucinous cystadenoma	0
Adenocarcinoma	0

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