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Research Article

Clinicopathological Analysis of Appendicectomy Biopsies

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Abstract

Introduction: Acute appendicitis is an inflammation of the vermiform appendix arising from the mucosal membrane and spreads to the outer serosal coat. It is a global disease and one of the most common general surgical emergency.

Method: Data obtained from the histopathology records from July 2021 to June 2024 were studied. It included demographic information and histopathological diagnoses of appendicectomy biopsies.

Result: A total of 170 appendectomy specimens were recorded during the study period from July 2021 – June 2024. The M:F ratio was 1:1.4 with a mean of 26.2 years. The peak age groups were recorded in the 2nd and 3rd decades. The acute appendicitis(uncomplicated) were seen in 46% of the biopsies while the complicated(purulent, perforated and gangrenous) were 54%. Lymphoid hyperplasia was found in 12% of biopsies. Two(1.2%) biopsies revealed chronic nonspecific granulomatous inflammation and a biopsy (0.6%) showed Schistosoma appendicitis.

Conclusion: Appendix specimens should be subjected to histopathological assessment to confirm the diagnosis of appendicitis, in addition detect other pathologies that may require further treatment.

Keywords: Acute appendicitis; Appendectomy; Biopsies; Histopathology; Further treatment

Introduction

Acute Appendicitis (AA) is an inflammation of the mucosal membrane lining the inner part of the vermiform appendix that spreads to the outer serosal coat [1,2]. The appendix is a worm like extension from the apex of the cecum hence the name vermiform appendix [2,3]. AA is a global disease and one of the most common general surgical emergency [4,5]. The incidence varies with geographical region and ranged from 2 - 9% [6]. It is most common in adolescence and young adults with a life-time risk of 7%. The rate of AA varies among countries with declining rates in USA and Europe [7]. In the developing countries, arising from changes in lifestyle in urban areas, there is increased incidence of AA [8]. In AA, obstruction of the appendix lumen is regarded as the most important factor that triggered the inflammatory process [1]. The most important causative factors of luminal obstruction were lymphoid hyperplasia and appendicolith [4,5]. Others causes were stool impaction and appendiceal or cecal tumor [6]. AA is a surgical emergency with protean manifestation [2]. Despite the advances in imaging, dilemma still exist in the diagnosis of AA. Histological evaluation remains the gold standard for the confirmation of appendicitis [7]. Appendectomy, the surgical removal of the appendix provides the diagnosis of appendicitis on histology [9]. Furthermore, it helps in minimizing the risk of complications which could be fatal and it is also curative [10,11]. This study was designed to evaluate the clinicopathological findings of appendicectomy biopsies performed for AA and in addition determine the adequacy of treatment.

Materials and Methods

Data obtained from the histopathology records from July 2021 to June 2024 were studied. It included demographic information(age, gender), year of biopsy, histopathological diagnoses of appendicectomy biopsies. These results were analyzed and presented in pie charts and tables.

Results

A total of 170 appendectomy specimens were recorded during the study period from July 2021 - June 2024(3 years) with an average of 57 appendectomy biopsies per year. This accounted for 6% of total biopsies recorded during the same period. There were 70 males and 100 females with a M:F ratio of 1:1.4 and their ages ranged from 6-80 years with a mean of 26.2 years. Those aged 40 years and below were 130(76%), while those above 40 years were 40(24%). The peak age groups were recorded in the 2nd and 3rd decades, 47(27.6%) each, Table 1, Figure 1. There was a female preponderance, M:F= 1:1.7 in the patients 40 years and below, while there was a slight male preponderance in those aged above 40 years, 1:0.8. Based on the histopathological findings, the stages of AA were categorized into 4 groups: acute simple appendicitis 78(46%), Figures 2a,2b, acute purulent appendicitis 80(47%), Figures 3a,3b, acute perforated appendicitis 5(3.0%), Figures 4a,4b,4c and acute gangrenous appendicitis 7(4%), Figures 5a,5b, Table 2, Figure 6. The AA(uncomplicated) were seen in 78(46%) biopsies while the complicated(purulent, perforated and gangrenous) were 93(54%), Table 2. In the uncomplicated AA group, 21(27%) biopsies showed lymphoid hyperplasia and it accounted for 12% of the biopsies, Figure 7. Two(1.2%) of the total biopsies from the acute purulent appendicitis group revealed chronic nonspecific granulomatous inflammation, Figure 8. One(0.6%) of the total biopsies from the acute gangrenous appendicitis showed Schistosoma appendicitis, Figure 9.

Age range	Male	Female	Total (%)
1-10	5	6	11(6.5)
11-20	18	29	47(27.6)
21-30	13	34	47(27.6)
31-40	12	13	25(14.7)
41-50	11	10	21(12.4)
51-60	7	2	9(5.3)
61-70	3	4	7(4.1)
71-80	1	2	3(1.8)
Total	70	100	170(100)

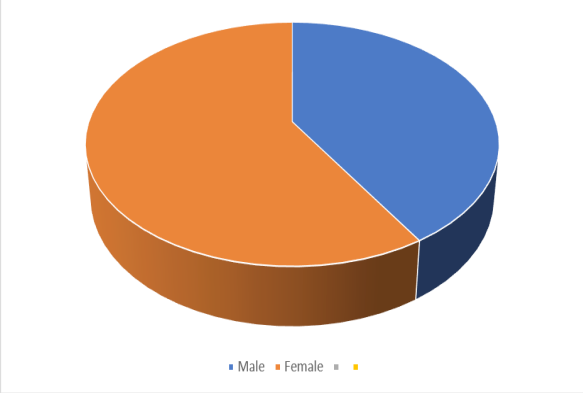
M:F = 1: 1.4 , age range- 6-80 years, mean = 26.2 years; Peak ages- 2nd and 3rd decades; 40 years and below- 76%, above 40 years- 24%.

Table 1: Age/ Sex distribution.

S/No.	Type of appendicitis	Male	Female	Total (%)
1.	Acute simple appendicitis	33	45	78(46)
2.	Acute purulent appendicitis	31	49	80(47)
3.	Acute perforated appendicitis	3	2	5(3)
4.	Acute gangrenous appendicitis	4	3	7(4)
Total		71	99	170(100)

Acute simple appendicitis- 21(27%) biopsies showed lymphoid hyperplasia on histology and accounted for 12% of total biopsies; Acute purulent appendicitis- 2(1.2%) biopsies of total biopsies showed chronic nonspecific granulomatous inflammation; Acute gangrenous appendicitis- 1(0.6%) biopsy of total biopsies showed Schistosoma appendicitis; Acute appendicitis- uncomplicated 78(46%) biopsies, acute appendicitis- complicated 93(54%).

Table 2: Stages of acute appendicitis/sex distribution.



Male- 70(41%), Female- 100(59%). M:F = 1: 1.4

Figure 1: Male/Female distribution.

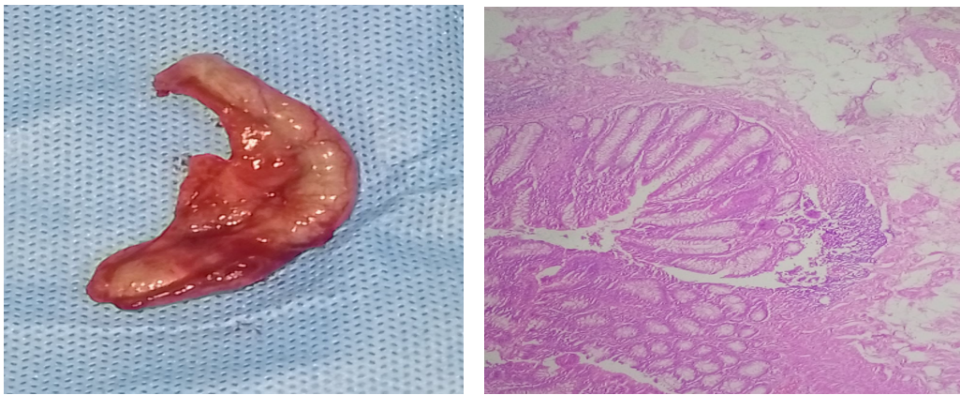
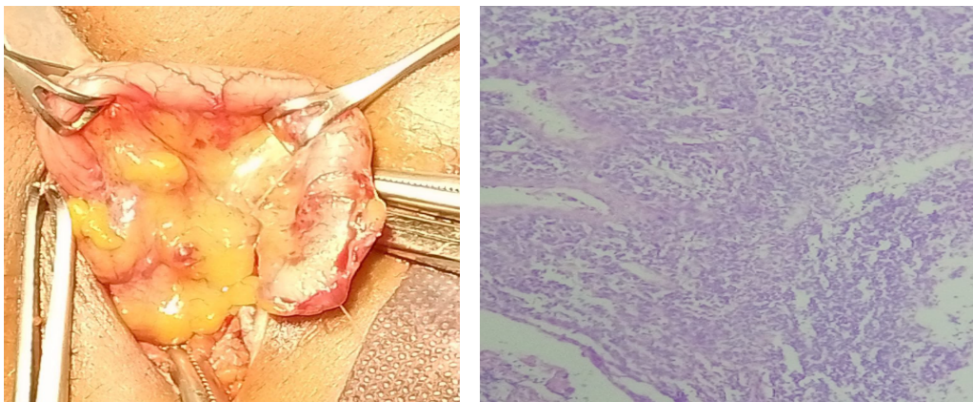


Figure 2: 2a- Acute simple appendicitis. 2b- H&E x 40. Acute appendicitis – section of the appendix that showed partially ulcerated mucosal lining, submucosal oedema, polymorphonuclear inflammatory infiltrates within the mucosal coat and congested mucosal vessels also noted.



Figures 3a,3b: 3a- Acute suppurative appendicitis, 3b- H&E x 100. Acute suppurative appendicitis - section of the appendix that showed ulcerated superficial epithelial lining with transmural polymorphonuclear inflammatory infiltrates mainly neutrophils with cellular oedema and congested blood vessels.

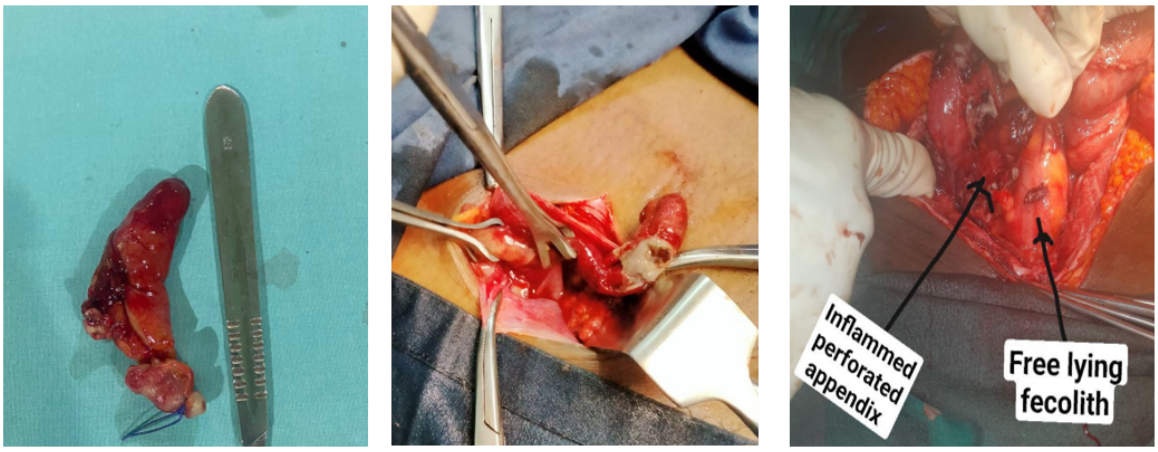


Figure 4: 4a- Perforated appendix biopsy, 4b- perforated appendix in situ, 4c- perforated appendix with free lying fecolith.

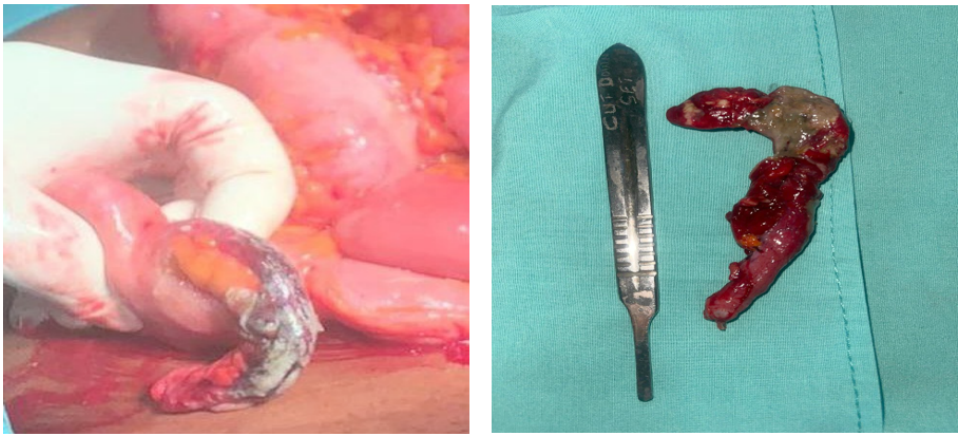
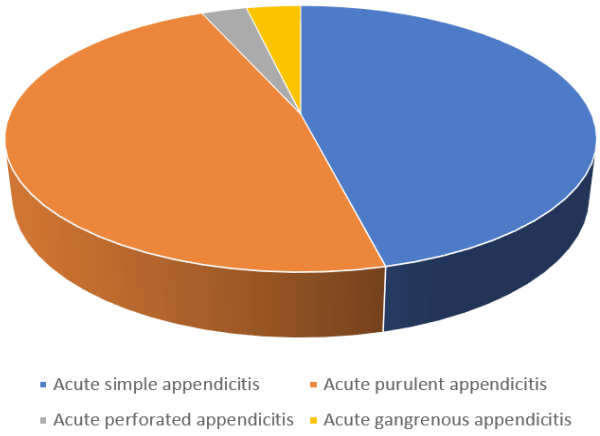


Figure 5: 5a- Gangrenous appendix in situ, 5b- excised kinked gangrenous appendix.



Acute simple appendicitis- 78(46%); Acute purulent appendicitis- 80(47%); Acute perforated appendicitis- 5(3%); Acute gangrenous appendicitis- 6(4%)

Figure 6: Distribution of stages of acute appendicitis.

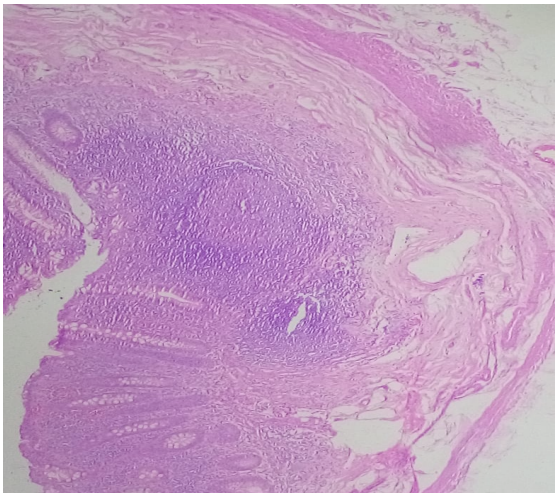


Figure 7: H&E x 40. Acute appendicitis with reactive lymphoid hyperplasia - section of vermiform appendix that showed prominent lymphoid follicles with enlarged germinal centers containing tangible body macrophages with prominent mucosal glands.

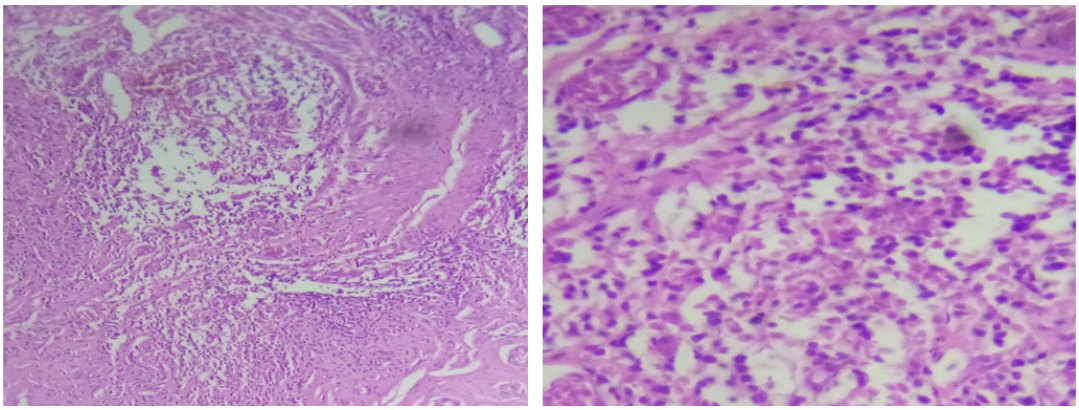


Figure 8: Chronic granulomatous inflammation. Figure 8a- H&E x 40, Figure 8b- H&E x 100. Section of appendix that showed intense inflammatory infiltrates consisting of mononuclear cells and fibrosis.

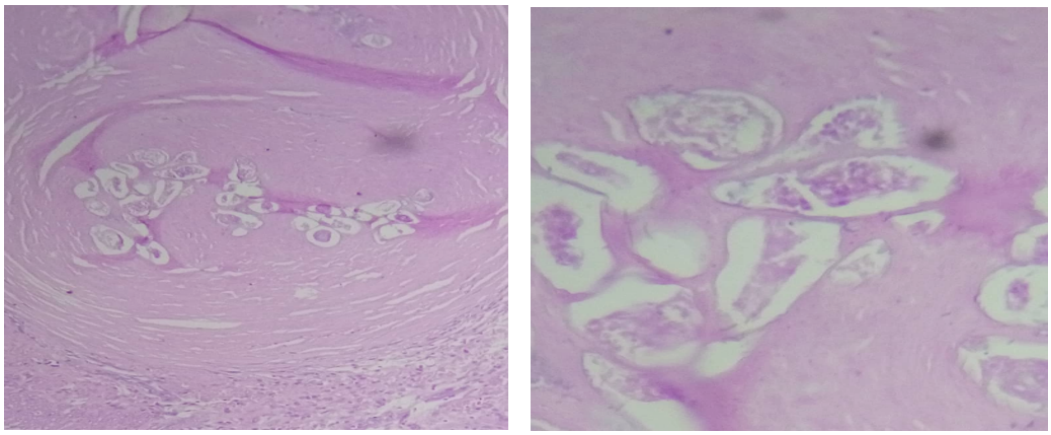


Figure 9: Schistosoma appendicitis. Figure 9a H&E x 40, Figure 9b H&E x 100- Section of appendix that showed ova of Schistosoma and intense fibrosis with inflammatory infiltrates.

Figure 4b,4c showed an appendicolith in from a perforated appendicitis. Two other biopsies in the males, Figures 10a,10b were found in association with a sliding hernia and ileocecal knotting respectively. In the females, there were 3 cases of corpus luteal cysts associated with AA with histopathology that revealed reactive lymphoid hyperplasia. There were also 3 cases of uterine nodules (leiomyomas) also in association with reactive lymphoid hyperplasia and one associated with ovarian teratoma.

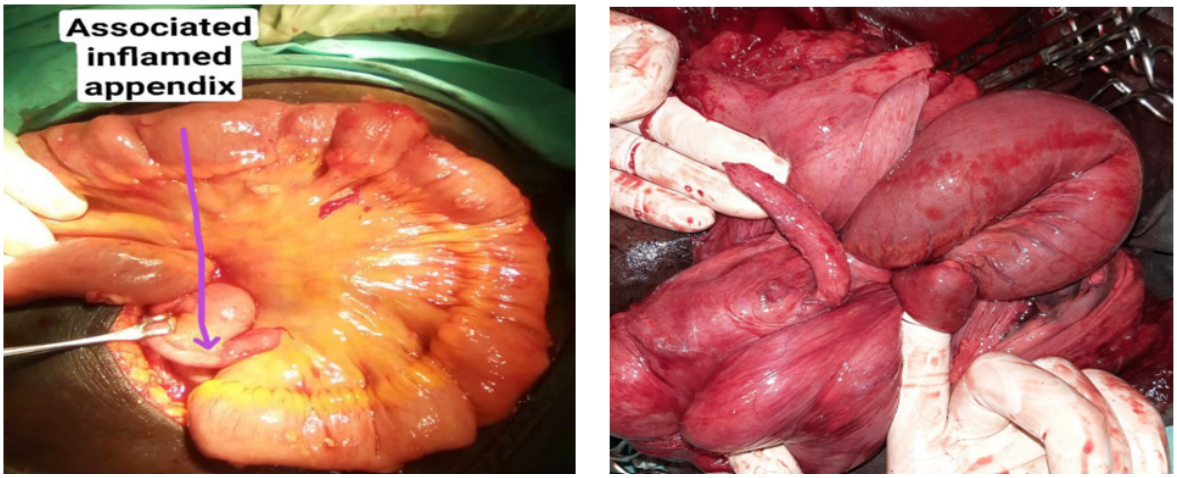


Figure 10: 10a- acute appendicitis in a sliding right inguinal hernia. 10b- acute appendicitis with ileocecal knotting.

Discussion

Acute appendicitis is one of the most common cause of acute abdomen managed by appendectomy which may be open or laparoscopic. It is one of the most frequent emergency surgical procedure worldwide [12,13]. In the Western world, it accounted for about 40% of surgical emergencies and in Nepalgunj, the incidence of 26% was reported [7]. The most common age group was 11-20 years, this was closely followed by 21-30 years that ranked second [7,9]. Similarly, our finding showed the peak age groups within the 2nd and 3rd decades, Table 1. About 80% of AA were found below the age of 40 year [7] in keeping with our finding of 76%. In a study, the mean age reported was 32 years while another reported a median age of 22 years [2,6]. In our report, their ages ranged from 6-80 years with a mean of 26.2 years. The M:F ratio was reported as 1.5: 1 [9] in a report while another showed a M:F ratio of 1.1-2.9: 1 [7]. Contrarily, our report revealed a M:F ratio of 1:1.4 with a female preponderance, Figure 1, which was like another report with a M:F ratio of 1:1.1 [7]. Furthermore, our study revealed a slight female preponderance in those age 40 years and below, while those older than 40 years had a slight male preponderance. In another report, there was a slight male preponderance of 3:2 in the teenagers and young adults, while the adult revealed that AA was approximately 1.4 greater in men than in the women [2].

Lymphoid hyperplasia and appendicolith are the most common causative factors involved in luminal obstruction[1], Figure 7 and Figure 4c respectively. In our study, 27% of the biopsies with acute simple appendicitis revealed lymphoid hyperplasia. The most common underlying condition is lymphoid hyperplasia prevalent between 10 and 30 years, whereas faecal obstruction is common in the elderly [1,6]. In the etiopathogenesis of AA, the most important factor is luminal obstruction regardless of the etiology. Following luminal occlusion, the primary pathological event in AA is increased intraluminal pressure in the appendix with subsequent ischemia [6]. The stages of AA were made up of 4 major groups: acute simple appendicitis, acute suppurative appendicitis, gangrenous appendicitis and perforated appendicitis [14]. 1. Acute simple appendicitis(early)- following the obstruction of the lumen of the appendix, there is mucosal oedema that progressed to mucosal ulceration and bacterial invasion. The resultant effect of the distension from fluid accumulation is an increased intraluminal pressure, Figure 2a. The visceral afferent fibers become stimulated resulting in mild visceral pain located in the periumbilical or epigastric region. 2. Acute suppurative appendicitis- the increase in the intraluminal pressure results in the obstruction of the lymphatic and venous drainage following which bacteria invade the appendiceal wall. The transmural spread of bacteria results in acute suppurative appendicitis with an inflamed serosa, Figure 3. During this phase, pain migrates from the periumbilical to the right lower quadrant. 3. Gangrenous appendicitis- the pathology progresses to intramural venous and arterial thrombosis that result in gangrene, Figures 4,5. Perforated appendix- increase pressure results in ischemia and subsequent infarction and perforation with sometimes extrusion of the appendicolith, Figures 4c. Further progression may result in localized or generalized peritonitis.

Histological evaluation is very important as this may confirm the diagnosis of AA and in addition may reveal pathologies that may necessitate further treatment [4,6,9]. Jat MA et al reported the histopathological diagnosis that showed acute simple appendicitis 52%, acute suppurative appendicitis 28%, acute gangrenous

appendicitis 12.5%, acute perforated appendicitis 2%, resolving or chronic appendicitis 2.5% [7]. This was like our report although our series had a higher percentage of the suppurative appendicitis which may have been due to late presentation or delay in treatment: acute simple appendicitis 46%, Figure 2, acute purulent appendicitis 47%, Figure 3, acute perforated appendicitis 3.0%, Figure 4 and acute gangrenous appendicitis 4%), Figure 5, Table 2, Figure 6. In our report, AA(uncomplicated) was 46% while the complicated (purulent, perforated and gangrenous) were 54% in keeping with late presentation and sometimes due to the delay of treatment in the hospital, Table 2. Momin YA et al reported a high rate of perforation 35.44% [3], this may be attributed to late visit to the hospital.

The spectrum of pathological types usually seen included: infections, granulomatosis, benign and malignant neoplasms [9,15,16]. Abnormal pathological findings in appendectomy biopsies include parasitic infections(such as enterobiasis, ascariasis, schistosomiasis, amoebiasis). Others were, endometriosis, granulomatous diseases, benign and malignant tumors [1,2,4]. Momin et al reported 2 cases(0.18%) of tuberculosis. This was clinically diagnosed as AA in a case and the other associated with a perforated appendicitis[3]. We report 2(1.2%) cases of chronic nonspecific granulomatous inflammation, Figure 8a&8b that presented as acute suppurative appendicitis. Granulomatous appendicitis may be the first indication of tuberculosis especially in patients living in endemic regions [1]. It is a rare condition with the incidence of 0.31%-1.04% in patients who were operated upon, with clinical presentation of AA [4]. Schistosomiasis of the appendix was first described in 1909, however, it remains a rare condition and has been reported in endemic areas. Increasing globalization has made the disease important in the west [17]. Our study showed a patient(0.6%) with acute gangrenous appendicitis that revealed Schistosoma appendicitis. In our earlier study, we reported Schistosoma appendicitis seen in an undergraduate who hitherto resided in an endemic area and later moved to the urban following his admission into the university [18]. Appendiceal tumor accounted for < 3% of appendectomy specimens [4]. In the present study, there was no tumor of the appendix, perhaps highlighting its rarity. Three(3%) of the total number women in this study had corpus luteal cyst. Similarly, 3(3%) of total number of women with AA were associated with uterine leiomyoma. Reported also was a woman with ovarian teratoma. The association of ovarian cyst and AA though unlikely does happen as was our experience [19]. Two patients with sliding hernia and ileocecal knotting, Figures 10a &10b. were seen in association with AA. This may be due to the obstruction of the appendix thereby initiating the inflammatory process.

Appendectomy can be classified into 2 therapeutic categories; the curative group and the other category in which further or supplementary therapy is required. It is curative in patients with benign tumors. Further surgery may become necessary for some malignant tumors based on the tumor characteristics. Patients with parasitic infections require antiparasitic therapy [4]. Additional laboratory, imaging or endoscopic evaluation are required in suspected inflammatory diseases in patients with granulomatous appendicitis [4]. The mortality rate of 0.2-0.8% is attributable to complications of AA rather than the surgical intervention. Diagnostic challenges and therapeutic delay occasioned by late presentation and delayed surgery within the hospital facility constituted primary causes of morbidity and mortality [2].

Conclusion

The appendix with no appreciable function when neglected, not treated promptly and properly may result in complications some of which may be fatal. Pathologic evaluation remains the gold standard as additional information directs further treatment. All appendix specimens should be subjected to histopathological assessment to confirm the pathology and in addition detect other pathologies that may require further treatment.

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