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Original article

Outcome of Conservative Management of Appendicular Mass in Pediatric Age Group in Benghazi Children's Hospital

Amna Abdulrahman*, **Saleh Mohamed Algumati**

Department of Pediatric Surgery, Faculty of Medicine, University of Benghazi, Benghazi, Libya
Corresponding email. *amnasulimany@gmail.com*

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Appendicitis, Appendicular Mass, Conservative Management, Appendectomy.

A B S T R A C T

Acute appendicitis is the most common cause of acute abdomen in the pediatric age group. Appendicular mass is one of its complications, which occurs in 2 to 7% of cases of complicated appendicitis. Different data exist concerning the optimal treatment of these patients with early versus delayed appendectomy. Retrospective review of all patients' diagnostic as appendicular mass in Benghazi Children Hospital over 6 years period from 2018 to 2024. Results: 76 children below the age of 14 years with a mean +_ SD 7.92+_ 3.62, the minimum age of 2 years, and a maximum age of 13 years. Male to female ratio 1:1 treated conservatively with nil per mouth, intravenous fluid, intravenous antibiotics with close observation. Conservative management was successful in 67 patients with a percentage of 88%, and failed in 9 cases in which we performed early appendectomy within 48 hours of admission, with a percentage of 12%. The number of cases which re admitted due to recurrent symptoms was 8 cases. The number of cases that came back to do elective appendectomy on the scheduled date after success of conservative management is 19 cases (28%), and the other 48 cases (72%) never came back. We conclude, in patients presenting with appendicular mass conservative management should be the treatment of choice, with delayed appendectomy only in patients who develop recurrent symptoms.

Introduction

Acute appendicitis is one of the most common causes of acute abdomen in pediatric age groups-1. Appendicitis is an inflammation of the appendix, which commonly occurs when the lumen of the appendix becomes obstructed either by hard fecal material (called a fecolith), foreign body, tumor, or even worms or hyperplasia of the lymph nodes in the submucosa that occur with various infections- 2. The inflammatory process progresses when the obstruction of the inner space of the appendix occurs. Mucus and fluid are secreted by the appendix, increasing the pressure within it. The blocked and pressurized environment favors bacterial overgrowth within the appendix, leading to infection, the infection and increased pressure cause the appendix to be inflamed, swollen, and filled with pus. If the pressure continues to rise, it can compress blood vessels leading to ischemia, tissue damage and necrosis. In severe cases, the ischemic appendix perforates and causes peritonitis.

The patient with appendicitis presented at any stage of the inflammatory process, simple appendicitis or complicated appendicitis. The classic history of anorexia and vomiting with vague periumbilical pain, followed by migration of pain to the right lower quadrant (RLQ) is not observed in all pediatric patients with acute appendicitis- 3. So, the diagnosis of acute appendicitis in young children remains a challenge despite the availability of advanced diagnostic imaging, with the percentage of patients ranging from 28% to 57% in 2- to 12-year-olds and nearly 100% in children younger than 2 years old who present late with complications e.g., perforation, appendicular mass, abscess formation, or sepsis-4. Appendicular mass is one of the complications of appendicitis, which develops when the body tries to wall off an inflamed or perforated appendix. Appendicular mass is an inflammatory mass consist of an inflamed or perforated appendix, adjacent viscera, and greater omentum, while appendicular abscess is an appendicular mass containing pus. Appendicular mass occurs in 2 to 7% of all cases of appendicitis.

Most patients with appendicular mass presented with a history of abdominal pain and vomiting of variable duration, associated with fever, with or without a change in bowel habits. Some patients may present with urinary symptoms like dysuria and frequency if the position of the appendix is pelvic-5. The diagnosis of appendicular mass is made clinically by history and clinical examination involving vital signs and palpation of the mass during the abdominal examination, but the mass may be missed clinically in obese patients and in those with marked tenderness and rigidity, so it may be detected for the first time when the patient is already under anesthesia for emergency appendectomy. Regarding the radiological imaging, the appendicular mass is detectable in most cases by ultrasonography. Although computerized

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tomography (CT) is more sensitive but used only in some cases to confirm the diagnosis -6. The management of appendicular mass is still controversial. The traditional approach is conservative management following what is known as the Oschner-Sherrin regimen, which was explained by Oschner in 1901, then approved by Sherrin in 1905. (with nil per mouth, intravenous fluid, and broad-spectrum antibiotics) followed by interval appendectomy 6 to 8 weeks later, after the mass had resolved, this remains the most common approach at many centers in the world. The second approach is conservative management without interval appendectomy, due to the low risk of recurrence. The third approach goes toward early appendectomy during the initial admission. None of these three approaches has gained total universal acceptance, and management of appendicular mass differ from one center to another according to the surgeon's experience-7. Childhood and teenage appendicitis and appendicular mass are conditions commonly encountered in the local practice. The need to improve concurrent practice and support it with guidelines calls for exploring outcomes and conducting extensive research.

Methods

Study design

A retrospective cohort, hospital- based study design.

Ethical considerations

This research was in accordance with the highest ethical standards and adhered to all relevant guidelines and regulations governing medical research involving human subjects. The study was approved by the review and approval by the responsible ethics committee at the Benghazi Children's Hospital in Benghazi. The researcher ensured the protection of patient privacy and confidentiality by DE identifying all data collected during the study. Additionally, the researcher obtained the necessary permissions and approvals from the hospital administration and the relevant governmental agencies regarding access to the medical records and data required for the study.

Settings and period

Data in the records of Benghazi Children Hospital (pediatric surgical department) in the years from January 2018 to January 2024.

Data synthesis

The study population consists of 76 medical records of patients. Which is include pediatric patients with a diagnosis of appendicular mass who were treated at the Department of Surgery in Benghazi Children's Hospital from January 2018 until January 2024. Patients with appendicular abscesses were included in our study. Patients with other serious comorbidities were excluded. The demographic information collected for each patient from the admission note, findings in clinical examination, laboratory, and radiological findings in the investigation at the time of admission. Data was collected from hospital records on a structured form.

Variables and measured Outcomes:

1. Demographic characteristics. 2. Clinical data. 3. Diagnosis. 4. Success of conservative management. 5. Readmission. 6. Surgical intervention on an elective basis. 7. Mortality.

Statistical analysis

Data analyzed using the statistical package for the social sciences SPSS program, version 23. Descriptive statistics, such as mean, maximum, minimum, and standard deviation, were used, and the categorical variable was presented as percentages. Data presented in the form of tables and figures, where the figures were done using Microsoft Excel 2010.

Results

During the period from January 2018 to January 2024, there were 1307 patients below the age of 14 admitted and diagnostic as appendicitis (including complicated and non-complicated appendicitis). 76 patients were diagnosed with appendicular mass, which represent 5.8 % of the total cases. My retrospective study included 38 boys and 38 girls, with a male –to- female ratio of 1:1. The age of presentation ranged from 2 years to 14 years, with a mean +- SD7.92+-3.62, minimum age was 2 years, the maximum age was 13 years, the median =8, mode =10. The duration of symptoms before admission ranged from 2 days to 20 days, with presenting symptoms abdominal pain and vomiting in 38%, abdominal pain and fever in 25%, abdominal pain and diarrhea in 10%, diarrhea and fever in 8%, abdominal pain only 7%, dysuria 7%, loss of appetite 3%, abdominal pain, fever, and diarrhea in 2%. In

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our patients. We found in 46% of patients during physical examination fever and tachycardia, we found in 54% of patients the temperature and heart rate were within normal range. During the abdominal examination, we can palpate the abdominal mass in 52 patients, of which 47 were in RT. iliac fossa and 3 cases it was sub- hepatic, 2 cases were pelvic, while in 24 cases there was guarding all over the abdomen and the mass was palpated only under general anesthesia (EUA).

The diagnosis was made clinically in 70% of patients. Based on the history of the illness, palpable mass in the abdomen and confirmed by US, however in 30% of patients. The diagnosis was made by examination of the mass under general anesthesia. Soon after confirmation of the diagnosis, we start conservative management in which patients. Kept NPO, we may need to insert NGT if needed, give intravenous fluid (cover maintenance and deficit), and start intravenous antibiotics (cefotaxime -3 rd generation cephalosporins 100 mg\kg\8hrs +gentamycin 5mg\kg\8hr+ metronidazole 7 mg \kg\8 hrs.). Basic investigations were performed including complete blood count, renal function test, electrolyte, blood group, serology, and blood Sugar. Erect X-ray abdomen also performed. In our patients. WBC count was elevated in 72% of cases, while in 28% of cases were normal, other investigation was within normal range except for 2 patients Were anemic with HGB less than 8 mg\dl and received blood transfusions. One patient was post covid with IgG positive. Observe and follow up on the patients with general condition, vital signs and examination of the abdomen. 67 patients show response within the first 24 to 48 hours. Then we start oral feeding and continue intravenous antibiotics for the next few days with follow up of the clinical stats of the patients in addition to the size of the mass by uss.

Finally, patient can be discharged on oral antibiotics when the general condition improves, and the mass disappears or the size becomes un remarkable, with follow up of the surgical opd after giving advice to the family to return if there are any symptoms developed. Schedule date for elective appendectomy given after 6 weeks. In nine cases, we decided to do the operation within the 1st 48 hours due to deterioration of the general condition of the patients, in these cases 8 of them the surgeons can do an appendectomy safely without any complications, in one case, appendectomy can't be done ,the surgeon decides to end the operation by insertion of 2 drains to protect the patient from the hazards that occur during the release of the mass. Our outcome regarding the conservative management of appendicular mass in 76 patients was as follows: - 1-conservative management success in 67 patients with a percentage 88%. 2-failed conservative management with early appendectomy in nine cases with percentage 12%. Re admission of eight cases due recurrent of symptoms after success of conservative management with a percentage of 10%. Only 19 patients return at schedule date to do an interval appendectomy, rest of patients (48 cases) never come back. There was no major complication noted in our 76 patients, with a mortality rate 0%.

Demographic characteristics:

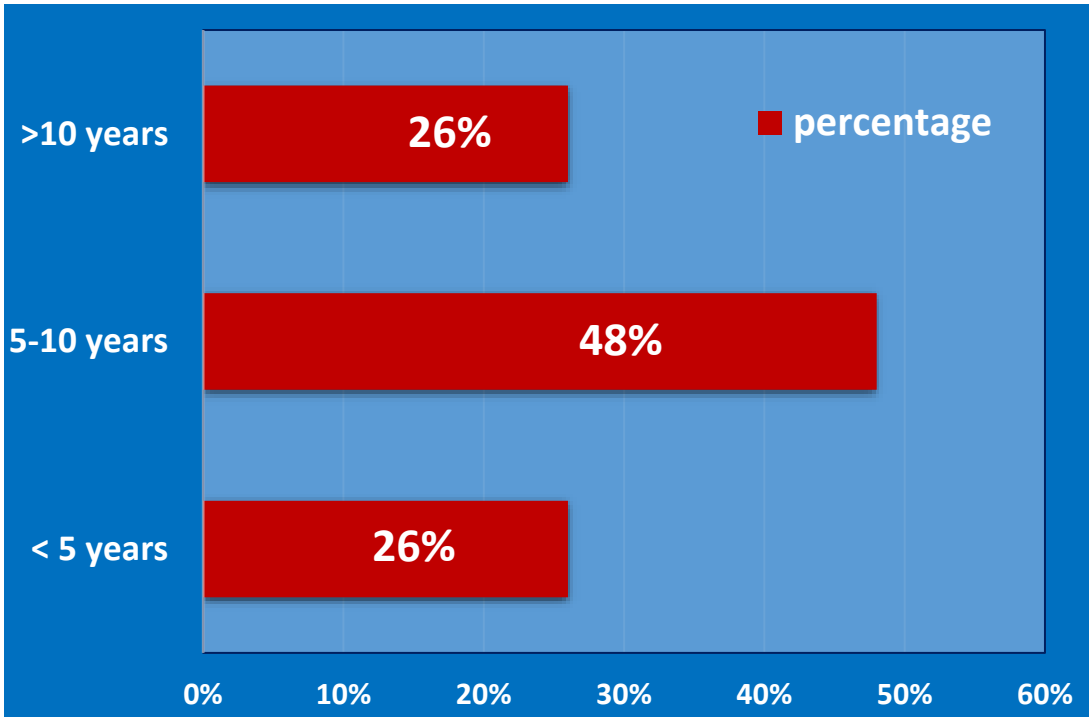

Figure (1) shows the distribution of the sample according to age.

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Table 1: Distribution of the sample according to gender

Gender	Frequency (%)
Male	38 (50%)
Female	38(50%)
Total	76

The male-to-female ratio in this study was 1: 1

Table 2: Distribution of the sample according to the presenting symptoms

Symptom	Percentage
Abdominal pain & vomiting	38%
Only abdominal pain	7%
Abdominal pain & fever	25%
Abdominal pain & diarrhea	10%
Diarrhea & fever	8%
Dysuria	7%
Loss of appetite	3%
Abdominal pain, fever & diarrhea	2%

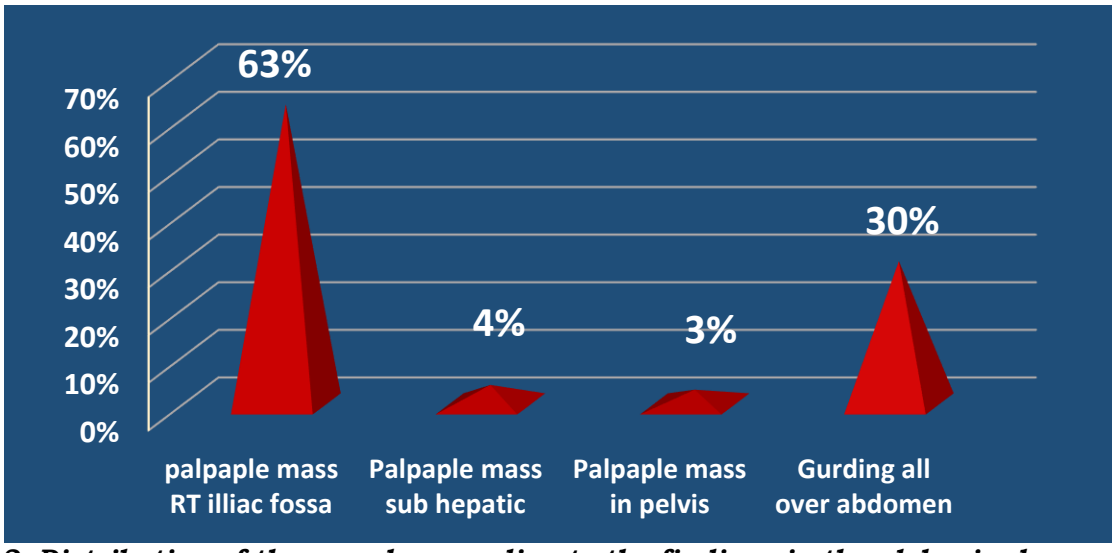

Figure 2: Distribution of the sample according to the findings in the abdominal examination

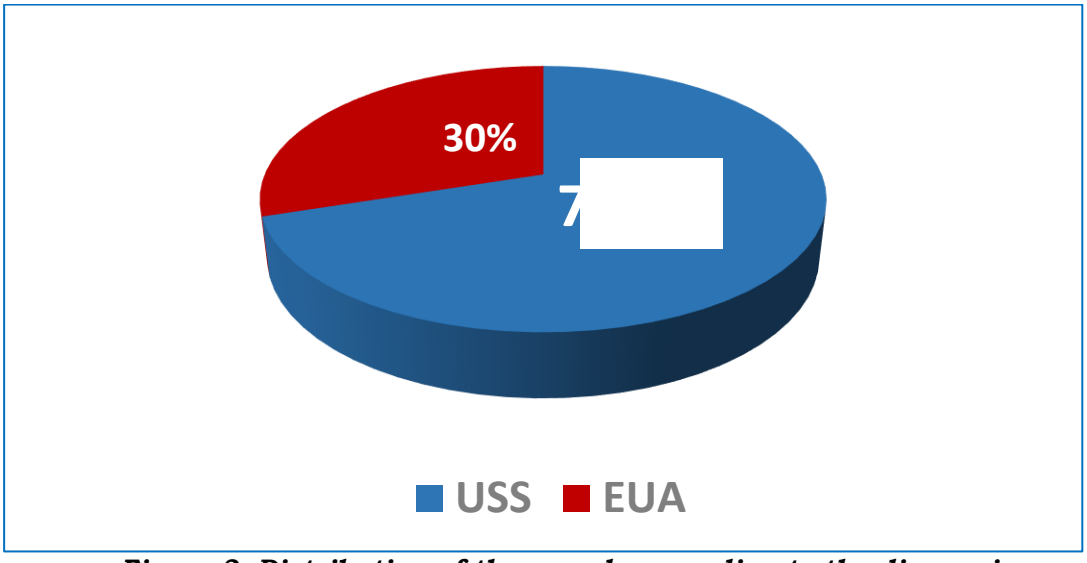

Figure 3: Distribution of the sample according to the diagnosis.

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USS for ultrasound, and EUA for examination under anesthesia.

Outcomes analysis:

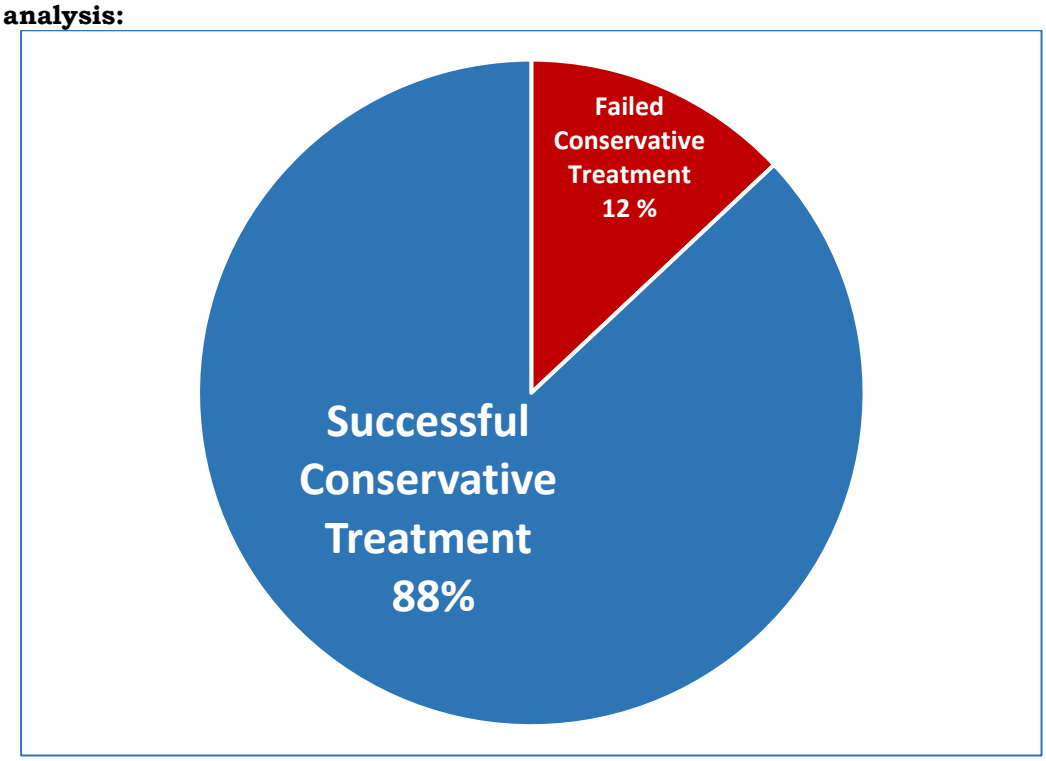

Figure 4: Distribution of samples according to the outcome of conservative management of appendicular mass

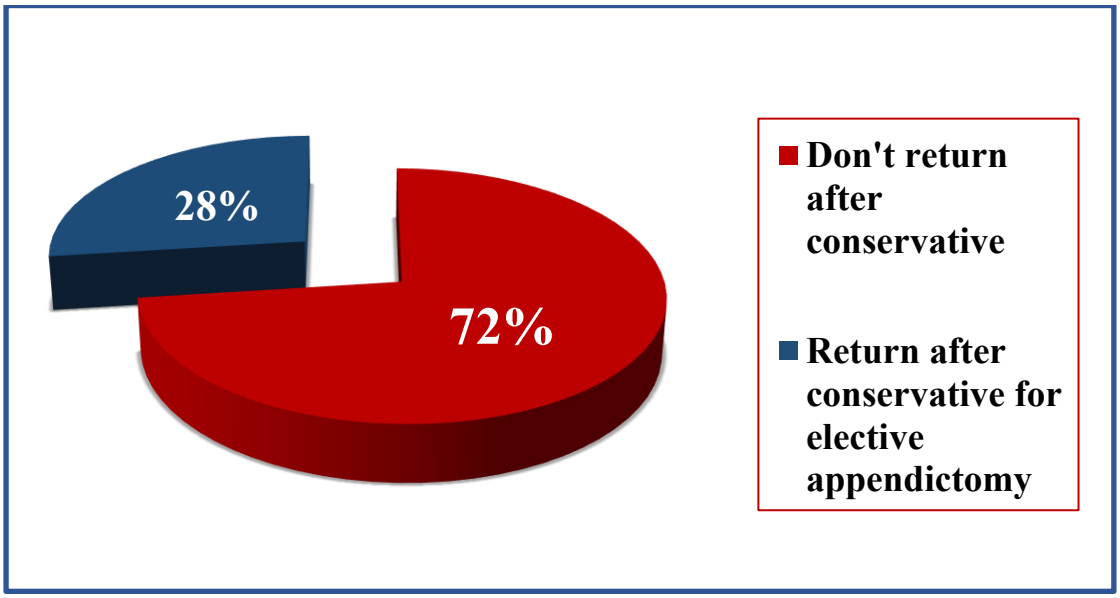

Figure 5: Distribution of the sample according to the response of the patients to follow-up and perform an elective appendectomy.

Discussion

During the period from January 2018 to December 2024, there were 1307 patients below the age of 14 admitted and diagnostic as appendicitis (including complicated and non-complicated appendicitis) 76 patients were diagnosed with appendicular mass, which represent 5.8 % of the total cases. This percentage follows the global percentage of appendicular mass which ranges from 2% to 7%, like Erdogan (2005), Ali H (2021), and Dominguez (2008) who are 4.2%,3.9%,6.4% respectively.

The study includes 38 boys and 38 girls, with male- to- female ratio of 1:1. Instead, most studies show a higher incidence in male patients than females, but Dominguez (2008) shows equal presentation in males

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and females. The mean age of presentation was 7.92±3.62 years, the minimum age was 2 years, maximum age was 13 years. This is similar to the study of Erdogan (2005) in which the age of presentation was 2 to 14 years, with a mean 7.6±3.7.

None of the investigated factors, age, duration of symptoms, presence of fecolith, or the size of the mass, has been found to have a significant statistical association with the success of conservative management.

Ali H. (2021), in discordance with the present study, shows that age has a significant effect on the efficacy of conservative management of appendicular mass. However, comparably, they declined the association of duration of symptoms or size of the mass with the success of conservative management. Zhang HL in his study in 2013, show presence of fecolith will not affect the conservative management and fecolith may be resolved, but the persistent presence of fecolith carries a high risk of recurrence. The approach followed in the management of appendicular mass in our department is conservative management followed by interval appendectomy 6 to 8 weeks later. This approach is safe and effective, as confirmed by our study, with a success rate 88% higher than described by Ali H. (2021), (84.5%).

Gilick (2001), (84.2%), and Caruso AM et al (2017), (54%). Low rate of recurrence after successful of conservative management, which is explained by the fact that the lumen of the appendix is still patent. In our study, only eight cases were readmitted due to recurrence of symptoms, with a percentage of 10%. The review of Andersson RE and Petzold MG (2007) showed the risk of recurrence is 7.4%, which is still more rewarding than the present study dictates.

The need for routine interval appendectomy is highly questioned. Because of the large number of patients who lose their follow- up visit or refuse readmission for surgery once their acute problem is solved. This is what happened in our study with the number of patients who follow up our OPD, and come for schedule date to do an interval appendectomy, 19 cases with a percentage of 28%, and the other 48 cases (72%) never came back. These surgeons prefer early surgical intervention to minimize the cost-effectiveness by early recovery, complete cure during the same admission, avoid the need for readmission, and immediately exclude other pathologies without the need to repeat radiological imaging. The disadvantages of this early surgical intervention are difficulty in dissection of the mass and intra operative complication which may result. We do not consider the cost-effectiveness as the main problem because our services are provided free.

Conclusion

Conservative management of an appendicular mass remains a viable option given its apparent safety and effectiveness. Although some studies suggest that early appendectomy is preferable to reduce cost, regardless of the potential risks associated with the dissection of the mass, we do not consider this issue, as our services are free of cost. The incidence of recurrence among patients who have completed conservative management is low. A high percentage of patients are missing their scheduled date of interval appendectomy compared with the number of patients who are complete with their follow- up and do interval appendectomy, so interval appendectomy can be omitted safely.

Conflict of interest. Nil

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