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Inflammatory Appendicular Masses as Acute Abdominal Emergencies in Adult Iraqi Patients: Incidence, management and outcomes

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Summary

Acute appendicitis is one of the most common causes of acute abdominal emergencies therefore we aimed to assess the incidence, management and outcome of inflammatory appendicular masses among adult population presented with acute appendicitis as an emergency at Balad Hospital. We conducted a mixed design "Retrospective-Prospective" cross-sectional study by review of patients medical records and collecting data of progressing operations and new attended cases for Five years period; 2015 to 2019. We found the incidence of inflammatory appendicular masses in the established period was 4.2% with a rate of 42 per1000 acute appendicitis cases. In conclusion incidence of inflammatory appendicular masses , management and outcomes were comparable to previous literatures and studies. Conservative management that is chosen in our hospital, having a success rate of 86.4%

Keywords: Appendicitis, inflammatory Appendicular Masse, management, complications, outcome

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1 | INTRODUCTION

Acute appendicitis is one of the most common causes of acute abdominal emergencies. In adolescents and young adults the male / female ratio is approximately 3: 2, after 25 years of age, this ratio gradually declines until the ratio is equalized by age 35. Almost 2%-10% of acute appendicitis cases are complicated with inflammatory appendicular masses (1). This mass is the result of a perforation of the appendicular wall and represents a broad pathological spectrum that ranges from an inflammatory mass, consisting of inflammation of the appendix, some adjacent viscera, and the greater omentum (a phlegmon or plastron) to a peri appendicular abscess (2,3). There are still controversies and there is no general agreement among surgeons regarding the management of the inflammatory appendicular mass. Conservative management has proven to be very popular in recent years as well as being safe and effective. However, lack of response can be found in 10 to 20% of patients (4–7). For surgeons who adopt conservative management of the inflammatory appendicular mass, surgery can be safely omitted or postponed as long as there is no recurrence of symptoms, and all other pathological causes of a mass in the right iliac fossa have been totally excluded by follow-up and investigations, such as colonoscopy and computed tomography, especially in patients older than 40 years (8–11). Appendicitis without timely treatment can evolve into an appendicular perforation, generating peritonitis, a more serious entity; however, the body can partially control this process, generating an appendicular plastron (AP) in approximately 10% of cases 2,3 , that is to say, a mass formed by tissues adjacent to the perforated appendix delimiting the infectious process, which additionally increases morbidities such as prolonged treatment, time of hospitalization or rest, and examinations, among others (12). There is great controversy regarding the ideal therapeutic method ; on the one hand, given the number of complications that could occur in immediate surgery compared to conservative management, and on the other, defining a subsequent delayed appendectomy (5,11,13). Some are in favor of this trend because by preserving the appendix there is a risk of suffering recurrent appendicitis, or appendicular cancer (14), however, opponents suggest that these

events would occur in a low percentage . There is currently no consensus on the subject, which is evidenced by multiple scientific publications supporting both positions (5,9). The advantages of immediate surgical management show a shorter hospital stay and, therefore, less use of resources, however, it presents multiple complications such as injury to other viscera, infection of the operative wound, pelvic abscess and the need for surgical reintervention. Because of this, this option is not considered first line by most professionals, choosing conservative management to avoid the adverse situations mentioned (15,16). There are some meta-analyzes that support the choice of medical versus surgical management, however, there are centers where immediate intervention is chosen based on the high probability of recurrence. Regarding the complications of non-surgical management, the following can be mentioned: failure of this, incomplete drainage or the need for additional drainage, infections, fistulas, requirement of laparotomy to drain abscesses and recurrent appendicitis (4, 17–19). However, in our environment, the type of therapy is mainly left to the discretion and experience of the treating surgeon, with immediate surgical intervention, or a non-surgical or conservative management being within the possibilities. The objective of the present work was to estimate the incidence rate, management options and outcomes of the inflammatory appendicular masses in the adult population in our center.

2 | PATIENTS AND METHODS

This was a mixed design “ Retrospective-Pro prospective” cross-sectional study by review of patients’ medical records and collecting data of progressing operations and new attended cases for Five years period; 2015 to 2019. The study population included patients with acute appendicitis who attended the hospital as emergencies, during the study period. Study sample was patients with a diagnosis of Inflammatory Appendicular Masses as Acute abdominal emergency who met the inclusion criteria.

Inclusion criteria:

1. Adult patient older than or at 18 years of both genders
2. With palpable mass in the right iliac fossa.

3. Four days longer than illness

Exclusion criteria:

Patient was excluded if he/she had one or more of the following:

1. Additional diagnoses such as: pilephlebitis, localized or generalized peritonitis, intestinal obstruction.
2. Sepsis
3. Incompletely filled medical records or missed investigations or outcome.
4. Missed to follow-up
5. Refuse consenting to participate in the study.

Data collection, management and analysis:

Data were collected using a pre-constructed data collection sheet , prepared by the researcher, included the demographic , clinical , laboratory findings , management approaches and outcomes. For the elaboration of the work, we proceeded to select the patients with a diagnosis of appendicular mass, collecting data by full clinical history at the Emergency room and admissions book of General Surgery department and discharge records. The medical records of the selected patients were reviewed and data collection form completed for newly presented cases in addition to the data obtained from medical records.

Then all collected data (retrospectively and prospectively) were transferred into computerized database, using personal PCs of the authors. Then with assistance of a biostatistician, data were analyzed using the statistical package for social sciences version 24 and Epicalc-2000 software. Variables presented as mean, standard deviation (SD), frequency and percentages according to the type of variable. Incidence rate calculated as “ the number of cases with inflammatory appendicular masses divided by total number of cases during the study period” multiplied by 100%, A cumulative incidence rate then calculated per 1000 acute appendicitis cases. Level of significance, p. value was two tailed ≤ 0.05 to be significant. Tables , graphs and interpretation of findings were performed with Microsoft Office Excel and Word Programs version 2013.

3 | RESULTS

During the study period, the number of patients found with a diagnosis of inflammatory appendicular mass was 82, of them 12 cases were excluded due to insufficient information in their medical records or refuse to participate in the study, therefore the total number of patients included in the study was 68. The number of adult patients with a diagnosis of Acute Appendicitis who attended our Hospital during the years 2015-2019 was 1,618 cases, hence the incidence rate of an inflammatory appendicular mass in the established period was 4.2% with a cumulative incidence rate of 42 per1000 acute appendicitis cases ([Table 1 and Figure 1](#)). The mean age of the 68 cases of inflammatory appendicular masses was 31.6 ± 12.4 years and majority of cases aged 40 years or younger . Males were relatively dominant, 37/68 with a male to female ratio of 1.2 to one ([Table 2](#)) . Clinical parameters of 68 cases with inflammatory appendicular masses revealed that the mean time of illness before admission was 7.1 ± 4.5 days. Ultrasonography and abdominal tomography performed in 65 and 22 patients respectively. The mean leukocytes count upon admission of patients with appendicular mass was $14.2 \pm 3.1 \times 10^3$ cell/ml. Regarding antibiotic treatment on admission it was Ceftriaxone - Metronidazole in 62 (91.2%) patients and Ciprofloxacin – Metronidazole in 6 (8.8%) patients, ([Table 3](#)).

Response to conservative treatment was successful in 59 patients (86.8%) then interval appendectomies were performed, while conservative treatment failed in the remaining 9 patients who need emergency appendectomy, ([Table 4](#)).

Operative findings of the 68 patients indicated simple mass in 50 patients while pus collection in 11, Appendicular abscess in 7 patients. From other point of view, 6 patients had localized and 2 patients had generalized peritonitis. Free fecalith found in 8 patients. Nineteen patients (27.9%) needed incision extension, and 11 (16.2%) there was difficult adhesiolysis and localization of appendix, ([Table 5](#)).

The mean operative time was 65.4 ± 17.2 (range: 40 – 120) minutes . Interval to appendectomy ranged 2 – 4 months with a mean of 3.2 ± 0.3 months. Mean Hospital stay for second hospitalization to perform interval appendectomy was 3 ± 1 (range: 2 –

5) days, (Table 6). Among the studied group surgical site infection developed in 6 patients (8.8%) , no other serious complications or mortalities were reported, (Table 7)

Table1. Frequency and incidence rate of inflammatory appendicular masses diagnosed at Al-Hakeem Hospital in Najaf , 2016-2019

Variable	No.	%	Incidence per 1000 cases
Appendicular mass	68	4.2	42.0
No Appendicular mass	1550	95.8	95.8
Total appendicitis	1618	100.0	

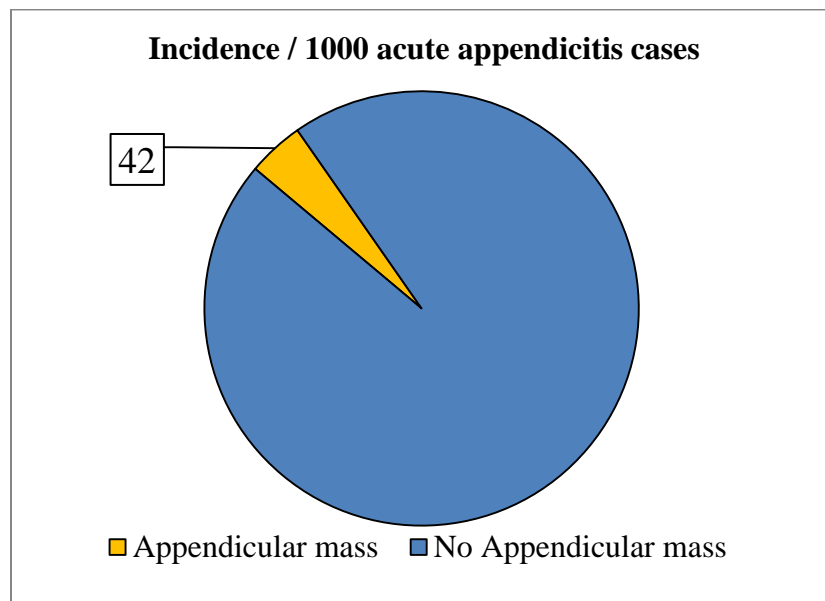


Figure 1. Pie-chart showing the incidence rates of inflammatory appendicular masses

Table 2. Baseline characteristics of 68 cases with inflammatory appendicular masses admitted at Al-Hakeem Hospital in Najaf , 2016-2019			
Variable		No.	%
Age	18 - 30	31	45.6
	31 - 40	26	38.2
	> 40	11	16.2
	Mean (SD*)	31.6 (12.4)	-
Gender	Male	37	54.4
	Female	31	45.6
	Male: Female ratio	1.2: 1.0	-
Total		68	100.0
SD: standard deviation of the mean			

Table 3. Clinical parameters of 68 cases with inflammatory appendicular masses admitted at Al-Hakeem Hospital in Najaf , 2016-2019		
Variable		Value
Mean time of illness before admission, mean (SD) days		7.1 (4.5)
Abdominal ultrasound performed n (%)		65 (95.6)
Abdominal tomography n (%)		22 (32.4)
WBC count (x10 ³) cells/ml , mean (SD)		14.2 (3.1)
Antibiotic treatment on admission		
	Ceftriaxone - Metronidazole n (%)	62 (91.2)
	Ciprofloxacin - Metronidazole n (%)	6 (8.8)

Table 4. Response to conservative treatment of 68 patients with inflammatory appendicular mass		
Response	No.	%
Successful *	59	86.8%
**Failed	9	13.2%
Total	68	100.0%
*Interval appendectomy performed, **Need emergency appendectomy		

Table 5. Operative findings of inflammatory masses patients (N=68)		
Finding	No.	%
Simple mass	50	73.5
Pus collection	11	16.2
Appendicular abscess	7	10.3
Localized peritonitis	6	8.8
Generalized peritonitis	2	2.9
Free fecalith	8	11.8
Need extending of incision	19	27.9
Difficult adhesiolysis and localization of appendix	11	16.2

Table 6. Statistics of operative time, interval to appendectomy and hospital stay			
Finding	Mean	SD	Range
Operative time (minutes)	65.4	17.2	40 - 120
Interval to appendectomy in months	3.2	0.3	2 - 4
Hospital stay for second hospitalization (days)	3.0	1.0	2 - 5

Table 7. Complications of patients		
Finding	No.	%
Surgical site infection	6	8.8
Mortality	0	0.0

4 | Discussion

Historically, the management of a patient with an inflammatory appendicular mass consisted of performing emergency surgery; Later, conservative management arose, which if successful continued with a scheduled interval appendectomy; Currently the different studies, including meta-analyzes, demonstrate the advantage of conservative management of these patients and that there is no need to perform an interval appendectomy except for patients who present recurrent symptoms, however in our experience, interval appendectomy still of high recommendation (4,9,14,18) . We found appendicular masses in 4.2% of a total of 1618 acute appendicitis cases, these findings in line with that reported in previous studies; Meshikhes Abdul-Wahed (5) documented that acute appendicitis can be complicated by the development of an inflammatory appendicular mass in 2-10% of cases; another study conducted by Andersson and Retzold (6) reported 3.8% inflammatory appendicular mass among acute appendicitis cases . In our study, we found that the incidence of an inflammatory appendicular mass in Al-hakeem Hospital in a figure within that described in previous studies. The mean age of presentation of the inflammatory appendicular mass in our study was 31.6 years, however, it should be noted that this study covers only the adult population (at 18 years or older). There are studies that include patients of all ages, in which the highest incidence occurs in children, 8.8% versus 4.8% in adults (6) . Furthermore, Teixeira et al.(13) reported in their review articles included multiple studies that among 13244 cases presented as acute appendicitis , 2-6% had appendicular masses. The most frequently used intravenous antibiotic regimen in patients diagnosed with an inflammatory appendicular mass was Ceftriaxone and Metronidazole, which provide coverage for the germs present in this pathology (gram negative and anaerobic); Rushing et al. also established by their recent practice management guidelines from the Eastern Association for the Surgery of Trauma (4). Moreover, it had been postulated that antibiotic management of such cases associated with 68-85% success rate and a reduction in complications(7). Non-surgical management of appendicular masses followed by interval appendectomy to prevent recurrence. The average time of illness

was 7.1 days, which reflects the delay in attending the surgery service by patients, assuming that this may be due to an error in the initial diagnosis or simply a lack of awareness of the disease on the part of the same patients who opt for self-medication. At our hospital, conservative treatment is chosen in adult patients with inflammatory appendicular masses. It was determined that the success rate for this management corresponds to 86.8%, leaving the remaining 13.2% as patients who fail this treatment; This figure is similar to that described in previous published studies (6) . These results support the management adopted our Hospital. Out of all 68 patients, who managed as emergency or those managed with interval appendectomy, only 6 patients developed surgical site infection , while no other serious complications had been reported. Fortunately none of the patients died or developed sepsis. Although our study is purely descriptive, we can affirm that this finding confirms what has been demonstrated in other investigations in which emergency surgery is correlated with a higher incidence of postoperative complications(9) while no serious complications reported after interval appendectomy. This figure is related to what is mentioned in the bibliography regarding the fact that there is still no consensus for the use of interval surgeries in patients with an inflammatory appendicular mass. Regarding the histopathology results of the patients who underwent interval appendectomy, none of them found acute inflammatory response cells (neutrophils), on the contrary 50% presented chronic inflammation, which is a figure higher than that found in previous studies (3,20) . The finding of a normal appendix in the pathological anatomy was similar to that found by Al-Kurd et al. (20), Guida et al. (2) and Otake et al. (21).

5 | Conclusion

The incidence of inflammatory appendicular mass is was 42 per 1000 acute appendicitis cases and this rate is comparable to that reported in previous literatures and studies. Conservative management had a success rate of 86.4%. It is recommended to emphasize the need for a good follow-up and outpatient control of patients with a diagnosis of appendicular mass who do respond to conservative management, which will help to implement the acute appendicitis clinical guide of the general surgery

service in our Hospital.

Ethical Issue

All ethical issues were approved by the authors. Informed consent was obtained from all participants. Data were collected in accordance with declaration of Helsinki of the World Medical Association, 2013 , all other ethical issues were approved by the author

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