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Management of Appendiceal Mass and Abscess. An 11-Year Experience

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The aim of our study is to compare the results of emergency surgery versus conservative treatment with interval surgery in patients diagnosed with appendiceal mass and abscess. A retrospective review of 48 patients with appendiceal mass and abscess treated from January 2002 to January 2013 at General Surgery Department of Kipshidze Central University Hospital was performed. Patients with emergency surgery were compared to patients treated by nonoperative management with interval surgery. Demographics, clinical profile, and operative outcomes were studied. The emergency surgery group included 25 patients, and the interval surgery group included 23 patients. The clinical characteristics of the emergency surgery and interval surgery groups were not statistically different. In the emergency surgery group, an open appendectomy was performed on 17 patients, and colonic resections (ileocecectomy or right hemicolectomy) were performed on 8 patients. In the interval surgery group, an open appendectomy was performed on 21 patients, and colonic resections were performed on 2 patients. There were no statistical differences in types of surgery, postoperative complications, operation time without colonic resections, and postoperative hospitalization period among these 2 groups. Operation time with colonic resections was of greater duration in the emergency surgery group than in the interval surgery group ($P = 0.04$). Both treatment methods for appendiceal mass and abscess have the same results. The surgeon must consider clinical symptoms and results of investigations in each particular case when choosing an appropriate treatment method. Prospective randomized controlled trials are required for comparing the results of all 3 treatment methods of appendiceal mass.

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Acute appendicitis is one of the most frequent acute surgical pathologies. The inflammation in acute appendicitis may sometimes be fixed by the patient's own defense mechanisms, by the formation of an inflammatory mass (an appendiceal phlegmon) or a circumscribed abscess (an appendiceal abscess), often presenting as a palpable mass days following the onset of symptoms. This complication occurs in 2 to 7% of all cases of appendicitis.[1,2]

Management of appendiceal mass and abscess is either operative or conservative. More evidence is needed to identify which method is superior.[1] Immediate appendectomy may be technically demanding because of the distorted anatomy and difficulties in closing the appendiceal stump due to the inflamed tissues. According to the aforementioned, the operation could be finished with colonic resections (ileocecectomy or right hemicolectomy).[2–4]

Conservative management with interval appendectomy has traditionally remained the gold standard management. The need for interval appendectomy after a successful nonsurgical treatment has recently been questioned as the risk of recurrence is relatively small.[5–7] After successful nonsurgical treatment of an appendiceal mass, the true diagnosis is uncertain in some cases and underlying diagnosis of cancer or Crohn's disease (CD) may be delayed.[1,8,9]

The aim of our study is to compare the results of emergency surgery versus conservative treatment followed by elective surgery in patients diagnosed with appendiceal mass and abscess.

Materials and Methods

The research was conducted at General Surgery department of Tbilisi State Medical University Central Hospital of N. Kipshidze. Retrospective analyses of 48 patients' histories were carried out. The patients with diagnosis of appendiceal mass and abscess were treated at the department, from January 2002 until January 2013. An appendiceal mass is an inflammatory tumor consisting of the inflamed appendix, its adjacent viscera, and the greater omentum, whereas an abscess is a pus-containing appendiceal mass.[1,5] The patients were diagnosed by physical examination, computed tomography (CT), and ultrasound. Patients who have undergone emergency operation were defined as the emergency surgery group (Group 1). The patients under conservative treatment by antibiotics, with or without percutaneous drainage, guided by CT or US, and operated on after 8 to 10 weeks from the time of initiation of treatment, were defined as the conservative treatment group, requiring interval surgery (Group 2). Indication of percutaneous drainage was the existence of appendiceal abscess.

The clinical characteristics were collected for each patient: gender, age, major symptoms, duration of symptoms prior admission, heart rate, body temperature at time of admission, the number of leukocytes, the presence or absence of a mass or abscess in the ileocecal region and size, and associated chronic diseases. Among patients who underwent surgery, the surgical methods, operation time with and without colonic resections, postoperative hospitalization period, and postsurgical complications were analyzed. The follow-up observation period was from the day of the first visit to the most recent visit to outpatient clinic.

Descriptive statistical methods were used to characterize each variable. Comparison of continuous variables was performed by independent samples t test or the Mann-Whitney U test, according to the normality of the variables. Categoric variables were evaluated by two-tailed chi-square test or Fisher's exact test where appropriate. The threshold for statistical significance was set to $P < 0.05$. Statistical tests were performed by SPSS 16.0 (SPSS Inc, Chicago, Illinois).

Results

A total of 1127 patients with diagnosis of acute appendicitis were operated on during the study period. Forty-eight (4.3%) patients had appendiceal mass and abscess. The mean age of the study group was 41.9 years, and ratio of males to females was 25:23. Among them, the emergency surgery group (Group 1) included 25 patients, and the conservative treatment group requiring interval surgery (Group 2) included 23 patients.

The clinical characteristics of the emergency surgery and conservative management, requiring interval surgery groups were not statistically different (Table 1).

Table 1 Comparison of clinical characteristics between the emergency surgery and interval surgery groups

	Group 1 (n = 25)	Group 2 (n = 23)	*P* value
Male:female	14:11	11:12	0.57
Mean age (yr)	38.7 ± 16.3	42.5 ± 19.8	0.47
Pain	22 (88.9%)	21 (91.3%)	0.71
Duration of symptoms (day)	6.7 ± 4.5	7.9 ± 3.9	0.33
Nausea and vomiting	14 (56%)	11 (47.8%)	0.57
Mass	9 (36%)	7 (30.4%)	0.68
Body temperature (°C)	37.4 ± 1.4	37.2 ± 1.7	0.65
Heart rate (pulse/min)	91.5 ± 22.8	88.6 ± 19.4	0.64
WBC count (/mm^3)	12,800 ± 5600	12,100 ± 4300	0.63
Size of abscess (cm)	3.8 ± 1.6	4.4 ± 2.4	0.31
Comorbidities			
Cardiovascular	4(16%)	3(13%)	1.0
Respiratory system	1(4%)	1(4.3%)	1.0
Diabetes	1(4%)	3(13%)	0.34

Group 1, emergency surgery group; Group 2, conservative management group, requiring interval surgery; WBC, white blood cells.

Among patients of the interval surgery group, 14 patients with a diagnosis of appendiceal mass were treated with antibiotics only, and 9 patients with a diagnosis of appendiceal abscess were treated with antibiotics in parallel with US or CT-guided percutaneous drainage. One patient with US-guided percutaneous drainage has undergone delayed operation on the 14th day of drainage because of the worsening situation. Interval surgery was performed in the cases of 22 remaining patients after 8 to 10 weeks from the time of initiation of conservative management.

In the emergency surgery group, colonic resections (ileocecectomy or right hemicolectomy) were performed due to severe inflammation and adhesion around the ileocecal region or suspicion of cecal tumor. Histopathologic examination of the sectioned preparations confirmed perforated appendicitis in 24 patients (out of 25 patients) and cecal cancer in 1 patient, who was operated on in the right hemicolectomy. Postoperative complications developed in 4 patients; all were wound infections. None of the 25 patients died.

In the interval surgery, ileocecectomy was performed on the patient who was under US-guided percutaneous drainage. The patient's condition changed for the worse on the 11th day after drainage. On the 14th day, the patient was operated on as a result of progressed abscetic process. Right hemicolectomy was performed on the patient with intestinal fistula formed on the background of CT-guided percutaneous drainage. This patient was diagnosed with Crohn's disease with the help of a colonoscopy, and right hemicolectomy was performed after 8 weeks of conservative treatment. A postoperative complication (wound infection) developed in 1 patient. None of the 23 patients died.

When the emergency surgery group and interval surgery group were compared, surgical methods, operation time without colonic resections, postoperative complications, and the postoperative hospitalization period were not statistically significant or different. Operation time with colonic resections was more in the emergency surgery group compared to the interval surgery group. The different was statistically reliable ($P = 0.04$; Table 2).

Discussion

Appendiceal mass can be the reason for perforation of the appendiceal wall leading to formation of an inflammatory mass not only in the appendix, some

Table 2 Comparison of surgical outcomes between emergency surgery and interval surgery groups

Operations	Group 1 (n = 25)	Group 2 (n = 23)	*P* value
Appendectomy	17 (68%)	21 (91.3%)	0.08
Colonic resections	8 (32%)	2 (8.7%)	0.08
Operation time with colonic resections (min)	110.7 ± 41.4	88.1 ± 30.1	0.04
Operation time without colonic resections (min)	63.4 ± 18.7	55.7 ± 19.5	0.17
Postoperative complications	4 (16%)	1 (4.3%)	0.19
Postoperative hospital stay (day)	7.8 ± 3.4	6.4 ± 2.2	0.10

adjacent viscera, or great omentum, but also formation of periappendiceal abscesses.[2,8,10]

There are 3 methods for treatment of appendiceal mass: emergency surgery, conservative management followed by interval surgery, and totally conservative management without interval surgery.[1,2,5,11,12]

The most widespread method of treatment is considered the nonoperative method by Ochsner (1901).[13] In a modern-day environment, this method implicates starting treatment with broad-spectrum antibiotics and infusion therapy. In case of improvement in the patient's condition, interval surgery is indicated after 8 to 12 weeks.[1,9,15,20,22] In case of existence or formation of appendiceal abscess, US or computed tomography-guided percutaneous drainage is indicated.[2,5,10,14,15] If the patient's condition is not improved, surgical intervention must be performed. According to our results, 9 patients out of 23 conservatively treated patients had experienced US or CT-guided percutaneous drainage. Twenty-two patients' (out of 23 patients) condition improved, only 1 patient's health worsened, and operational intervention was performed on the 14th day from the beginning of conservative treatment. Currently, the need for interval surgery after conservative treatment is debatable. The reasons for this controversy are the data indicating the low rate of recurrence of acute appendicitis (about 10%), if the conservative treatment of appendiceal mass and abscess is not followed by interval surgery.[5–8,16–18] There were no patients like that in our study, so it is impossible to say anything about this issue. An interesting fact was fixed: 8 patients out of the 22 patients who were operated on after 8 to 10 weeks of conservative treatment, had periodic pain in the right iliac fossa area during the preoperative period.

Conservative treatment is associated with a risk of missing or delayed hidden pathologies such as cecal cancer or Crohn's disease in about 2 to 3% of the patients.[1,8] Therefore conducting tests such as colonoscopy, barium enema of the colon, and contrast-enhanced CT scan are important to make for exploration of such diseases after conservative treatment. There is no general consensus as to the right time to perform such investigations. Timing is important as incompletely resolved appendix mass may give false positive results. It is believed that such investigations can be performed safely 4 to 6 weeks after the acute episode.[2,9,17,18] According to the literature, these investigations are most important and necessary particularly in patients aged 40 years and over.[12,17,25] We think that all patients must be investigated with these tests after conservative treatment. Our data indicates that 1 patient from the conservative treatment group ($n = 23$ patients) was diagnosed with Crohn's disease with help of colonoscopy.

Emergency surgery has a certain place in the treatment of appendiceal mass and abscess. High frequency of postoperative complications is the negative side of this method.[14,16] These complications are caused by edema and the vulnerability of the adjacent small and large intestine, and difficult approach to the appendix due to deformation of anatomic structures and location. Conducting colonic resections (iliocecectomy, right hemicolectomy) is sometimes necessary instead of appendectomy due to the acute inflammation and adhesion.[1,5,14,16,19,20] The prevalence of this method compared to conservative is due to no need of longitudinal follow-up and repeated hospitalization because of elective operation. This method avoids misdiagnosed cases and promptly deals with any unexpected ileocecal pathology that masquerades as an appendiceal mass.[3,4,8,21–25] In our study the results of emergency surgery group and results of interval surgery group were not statistically significantly different, they were practically identical. Operation time with colonic resections was more in the emergency surgery group than in the interval surgery group and that was only statistically reliable indicator. Similar results are received in other investigations also.[2,4] It is possible that operative time was more due to more patients subjected to colonic resections—need for longer incision, need for anastomosis, etc. This is confirmed by the fact that operation time without colonic resections was identical in both groups.

Attention was given to the fact that most of the research regarding appendiceal mass treatment methods is retrospective. From our point of view, prospective randomized controlled trails are required. We think that prospective research concerning comparison of emergency surgery and conservative treatment without interval surgery has great importance. These studies will answer a lot of questions that have arisen around the issue. According to the scientists' view, additional research is needed for fully understanding this subject.[8,12]

Conclusion

Imaging techniques, especially computed tomography scans, are valuable methods to confirm the

diagnosis of patients with suspected appendiceal mass and abscess. According to our study, we can conclude that both treatment methods of appendiceal mass and abscess have the same results. The surgeon must consider clinical symptoms and investigation-based results for choosing appropriate treatment methods in each particular case. Prospective randomized controlled trials are required for comparing the results of all 3 treatment methods of appendiceal mass.

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