

## ORIGINAL ARTICLE

**Comparison between Percutaneous Drainage vs Operative Intervention in Treatment of Appendicular Abscess: A Retrospective Study**SURRENDAR DAWANI<sup>1</sup>, MANSAB ALI<sup>2</sup>, MADIHA MASOOD KHAN<sup>3</sup>, SALMAN JAFFERI<sup>4</sup>, ADEELA Z SIDDIQUI<sup>5</sup>, RAKESH KUMAR<sup>6</sup><sup>1-6</sup>Consultant General Surgeon, Jinnah Postgraduate Medical Centre Karachi PakistanCorresponding author: Surrender Dawani, Email: [surru82@hotmail.com](mailto:surru82@hotmail.com)**ABSTRACT****Aim:** To evaluate the outcomes of percutaneous drainage and surgery in periappendiceal abscesses.**Study design:** A Retrospective study**Place and Duration:** This study was conducted at Jinnah Postgraduate Medical Centre Karachi Pakistan from January 2020 to December 2021.**Methodology:** For this study, we defined abscess as fluid collection adjacent to the appendix with 0-20 Hounsfield units (HU) attenuation on CT scan. Classification of Jeffrey, et al was used to grade abscesses. According to the classification patients with abscess or phlegmon, lesser than or equal to 3cm were represented in the grade 1 category. Grade 3 comprised those patients who had larger abscesses extending to the pelvic cavity. Patients of periappendiceal abscess aged above 16 years were enrolled for this study. The diagnosis was based on CT findings. The patient's discharge summary was used for confirmation. All the patients underwent two treatment options; Surgery or ultrasonography or CT-guided percutaneous drainage.**Results:** Out of 67 cases 44 (65.6%) cases underwent percutaneous drainage while 23 (34.3%) patients underwent surgery. Male participants were 37, 55.2% with a relative ratio of females (30, 44.7%). The mean symptoms onset was reported as 5 days ranging from 1-to 30 days. We observed that the percutaneous drainage group had 84.1% (37 cases) successful outcomes with a 15.9% (7 cases) failure ratio whereas only a single case of failure was observed by a surgery.**Conclusion:** Our results concluded that percutaneous drainage is effective for treating abscesses >6cm with a low risk of recurrence. However, this procedure lengthens the hospital stay until the complete resolution of the abscess.**Keywords:** Abscess, Percutaneous drainage, Surgery**INTRODUCTION**

Acute appendicitis is one of the common problems which require immediate treatment. In the past there is no optimal treatment for appendicitis found yet, however, 2-6% of cases presented in the emergency department have manifest appendiceal perforation with abscess.<sup>1</sup> These cases of periappendiceal abscesses are the product of perforated acute appendicitis and can cause a high morbidity ratio. Surveys report that 20% of cases of acute appendicitis have periappendiceal abscesses.<sup>2</sup> In clinical settings, these cases are diagnosed by using imaging techniques.<sup>3</sup> Imaging techniques like enhanced computed tomography assist in the evaluation process of percutaneous drainage feasibility and also guide the access route of drainage.<sup>3</sup> Furthermore, many conservative and non-conservative methods have been introduced including antibiotic therapy alone or combined with percutaneous drainage to overcome the morbidity ratio.<sup>4</sup> However, the variations in results and lack of agreement cause uncertainty. The percutaneous drainage method with intravenous (IV) antibiotics is considered one of the most effective conservative treatments for abscesses in terms of managing inflammation.<sup>5-7</sup> However, some studies reported prolonged hospital stay, emergency appendectomy, and a high recurrence rate of this method.<sup>8-10</sup> Studies reported that the male population is more vulnerable to appendicitis still female population has two times the greater ratio of appendectomy. Timely management of acute appendicitis is still challenging especially in atypical cases.<sup>11</sup> Research revealed that 15-40% of cases of appendicitis are misdiagnosed or mistreated at the initial stage resulting in emergency surgery.<sup>11</sup> We designed this study to evaluate the outcomes of percutaneous drainage and surgery in periappendiceal abscesses.

**METHODOLOGY**

This retrospective study was conducted after obtaining ethical approval from the research department of our hospital. Patients of periappendiceal abscess aged above 16 years were enrolled for this study. The diagnosis was based on CT findings. The patient's discharge summary was used for confirmation. All the patients underwent two treatment options; Surgery or ultrasonography or CT-guided percutaneous drainage. Treatment options were suggested by a senior physician after a radiological assessment of each individual. Antibiotic treatment was provided to each patient before and after drainage and surgery until the complete course.

Patients who had drainage within three days after diagnosis were classified in the percutaneous drainage group as suggested by Richmond.<sup>3</sup> Interventional radiologists decided on the feasibility of the drainage process. During the study period, 80 patients revealed periappendiceal abscess on CT. However, ten patients were shifted to another hospital and excluded from our study. We also excluded three cases of appendiceal or cecal tumor diagnosed in the final pathological analysis. The remaining 67 patients were recruited for our research. We used a 64-slice CT scanner to diagnose cases with a dose of 2 ml/kg and an injection rate of 3 ml/second intravenous contrast-enhanced CT was performed. The demographic information of each patient was noted for statistical analysis. Abscess characteristics and the time interval between drainage and surgery and surgery type were also recorded. For this study, we defined abscess as fluid collection adjacent to the appendix with 0-20 Hounsfield units (HU) attenuation on CT scan. However, phlegmon was defined as an area of 20 HU or greater within periappendiceal fat. Classification of Jeffrey et al.,<sup>12</sup> was used to grade abscesses. According to the classification patients with abscess or phlegmon, lesser than or equal to 3cm were represented in the grade 1 category while grade 2 was conformed to patients with abscess or phlegmon greater than 3cm. Grade 3 comprised those patients who had larger abscesses extending to the pelvic cavity. Patients with multiple abscesses were also categorized in grade 3. Four experienced interventional radiologists performed the procedure of percutaneous drainage. We used 8-12 Fr catheter size depending on the viscosity of the aspirated liquid. Almost all the participants were of transabdominal route drainage while only one patient had Tran's gluteal drainage. Patients who recovered after single drainage with a fluid output of fewer than 10 ml/day x 3 consecutive days without any need for surgery were considered successful outcomes of percutaneous drainage.<sup>13</sup> Reduction of abscess size was also considered a successful outcome. Meanwhile, if the patient needs urgent surgery and clinical worsening of the process observed we consider it as drainage failure. However, patients with elective surgery were not classified as drainage failure. On contrary, successful outcomes of surgery were dependent on a patient recovery in which patients were discharged from the hospital after a single intervention. However, those cases that required another surgical intervention or percutaneous drainage were defined as surgical failure.

We used SPSS statistics 23.0 for data preparation and analysis. The median interquartile range was used for representing patients' characteristics whereas qualitative variables were summarized by using a frequency distribution table. We used Pearson coefficient correlation and Chi-square test for comparing qualitative variables while quantitative variables were compared by Mann Whitney test. P-value was set as 0.005 for statistical significance.

## RESULTS

Out of 67 cases, 44 (65.6%) cases underwent percutaneous drainage while 23 (34.3%) patients underwent the surgery process. Half of the research participants were male (37, 55.2%) with a relative ratio of female (30, 44.7%). The mean symptoms onset was reported as 5 days ranging from 1-to 30 days (As shown in Table 1).

Table 1: Demographic information of the study participants

Characteristics	N (%)
Mean age of the patient	53 (16-93)
Gender	
Male	37 (55.2)
Female	30 (44.7)
Mean days of symptom onset	5 (1-30)
Percutaneous drainage	44 (65.6)
Surgery	23 (34.3)

Table 2: Comparison of abscess characteristics in both groups

Variables	Surgery N= 23	Percutaneous drainage N= 44	P- value
Size of an abscess (Median IQR)	3.6 (0.9, 11.0)	6.0 (2.5, 12.3)	<0.001
Length of hospital stay (Median IQR)	6 (2, 16)	10 (3, 67)	0.008
Total number of abscesses	0.173		
Multiple	5 (21.7%)	9 (20.5%)	
Single	18 (78.3%)	35 (79.5%)	
Abscess grading			
Grade 3	3 (13%)	13 (29.5%)	0.019
Grade 2	14 (60.9%)	29 (65.9%)	0.875
Grade 1	6 (26.1%)	2 (4.5%)	0.005
Extra luminal air	11 (22.9%)	27 (56.2%)	<0.001
Appendicolith	9 (36.0%)	7 (28%)	0.043
Phlegmon	1 (4.3%)	0 (0%)	<0.001
Location of abscess	0.021		
Extend to distant location	5 (21.7%)	12 (27.3%)	
Right lower quadrant	18 (78.3%)	32 (72.7%)	
Recurrent appendicitis	0%	1 (2.3%)	0.438

Table 3: Percutaneous drainage outcomes

Variables	Percutaneous drainage
Image technique	
CT and US-guided	25 (56.8%)
US	11 (25%)
CT	8 (18.2%)
Size of Catheter (Fr)	
12 Fr	6 (13.6%)
10 Fr	26 (59.1%)
8 Fr	12 (27.3%)
Approach	
Trans gluteal	1 (2.3%)
Transabdominal	43 (97.7%)
Outcomes after percutaneous drainage	
Successful results	37 (84.1%)
Failure results	7 (15.9%)
Outcomes in failed drainage	
Cases that were not treated with surgery	31 (70.5%)
Exploratory laparotomy with drainage (Failed drainage)	3 (6.8%)
Interval appendectomy	6 (13.6%)
Hemicolectomy (Failed drainage)	4 (9.1%)

According to the abscess grading, we observed that percutaneous drainage had more cases of abscess >6cm as compared to surgery (29.5% vs 13% respectively) with a statistical significance of 0.019. In grade 2 (>3cm) both groups have quite a similar number of patients with a significant statistical difference of 0.005. We reported a single case of phlegmon in the surgery group whereas the majority of the cases had abscesses found in the lower right quadrant. One case of recurrent appendicitis was observed in percutaneous drainage with a prolonged hospital stay of 3-67 days (As shown in Table 2). In Table 3 we presented the percutaneous drainage outcomes. We observed 10 Fr catheter in 26 cases (59.1%), 8Fr in 12 cases (27.3%), and 6 (13.6%) cases required 12Fr catheter. Seven cases of failed percutaneous drainage were observed which were treated with exploratory laparotomy, interval appendectomy, and hemicolectomy (As shown in Table 3). We observed that the percutaneous drainage group had 84.1% (37 cases) successful outcomes with a 15.9% (7 cases) failure ratio whereas only a single case of failed surgery was observed (As shown in Table 4).

Table 4: Outcome comparison of both groups

	Surgery	Percutaneous drainage
Successful outcomes	22 (95.7%)	37 (84.1%)
Failure outcomes	1 (4.3%)	7 (15.9%)

## DISCUSSION

Periappendiceal abscesses are the product of perforated acute appendicitis and can cause a high morbidity ratio. In the past the standard treatment guideline for periappendiceal abscess is controversial however, many treatments are practiced by physicians. In this study, we compared the outcomes of percutaneous drainage and emergency surgery for patients diagnosed with periappendiceal abscess. We observed successful outcomes of percutaneous drainage with an 84.1% positive rate. These results echo the previous result of Marin et al.,<sup>5</sup> in which they observed 90% successful outcomes of percutaneous drainage without any complications. Our results are similar to three previous studies that reported 78.6% to 100% positive response to percutaneous drainage.<sup>6-9</sup> However, one meta-analysis revealed that periappendiceal abscess can be manageable with antibiotics in 93% of cases only 20% required percutaneous drainage.<sup>10</sup> Furthermore, Miftaroski et al.,<sup>14</sup> study revealed that 7% of cases who initially reported positive outcomes of antibiotics and CT-guided drainage had a risk of recurrent appendicitis. In our study recurrence rate of appendicitis, was 2.3% after drainage without any statistical significance. Only a single case of recurrent appendicitis was reported.

Comparing the results with international literature we observed that the majority of studies compare results of conservative versus surgical treatment. Research revealed better treatment outcomes than conservative treatments.<sup>4, 8, 15</sup> Controversial results had been produced in past. A study by Kim et al.,<sup>4</sup> conducted a comparison of percutaneous drainage with antibiotics and emergency surgery. They concluded that 91.7% of cases had better outcomes with conservative treatment than surgery. We found a single prospective controlled trial of Zerem<sup>16</sup> for comparison in which they compared percutaneous drainage with antibiotics. The involved cases had abscesses >3 cm in diameter. Their results revealed that percutaneous drainage had more efficient outcomes than antibiotic treatment due to less risk of appendectomy. In our study overall success ratio of percutaneous drainage was 55.2% (37 out of 67 cases).

After adjusting the confound variables we observed no statistical difference between percutaneous drainage and surgery. The odd ratio between both groups was reported as 4.529 ranging from 0.521-to 39.386 at a 95% confidence interval. We observed successful outcomes of surgery in 22 patients with an overall success ratio of 32.8%. Our results are in contradiction to the Zerem et al.,<sup>16</sup> study because we also included cases of phlegmon. The size of abscess in our study also varied from Zerem et al.,<sup>16</sup> In

our study we observed the largest abscess size of 6cm (in median) in the percutaneous drainage group which was successfully managed. However, the abscess size in the surgical group was reported as 3.6 cm. A statistical difference had been found between both groups (<0.001). Our results suggested that physicians should choose a percutaneous drainage method for treating abscess size >6cm rather than surgery. Abscess size <3 cm was least found in the drainage group. This result indicated that small abscesses can be successfully managed by antibiotics or surgical interventions. Chances of abscess recurrence are high when treating large size or multiple abscesses with surgery or antibiotics. Our results revealed that treatment of >3 cm (localize) is dependent on the physician's choice of either to choose drainage or surgical intervention. A study by Zeren et al.,<sup>16</sup> revealed that patients with percutaneous drainage had shorter hospital stays, however, our results are quite opposite. Our patients were hospitalized until the complete resolution of the abscess was reported on imaging. After confirmation patients were discharged.

## CONCLUSION

Our results concluded that percutaneous drainage is an effective method for treating abscesses >6cm with a low risk of recurrence. However, this procedure lengthens the hospital stay until the complete resolution of the abscess.

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**Conflict of interest:** No

**Ethical considerations:** Ethical approval was obtained from the institute and research center of our hospital.

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