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*Original Article*

# Short Term Outcome of Image Guided (USG) Percutaneous Pigtail Catheter Drainage of Intra-abdominal Abscess

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**Abstract**

*In surgical practice, it is common and important to deal with intra-abdominal abscesses. Incision and drainage through laparotomy has traditionally been used to manage abdominal abscesses. Percutaneous catheter drainage is favorable due to avoiding of laparotomy, general anesthesia, easier postoperative care, less patients' complaints, shortened hospital stay and less cost. However, the advance technology of ultrasonography helps for precise localization of abscesses to place the catheter percutaneous for effective, adequate and definitive drainage. This hospital based prospective observational study was carried out among the patients of intra-abdominal abscess and the aim was to measure the short-term outcomes of drainage of intra-abdominal abscesses with an image-guided percutaneous pigtail catheter. Study subjects were selected from patients with intra-abdominal abscess and were enrolled as per selection criteria. Data were connected to intra-abdominal abscess derived from the pan-procedure was collected on or after the follow-up sheet and also from post-procedure investigation reports. The questionnaire was finalized following pretesting. Collected data were checked daily and edited (if needed). Data were processed and analyzed using computer software SPSS (Statistical Package for Social Sciences) version 20. Quantitative data were expressed as mean and standard deviation. Qualitative data were expressed as frequency and percentage; and comparison was done by fisher exact test. A probability value (p) of less than 0.05 was considered as statistical significance. This study finds that maximum patients (30%) were in the age group of 41-50 years and males were predominant (65%). Most of the (85%) pig-tail catheters were used for intra-abdominal abscess were 14Fr size. All most all (95%) of the intra-abdominal abscess were single abscess and a few of those (5%) were multiple abscess. More than half (55%) of the abscess were appendicular, 10% were liver abscess, one-fourth (25%) of those were sub-hepatic and 10% were sub phrenic abscess. It was observed that 95% required single drainage and 5% required multiple drainage. All most all of the patients (95%) were given local anesthesia and only 1 patient (5%) needed conversion (open surgery). Nearly two-third (65%) patients were needed hospital stay for 6 to 10 days. Most of them (90%) were success and failures were minimum (10%). The average (Mean ± SD) catheter removal was 6.90±1.87 days and most of the patients (90%) had no complications. It was observed that 60% organism were escherchia coli, 25% were staph. aureus, 5% were pseudomonas and 10% were streptococcus spp. Using an image-guided percutaneous pigtail catheter for drainage of intra-abdominal abscesses is easily applicable, well-tolerated procedure that doesn't require general anesthesia with high success rates and low complications. The practice of this method can reform the treatment policy for drainage of intra-abdominal abscesses.*

***Keywords:*** *Image guided (ultrasonography), percutaneous pigtail catheter, drainage of intra-abdominal abscess.*

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## INTRODUCTION

An abscess is a localized collection of purulent materials, lined by a pyogenic membrane. Which can have a significant impact on the clinical outcome of a patient. Intra-abdominal abscess formation can be a life-altering event and an important cause of morbidity and mortality.[1-4] Intra-abdominal abscesses are like Organ specific abscess (liver, spleen and appendix) or abscesses in abdominal recesses (eg: paracotic, subdiaphramatic, pelvic etc.).[5,6] Intra abdominal abscesses were treated with operative drainage that was associated with significant morbidity and mortality.[1]

Advances in image-guided percutaneous drainage have provided a safe and effective alternative to operative drainage. Presently, most clinician would consider image-guided percutaneous abscess drainage as the treatment of choice because it offers a relatively simple, minimally invasive procedure with the goal of averting the development of sepsis, reducing length of hospital stay and reducing the cost of treatment.[4,7]

Percutaneously inserted catheter drainage is an accepted treatment modality for large abscess. Complications that can arise are; secondary infection, bleeding into the abscess cavity and rupture of abscess with spillage into the peritoneal cavity.[8-11]

Poor accessibility is another major concern in the management of many abdominal abscesses.[9,10] Post-operative abdominal abscess may be challenging due to an anatomical distortions secondary to surgery. Percutaneous access to some of these lesions may often necessitate invasive transgressions of surrounding organs (e.g. Stomach, liver and pleura) rather than straight forward access. In some cases, even with such second-line access routes, abscesses are inaccessible and eventually necessitate open surgical drainage.[8]

In recent years the indications for percutaneous catheter drainage have expanded significantly. The result of percutaneous drainage procedure has been so good and so widely accepted that the indications and applications have been continued to expand. Ultrasound guided percutaneous catheter drainage permit effective drainage of abscesses in the abdomen.[6] Percutaneous pigtail catheters are now used extensively for abscess drainage.[7]

Intra-abdominal abscesses may complicate many illnesses including diverticulitis, pancreatitis, and appendicitis, or they may occur during the postoperative period. As new methods of imaging are developed that provide additional information on patients with these abscesses, earlier and more accurate diagnoses can be made, allowing for prompt intervention. With the advent of these new imaging methods, techniques for treatment of abscesses by percutaneous drainage have been developed.

Ultrasound is extremely sensitive in detecting fluid collection in the abdomen. Ultrasound allows a rapid searching of intra-abdominal collections even in extremely ill patients.[2,6] This study was therefore aimed at evaluating the short-term outcome of image guided (USG) percutaneous pigtail catheter drainage of intra-abdominal abscess in Enam Medical College and Hospital.

## MATERIALS AND METHODS

It was a prospective observational study carried out Department of Surgery, Enam Medical College & Hospital (EMCH). During the period December 2017 to May 2018. A total number of 20 cases undergoing percutaneous pigtail catheter drainage of intra-abdominal abscess guided by ultrasonography was considered as study population. Study populations were selected from General surgery department of Enam Medical College Hospital (EMCH). Inclusion criteria are all the intra-abdominal abscess cases like: organ specific abscess (liver, spleen, appendix, the mesentry and pancreatic), post laparotomy residual abscess, abscesses in abdominal recesses (eg: paracolic, subdiaphramatic, pelvic etc.).

Duration of data collection was approximately 3(three) months. Data was collected from patient's clinical history-physical examination-follow up sheet and investigations of the patients. Patient was monitored from admission to discharge and follow up at outpatient department (two weakly for one month). After collection, data editing and clearing was done manually and prepared for data entry and analysis by using computer (by using SPSS).

## RESULTS

This prospective observational study was carried out among 20 patients with intra-abdominal abscess who undergone percutaneous pigtail catheter drainage guided by ultrasonography. The aim of this study was to measure the short-term outcomes and success rate of drainage of intra-abdominal abscesses with an image-guided (USG) percutaneous pigtail catheter. Here Total number of 20 cases underwent percutaneous pigtail catheter drainage intended for intra-abdominal abscess guided by USG was considered as study population.

Table I contains the demographic characteristics of the patients with intra-abdominal abscess; here, 55% patients were in age group of 31-50 years. Others 25%, 15% and 5% were in age group of 11-30, 51-70 and >70 years respectively. The mean age (Mean ± SD) of the patients was 40.35±15 years and male female ratio was 1.8: 1.

**Table-I: Demographic characteristics of the patients (n=20)**

| Characteristics | | Frequency | % |
|---|---|---|---|
| **Age group** | 11-30 | 5 | 25 |
| | 31-50 | 11 | 55 |
| | 51-70 | 3 | 15 |
| | >70 | 1 | 5 |
| Mean ± SD | | 40.35±15.80 | |
| Age range | | 12-71 | |
| **Sex** | Male | 13 | 65 |
| | Female | 7 | 35 |
| Male- Female ratio | | 1.8:1 | |

Table II labels the extent of pus drained and quantity of drains were required; here, ≤500 ml, 501-1000 ml and >1000 ml volume of pus were drained from 55%, 35% and 10% patients respectively. Single drainage were required in 95% patients and multiple drainage in only 5%. Size of the catheter used in 85% was 14 Fr and other was 12 Fr.

**Table-II: Volume of pus drained, quantity of drains and required size of catheter (n=20)**

| Total Volume of pus drained (ml) | | Frequency | (%) |
|---|---|---|---|
| | ≤500 | 11 | 55.0 |
| | 501-1000 | 7 | 35.0 |
| | >1000 | 2 | 10.0 |
| **Quantity of drain required** | | | |
| | Single | 19 | 95.0 |
| | Multiple | 1 | 5.0 |
| **Size of catheter used** | | | |
| | 12 Fr | 3 | 15 |
| | 14 Fr | 17 | 85 |

Table III shows that the duration of hospital stay of 65%, 25% and 10% patients were 6 to 10, 1 to 5 and >10 days respectively. Here, 70% catheters removed within 6-10 days; 25% and 5% within 1-5 days and >10 days respectively. The average catheters removal date 6.90±1.87 days.

**Table-III: Duration of hospital stay and time of removal of pigtail catheter of patients (n=20)**

| | | Frequency | Percentage |
|---|---|---|---|
| **Hospital stay** | | | |
| | 1-5 days | 5 | 25.0 |
| | 6-10 days | 13 | 65.0 |
| | > 10 days | 2 | 10.0 |
| **Time of removal of pigtail catheter** | | | |
| | 1-5 days | 5 | 25.0 |
| | 6-10 days | 14 | 70.0 |
| | >10 days | 1 | 5.0 |
| Mean±SD | | 6.90±1.87 | |

Figure 1 illustrates the success rate of the procedure. Here, 90% success rate were achieved and 10% were failure.

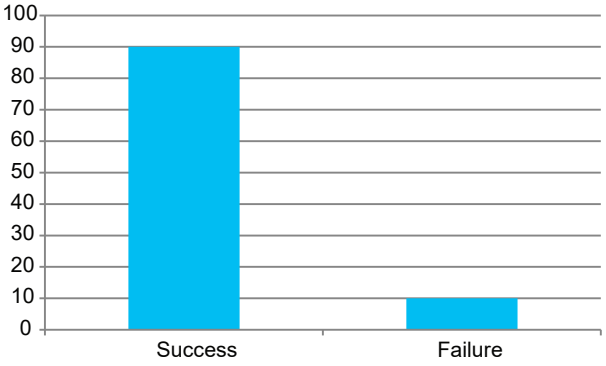


**Figure- 1: Result of success rate of the procedure (n=20)**

Table IV states the post drainage complications of patients; here, 90% of the patients didn't developed any complications.

**Table- IV: Post drainage complications (n=20)**

| Complications | Frequency | Percentage (%) |
|---|---|---|
| Wound Infection | 1 | 5.0 |
| Peritonitis | 1 | 5.0 |

Table V displays the causative micro-organisms of intra-abdominal abscesses by pus analysis; here, Escherchia coli was detected in 60% cases. Staph aureus, Streptococcus and Pseudomonas were found in 25%, 10% and 5% of patients.

**Table- V: causative micro-organisms of intra-abdominal abscesses by pus analysis (n=20)**

| Organism | Number | Percentage (%) |
|---|---|---|
| Escherichia coli | 12 | 60.0 |
| Staph aureus | 5 | 25.0 |
| Pseudomonas | 1 | 5.0 |
| Streptococcus | 2 | 10.0 |

## DISCUSSION

The approach to managing intra-abdominal abscesses is increasingly favoring nonsurgical methods, though many surgeons still opt for surgical intervention in some institutions. Many experts recommend percutaneous catheter drainage and antibiotic therapy as the preferred treatment for most abdominal and pelvic abscesses when surgery is not immediately required, as this approach minimizes the risks associated with general anesthesia and surgical procedures. Abscess treatment relies on two primary principles: evacuation and sustained drainage. While aspiration and continuous drainage have been explored for liver abscesses, catheter drainage (CD) remains the most commonly applied technique for abdominal and pelvic abscess collections.[1]

This study was a hospital based study among the patients of intra-abdominal abscess to see the short term outcome of image guided (USG) percutaneous pigtail catheter drainage of intra-abdominal abscess.

The age incidence in this study ranged from 12 years to 71 years. Among them 55% was in between 31-50 years age group. The mean age was 40.35±15.80 years. The youngest patient was 12 years and oldest was 71 years. Similar study Singh et al.[12] found the age of the patients ranged from 18 years to 65 years with majority of the patients falling within the age range from 40 to 50 years ($n$ = 28). The second most common age group was 31–40 years ($n$ = 15 patients) that was followed by 21–30 years ($n$ = 10 patients).

In this study out of 20 patients, 13(65%) were males and 7(35%) were females. The female to male ratio was 1.8:1. This findings consistent with Dhurve et al.[13] they found 73 males (60.8%) and 47 females (39. 2%). Thus, the male: female ratio was 1.5:1. Another study Singh et al.[12] the found majority of the patients were males ($n$ = 55) with females accounting for only minority of the participants.

This study finds that most of the catheter size was 14Fr (85%) and 15% were catheter size 12Fr. Similar study Raj et al.[14] reported 3.2% were catheter size was 8Fr, 54.8% were catheter size 10Fr, 35.5% were catheter size 12Fr and 6.5% were catheter size 14Fr.

In this study most of the number of abscesses cavities were single abscess cavities (95%) and 1 patients (5%) hade multiple number abscess cavities. Therefore, the findings of the study are in well agreement with the findings of the other research works[14] they found 77.4% were single number of abscess cavities and 22.6% were multiple number of abscess cavities.

This study shows the most common were appendicular abscess (55%) then sub-hepatic (25%) and Sub-phrenic (10%). Several reports also have found that majority of the liver abscesses.[5,7,9,11,15,16]

This study shows 95% were single drained required and 5% were multiple drained required. Therefore, the findings of the study are in well agreement with the findings of the other research works[14] they found 22.6% were single drained required and 77.4% were multiple drained required. A Wani et al.[17] study 87.5% were done with local anesthesia. Only 3 of the patients got general anesthesia due to patients interested. They were unwilling to go through any procedure under local anesthesia.

In this study found complication rate was 10%. Anbumani et al.[18] recorded the same findings with no complications recorded. Another study Bayomi et al.[19] reported complication rate was 10.6%.

This study shows 65% patients were needed 6-10 days hospital stay is similar to the findings of previous studies.[19] The same results were proved by Dhurve et al.[13] who reported hospital stay (7.5 days) with drainage.

In our study, the overall success rate of the percutaneous drainage procedure for all types and locations of intra-abdominal abscess was 90%. This finding is in sync with similar previous studies thereby adding greater credibility to image guided PCD as a treatment modality.[14,15,18,20-23] Previous studies percentage of success (94%) was achieved by Saxena et al.[24] with only (6%) failure rate. Also (94%) of cases studied by Abusedera et al.[1] showed complete resolution by percutaneous, only (6%) of cases failed. The success rate of image guided PCD ranges widely from 70%-97% for single / late onset abscess and about 80% in cases of multiple/ early onset abscesses.[13,25,26] The success rate in the present series is approximately 89.2%.[15]

In this study shows 25% were catheter removal 1-5 days, 70% were catheter 6-10 days and 10% were catheter

removal >10 days. The average day of catheter removal was 6.90±1.87 days. Therefore, the findings of the study are in well agreement with the findings of the other research works[15] they reported after about 7 days after catheter withdrawal.

In this shows the most common strain cultured was Escherichia coli found in 60% of the cases. Therefore, the findings of the study are in well agreement with the findings of the other research works[13] they reported the most common strain cultured was Escherichia coli (25%) which is comparable with study reported by Aeder (23%) and WA. Joseph (21.42%).[6,7] However based on these findings, image guided percutaneous pigtal catheterization of intra-abdominal abscesses can be applied as the first line of treatment for uncomplicated intra-abdominal abscess. Furthermore the technique can be easily learned and the service can be provided at OPD in case of residual abscesses. However, where catheter drainage failed open drainage still has a role.

The limitations of the studies were as study was conducted in only one centre, sample size was small and study period was short and long term effects could not be assessed.

## CONCLUSION

Image guided (USG) percutaneous pigtail catheter drainage is an easy, safe, effective and relatively atraumatic procedure for draining intra-abdominal abscess. It reduces post-operative morbidity and hospital stay. Practicing this method can reform the treatment policy of intra-abdominal abscess. Further studies are needed to address the effect of catheter type and technical success rate for abscess drainage.

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