



## ORIGINAL ARTICLE

## Percutaneous Versus Open Surgical Drainage of Intra-Abdominal Abscesses

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**Submit Date:** 14-07-2019

**Revise Date:** 08-08-2019

**Accept Date:** 19-08-2019

## ABSTRACT

**Background:** Interventional (percutaneous) drainage of abdominal abscesses provides a safe and effective route of management and through which we can avoid the common drawbacks of the conventional surgical drainage. The Aim of the work was to evaluate the efficacy of the percutaneous drainage compared to the conventional surgical drainage and report advantages if proved. **Methods:** This prospective randomized comparative study included patients who presented to the Surgery Department of Zagazig Emergency hospital complaining of the abdominal abscesses within the period from May 2018 to November 2018. These patients were randomly divided into two groups with each had its management approach, Interventionally drained group: 15 patients and surgically drained group: 15 patients. The procedure was explained to the patients, and they were consented as regard to the postoperative morbidity and mortality. **Results:** There were statistically significant difference between both groups in which application of interventional drainage decreases the post-operative hospital stay ( $P = 0.0004$ ). also, maneuver costs showed significant decrease in the Interventionally drained group ( $P < 0.00001$ ) whereas other aspects as drainage time ( $P = 0.482$ ), occurrence of no complications in both groups. **Conclusion:** interventional abdominal abscesses drainage is very nearly as effective as surgical drainage moreover it decreases the complications of surgical exploration. **Key words:** abdominal abscesses, conventional surgical drainage, interventional (percutaneous) drainage.

## INTRODUCTION

An intra-abdominal abscess stands as a significant entity in surgical morbidity and mortality issues and still a fearsome complication for abdominal surgery (1).

Intra-abdominal abscesses may be of primary origin (less common), or more commonly secondary, resulting from migration of gut micro-organisms to the peritoneal cavity following gut perforation, or secondary to trauma (2).

Clinically the patient is mostly presented by fever, abdominal pain either localizing or not, ileus with or without vomiting and leukocytosis (3).

Ultra-sound diagnosis being of high availability is very useful in establishing the

diagnosis and localization (4). Nevertheless, it is limited by presence of ileus and big exploratory wounds with the covering dressings (5).

Computed tomography (CT) is now established as the gold standard tool of diagnosis especially in post-operative conditions (6).

As a surgical rule, any septic fluid collection needs drainage. For decades conventional surgical exploration was the widely adopted route for drainage (7).

In 1954 was the first trial by Mc Fadzean to aspirate a liver abscess, but being a blind technique, this hindered it to be an adopted route popularly (8).

By introduction of ultrasound and CT guided aspiration, the technique began to be safely adopted being with fewer complication if compared to conventional surgical drainage (9).

The Aim of this work was to report the advantage of interventional (percutaneous image-guided) drainage over the conventional surgical drainage.

### METHODS

Starting at May 2018 and continued up to November 2018, this study was conducted at Zagazig University hospitals, Egypt. In this study 30 patients were included with proven diagnosis of intra-abdominal abscess through pelvi-abdominal ultra-sound (and enhanced pelvi-abdominal CT in suspected cases). The studied patients were 18 years of age or older with confirmed intra-abdominal abscess provided that being surgically fit. All patients with dialysis catheter related infections or surgically unfit were excluded.

Written informed consent was obtained from all participants and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University. The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

The patients were randomly allotted to 2 groups; one destined to percutaneously drained while the other group was submitted to conventional surgical drainage.

As the patient diagnosis was confirmed, those allotted for percutaneous drainage were given empirical antibiotics then had their site of needle introduction determined using either of the above imaging technique ensuring the safety for not causing visceral injury and not contaminating other peritoneal compartments as well. Then the area of needle entry was sterilized, draped then infiltrated by lidocaine subcutaneously as anaesthetic agent.

A 20-gauge needle is introduced until the collection site is reached (image-guided) then a sample is obtained for culture and sensitivity purpose. Then the guide wire was introduced then tunnelling the draining catheter track and finally a 12 F catheter is applied with skin securing to prevent its slippage or migration.

On the other hand, those allotted for conventional surgical drainage were prepared for the operation and also prescribed antibiotic empirically. After induction of anaesthesia, skin incision is fashioned according to abscess site. Exploring the abdominal layer until reaching the abscess cavity. On reaching it, a sample is obtained for culture and sensitivity purpose. Then the abscess was evacuated and finally a 20 F draining catheter is applied and drawn out through a separate puncture other than the exploratory wound with skin securing then the wound is closed.

The patient were followed up through clinical improvement signs, repeated leukocytic cell counting and repeated ultra-sound to follow the abscess cavity. Those who had been operated were followed for routine post-operative recovery. Antibiotic were given afterwards guided by the culture and sensitivity results. Any complications, efficacy of drainage and length of hospital stay were recorded.

### Statistical analysis

All patients' data were collected, checked and analyzed by using (SPSS version 20). Data were expressed as mean and number with (%) according to type of variable. Chi-square test ( $\chi^2$ ) or Fischer's exact t test or Mann-Whitney were used when appropriate. P value <0.05 was considered statistically significant.

### RESULTS

The total number is 30 patients included in the study. The baseline demographic criteria of patients were given in table (1). 15 patients were submitted to interventional (percutaneous) drainage; 15 patients were submitted to conventional surgical drainage.

In the percutaneously drained group, 10 patients were males and 5 were females with age ranging from (18-59) and mean age (45.2), but in the surgically drained group, 13 patients were males and 2 were females, their ages ranged from (25-65) with mean age was (48.2).

Regarding the underlying cause, most of the cases following appendectomy (14 cases of the 30) with other causes as post splenectomy, post laparoscopic cholecystectomy, post cesarean section and following abdominal trauma.

The pelvic site for abscess collection was the most prevalent site of collection (50% of the cases) followed by the subphrenic site and only two cases had multiple site collection

Regarding the success of drainage, encountered complications, length of drainage

Concerning the success of drainage, only one case of those submitted to percutaneous drainage failed to resolve and needed open surgical drainage, otherwise all cases resolved whatever the adopted method of drainage with no significant difference between the two groups

No complications were recorded in both groups like organ injury or drain complications; moreover the duration of drainage was quite similar in both groups.

and hospital stay and costs of the maneuver all shown in table (2).

But on comparing the need for hospital stay, those submitted to surgical drainage stayed for significantly longer interval (9.27 days) compared to the other group who spent (5.27 days) after which were discharged completely stable.

Also when the costs spent in both methods, obviously the surgically drained group needed significantly higher costs (3853.33 £) when compared to the other group (726.67 £).

**Table 1.** Demographic data, the underlying cause and site of the abscess collection in both groups.

Demographic data, the underlying cause and site of the abscess collection		Percutaneously drained N(15)	surgically drained N(15)	P Value
<i>Sex of patients</i>	Male	10 (67%)	13 (87%)	0.195
	Female	5 (33%)	2 (13%)	
<i>Mean age (years)</i>		45.2 (18-59)	48.2 (25-65)	0.247
<i>The underlying cause</i>	Post-appendectomy	9	5	0.369
	Post-splenectomy	1	2	
	Post-cholecystectomy	2	3	
	Post-cesarean section	1	1	
	others	2	4	
<i>Site of abscess collection</i>	Single subphrenic	6	7	0.706
	Single pelvic	9	6	
	Multiple intra-peritoneal	0	2	

**Table 2.** success of drainage, encountered complications, length of drainage and hospital stay and costs of the maneuver

Outcome	percutaneously drained N(15)	surgically drained N(15)	P Value
<i>Success of drainage</i>	14	15	0.309
<i>Encountered complications</i>	0	0	1
<i>Length of drainage (days)</i>	12.2 (8-21)	12.27 (7-21)	0.482
<i>Length of hospital stay (days)</i>	5.27 (3-7)	9.27 (6-19)	0.0004
<i>Inclusive hospital costs up to discharge</i>	726.67 (500-900)	3853.33 (3200-5800)	< .00001

## DISCUSSION

Intra-abdominal abscess is a pus collection within or exterior to the peritoneal cavity. Mostly it arises following inflammatory bowel

disease, complicated colonic malignancy or abdominal trauma (8).

This pathological condition still represents a surgical challenge with significant lethal complications either due to the abscess

pathology itself or as the complications of surgical intervention (11).

When CT and ultra-sound guided drainage was introduced with comparable efficacy of drainage and fewer risks, so there was significant decrease in this pathology-related morbidity (9).

In this study we aimed at evaluating the efficacy of the percutaneous drainage compared to the conventional surgical drainage and report the other advantages if proved.

In the 6 month interval of the study, 30 cases were admitted having intra-abdominal abscesses and fulfilling our inclusion criteria; the majority of these cases (47 %) were complicating appendectomy, this may be attributed the high prevalence of appendicitis with most of the cases present in advanced conditions of obstructive inflammation and hence septic complications are common.

This may be different than the findings of *Akinci et al. (12)* whose study continued for nearly 7 years but post appendectomy was of low ratio (4%) as majority was following genitourinary operation (38%).

In our study both suphrenic (with its anatomical subtypes) and pelvic loci of collection were nearly equally encountered and both comprised (93%) of the total number of cases of the study and only (7%) were multiple intra-peritoneal ones. These findings are widely different than those found by *Dhurve et al, (13)* who reported more visceral (solid organ) abscesses (67%) in their cases compared to (17%) for both subphrenic and pelvic abscesses.

On comparing the cases submitted to percutaneous drainage on which the study was focusing there was a very significant success rate (14 out of 15 cases allotted for this method and representing 93%) compared to the originally successful surgical drainage method which provide significant evidence supporting adoption of this technique. Only one case of those having multiple intra-peritoneal abscesses failed to resolve and needed conventional surgical drainage.

A similar percentage of success (94%) was achieved by *Akinci et al. (12)* with only (6%) failure rate but the main cause of failure was presence of communications between the abscess cavity and GIT lumen for which some cases needed surgical intervention not only to

evacuate the abscess but also to deal with the GIT defect.

Also (94%) of cases studied by *Abusedera et al. (14)* showed complete resolution by percutaneous, only (6%) of cases failed as the underlying pathology was either necrotizing pancreatitis or diverticulitis for both surgical intervention was required and the original pathology was managed.

No significant complications were encountered in both techniques especially the interventional route, no visceral injury was recorded and in surgical group no recovery complications were recorded. *Abusedera et al. (14)* recorded the same findings with no complications recorded. Nevertheless *Akinci et al. (12)* encountered some catheter complications as dislodgement, obstruction, or kinking in (6.7%) of the patients, with no major injuries. *Dhurve et al, (13)* encountered different category of complications which are some cases of septicemia and chest infections which are not related to the interventional maneuver itself but a complication of the original septic condition.

Actually, in our study, there is no advantage of either of these methods over the other regarding the drainage time length needed before reaching the full evacuation of the abscess and complete resolution on imaging; but there was a considerable significant difference in favour of the percutaneous route regarding the duration the patient needed to reach satisfactory clinical improvement and be able to be discharged home safely (5.27 days in the percutaneous group versus 9.27 days in the other group).

It was also proved by *Chen et al. (15)* that the need for hospital stay was considerably long reaching up to nearly one month in some cases. The same results were proved by *Nguyen et al. (16)* who reported longer hospital stay (15.5 days) with surgical drainage.

Finally when the costs of both methods of drainage were calculated, there was very significant difference between the methods favoring the percutaneous route massively. Although in our study the patients are managed in the hospital of study (Zagazig University Hospital) nearly totally free, so the fees of the doctors or other included staff were not considered in both groups, but just calculating



the consumed materials by every patient including the material of the therapeutic modality used and the patient's need in the post intervention follow up, a very wide gap in the costs was surely proved

In a trial to search for comparable studies in the Egyptian country searching this point, no available study was found and searching for other foreign studies; *Roberts' study* could prove a clear cost benefit in using percutaneous drainage of abdominal abscess (17).

### CONCLUSION

Based on this study, we conclude that percutaneous drainage of an abdominal collection is a safe and effective method with no significant complications and should be tried whenever available as a 1<sup>st</sup> line management method especially in unilocular collection leaving the surgical exploration to non responding cases or complicated ones.

**Conflict of Interest:** Nothing to declare.

**Financial Disclosures:** Nothing to declare.

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Bayomi, M., Alkilany, M., Israel, J. Percutaneous Versus Open Surgical Drainage of Intra-Abdominal Abscesses. *Zagazig University Medical Journal*, 2019; July. 2020 Volume 26 Issue 4 (649-653): -. doi: 10.21608/zumj.2019.14746.1333