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Original Research Article

Clinical study of intra-abdominal abscess and its management by percutaneous USG guided drainage

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ABSTRACT

Background: Intra-abdominal abscesses continue to present therapeutic challenge to the surgeon. They are common complication of inflammatory bowel disease, malignancy and trauma. The objective of the present study is to manage the intra-abdominal abscesses by percutaneous aspiration under ultrasound guidance and placement of continuous catheter drainage wherever deemed necessary and to assess the efficiency, limitations and complications, if any of this method.
Methods: A total of 120 cases of intra-abdominal abscesses were selected. The diagnosis of intra-abdominal abscess was confirmed by USG and/or CT. Patients were then subjected to ultrasound guided drainage/aspiration as a therapeutic measure. Post procedure patients were watched for signs of peritonitis. Systemic antibiotics were given, and analgesics were given on SOS basis. Follow up ultrasound after three days was done. Follow up was kept in all cases.
Results: Most common occurring intra-abdominal abscesses were liver abscess (60.83%) and sub-diaphragmatic abscess (11.67%). The etiology was not known i.e. cryptogenic in 47.5% and occurring post-surgically were 28.33%. In 25% patients, single aspiration was sufficient. In 30.80% patients, 2 aspirations and in 29.12% patients, 3 aspirations were needed. 72.5% patients were successfully treated by aspiration only and in the remaining 27.5% patients drain was kept. The complication rate was 7.5%. [Bleeding-0.83%, recollection-1.67% and damage to viscera-0.83%, which were related to the procedure].
Conclusions: The method is associated with good success rate, low morbidity and mortality, better patient compliance, low cost, can be performed under local anaesthesia and even in critically ill and high-risk patients and should be used as an initial procedure in the treatment of intra-abdominal abscesses.

Keywords: Intra-abdominal abscess, Minimally Invasive drainage of intra-abdominal abscess, USG guided aspirations

INTRODUCTION

Intra-abdominal abscesses have been well recognized throughout history of medicine and continue to present diagnostic and therapeutic challenge to the surgeon. Intra-abdominal abscesses are abscesses that occur within the abdominal cavity i.e. within, the peritoneal cavity, the pelvis or behind the peritoneum (retroperitoneum). They are common complication of colorectal disease, particularly inflammatory bowel disease, malignancy and trauma. They also follow operation of alimentary tract and less frequently, as a result of similar lesions of female and male genitourinary tracts. The onset of these abscesses may be insidious, and their presence may be

obscure. Earlier their localization used to be difficult and these characteristics in turn used to create serious problem in management of such a patient. Prompt recognition, early localization and adequate drainage are the key factors in successful treatment of intra-abdominal abscesses.

Till 1953, surgery was the absolute answer for the treatment of intra-abdominal abscesses. It was Mc Fadzean in1954 who for the first time successfully tried to aspirate liver abscess.[1] But it was basically a blind procedure and there were no means to guide his needle placement. Hence, surgeons were reluctant to use this blind procedure as a therapeutic modality for treatment of intra-abdominal abscesses.

However, the picture changed from 1974 onwards when there was invention of Computed Axial Tomography and when in the same year ultrasound guided aspiration of liver abscesses was done.[2] This modality offers several potential advantages such as fewer complications, reduced hospitalization, avoidance of general anaesthesia and lower costs when compared to surgical drainage. When properly applied it appears that percutaneous drainage can be performed as safely as surgical drainage. It is well tolerated by the patients.

METHODS

A total of 120 cases of intra-abdominal abscesses were included in the study from June 2014 to December 2016. The diagnosis of intra- abdominal abscess was considered by clinical examination and was confirmed by ultrasonography and/or CT.

Patients who were diagnosed to be harboring intra-abdominal abscesses (visceral, intra-peritoneal or retro-peritoneal) were included in this study and were subjected to ultrasound guided drainage / aspiration as a therapeutic measure.

Written consent of the patient / guardian (If the patient is a minor) were obtained. Base line investigation like haemogram, urine-albumin and sugar, Coagulation profile of the patient were assessed. Anesthetist standby was obtained. Basic preparation like securing IV-line, emergency tray standby were kept ready.

Patients were pre-medicated with inj. atropine 0.6mg im, inj. diazepam 5-10mg im, and inj. penzyl 15-30mg im. Vitals were monitored throughout the procedure. Depending upon the abscess to be drained the patient was given appropriate position. The appropriate part of the abdomen was cleaned thoroughly with savlon, betadine and spirit. The cleaned part was then draped. The transducer probe was covered with sterile glove.

The abscess cavity was located, and approach route decided avoiding important structures. A direct, easily accessible and a safe path was chosen. Depth of abscess from skin, appropriate angle of the approach and the exact site of puncture was determined. Local anaesthesia with 2% xylocaine was given so as to raise small wheal and then at the site of puncture a small cut was given on the skin with the help of scalpel. The patient was asked to hold his breath and the jelco needle along with trocar was passed towards the abscess cavity with predetermined angle and up to the predetermined depth.

Presence of needle in the abscess cavity was confirmed by a giving way sensation, scanning needle tip echo and the free flow of pus. Trocar was removed, and a syringe was applied. Pus sample was collected in a sterile specimen bottle for microscopy and culture sensitivity and the pus was drained till the cavity collapsed (As confirmed by ultrasound) or till no more pus is aspirated.

In this study we have kept an indwelling drainage tube in some patients who had communicating abscesses or irregular cavities where dependent drainage of each abscess individually was not possible or with large collection or with thick / viscous pus content of cavity.

Pigtail catheter and supracath were also used in this study wherever deemed necessary. In those cases, where an indwelling catheter (draining tube) was kept, the decision to remove the drain was taken whenever there was no drain for at least 24 hours or when ultrasonography revealed no significant residual collection.

Post procedure patients were kept NBM (Nil by Mouth) for further 6 hours. Intravenous fluids were given, and patients were watched for signs of peritonitis. Systemic antibiotics were given, and analgesics were given on SOS basis.

Follow up ultrasound after three days for size of abscess cavity (Residual volume) and echogenicity of abscess cavity was performed. Routine clinical follow up was kept in all cases.

RESULTS

Out of 120 patients, the maximum number of cases i.e. 32 patients (26.7%) were found in the 5th decade and 31 patients (25.8% were found in the 6th decade. The incidence was less in children and after the age of 60 years. There were 73 males (60.8%) and 47 females (39. 2%).Thus, the male: female ratio was 1.5:1. Pain was the single most consistent symptom observed in all 120 cases (100%) associated with fever in 108 cases (90%).

Temperature elevation varied from remittent to continuous elevation. In (74 cases 62%) there was tender hepatomegaly associated with jaundice in (24 cases 20%). Nonspecific symptoms like anorexia (84 cases 70%), malaise (48 cases 40%) and weight loss (60 cases 50%) were also observed in the present series.

Liver abscesses were the most commonly occurring intra-abdominal abscesses (60.83%) followed by sub-diaphragmatic (11.67%) and peri-nephric abscesses (7.5%).

There were 6 cases (5%) each of splenic, pelvic and psoas abscesses. Also, abscesses were found in lesser sac and iliac fossa in 2 patients each. Pancreatic and para-colic abscesses were observed in 1 patient each (Table 1).

Table 1: Site of occurrence of intra-abdominal abscess.

Site	No of patients		Total	%
	Male	Female		
Visceral				
Liver	40	33	73	60.83
Spleen	5	1	6	5.00
Pancreas	1	0	1	0.83
Intraperitoneal				
Sub-diaphragmatic	11	3	14	11.67
Lesser sac	2	0	2	1.67
Paracolic	1	0	1	0.83
Pelvic	1	5	6	5.00
Iliac fossae	1	1	2	1.67
Retroperitoneal				
Psoas	4	2	6	5.00
Perinephric	7	2	9	7.50
Total	73	47	120	100

In maximum number of patients, the etiology was not known i.e. cryptogenic (47.5%). Abscesses occurring post-surgically were the second most common etiological factor found in 34 patients (28.33%), followed by amoebiasis in 16 patients (13.33%).

The incidence of intra-abdominal abscesses was definitely less in traumatic (2.5%), enteric (2.5%), appendicitis (1.67%), tubercular (1.67%) and pancreatic (0.83%) cases (Table 2).

Table 2: Table indicating the etiology of intra-abdominal abscesses.

Etiology	No. of patients	%
Postsurgical	34	28.33
Amoebiasis	16	13.33
Appendicitis	2	1.67
Traumatic	3	2.5
Enteric	3	2.5
Tubercular	2	1.67
Pancreatic	1	0.83
Other (infected cyst)	2	1.67
Cryptogenic	57	47.5
Total	120	100

It was observed that in only 30 patients (25%) single aspiration was sufficient to completely evacuate the abscess cavity. In 37 patients (30.80%), 2 aspirations and in 35 patients (29.12%) 3 aspirations were needed. In 18 patients (15%) more than 3 aspirations required to completely evacuate the cavity.

The need for multiple aspirations was the presence of recurrent collection, large collection and pus, which was too thick to be drained in one sitting. However, there was no specific relationship between the site of abscesses and the number of attempts required (Table 3).

Table 3: The number of aspiration in patients of intra-abdominal abscesses.

No. of aspiration	Number of patients	%
1	30	25
2	37	30.80
3	35	29.12
>3	18	15
Total	120	100

Out of 120 patients, 87 patients (72.5%) were successfully treated by aspiration only and in the remaining 33 patients (27.5%) drain was kept (Table 4). Out of 33 patients in whom drain was kept, in 24 patients of liver abscesses the drain was kept, ranging from 10 days to 30 days, the average being 14 days. In 5 patients of perinephric abscesses, the drain was kept ranging from 7- 20 days (average 10 days). In 2 patients of intraperitoneal abscess, it was kept for 10 days to 24 days (average 17 days).

There was only 1 patient of sub-diaphragmatic abscess and 1 patient of splenic abscess, where the drain was kept for 15 days and 13 days respectively. There were no complications in relation to the indwelling catheter.

Table 4: Procedure performed on the patients.

Procedure done	No. of patients	%
Aspiration only (Drain not kept)	87	72.5
Drain kept	33	27.5

In the present study, in all the 120 cases, pus was sent for culture and sensitivity. In maximum number of patients i.e. 70 patients (58.33%), no organism could be grown i.e. pus was sterile. *E. Coli* was isolated from the pus in 30 patients (25%), followed by *Staphylococci* in 16 patients (13.33%), *Pseudomonas* and *Klebsiella* were grown in 2 patients (1.67%) each.

In the present series, the complication rate is 7.5%. Bleeding occurred in one patient (0.83%), recollection occurred in 2 patients (1.67%) and damage to viscera in 1 patient (0.83%) which were related to the procedure. These patients were managed successfully.

In two patients (1.67%), septicemia was present. Chest complication like empyema and respiratory failure were found in two patients (1.67%) and renal failure was

present in one patient. (Table 5). Out of 120 patients, in the present series, 107 patients were successfully treated by aspiration and percutaneous drainage.

Table 5: Complication rate.

Complication	No. of cases	%
Bleeding	1	0.83
Recollection	2	1.67
Damage to viscera	1	0.83
Septicaemia	2	1.67
Chest complication		
Respiratory failure Empyema	2	1.67
Renal Failure	1	0.83
Total	9	7.5%

In 5 patients (4.2%), there was inadequate drainage and persistent collection and were subjected to surgical drainage. The overall complication rate is 7.5%. 4 patients (3.3%) were lost to follow up. 4 patients (3.3%) died due to complications like septicemia in 2 patients (1.67%), chest complication in 1 patient (0.83%) and renal failure 1 patient (0.83%). Thus, showing the mortality rate of 3.3% and not directly related to the procedure. (Table 6).

Table 6: Final outcome.

Outcome	No. of patients	%
Full recovery	107	89.2
Surgical drainage	5	4.2
Complications	9	7.5
Lost to follow up	4	3.3
Death	4	3.3

DISCUSSION

The study was conducted with the motive of minimum invasiveness and maximum benefits to the patient. The procedure was always undertaken in patients, with a clear idea in mind that it is an initial valid alternative and may not be a total substitute to surgery. Till 1953, surgery was the absolute answer for the treatment of intra-abdominal abscesses. It was Mc Fadzean in1954 who for the first time successfully tried to aspirate liver abscess, but it was basically a blind procedure and there were no means to guide his needle placement.[1] Hence, surgeons were reluctant to use this blind procedure as a therapeutic modality for treatment of intra-abdominal abscesses.

However, the picture changed from 1974 onwards when there was invention of Computed Axial Tomography and when in the same year ultrasound guided aspiration of liver abscesses was done. 2 It was mostly a diagnostic aspiration. Since then the procedure has been well accepted with some modifications being suggested from time to time. An understanding of anatomic consideration is important for the recognition and drainage of abscesses. In the present study, of the visceral abscesses, there were 60.83% of hepatic abscesses and 5% of the splenic abscesses, thus comprising the maximum number of cases. Lorber reported the incidence of hepatic abscesses in 86.6% cases and splenic abscesses in 6.5% of cases. 3 Reported success rate in the literature for percutaneous splenic abscess drainage range from 60-77%. The success rate of percutaneous splenic abscess drainage is lower than percutaneous drainage of abscesses located in the remainder of the abdomen and pelvis, which varies form 80-90%. The lower success rate may reflect both the multiloculated nature and multiplicity of these abscesses.[4]

Etiology of the abscess formation was known in some cases, but it was not the primary aim of this study. Maximum number of cases in the study comprised of liver abscesses (60.83%), in which amoebiasis was responsible for the formation of abscesses in 16 patients (13.33%). Previous surgery for varying reasons is responsible for the formation of abscesses in 34 patients (28.33%). However, abscess formation could be attributed to appendicitis in 2 patients (1.67%), enteric in 3 patients (2.5%), traumatic in 3 patients (2.5%), tubercular in 2 patients (1.67%) and pancreatic in one patient (0.83%). In 57% patients (47.5%), the cause of abscess was not known and labelled as a cryptogenic.

The incidence of intra-abdominal abscesses secondary to disease or operations of pancreas ranges form 12-13%.5 But in the present study, there were only 3 cases (2.5%) which include 1 pancreatic (0.83%) and 2 cases (1.67%) of infected pseudo-pancreatic cyst secondary to disease of pancreas. Similarly, the incidence of intra-abdominal abscesses secondary to appendicitis is also reported to 12-19%.5 But, in the present study, there were only two cases (1.67%), which could be related to secondary to appendicitis.

All the pus samples were sent for culture and sensitivity. Organisms could be grown in 50 pus samples (41.67%) and 70 samples (58.33) were sterile. The most common strain cultured was Escherichia coli found in 25% of the cases which is comparable with study reported by Aeder (23%) and WA. Joseph (21.42%).[6,7]

Staphylococci was grown in 16 samples, pseudomonas and klebsiella could be grown in 2 samples each. The number of sterile culture in the present series is 58.33%. The explanation for this could be found in the fact that at least half of the varieties of bacteria found in the intra-abdominal abscesses are anaerobic.[8]

Anaerobic organisms must be cultured immediately after drainage in appropriate media since a delay of 1 or more hours will frequently result in negative culture results. The identification of these anaerobes is assuming increased importance in relation to their synergistic action, which greatly enhances their pathogenic capabilities.[5] Since we had no facilities for immediate

anaerobic culture method, the high incidence of apparently sterile culture reports can be well explained.

Halasz N.A. reported incidence of missed abscesses in 22-29% of cases, using the various surgical extraperitoneal approaches, which also had an extremely high mortality.[9] Although some workers recommended irrigation of the abscess cavity, we have not found irrigation to be necessary for the majority of abscesses except in 1 patient of infected pseudopancreatic cysts in which there were abundant necrotic debris. Gerzof SG and Warshan AL reported that catheter drainage cannot carry out debridement as may be required in pancreatic abscess and infected pseudocysts.[10,11] So, it may not be the procedure of choice in these circumstances. We have not noticed any correlation between abscess size and the difficulty or ease of drainage. There is some controversy over the timing of removal of the drainage catheter. We have not experienced any significant difference in outcome when the catheter is abruptly removed instead of gradually advanced, which is the traditional surgical practice. Alan A. Saber suggested the criteria for removal of percutaneous catheters which include resolution of sepsis signs, minimal drain output and resolution of the abscess cavity as demonstrated by a sonogram or CT scan.[12]

The success rate in the present series is approximately 89.2% which is well compared and correlated with those reported by different authors Capitan MC. and Akinci D (Table 7).[13,14]

Table 7: Success rate reported by different authors.

Authors	No. of Patients	Success rate (%)
Capitan MC	66	86.30
Akinci D	300	91.00
Present series	120	89.20

Thus, our results demonstrate the effectiveness of percutaneous needle aspiration / drainage and it should be considered a first line treatment in the management of intra-abdominal abscess, irrespective of their number and sizes. In the present study, there were no major complications, directly related to the procedure. There was minor bleed in 1 patient, damage to viscera in 1 patient (which required surgical exploration) and recollection in 2 patients.

Septicaemia occurred in 2 patients (1.67%). Most common cause of this complication was presence of shock, increased severity of infection and uncontrolled sepsis. Even after proper treatment, there patients didn't respond and died. Field T.C., reported septicaemia in 7.7% patients which is higher than present series. 12 Chest complications such as empyema and respiratory failure were found in 2 patients (1.67%). Of these, one patient with empyema was treated by intercostal drainage. Follow up x-rays were taken. Other patient had inadequate percutaneous drainage because of viscous nature of the material within the abscess. Surgical drainage was subsequently performed. Postoperatively, the patient developed adult respiratory distress syndrome with continued sepsis and died. This complication rate is compared and correlated with those reported by different authors such as, Akinci D. and Lucey B.C (Table 8).[4,14]

Table 8: Complication rates, reported by different authors.

Authors	Patients	Complications rate (%)
Lucey BC	38	10.3
Akinci D	255	3.1
Present study	120	7.5

In the present series of 120 patients, 4 patients died, thus mortality rate is 3.3%. These deaths were not directly related to the procedure itself but were due to underlying cause and uncontrolled sepsis. Out of these 4 cases, 1 patient (0.83%) developed respiratory failure (ARDS), 2 patients (1.67%) with septicaemia and 1 patient (0.83%) with renal failure. The mortality rate of 3.3% in the present series is well correlated with those reported by different author.[13]

Early recognition with various diagnostic modalities, powerful antibiotics and prompt treatment has helped to bring down mortality in management of intra-abdominal abscesses.

CONCLUSION

The method is associated with good success rate, low morbidity and mortality, better patient compliance, low cost, can be performed under local anaesthesia and even in critically ill and high-risk patients and should be used as an initial procedure in the treatment of intra – abdominal abscesses. The fact that pus should be drained is of prime importance (whether percutaneously under CT/Ultrasound guidance or by surgical drainage). The choice between percutaneous and surgical drainage must be made through full discussion with the radiologist and final decision should be made by the surgeon. Hence, the treating surgeon should not hesitate to undertake surgical drainage whenever and wherever indicated.

Thus, percutaneous aspiration/catheter drainage of intra-abdominal abscess under USG guidance is the accurate, safe, economical and effective method and is the treatment of choice in patients who do not have other indication of exploration. Thus, it should be considered as an initial valid alternative and may not be a total substitute to surgery.

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