

Ultrasound Guided Percutaneous Drainage of Abdominal Abscesses

Muhammad Saleem, Nadeem Ahmad, Ijaz Ahsan (Department of General Surgery, Postgraduate Medical Institute, Lahore.)

Abstract

Objective: To see yield of ultrasound guided percutaneous drainage of abdominal abscesses.

Setting: Department of General Surgery Unit 1, Lahore General Hospital and North Surgical Unit, Mayo Hospital, Lahore.

Design: A prospective case-controlled study.

Subjects: Patients with spontaneous or post operative abdominal abscesses.

Results: Overall success rate was 96.2%, major complications 11.5%, minor complications 26.9% and mortality 3.8%. In simple abscesses (20 patients), the success rate was 100% and in complex abscesses (six patients) 83.4%, with respective mortality 0.0% and 16.6%. Mean hospital stay was 10.7 days (range 3-25).

Conclusion: Ultrasound guided percutaneous drainage of abdominal abscesses is an effective and safe method, suited particularly for simple abscesses (JPMA 50:50, 2000).

Introduction

Abdominal abscesses are conventionally drained by open surgery. The method, though quite efficient, has the disadvantage of involving a major operation and in most cases, general anesthesia as well. The need for a minimally invasive technique with little procedure related morbidity and equal applicability to unfit patients, has long been felt. As percutaneous drainage meets these objectives, it has been tried since ancient times¹. However, its scope as a blind procedure remained limited due to its inaccuracy and high potential for major organ injury. The availability of radiological guidance for catheter placement was a major breakthrough in this regard^{2,3}. It led to the wider application of the technique by improving its safety and efficacy. The present study was done to see the yield and efficacy of ultrasound guided aspiration of post-operative abdominal abscesses.

Patients and Methods

The study was done in the Department of General Surgery Unit 1, Lahore General Hospital and North Surgical Unit, Mayo Hospital, Lahore during October 1992-94. Patients with simple plus complex abscesses as multiple, recurrent or secondary abscesses were included. Abscesses with internal or external fistula and tubo-ovarian and splenic abscesses were excluded. Patients with incomplete treatment or follow-up were also excluded. Ultrasound was done by a trained radiologist. Patients received the general treatment including appropriate antimicrobials as usual.

Technique: Abscess was precisely delineated and a safe route from skin to the abscess cavity was identified by ultrasound (Sonolayer 32B Toshiba with transducer PLB 508M). Prior to the catheter introduction, a diagnostic needle aspiration was done. The catheter was introduced into the abscess cavity, either directly using a trocar catheter (as used for chest intubation (Protex 10-I 6F)) or by modified Seldinger's technique using a guide-wire. The former was used when a direct route from skin to the abscess cavity was available and the latter when the abscess was deep with likelihood of inadvertent injury to the nearby viscera. Maneuvering of the trocar or guide-wire within the abdominal

cavity was done strictly under ultrasound surveillance. Once in position, the catheter was secured and attached to a drainage bag. Drainage was recorded daily and the response to the treatment was assessed by clinical parameters and also by serial ultrasound. The procedure was considered successful if the patient was cured without the need for surgical drainage. After catheter removal, patients were followed up for three months. The results were compared with historical records.

Results

Number of patients provisionally included in the trial was 38. Twelve patients were later excluded; nine due to having small asymptomatic abscesses not requiring drainage and three due to incomplete follow-up. Amongst 26 patients completing the trial, all except one were male (male to female ratio 25:1). The age of the patients ranged 13-60 years (mean 34.92 ± 14.45 SD). Twenty patients had simple and six had complex abscesses. In 16 patients the abscesses were spontaneous while in the rest were post-operative. The abscesses sites were: liver 23, subphrenic 5, perinephric 2, paracolic 2, sub-hepatic I and psoas I. Sizes of the abscesses on ultrasound varied 7-17 cm (mean 11.5 ± 2.9 SD) while the volume of pus ranged between 105-1250 ml (mean 477.1 ± 309.9 SD). Diagnostic needle aspiration was successful on first attempt in 24 patients and on second attempt in two patients. Trocar cannula was employed in 23 patients and the modified Seldinger's technique in three patients. The drainage was established in all. The volume of pus drained ranged from 145-1750 ml (mean 771.0 ± 566.4 SD), greater than the amount estimated on ultrasound. The drainage continued for 3-15 days (mean 8.65 ± 4.73 SD). The time abscess cavities took to resolve on serial ultrasounds is shown in Figure.

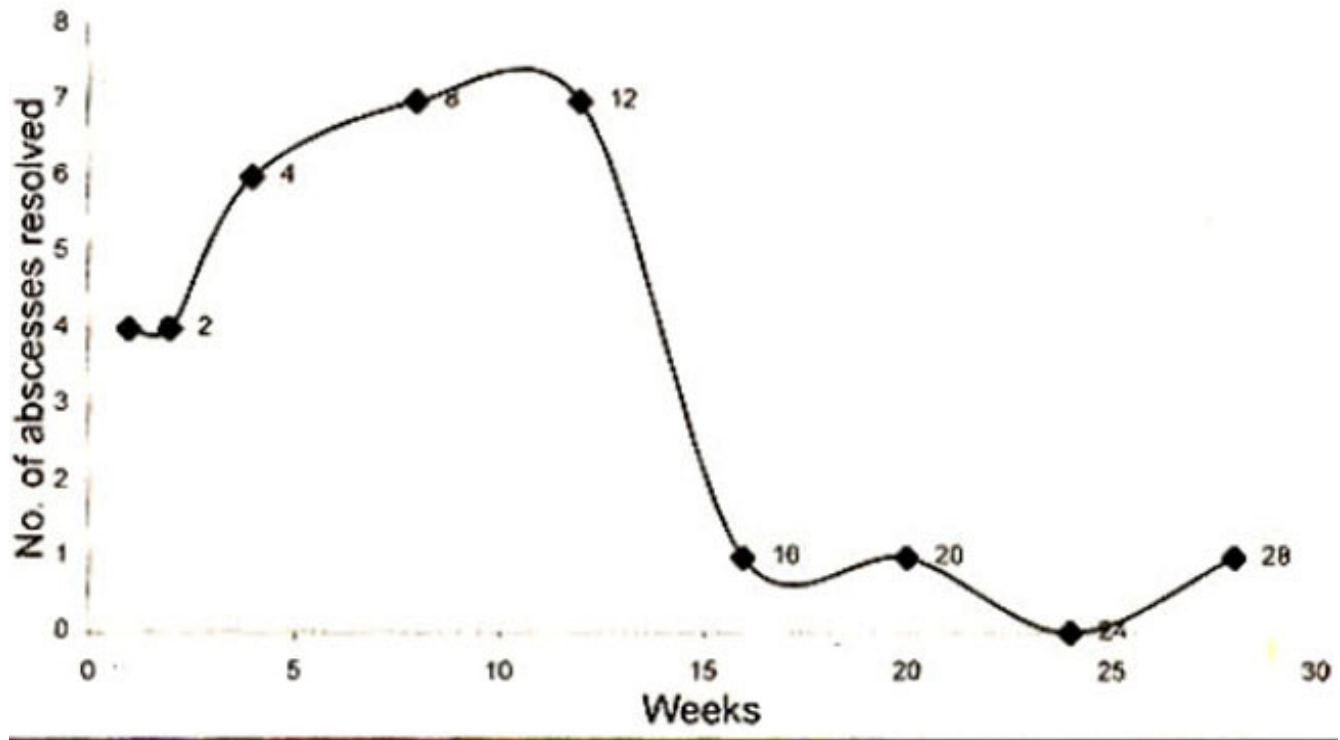


Figure. Resolution time of abscess cavities.

The following minor complications were noted: chills and fever (two patients), catheter blockade requiring irrigation/replacement (two patients), inadvertent catheter dislodgment and sinus formation after catheter removal (one patient each). The only major complications occurred were one recurrent abscess, one secondary peritoneal empyema (following transpleural approach). One patient died: he was moribund on admission, did not improve after the procedure and underwent unsuccessful

operation for a missed interloop abscess and devitalized gut. Results are summarized in Table.

Table. Comparison between Percutaneous drainage (PD) and Surgical drainage (SD) (reported series).

Authors	Procedure	No. of patients	No. of abscesses	Success Rate (%)	Complications Rate (%)	Mortality (%)
Johnson et al ¹⁴ (1981)	PD	27	27	89.0	4.0	11.0
	SD	43	43	79.0	16.0	26.0
Glass and Cohn ¹⁵ (1984)	PD	15	15	47.0	6.0	Not mentioned
	SD	44	44	88.0	27.0	Not mentioned
Olak et al ¹⁶ (1986)	PD	24	24	70.3	30.8	11.0
	SD	24	24	85.3	15.9	7.4

Discussion

Because of their peculiar location, treatment of abdominal abscesses is quite challenging. Despite progress in antibiotic therapy, drainage remains the mainstay of the treatment as patients with undrained abscess have a very high mortality. Though fairly established, percutaneous drainage under radiological guidance is still adopted only occasionally in our country. Also there is considerable debate about the nature of radiological guidance and the type of abscesses more suitable for the technique. The present study addressed these issues in a prospective clinical setting.

We opted for ultrasound guidance for its easy availability and known versatility, Fluoroscopy and CT are the alternatives. CT after ultrasound has fast emerged to provide radiological guidance more for its specificity than its sensitivity. Haggas and Weinstein prefer CT over ultrasound⁴. Gerzof et al consider CT and ultrasound complementary rather than competitive², the former better for localization of abscess and route planning (as bowel gas or bone does not hamper it) and the latter for catheter placement (as imaging and sector plane flexibility are achieved simultaneously). In one of our patients where ultrasound was unclear, CT helped in outlining the abscess and ultrasound was again resorted to for introduction of catheter.

We considered percutaneous drainage successful if the patient was cured without undergoing surgery. With this criteria, our overall success rate was 96.2%; 100% in simple and 83.4% in complex abscesses. In the reported series, the success rate varied 85.6-96.3% and 52.3-69% respectively in simple and complex abscesses^{5,6}.

This both in the present and reported series, the results are quite satisfactory and are better in simple than in complex abscesses. The latter is understandable as surgical drainage also shows such difference, indicating interplay of other variables in addition to the drainage technique in the outcome. It also explains why earlier series on percutaneous drainage showed better results as these included only simple abscesses. In fact the initial success in simple abscess of percutaneous drainage encouraged its use in complex abscesses, like multiple and multilocular abscesses⁵, infected pseudocysts^{2,7,8} splenic abscess^{5,9,10} and abscesses with fistula^{2,11}. Thus compared with the initial 40%, up to 90% abdominal abscesses can now be subjected to percutaneous drainage¹².

The comparison between percutaneous drainage and surgical drainage has been difficult due to the lack of randomized controlled trials. Our series also was without a control group. Data from case controlled series show a success rate of 79-85% for surgical drainage^{12,13}, not much different from that of percutaneous drainage (Table). Olak et al series having closely matched patients also substantiates this¹⁵. Although both surgical drainage and percutaneous drainage have lower success rate in complex abscesses, percutaneous drainage has less morbidity and mortality in these cases¹⁵.

The available data including ours while confirming the superiority of percutaneous drainage in simple abscesses, shows variable outcome in complex abscesses. As these may ultimately require surgery, Olak et al recommend surgical intervention in them at the outset¹⁵. Other workers, however, consider percutaneous drainage worth trying as even if it fails to prevent surgical intervention, it can be a useful temporizing measure⁵. Further in moribund patients, percutaneous drainage would be the only option available.

Complications noted in our series were mostly minor. Major complications reported are bowel and vascular injury¹⁷ and recurrent and secondary abscesses. Bowel injury may go unrecognized at the time of procedure to appear later as enterocutaneous fistula. It often closes spontaneously⁵. Vascular injury can lead to visceral hematoma or bleeding in the parities. Serious bowel vascular injury can be avoided by proper technique and careful planning. Prior diagnostic needle aspiration is an additional safeguard⁴. Bowel or vascular injury were notably absent in our series. Recurrent abscess formation, quite rare after surgical drainage, is relatively common after percutaneous drainage, up to 5% in reported series⁴ and 3.8% in the present one. These are treatable by repeating percutaneous drainage. Secondary peritoneal or pleural abscesses can also develop, if the latter are transgressed. One of our patients developed empyema requiring chest intubation and another developed peritoneal abscess requiring separate drainage. Thus transpleural and transperitoneal routes should be avoided if at all possible. We had catheter related problems in four patients. As a narrow caliber catheter is used, its blockade is common. To avoid this many workers recommend routine saline irrigation of the catheter. We are for its selective use. Permanently blocked catheter needs replacement by repeating the whole procedure, Bacteremia during manipulation may also occur requiring appropriate antibiotic cover.

The overall mortality of 3.9% -0% in simple abscesses and 16.6% in the case of complex abscesses in our series does not match exactly with the reported overall mortality of 0-3% after percutaneous drainage and 7.4-37% after surgical drainage^{6,16-19}. It is explained by the difference in the number and the type of patients and the characteristics of the abscess⁵. The abscess most likely to be missed is intermesenteric, this also happened in our patient who died eventually. A meticulous ultrasound, supplemented by CT in doubtful cases can help avoid this. Diagnostic contribution of exploratory laparotomy after such screening is only 9%²⁰, As the cost of such missing is very high, a nearly 100% mortality²¹ surgical intervention is strongly indicated if a patient fails to respond to percutaneous drainage.

In conclusion, ultrasound guided percutaneous drainage is an efficient and safe method of drainage of abdominal abscesses. Its results are excellent in simple abscesses. In complex abscesses also, its results are atleast as good as of open drainage. Percutaneous drainage being least traumatic, should be preferred to surgical drainage in most abdominal abscesses. The latter should be reserved for cases where the former has failed or a safe route is not available radiologically. Risk of missing an abscess is avoidable by meticulous radiology and timely surgical intervention in patients unresponsive to percutaneous drainage.

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