

Percutaneous Drainage of Abdominal Collections under Imaging Guide

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Abstract:

Background: One of the most significant advances in the treatment of intra-abdominal collections during the past 2 decades has been the introduction of image-guided therapy with percutaneous catheter drainage. The development of improved imaging modalities, together with broad-spectrum antibiotics and soft drainage catheters, has changed the treatment of collections that previously required an urgent operation. Disease processes that have traditionally been treated with open surgical drainage and debridement can now be resolved with percutaneous catheter drainage and antibiotics. In selected cases, this will allow for better preparation of the patient for a later elective and definitive operation.

Objective: Highlight the outcome, safety and effectiveness of percutaneous drainage procedure of abdominal collections performed under imaging guide.

Patients and Methods: Forty one patients were referred from surgical wards and emergency department after diagnosing abdominal collections. Then each case discussed with radiologist to determine the route and type of catheter and imaging modality for guidance (ultrasound and/or computerized tomography). The size and site of the collections were estimated along with the most suitable approach and angle of catheter insertion. A safe drainage route was identified avoiding solid organs and bowel.

Results: Percutaneous drainage of 41 abdominal collections under imaging control was carried out in 41 patients during a one year period. No complications resulted from the procedure itself. Percutaneous drainage was sufficient to drain the collections in 35 cases (no further surgery is needed). Of those who require surgery (5 patients), the procedure considered to be as a temporary measure. One case was diagnosed as sero-mucinous tumor of bowel.

Conclusion: Percutaneous drainage of abdominal collections is a safe, effective and minimally invasive alternative approach to formal surgical drainage. The advantages include: the drainage can be done under local anesthesia, diagnosis and treatment can be achieved simultaneously in radiological department.

Key words; Percutaneous drainage, Imaging guide, Collection.

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Introduction:

Percutaneous catheter drainage (PCD) is now standard therapy for patients with intraabdominal collections who do not have other indications for surgery. The vast majority of collections can be managed with an appropriately sized and positioned catheters[1]. Percutaneous drainage is defined as the placement of a catheter using imaging guidance to provide continuous drainage of a fluid collection. [2]. Percutaneous aspiration is defined as evacuation of a fluid collections using either a catheter or needle, with removal of the catheter or needle immediately after the aspiration [3, 4]. Contraindications of percutaneous drainage: Common contraindications include uncorrectable coagulopathy and the absence of a safe percutaneous path access the collection [4,5,6]. Catheter insertion technique: There are two methods for introducing a catheter into collections:

Trocar technique: The trocar technique involves a catheter

mounted on a sharp trocar and inserted into the abscess or collection with a guiding needle [5,7]. Seldinger technique: The Seldinger technique involves the insertion of a hollow needle into the abscess cavity or the collection and the placement of a guide wire through the needle to create a percutaneous path for a drainage catheter [5,7].

Aim of the study:

Evaluate the outcome of percutaneous drainage procedure of intraabdominal abscesses and fluid collections performed under imaging-guide and the effectiveness as alternative to open surgical drainage.

Patients and Methods:

From October 2013 to November 2014, 41 patients were referred from surgical wards and emergency department in Baghdad teaching hospital and Al-Sadder teaching hospital after diagnosing abdominal collections. Then each case discussed with same radiologist in each center to determine

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the route and type of catheter and imaging modality for guidance (US and/or CT). Detection of the collections by US only was done in 30 of 41 patients, while CT scanning was needed in addition to US in 11 patients. The size and site of the collections were estimated along with the most suitable approach and angle of catheter insertion. A safe drainage route was identified avoiding solid organs and bowel. The procedures were done in radiology department as outpatient procedure in 41 patients, some of them admitted to the surgical ward for followup and management (rehydration and iv antibiotics). All procedures were done under local anesthesia using Lidocaine 1% (5-10 ml) without adrenaline and without sedation. Aspiration was done using wide bore needle and the sample isolated and sent for culture and sensitivity, AFB, biochemistry and cytology. The catheter was then sutured directly to the skin and left in situ until free drainage stopped and follow-up ultrasonography showed resolution of the collections. Suprapubic catheter used for superficial collections with safe route, chest tube was used for thick collections specially in the right subphrenic abscesses and PNS catheter was used for deep collections with critical route, so we use Seldinger technique for placing the catheter. Needle aspiration was done for two patients and improved completely without need for catheter insertion. Initial drainage usually ended with complete evacuation, then the patients were followed daily by US, and catheter care to ensure patency (Irrigation of the catheter was done once daily with normal saline to ensure tube patency). Additional procedures (ERCP and stenting) was required for those with history of bile leakage (seven patients needed ERCP and one of them required stenting of right hepatic duct). Catheters were removed after few days to weeks depending on certain criteria.

Criteria for removal of the drain include

- (1) Clinical resolution of septic parameters, including patient well-being, normal temperature, and leukocyte count;
- (2) Minimal drainage from the catheter; and
- (3) Evidence of the resolution of the collections depending on imaging study.

Results:

Forty one patients were included in the study from Baghdad teaching hospital and AL- Sadder teaching hospital between October 2013 to November 2014; all of them had abdominal collections. They were 23 females and 18 males with age range (5 to 75) years. The patients had either postoperative or primary collections; 34 patients had postoperative collections mainly following cholecystectomy, laparotomy (trauma and perforated viscus), hydatid cyst and appendicectomy (Table 1); 6 patients had primary collections mainly pyogenic liver abscess. One case was colonic tumor and misdiagnosed as appendicular abscess.

Table 1: Distribution of the post-operative cases according to the primary operation or procedure:

Operation	No. of patients.	% of postop. patients. (34 patients.)	% of Total (41 patients.)
Cholecystectomy	15	44.11%	36.58%
Laparotomy *	4	11.76%	9.75%
Hydatid Cyst surgery	4	11.76%	9.75%
Appendicectomy	4	11.76%	9.75%
Colonic surgery	1	2.94%	2.43%
Hysterectomy	2	5.88%	4.87%
Gastrectomy	1	2.94%	2.43%
Whiple's procedure	1	2.94%	2.43%
Hernia repair	1	2.94%	2.43%
Trauma**	1	2.94%	2.43%
Total	34		82.92%

Laparotomy following trauma and perforated viscus; Trauma due to motor vehicle accident (blunt trauma). Locations of collections on diagnostic imaging study were mainly Rt. Subphrenic and subhepatic; pelvic, retroperitoneal and RIF collections (Table 2).

Table 2: Location of collections on Diagnostic Imaging Study:

Location	No. of patients.*	% of Total (41 patients.)
Right subphrenic/subhepatic	23	56.09%
Pelvis/perirectal	12	29.26%
Retroperitoneal (perinephric/psoas)	4	9.75%
Right lower quadrant	3	7.31%
Left lower quadrant	1	2.43%
Abd. Wall	1	2.43%

* some patients have multiple collections. The drained materials were mainly pus or bile and one was serous which was then diagnosed as cystic adenocarcinoma as shown in (Table3).

Table 3: Drained material:

Drained material	No. of patients.	% of Total (41 patients.)
Pus	24	58.53%
Bile	12	29.26%
Blood	2	4.87%
Lymph	1	2.43%
Small bowel content*	1	2.43%
seromucinous	1	2.43%
Total	41	100%

*Anastomosis leak
Twenty eight patients were improved completely after drainage of their collections (70%). Seven patients with bile leak needed further interventional procedures (ERCP and Sphincterotomy) and one of them was required stenting of Rt. hepatic duct (17.5%). Five patients did not improve after PCD and need surgical intervention (12.5%); one patient with peritoneal mucinous carcinomatosis died after 6 months;

Table 4 : Details of [5] cases required surgery(PCD failed):

Case no.	Anatomical Site	Pathology	Duration	Reason for surgery
1.	Rt. subphrenic	Colorectal carcinoma	14 days	persistent discharge(residual necrotic tumor
2.	Abdominal wall	Hernia mesh repair	21 days	persistent discharge (Foreign body)
3.	Lt. iliac fossa	Laposcopic cholecystectomy	4 days	Perforated viscus
4.	Pelvic	hysterectomy	17 days	Septated collection
5.	Rt. subphrenic	Liver hydatid cyst (postop.)	20 days	Insufficient drainage

Discussion:

The use of radiologic guidance techniques for the diagnosis and aspiration of intraabdominal collections was described as early as 1977 [8, 9]. In a 1981 review, Gerzof described radiologic placement of drainage catheters in 67 patients with intra-abdominal abscesses with satisfactory drainage of 86 percent [10]. In our study, detection of the collections by US only was in 30 of 41 patients (73.1%), while CT scanning was needed in addition to US in 11 (26.8%) of patients. Ultrasound accuracy has also been quite favorably reported by numerous authors for fluid collections detection [11]. Knochel et al [12] reported a sensitivity of 82% and a specificity of 94.5%, and Carroll et al [13] reported an overall accuracy of 84%. Observational studies from a number of centers have shown it to be a safe effective alternative to surgical intervention, with equivalent success rates, comparable mortality (10–20%) and morbidity (~25%) [14,15]. In spite of the 100% technical success in the procedure, which is exactly the same as in Marianne E et al study [16], failure of drainage in our study occurred in 5 patients (12.5%), compared to Kumar et al study [17], in which 3% failed to improve and underwent operative intervention, and to Lagana et al 8.4% [18]. Others reports include Haage et al with 14% [19], Lang et al with 23% [20], Jaques et al with 34% (15% failure and 18% partial success) [21]. In our study, 24 cases were abscess collections and PCD was done; 19 cases improved completely and 5 cases need surgical interventions (success rate was 79% and failure rate was 21%). These results are similar to the results achieved by (Bakal CW. et al and Cinat ME. et al) [22,2]. Other circumstances such as necrotic-infected tumor have a lower success rate for percutaneous drainage and early consideration for surgical intervention [22]. Seeto RK et al mentioned needle aspiration and percutaneous catheter drainage of abscesses have similar mortality rates; however, recurrence rates and the requirement for surgical intervention may be greater in those who undergo aspiration alone [23]. Needle aspiration is less invasive, less expensive, and avoids all of the complications associated with catheter care. Giorgio and colleagues [24] reported a series of 115 patients with a 98.3% success rate for needle aspiration, no mortality, and no procedure-related morbidity. A randomized controlled trial

by Rajak et al [25] in 1998 compared percutaneous needle aspiration to catheter drainage and also found no major complications and no deaths.

In our study we did aspiration in two cases and was improved completely. Significant postoperative bile leaks occur in approximately 0.8 to 1.1 percent of patients [26, 27]. In our study, bile was drained in 12 (29.2%) of the cases, seven of them need further intervention (ERCP, and stenting in one pt.) Gianpaolo Carrafiello et al had shown interventional radiological procedures are effective in the emergency management of surgical bile duct injury since they are minimally invasive and have a high success rate and a low incidence of complications compared to the more complex and dangerous surgical or laparoscopic options and can be considered as lifesaving procedure [28].

Conclusion:

Percutaneous drainage of abdominal collections is a safe and effective alternative to formal surgical drainage. The advantages include the fact that drainage takes place under local anaesthesia, which is beneficial especially when the patient's general condition is too poor for the administration of a general anaesthetic. PCD is a good alternative for open procedures and can be repeated as necessary.

Author contributions:

Prof. Safa M. Al Obaidi: study conception and design. data interpretation and analysis, revision.

Dr. Nasser Madhlom Meazher: study conception and design. data interpretation and analysis, drafting of manuscript and revision.

Dr. Mohammed Abdalameer Mahdi: study design, data interpretation and analysis.

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