CT-guided Drainage of Pelvic Collection Following Acute Appendicitis: Technical Success and Possible Complications

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ABSTRACT:

BACKGROUND:

Acute appendicitis is a common clinical problem with an incidence of approximately ١ case per ١،٠٠٠ persons per year. Perforation is a common complication of appendiceal inflammation, with an overall incidence of approximately ٣٠٪ in pediatric populations and as high as ٦٦٪ in children younger than ٥ years and up to ١٠٠٪ in ١-year-olds. Computed tomography (CT)-guided abscess drainage has also been shown to provide definitive treatment for ٧٠–٩٠٪ of abdominal abscesses

OBJECTIVE:

The aims were to report the role of CT-guided drainage of pelvic collection following acute appendicitis, technical success and possible complications.

PATIENTS AND METHODS:

A prospective study was done in Al-Kadhimyia teaching hospital,between March ٢٠٠٩ and November ٢٠١٢. The study included ٤٨ consecutive patients with pelvic abscess following appendicectomy for acute appendicitis. Age range was ١٠–٥٨ years; ٢٦ male, ١٢ female. All patients underwent sonography and contrast-enhanced abdominal CT was performed to confirm the diagnosis. CT guided drainage with a pigtail multi-sidehole catheter of ١٢ – ١٤ French was done. Post-drainage scans were obtained to assess the position of the catheter and to exclude early complications (e.g., hematoma). Catheters were flushed with ١٠-١٥ ml of ٠,٩٪ sterile saline every ٨ hr. to maintain patency.

The decision for catheter removal was based on the following criteria: clinical improvement (normal body temperature and white blood cell (WBC) count, no clinical symptoms), drainage output of ١٠ mL/d or less, and ultrasound findings of complete resolution of the target fluid collection.

RESULTS:

The study included ٤٨ patients. The depth of the collections was ranged from ٤-٨cm (mean of ٦cm). Of the ٤٨ patients, ٤٠ had single drainage procedure, and ٨ returned for a second procedure. The (٨/٤٨) necessitated a second drainage procedure (٥cases of catheter displacement and ٣ cases of catheter obstruction). Treatment failure was seen in ٣/٤٨ (٦,٢٥٪) patients and were treated with surgical drainage. Clinical success of the procedures was (٩٣,٧٥٪). The volume of fluid drained ranged from ٢٠٠ ml to ٤،٥٠٠ ml (mean ٤٤٠ ml). Fluid culture reveals Escherichia coli in ٢٧٪, and Enterococcus spp in ١٥٪ and polymicrobial in ٥٨٪ of cases. hospital stay was ١٣±٦,٤ days (٨–٢٨ days), while those who underwent two procedures had an average stay of ٢٠,٢±٦,٥ days. No catheter-related wound sepsis was noted at the time of discharge or follow-up, and no catheter tract failed to close spontaneously.

CONCLUSION:

CT _guided drainage of pelvic abscess following acute appendicitis is an effective method of treatment with no catheter-related wound sepsis and no major periprocedural complications.

KEYWORDS: CT – guided drainge, pelvic collection, acute appendicitis.

INTRODUCTION:

Acute appendicitis is a common clinical problem with an incidence of approximately ١ case per ١،٠٠٠ persons per year [١]. Perforation is a common complication of appendiceal inflammation, with an overall incidence of

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approximately ٣٠٪ in pediatric populations and as high as ٦٦٪ in children younger than ٥ years [٢,٣] and up to ١٠٠٪ in ١-year-olds [٢,٤]. Percutaneous drainage is a well-established treatment option for abdominal abscesses of many etiologies [٥, ٦]. In many cases image-guided percutaneous drainage of fluid collection has become the first-line treatment, as it is less invasive and has a lower rate of periprocedural complications [٧]. Imaging-guided percutaneous drainage in combination with broad-spectrum IV antibiotics is an effective, minimally invasive treatment of patients with acute appendicitis complicated by perforation and abscess [٨-١٢]. CT-guided abscess drainage has also been shown to provide definitive treatment for ٧٠–٩٠٪ of abdominal abscesses [١٣-١٨]. Imaging-guided percutaneous drainage of abdominal and pelvic abscesses was initially developed and used in adults, however, because the successful treatment of abscesses with percutaneous drainage the technique was soon adapted for use in the pediatric population [١٩–٢٢].

Although fluid collections have diverse origins, the purposes of percutaneous intervention in all such collections may be classified in one or more of the following three categories: to obtain a fluid sample for diagnosis, to completely drain the fluid from an abscess or symptomatic collection, or to treat a recurrent collection by instilling a sclerosing agent [١٩].

Contraindications for percutaneous treatment are relatively few. The main ones are uncorrectable coagulopathy, lack of safe percutaneous access, and inability of the patient to cooperate. For practical purposes, the absence of a safe percutaneous path is the only factor that prohibits percutaneous abscess drainage, since in most instances coagulopathy can be corrected to allow drainage. The presence of bowel near the abscess may preclude percutaneous abscess drainage. Abscesses located near or between bowel loops are not amenable to percutaneous catheter drainage and may require surgery if the patient experiences symptoms of peritonitis. However, in the absence of acute peritonitis, needle aspiration of an interloop abscess can be performed to obtain material for culture. Transection of the bowel with a small (١٩–٢٢ gauge) needle is generally safe. However, transgression of the colon should be avoided, as the colonic flora will contaminate the specimen and may cause infection in the fluid collection [٢٣].

To our knowledge this study is the first one done in Iraq to study role of CT-guided drainage of pelvic collection.

AIMS:

The aims of our study were to report our experience with regard to the role of CT-guided drainage of pelvic collection following acute appendicitis, technical success and possible complications.

PATIENTS AND METHODS:

This study was done in Al-Kadhimyia teaching hospital, Baghdad, Iraq, in the period between March ٢٠٠٩ and November ٢٠١٢. The study was approved by the local ethics committee. The study included ٤٨ consecutive patients with pelvic abscess following appendicectomy for acute appendicitis. Age range of the studied population was ١٠–٥٨ years; ٢٦ male, ١٢ female. The diagnosis pelvic abscess was made on the basis of clinical and imaging findings (with ultrasound or computed tomography) as all patients underwent sonography as a diagnostic study and contrast-enhanced abdominal CT was performed to aid diagnosis and better define the location of abscesses.

Informed consent was obtained from all patients included in this study. All patients were treated with broad-spectrum antibiotics before and after the drainage procedure.

Before each procedure, diagnostic CT examinations were reviewed for planning of an appropriate route and catheter size. Drainage was performed under CT guidance (Somatom definition AS ٦٤ slice; siemens medical system, Germany). and Seldinger technique. Local anesthesia was used, no conscious sedation was applied. A pigtail multi-sidehole catheter of ١٢ – ١٤ French was used. The procedure was performed in the supine position. After the lesion had been localized, depth of the lesion from the skin surface was measured (The shortest or safest route of drainage was chosen to avoid contamination of a second body compartment, a solid organ, neurovascular structures, or the bowel). The chosen entry site was prepared and draped in a sterile fashion, under local anesthesia a small skin incision was made, the needle was advanced through this incision until it reaches the abscess cavity, a sample was aspirated to confirm the diagnosis and send for microbiological evaluation, then a guide wire was advanced through the needle then serial dilatators were used reaching the larger size, then the pigtail catheter was

advanced into the abscess cavity and the catheter was then secured to the skin. After catheter placement, the collections were aspirated as completely as possible, the catheters were attached to an external drains for continuous external drainage. Post-drainage scans were obtained to assess the position of the catheter and to exclude early complications (e.g., hematoma). Catheters were left in place for free drainage and were flushed with ١٠-١٥ ml of ٠,٩٪ sterile saline every ٨ hr. to maintain patency. Patients were admitted by the attending general surgeon for observation and IV antibiotic treatment, which continued for a minimum of ٥ days after drainage. Patients underwent regular clinical and imaging follow up.

Patient Follow-up and Outcome Measures: the patients were assessed clinically until they were discharged from the hospital. The clinical symptoms and laboratory tests were monitored. The criteria of successful procedure were defined as adequate drainage of abscess to allow resolution of infection without the need for surgical drainage. The decision for catheter removal was based on the following criteria: clinical improvement (normal body temperature and WBC count, no clinical symptoms), drainage output of ١٠ mL/d or less, and U/S findings of complete resolution of the target fluid collection. When catheter output had stopped for ٢٤ hours, a follow-up sonography was performed. If an abscess cavity was absent, the catheter was removed. If a residual cavity was present, the catheter was flushed with saline and aspirated until the return was clear. Residual loculations of abscess were treated with catheter repositioning and aspiration. Further sonography was performed ٣ days later and the catheter was removed if the catheter had remained unproductive. Otherwise, the catheter was left in situ until catheter output had stopped. Sonography was repeated every ٣ days until the cavity had either disappeared or when less than ٥-١٠ ml of serosanguineous fluid was draining per day with clinical recovery.

Patient outcomes, including the duration of hospital stay, procedure-related complications, treatment failure were recorded. The patients were discharged from hospital when the infection had subsided clinically and there was sonographic evidence of abscess resolution such as disappearance of abscess cavity or static or decrease in size of abscess cavity. A final sonogram was performed ٢ weeks later to exclude recurrence.

Statistical analysis using the program SPSS (version ١٥ for Microsoft Windows). The overall Clinical success of the procedures, complications rate, volume drained and duration of hospital stay were determined.

RESULTS:

The study included ٤٨ patients with pelvic abscess following appendicectomy for acute appendicitis with an age range of ١٠–٥٨ years; ٢٦ male, ١٢ female, male to female ratio was ٢,٣:١.

The size of the collections was ranged from ٤-٨cm (mean of ٦cm).

Of the ٤٨ patients, ٤٠ (٨٣,٣٪) had interventions performed during a single procedure, and ٨ (١٦,٧٪) returned for a second procedure, thus ٥٦ procedures were performed throughout the group.

There were ٥/٤٨ (١٠,٤٥٪) cases of catheter displacement and ٣/٤٨ (٦,٢٥٪) cases of catheter obstruction that could not be recanalized with a metal guidewire or by saline irrigation. These cases (٨/٤٨) (١٦,٧٪) necessitated a second procedure to replace the drainage catheter.

Immediate technical success, defined as correct placement of the distal tip of the drainage catheter inside the abscess cavity, was achieved in ١٠٠٪ of cases. There were no major periprocedural complications, such as bowel perforation or bleeding, necessitating surgical intervention.

Treatment failure (which is defined as recurrence at less ٦ weeks from the intervention) was seen in ٣/٤٨ (٦,٢٥٪) patients followed up after discharge. These patients re-presented at ٦, ٩ and ٣٧ days after discharge, respectively. All three were treated with surgical drainage.

Clinical success of the procedures was achieved in ٤٥/٤٨ (٩٣,٧٥%) collections, as demonstrated by resolution of the clinical picture and disappearance or shrinkage of the fluid collection and no recurrence at <٦ weeks after discharge on follow up.

The volume of fluid drained ranged from ٢٠٠ ml to ٤،٥٠٠ ml (mean ٤٤٠ ml). Fluid culture reveals Escherichia coli in ٢٧٪, and Enterococcus spp in ١٥٪ and polymicrobial in ٥٨٪ of cases.

The mean length of hospital stay for the whole group was ١٣±٦,٤ days (٨–٢٨ days), while those who underwent two procedures had an average stay of ٢٠,٢±٦,٥ days.

No catheter-related wound sepsis was noted at the time of discharge or follow-up, and no catheter tract failed to close spontaneously.

DISCUSSION:

One of the major advances in the management of abscesses over the past two decades has been the introduction of image-guided percutaneous drainage procedures. The development of improved imaging modalities, together with broad-spectrum antibiotics and new drainage catheters, has changed the management of patients with infected intra-abdominal fluid collections that previously required an urgent operation [١٥, ٢٤].

The earliest experiences with image-guided percutaneous drainage of intra-abdominal fluid collection date back to the late ١٩٧٠s, when Gerzof et al. reported a success rate of ٨٦٪ in ٦٧ patients treated with the procedure [٣٥]. Additional reports published during the next several years demonstrated and confirmed the efficacy of the procedure, with success rates ranging from ٧٠٪ to ١٠٠٪ [١٤, ١٥, ٢٦-٣٧]. Although the trans-abdominal approach is the simplest, it may not always be feasible due to interposed intestine and other pelvic viscera [٣٨]. Imaging-guided catheter drainage of fluid collections in children is safe and effective. Newer approaches, better imaging, and improved techniques have resulted in improved cure rates [٣٩].

Patients with abscesses smaller than ٣ cm in size can be treated with antibiotics alone and, this is also likely true for patients with abscesses ٣–٤ cm in size. Patients with abscesses larger than or equal to ٤ cm can be managed with CT-guided abscess drainage [٤٠], in our study the size of the collections was ranged from ٤-٨cm (mean of ٦cm).

Clinical success of the procedures in our study was ٩٣,٧٥٪, this rate compares well with other studies which have reported (٩١,٥٪) rate of success [٤١], ٩٠٪ rate of clinical success [١٣,٣٥,٤٢,٤٣], ٥٧٪ to ٩١٪ [٩,٤٤,٤٥] and ٩٢,٣٪ [٦]. Clinical success is clearly dependent on size, location and multi-loculated structure of the collection and its communication with adjacent organs [٧].

In the current study the volume of fluid drained ranged from ٢٠٠ ml to ٤،٥٠٠ ml (mean ٤٤٠ ml), this volume was comparable with a previously reported study [٧].

The microorganisms in the fluid culture reveals Escherichia coli in ٢٧٪, and Enterococcus spp in ١٥٪ and polymicrobial in ٥٨٪ of cases and these results were comparable with a previously reported study [٧].

Treatment failure was seen in ٣/٤٨ (٦,٢٥٪), these results were comparable to a previously reported study where treatment failure was seen in ٧,٧٪ [٦], other studies show different results ranged from ١٪ to ١٠٪ [١٦, ٢٨, ٣٣, ٤٦].

About ١٦,٦٪ (٨/٤٨) necessitated a second procedure to replace the drainage catheter. (٥/٤٨) cases with catheter displacement and ٣/٤٨ cases with catheter obstruction that could not be recanalized with a metal guidewire or by saline irrigation, these results were similar to that reported previously [٧], other studies reported a lower figure, approximately ١٠٪ [٢٨, ٣٣], these differences may be related to the local experience of the interventuonal radiologist, the type of the drainage catheter used and the post-drainage care of the patients. Van Sonnenberg et al. and Gerzof et al. [١٦, ٣٣] found the highest complication rates to be associated with generally large, multi-loculated abscesses that could not be drained with a single catheter.

Immediate technical success, defined as correct placement of the distal tip of the drainage catheter inside the abscess cavity, was achieved in ١٠٠٪ of cases. This result is identical to that seen in a previous study [٧].

The mean length of hospital stay for the whole group was ١٣±٦,٤ days (٨–٢٨ days), while those who underwent two procedures had an average stay of ٢٠,٢±٦,٥ days. These results were close to those reported previously by Jeffrey et al [٦] were the mean length of hospital stay for the whole group was ١٥±٦,٤ days (٥–٣٥ days). Another study done by Lagana et al [٧] showed that the drainage catheter was left in place from ٢ to ١٢٠ days (mean ١٤,٢ days). Another study done by Murthy et al [٣٩] showed the duration of catheters ranged between ١ day and ٣٠ days (mean ٥,٧ days).

No catheter-related wound sepsis was noted at the time of discharge or follow-up, and no catheter tract failed to close spontaneously. These results were comparable to that reported previously Murthy et al [٣٩]

CONCLUSION:

١. CT _guided drainage of pelvic abscess fallowing acute appendicitis is an

effective method of treatment with a high technical success rate.

٢. No catheter-related wound sepsis and no major peri-procedural complications.

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