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## Brief communication

# Therapeutic impact of CT-guided percutaneous catheter drainage in treatment of deep tissue abscesses

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## ABSTRACT

Combination therapy of CT-guided percutaneous drainage and antibiotics is the first-line treatment for abscesses. Its effectiveness has been demonstrated. However, the therapeutic impact of this procedure for infection treatment has never been reported.

We retrospectively analyzed all 47 patients who received CT-guided percutaneous drainage for infection treatment. Patients' characteristics, pathogens isolated, antibiotics administered, technical and clinical outcomes, complications related to this procedure and therapeutic impacts were investigated. Patients were 26 males and 21 females. The mean age was 63.5 years ( $\pm 18.7$ ). The diseases targeted were 19 retroperitoneal abscesses, 18 intra-abdominal abscesses, three pelvic abscesses, and seven others. As for technical outcomes, all of the 54 procedures (100%) were successful. As for clinical outcomes, 44 (93.6%) were cured and three patients (6.4%) died. No complications related to this procedure were found in this study. A total of 42 patients (88%) had a change in the management of their infection as a result of CT-guided percutaneous drainage, such as selection and discontinuation of antibiotics. In conclusion, CT-guided percutaneous drainage is a safe and favorable procedure in the treatment of deep tissue abscesses. Therapeutic impact of these procedures helped physicians make a rational decision for antibiotics selection.

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In general, superficial and deep intramuscular abscesses as septic joints, discitis, and epidural abscess are most commonly treated with a combination of antibiotics and surgical incision and drainage.<sup>1–4</sup> While patients with diseases need optimal management, a majority of them are not able to tolerate surgical procedures due to a poor general condition. These infections such as iliopsoas abscess used to be considered rare. However, the number of these patients is on the rise.<sup>5</sup>

Currently, CT-guided percutaneous drainage procedure is a valuable tool in the diagnosis of malignancy, infectious discitis, or treatment of deep intramuscular and musculoskeletal abscesses.<sup>6–8</sup> The American College of Radiology has reported an 80% success rate for CT-guided percutaneous abscess drainage, with success defined as complete drainage with no further procedures required.<sup>1</sup> This procedure is considered useful because it is less invasive than a surgical incision

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and drainage and is tolerable for patients in poor condition. While the need of this procedure continues to increase, its effectiveness, risk of complications related to procedure and outcomes are not well known. Some previously reported the efficacy of CT-guided percutaneous drainage in the treatment of deep tissue abscesses; improving outcomes with acceptable tolerability.<sup>9</sup> However, the therapeutic impact of this procedure for antibiotics selection has never been demonstrated as far as we have searched. This retrospective study is the first report documenting the therapeutic impact of CT-guided percutaneous drainage for deep soft-tissue infection.

We retrospectively analyzed all patients who received CT-guided percutaneous drainage procedures for the treatment of deep tissue abscesses between January 2006 and September 2011, at Kameda Medical Center. Patients' characteristics (age, sex, underlying disease), treatments, pathogens isolated, outcomes (technical and clinical success rates) and complications related to this procedure were evaluated.

Percutaneous catheter drainage was considered a clinical success if the patient was cured and discharged from the hospital without surgical drainage, and a clinical failure if the patients required surgical drainage or died.

All drainage procedures were performed with CT guidance by an interventional radiologist and an attending doctor of the ward or a resident at the department of radiology. Sedation was not routinely used in this procedure. The experience of the staff radiologists who performed these procedures ranged from 4 to 25 years at the time of their initial involvement with patient treatment in this study.

Comparisons of group means were made by unpaired or paired t-tests or Mann-Whitney U-test. Contingency tables were evaluated by Fisher's exact test. *p*-Values < 0.05 were considered significant.

A total of 54 CT-guided percutaneous drainages were performed in 47 patients over six years at our hospital. The characteristics of the 47 patients who underwent CT-guided percutaneous drainages or aspirations are shown in Table 1. Among patients were 26 males and 21 females. The mean age was 63.5 years ± 18.7 [SD] (range 15–87). The most common disease was intra-abdominal abscess (*n* = 18, 38.3%), followed by iliopsoas abscess (*n* = 13, 27.7%). Six iliopsoas abscess patients were complicated by infectious discitis. The most common underlying diseases were malignancy (*n* = 15, 31.9%) and spinal disease (*n* = 13, 27.7%). Diabetes mellitus was associated in nine patients (19.1%).

Catheter insertions into the abscesses were technically successful in all 54 procedures (100%). No patients required any further surgical intervention. Among clinical outcomes, 44 patients were cured (44/47, 93.6%) and three patients died (6.4%). No adverse events related to drainage procedures were found in this study. The most common initial antibiotics administered were β-lactams alone (*n* = 27, 57.4%), followed by combination of β-lactams/carbapenem and new quinolones (*n* = 8, 17%) and combination of β-lactams/carbapenem and vancomycin (VCM) (*n* = 6, 12.8%).

Cultures of the drainage material were positive in 38 of the 47 patients (80.9%). Bacteriological results are shown in Table 1. The most common pathogen isolated was *Escherichia coli*, followed by *Bacteroides fragilis*. Blood cultures were performed in 39 patients (83%, *n* = 47) before drainage

**Table 1 – Patients' characteristics.**

Variables	All patients (n = 47)
<b>Sex (male/female)</b>	26/21
<b>Mean age, years (±SD)</b>	63.5 (±18.7)
Range	15–87
<b>Target diseases</b>	
Retroperitoneal abscess	19
Iliopsoas abscess	13 (27.7%)
Renal abscess	4
Pancreatic abscess	2
Intra-abdominal abscess	18
Pelvic abscess	3
Others <sup>a</sup>	7
<b>Underlying diseases</b>	
Diabetes mellitus	9 (19.1%)
Spinal disease	13 (27.7%)
Renal dysfunction	12 (25.5%)
Malignancy	15 (31.9%)
<b>Technical outcomes (n = 47)</b>	
Success	54 (100%)
Failure	0 (0%)
<b>Clinical outcomes</b>	
Survival	44 (93.6%)
Death	3 (6.4%)
Positive culture from abscess by drainage	38 (80.9%)
Positive blood cultures	12/39 (30.8%)
Antibiotics administered before drainage	33 (70.2%)
Duration of antibiotic therapy, mean days	38
Range (±SD)	2–168 (±30.2)
<b>Initial antibiotics at the start of treatment</b>	
β-Lactams alone	27
Carbapenem alone	5
β-Lactams/carbapenem + VCM	6
β-Lactams/carbapenem + NQs	8
β-Lactams + other	1
De-escalation	14 (29.8%)
Mean size of abscess (mm)	62.7
Range (±SD)	19–169.2 (±31.8)
No. (%) of subjects with pathogens	38 (80.9%)
No. (%) of subjects with single pathogens	20 (42.6%)
No. (%) of subjects with multiple pathogens	18 (38.3%)
<b>No. (%) of isolates of</b>	
<i>Escherichia coli</i>	13
<i>Bacteroides fragilis</i>	7
<i>Staphylococcus aureus</i>	
Oxacillin susceptible	6
Oxacillin resistant	1
<i>Pseudomonas aeruginosa</i>	5
<i>Klebsiella pneumoniae</i>	3
<i>Citrobacter freundii</i>	3
Koseri	1
<i>Streptococcus pneumoniae</i>	1
Constellatus	2
Sanguis	1
Milleri	2
<i>Enterobacter faecium</i>	1
Others <sup>b</sup>	4

VCM, vancomycin; NQs, new quinolones.

<sup>a</sup> Others include thoracic abscesses and splenic abscess.

<sup>b</sup> Others include *Peptococcus* species, *Proteus mirabilis*, *Enterococcus raffinosus*, *Lactobacter* species.

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