TAKE-HOME MESSAGE

Loop drainage technique may be associated with lower failure rate than conventional incision and drainage in treatment of skin and soft tissue abscesses, but data are limited. Further randomized controlled trial data are required.

Is Loop Drainage Technique More Effective for Treatment of Soft Tissue Abscess Compared With Conventional Incision and Drainage?

EBEM Commentators
Brit Long, MD
Michael D. April, MD, DPhil
Department of Emergency Medicine
San Antonio Uniformed Services Health Education Consortium
Fort Sam
Houston, TX

METHODS

DATA SOURCES

The meta-analysis was registered with the PROSPERO website and conforms to Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines.[1] Investigators searched PubMed, Cumulative Index of Nursing and Allied Health, Scopus, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials and reviewed references of eligible studies.

STUDY SELECTION

The meta-analysis included retrospective, prospective, and randomized controlled trials comparing loop drainage technique and conventional incision and drainage, with the primary outcome of treatment failure (defined as need for repeated incision and drainage, addition of antibiotic treatment, hospital admission, or need for operative therapy). Two authors independently assessed eligible studies, with discrepancies resolved by consensus.

DATA EXTRACTION AND SYNTHESIS

Two reviewers independently extracted data with a predesigned data collection form and assessed study quality. Authors analyzed pooled data of odds ratio by a random-effects model and the Mantel-Haenszel's method.

Results

Meta-analysis results.

Study	Design (Location)	Study Population, No.	CID Failed Treatment	LDT Failed Treatment	Odds Ratio (95% CI)
Overall	Meta-analysis	460	25/265	8/195	2.63 (1.04–6.63)
McNamara, 2011[2]	Retrospective (ED/OR)	219	1/134	0/85	1.92 (0.08–47.71)
Ladde, 2015[3]	Retrospective (ED)	142	15/91	2/51	4.84 (1.06–22.08)
Gaszynski, 2016[4]	Retrospective (ED/OR)	53	0/17	0/36	—*
Özturan, 2017[5]	RCT (ED)	46	9/23	6/23	1.82 (0.52–6.37)

CID, Conventional incision and drainage; *LDT*, loop drainage technique; *CI*, confidence interval; *OR*, operating room; *RCT*, randomized controlled trial.
*The dash indicates that it was not reported in the meta-analysis.

Authors identified 11,047 studies after removal of duplicates, of which they included 4 studies for the meta-analysis comprising 460 patients (Table). Three studies were retrospective, and the fourth study was a randomized controlled trial. Two studies included pediatric patients only (<18 years),[2,3] and 2 studies included adult patients (Table).[4,5] The conventional incision and drainage technique failed in 9.43% of cases (25/265), whereas the loop drainage technique resulted in failure in 4.10% of patients (8/195). Subgroup analysis demonstrated conventional incision and drainage failure in 7.1% of pediatric patients and loop drainage technique in 1.5%. In adults, results demonstrated failure in 22.5% of patients undergoing conventional incision and drainage and 10.2% of those undergoing loop drainage technique. Low to moderate risk of bias was present, with one study at moderate risk for possible confounding in age group differences.[2] Two studies were at

Investigators assessed heterogeneity with χ^2 and I^2 statistics. Two authors individually assessed study quality with the Cochrane Risk of Bias tool, and they used a modified version of the tool for retrospective and prospective observational studies.

moderate risk for departure from intended intervention,[2,3] 2 were at moderate risk of bias for missing data (loss of patients to follow-up),[3,4] and 3 were at moderate risk of bias for measurement of outcomes because of unclear blinding of data abstractors.[2-4] The randomized controlled trial was at low risk of bias in all categories except for allocation concealment and blinding of outcome assessor, the study methodology for which was unclear.[5]

Commentary

Soft tissue infections account for more than 3 million annual emergency department (ED) visits in the United States,[6,7] with nearly half of these infections associated with abscess.[8] Conventional incision and drainage has been considered the treatment of choice for abscesses, although the specific techniques used vary (irrigation, packing, etc).[9,10] Downsides of conventional incision and drainage include pain of packing and potential poor cosmetic appearance after healing.[9-11] Loop drainage technique entails a small incision at each abscess pole, blunt dissection to break loculations, and insertion of a vessel loop through the incision, which is then tied. This technique may be less painful, and it produces a smaller incision, does not require packing, and may reduce need for follow-up.[2,5] This meta-analysis suggests that loop drainage technique results in a lower likelihood of treatment failure compared with conventional incision and drainage. Individual studies also suggest improved cosmetic outcome,[2] reduction in cellulitis and antibiotic use,[5] and decreased return visits and health care costs.[2,4] Although these findings held in subgroup analyses with pediatric patients, neither strategy appeared superior in adult patients.

This meta-analysis has several important limitations. It included a small number of patients, the majority (88.5%) being children. Included studies displayed some variation in outcome definition and did not evaluate secondary abscess formation. Three of the included studies were retrospective,[2-4] with one randomized controlled trial,[5] although all studies were at low to moderate risk of bias, with low heterogeneity. Assessing abscess size or surrounding cellulitis in the 3 retrospective studies was not possible,[2-4] and only one study found a notable difference between groups, with 61% of patients in this study having clinical outcomes that could be assessed.[3]

Loop drainage technique is promising, especially in pediatric patients, but randomized controlled trial data are currently limited. The use of the technique requires more randomized controlled trial data in larger populations, including adults. Outcomes including patient and parent satisfaction, cosmetic appearance, length of stay, and overall health care cost should be evaluated, as well as the effect of abscess size and location in determining the benefit of loop drainage technique versus conventional incision and drainage.

Editor's Note: This is a clinical synopsis, a regular feature of the *Annals'* Systematic Review Snapshot (SRS) series. The source for this systematic review snapshot is:
Gottlieb M, Peksa GD. Comparison of the loop technique with incision and drainage for soft tissue abscesses: a systematic review and meta-analysis. *Am J Emerg Med.* 2018;36:128-133.

1. Moher D, Liberati A, Tetzlaff J. Preferred reporting items for systematic reviews and metaanalyses: the PRISMA statement. *Ann Intern Med.* 2009;151:264-269.
2. McNamara WF, Hartin CW Jr, Escobar MA, et al. An alternative to open incision and drainage for community-acquired soft tissue abscesses in children. *J Pediatr Surg.* 2011;46:502-506.
3. Ladde JG, Baker S, Rodgers CN, et al. The LOOP technique: a novel incision and drainage technique in the treatment of skin abscesses in a pediatric ED. *Am J Emerg Med.* 2015;33:271-276.
4. Gaszynski R, Punch G, Verschuer K. Loop and drain technique for subcutaneous abscess: a safe minimally invasive procedure in an adult population. *ANZ J Surg.* 2018;88:87-90.
5. Özturan İU, Doğan NÖ, Karakayalı O, et al. Comparison of loop and primary incision and drainage techniques in adult patients with cutaneous abscess: a preliminary, randomized clinical trial. *Am J Emerg Med.* 2017;35:830-834.
6. Pallin DJ, Egan DJ, Pelletier AJ, et al. Increased US emergency department visits for skin and soft tissue infections, and changes in antibiotic choices, during the emergence of community-associated methicillin-resistant. *Staphylococcus aureus. Ann Emerg Med.* 2008;51:291-298.
7. Hersh AL, Chambers HF, Maselli JH, et al. National trends in ambulatory visits and antibiotic prescribing for skin and soft-tissue infections. *Arch Intern Med.* 2008;168:1585-1591.
8. Merritt C, Haran JP, Mintzer J, et al. All purulence is local—epidemiology and management of skin and soft tissue infections in three urban emergency departments. *BMC Emerg Med.* 2013;13:26.
9. Liu C, Bayer A, Cosgrove SE, et al. Clinical practice guidelines by the Infectious Diseases Society of America for the treatment of methicillin-resistant *Staphylococcus*

aureus infections in adults and children: executive summary. *Clin Infect Dis*. 2011;52:285-292.

10. Singer AJ, Talan DA. Management of skin abscesses in the era of methicillin-resistant. *Staphylococcus aureus*. *N Engl J Med*. 2014;370:1039-1047.
11. O'Malley GF, Dominici P, Giraldo P, et al. Routine packing of simple cutaneous abscesses is painful and probably unnecessary. *Acad Emerg Med*. 2009;16:470-473.

This review does not reflect the views or opinions of the US government, Department of Defense, US Army, US Air Force, or SAUSHEC EM Residency Program.

Michael Brown, MD, MSc, Jestin N. Carlson, MD, MS, and Alan Jones, MD, serve as editors of the SRS series.

IMAGES IN EMERGENCY MEDICINE

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DIAGNOSIS:

Cutaneous larva migrans. Multiple hookworm species have larvae that can cause a classically erythematous, serpiginous, and intensely pruritic rash. Endemic to subtropical and tropical areas, these hookworms live in the intestines of domestic animals, shedding their eggs through feces into soil. Although the eggs are intended for ingestion by domestic animals to continue the hookworm's life cycle, humans become accidental hosts through contact with contaminated soil. Hatched larvae in the soil penetrate the intact skin but are unable to burrow deeper, and thus are confined to migrate aimlessly in the upper dermis without dissemination into the bloodstream or subcutaneous tissues. Diagnosis is based on visual recognition without laboratory testing or biopsy.[1]

Although cutaneous larva migrans can be self-limited, treatment is recommended because of the high risk of infection and intense pruritus. A single dose of oral ivermectin 12 mg or oral albendazole 400 mg has been reported to have cure rates of up to 100%. However, many experts recommend albendazole 400 to 800 mg for 3 to 5 days.[2] The patient in this case returned to the emergency department when his infection persisted after a single dose of ivermectin, and thus was treated with a week of albendazole on his second visit. He ultimately presented for a third time and was successfully treated with 14 days of albendazole in total.

Author affiliations: From Highland Hospital, Alameda Health System, Oakland, CA.

REFERENCES

1. Brenner MA, Patel MB. Cutaneous larva migrans: the creeping eruption. *Cutis*. 2003;72:111-115.
2. Caumes E. Treatment of cutaneous larva migrans. *Clin Infect Dis*. 2000;30:811-814.