Percutaneous CT-Guided Aspiration of Deep Neck Abscesses

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Summary: Four patients with deep neck or retropharyngeal abscesses underwent CT-guided aspiration and drainage from either of two percutaneous approaches. Percutaneous drainage contributed to prompt and/or dramatic clinical responses in all four patients by effecting decompression of the abscess cavities and by improving the ability to assess infectious organisms. There were no complications in this small group. Percutaneous drainage obviated more traditional invasive surgery.

Index terms: Aspiration, computed tomography guidance; Neck, abscess

Abscess of the deep spaces of the neck continue to present clinical challenges despite the widespread use of antibiotics (1–6). Conventional wisdom advocates surgical incision and drainage of these abscesses, which allows 1) evacuation of pus that presumably was isolated from antibiotics, thereby speeding recovery; 2) augmentation of organism identification; 3) alteration of antibiotic coverage; and 4) prevention of potentially life-threatening complications (1, 3, 4–8). However, because surgery carries its own inherent risks and potential complications (8), we have begun using percutaneous computed tomography (CT)-guided aspiration of deep neck abscesses as an alternative to conventional surgery in selected cases. This report describes our experience.

Materials and Methods

Between 1989 and 1994, we retrospectively reviewed four cases of percutaneous CT-guided aspiration of infectious fluid collections in the deep spaces of the neck. Patients ranged in age from 15 months to 45 years. Three patients were children, and all three were treated after May 1993. All four patients had signs and symptoms of deep neck infections including fever; leukocytosis; elevated acute phase reactants such as C-reactive proteins; dysphagia; deep and/or superficial neck swelling; superficial adenitis; and retropharyngeal, parapharyngeal, and/or posterior triangle mass. Aspiration was performed at the request of the referring clinical service for a variety of reasons: two patients had a poor clinical response to medical therapy and the physician wanted to isolate specific organisms; one patient was medically debilitated, raising the risk of conventional surgery; and, in one patient, religious considerations were a factor. Cosmesis, with the aim of reducing the risk of scarring, was a consideration in all children. In the case of one child, the parents’ religious beliefs were such that, given options, they preferred percutaneous drainage in the hope that this would reduce the chance of their child’s needing blood products. All patients were on antibiotics 24 to 72 hours before aspiration. CT scans were obtained on third-generation or fourth-generation scanners after patients were given intravenous injections of contrast material. Postcontrast axial CT scans revealed deep neck abscesses in three patients (two retropharyngeal and one parapharyngeal) and one collection that was thought to have been an abscess but may have been a large, separate lateral retropharyngeal node associated with retropharyngeal cellulitis. Aspiration was done via either the transpterygoid or retrocarotid approach with an 18-gauge or 20-gauge spinal needle.

Initially, with either approach, intravenous contrast material was administered for vascular orientation. The transpterygoid approach was used in one patient who had an abscess near the midline. In this approach, the needle was passed under the parotid duct, anterior to the mandibular ramus, and through the masticator and prestyloid parapharyngeal spaces into the retropharyngeal space. This approach is similar to one used for percutaneous trigeminal rhizotomy (9) (Fig 1). The second, or retrocarotid, approach was used in cases in which the large collections displaced the carotid artery and jugular vein laterally and anteriorly, and this approach allowed the needle to be placed behind these major vessels through the lateral aspect of the prevertebral space. The needle passed through the sternocleidomastoid muscle and scalenes behind the displaced carotid sheath. This approach is similar to the posterolateral cervicotomy advocated by Elliott et al (8) for retropharyngeal abscesses (Fig 2). Care was taken to avoid the vertebral artery as it coursed between the foramen transversarium of adjacent bodies. Theoretically, we could have used a transparotid approach, in which the
needle is passed through the parotid gland into the deep spaces of the neck, but the other two approaches seemed more appropriate. Pain control was managed by an anesthesiologist in all cases and included general anesthesia in all three children and deep intravenous sedation in the adult. One radiologist performed three of the aspirations. No draining catheters were left in place.

Results

Aspiration was successful in all cases, with collection of up to 15 mL of pus. Organisms were cultured in three of four cases. The most common organism cultured was streptococcus. One retropharyngeal collection reaccumulated. No organisms could be cultured in this collection. Serum immunofluorescent antibody panels were subsequently positive for *Rochalimaea henselae* (cat-scratch disease), which was not covered by the patient’s broad-spectrum antibiotics. In all other patients, the preaspiration antibiotics were appropriate but apparently not effective. Patients responded quickly to percu-

![Image 1](https://example.com/image1)

![Image 2](https://example.com/image2)

**Fig 1.** Retropharyngeal abscess in 10-year-old girl.

*Fig 2.** Transspatial abscess in 15-month-old boy.

A, Preaspiration postcontrast CT scan reveals moderate-sized fluid collection in left retropharyngeal space (*arrow*), creating mass effect on airway, lateral pharyngeal wall, and prestyloid parapharyngeal space. Notice suppurative and matted nodes in left internal jugular and spinal accessory chains.

B, CT-guided aspiration of retropharyngeal collection via transpterygoid approach (*arrow* indicates needle); 8 mL of pus was aspirated.

C, The needle is percutaneously placed along same route as identified in B to avoid major vessels. Fifteen milliliters of pus was drained from these collections.
taneous drainage: external swelling was reduced, orally visible mass effects improved or resolved immediately, fever abated, and white counts normalized within 24 hours. Even the child with cat-scratch disease responded clinically to aspiration alone for 48 hours before her fever and leukocytosis returned. Subsequently, she was successfully treated with antibiotics alone. Patients either reported or demonstrated prompt symptomatic improvement, with one patient indicating remarkable amelioration of symptoms upon waking from anesthesia. There were no immediate or delayed complications, such as hemorrhage, trismus, or nerve injury.

Discussion

Infections in the deep spaces of the neck, although not as common today as in the past, continue to be a serious clinical condition with potentially devastating complications. Such infections may be of nasal, oral, otitic, or bony origin (3–6, 8). Accumulation of pus within a lymph node is referred to as suppurative adenitis. Accumulation of pus outside the confines of lymph nodes constitutes an abscess that, in the deep neck, may be contained within various fascial spaces but is more commonly found in the retropharyngeal, danger, or parapharyngeal spaces (1, 2, 7, 10). Complications of deep neck abscesses include arterial erosion with exsanguination, venous thrombosis, caudal extension leading to mediastinitis, pharyngeal rupture with subsequent aspiration and pulmonary abscess, and intracranial spread (3, 8).

Traditional therapy has relied on open surgical drainage from various approaches (7, 8, 10, 11). Surgical drainage allows evacuation of pus and identification of organisms, thereby preventing complications and accelerating recovery. However, surgery carries its own obvious potential complications and has other drawbacks (8). CT-guided aspiration and open surgery carry some of the same risks, such as hematoma and nerve injury. Open surgery requires a longer recovery period and contains the risk of cutaneous scarring (8).

Therefore, we have begun using percutaneous CT-guided aspiration as an alternative to surgical drainage in selected patients who have infectious fluid collections of the deep neck. Most of the benefits of conventional surgery can be gained with the use of this CT-guided technique, which has proved both safe and effective, at least in our first few cases. Patients (when old enough) did not complain of worsening pain or neck discomfort or alteration in mastication. All patients had either a prompt (within 24 hours) or dramatic (within a few hours) response to our intervention. No drains were placed after aspiration, and there was just one case of reaccumulation, and that was in a child with subsequently proved cat-scratch disease that was not covered by her initial antibiotics. This case is a good example of the indirect benefits of our percutaneous approach: The child responded clinically to our initial CT aspiration. She would not have benefited more by open drainage, and would probably have undergone a more invasive procedure. Her otolaryngologist believed that given the severe superficial adenitis along nearly the entire length of the internal jugular and spinal accessory chains, surgery would have almost certainly left her with cutaneous scars.

Although there were no complications of the procedure in any of our cases, there are potential complications depending on the approach that is taken by the interventionalist. With the transpterygoid approach, there is risk to the parotid duct, the pterygoid venous plexus, the internal maxillary artery and its branches, and to the numerous nerves passing through the region. Depending on the depth of the abscess, a lateral retrocarotid approach places the carotid sheath and its contents or even the extrafomal vertebral artery and vein at greater risk. Although not used by us so far, the transparotid approach potentially carries risk of parotiditis and injury to the facial nerve, the retromandibular vein, and the external carotid artery. These risks are associated with almost any biopsy or interventional procedure of the head and neck (12, 13).

What are the justifications for performing this procedure? First, CT-guided aspiration allows a less invasive way to determine if what appears as a fluid collection is actually drainable and thereby treatable without surgery. In the age of modern antibiotics, deep neck abscesses in our collective experience, although potentially life-threatening, are not as serious as in the past. That is to say, it is unusual for patients to have an abscess that is serious enough to require immediate surgical drainage. This contention is substantiated in a review by Elliott et al (8). In fact, we have personally observed a number of cases in which, at the discretion of the referring
surgeon, patients with parapharyngeal abscesses at CT were treated with antibiotics alone to resolution. In a study from the University of Florida, only 4 of 12 “retropharyngeal abscesses” needed to be surgically drained (Barreda R, Mancuso AA, Stringer S, “Suppurative Retropharyngeal Lymphadenitis: Medical or Surgical Disease?” presented at the 76th Scientific Assembly of the Radiological Society of North America, November 27, 1990, Chicago, Ill). It is likely that the masses that responded to antibiotics alone were just “suppurative adenitis” (Anthony Mancuso, oral communication, 1993). Theoretically, suppurative lymph nodes are vascularized and accessible to intravenous antibiotics and should respond without drainage. We believe it is difficult to distinguish abscess from suppurative adenitis and cellulitis with 100% accuracy on CT scans. This was documented by Barreda and by Glasier et al (14), who reported that only 3 of 11 “abscesses,” as judged by CT criteria, were drainable when surgery was performed, indicating poor differentiation from cellulitis. It has been reported that cellulitis or edema in the retropharyngeal space may mimic an abscess (15, 16). Therefore, use of CT-guided aspiration may have a place in a number of challenging scenarios. For example, it may be useful in cases in which a pus collection is suspected but not definite, or in which abscess is difficult to distinguish from suppurative adenitis. Failure to aspirate purulent material should indicate that the infection has not progressed to abscess formation.

Second, delayed response to antibiotics leads to consternation on the part of the treatment team, the patient, and the family. CT-guided aspiration substantially increases the likelihood of organism isolation, thereby allowing more specific antibiotic use in pyogenic infections and the potential identification of unusual or opportunistic agents. This has added benefits today, as there is increased awareness of bacterial resistance to common antibiotics (17), and to the increasing occurrence of tuberculosis and Rochalimaeae (cat-scratch) adenitis among patients who carry the human immunodeficiency virus (18).

Third, CT-guided aspiration is significantly less expensive than conventional surgical drainage. At our institution, total professional and technical radiologic charges (excluding anesthesia) for the procedure are approximately half the total professional and operating room charges (excluding anesthesia) for surgery. The procedure may be cost-effective not only directly but also by reducing hospital stays.

Fourth, in young children, there is an added benefit of avoiding a superficial surgical scar with its potential psychological consequences. The risk of causing such a scar may be increased by entering infected tissue (in those patients with superficial cellulitis and adenitis) (8).

Since we have begun using this technique, we have not encountered a patient with a deep neck abscess and critical airway compromise. Because some pus collections are extremely thick and more difficult to drain, it seems imprudent to recommend this technique over conventional drainage in emergency situations in which there is a possibility of failure or of incomplete response. Moreover, we would not advocate its use at this time in very long collections that might require entry from several levels or when the skull base or mediastinum are at imminent risk.

In conclusion, we have demonstrated that CT-guided aspiration of deep neck abscesses in four selected patients was safe and effective and deserves consideration when clinically challenging situations arise.

Acknowledgments

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References