

## Percutaneous CT guided needle aspiration of a life threatening deep neck space infection of dental origin

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### Abstract

Deep neck space infection can lead to a life threatening situation if not treated on time. The best prognosis can be achieved when the treatment is early, limiting the complexity of the situation and using minimally invasive techniques for speedy recovery. In this article we emphasize on a novel technique of percutaneous CT guided needle aspiration in the management of a life threatening deep neck space infection of dental origin with report of a case.

**Key words:** percutaneous CT guided needle aspiration, odontogenic infection, deep neck space.

### Case Report

A 35 year old Asian female reported with pain and swelling in her left submandibular and sublingual region. Her mouth opening was limited to 2mm. She complained of dysphagia. She had no signs and symptoms of dyspnea initially. An orthopantomogram was taken to evaluate her dental condition which inferred to be generalized chronic periodontitis with grossly decayed lower left second and third molar teeth which was the source of infection. Intravenous antibiotics and fluid resuscitation were started immediately followed by surgical drainage of the submandibular and sublingual spaces hoping that the patient's mouth opening would improve within 24 hours. About 15 ml of pus was removed. The pus was sent for antibiotic sensitivity test. Routine blood screening showed no systemically comprised state. After 24 hours the patient was febrile and complained of mild dyspnea. Patient's mouth opening did not improve. CT with contrast scan was immediately taken. Scan interpretation showed evidence of left lateral pharyngeal space abscess with tracheal shift towards the right side (**Fig. 1**). Obliteration of the airway giving the reason for the existing signs and symptoms. Due to persistent trismus intraoral surgical drainage of the lateral pharyngeal abscess was not feasible so an alternate modality of percutaneous CT guided needle aspiration was planned.

Following diagnostic CT scan a radio marker was placed on the skin posterior to the left ramus of the mandible. Using the CT software the depth of insertion from the radio opaque marker to the lateral pharyngeal space abscess was predetermined to 4.75 cm (**Fig. 1, 2**). An 18 gauge was introduced through the marker (**Fig. 3**). Repeated CT scan was taken to orient the angulations of the needle. A total of 35 ml pus was aspirated. A pressure dressing was placed after the procedure. Following aspiration the patient was immediately relieved with her symptoms of dyspnea and dysphagia. Her mouth opening improved to 20mm

within the next 12 hours. Extraction of left lower second and third molar was done immediately. Intravenous antibiotics was continued based in the pus culture and antibiotic sensitivity report for a week following which the patient was put on oral antibiotics for five days.



**Fig. 1:** CT showing the predetermination of the depth of the lateral pharyngeal space abscess



Fig. 2: CT showing the needle in situ



Fig. 3: Percutaneous CT guided needle aspiration

### Discussion

Infections originating from the teeth and its periodontium are known as odontogenic infection. It contributes to 34.3% of deep neck space infections<sup>1,2</sup>. The sequence of odontogenic infection spread primarily involves the masticatory and the primary spaces such as the submental, sublingual and submandibular spaces in case of mandibular infection and buccal, canine and temporal spaces in case of maxillary infection. The neck spaces like parotid, lateral pharyngeal and retropharyngeal spaces are the secondary sites of spread from the masticatory or the primary spaces<sup>1</sup>. Various surgical approaches are carried out to drain the pus from these closed pathological spaces. Blood vessels, nerves and other vital structures lie over these spaces. So conventional surgical drainage carry a potential risk of damage to these structures, increased surgical site morbidity, iatrogenic fistula, cutaneous scar and in certain cases when associated with trismus it's difficult

to perform an intra-oral surgical drainage<sup>3</sup>. On the other hand percutaneous CT guided needle aspiration is more accurate, quick with less surgical site morbidity, minimal cutaneous scar and an excellent diagnostic tool for non palpable mass of the deep neck spaces<sup>3-5</sup>. In our literature search the study of deep neck space published as early as 1811 later refined by Levitt GW in 1970<sup>3</sup>. Percutaneous CT guided needle aspiration technique was later published by Poe et al. in 1996 were aspiration technique as an alternative to surgery, associated with a lower complication rate, decreased morbidity, lower cost per procedure, as well as a shorter hospital stay<sup>3</sup>. Other advantages of percutaneous CT guided needle aspiration are it can be used as both diagnostic tool as well as therapeutic tool in the treatment of deep neck space abscess. As a therapeutic tool the contents are fully aspirated and even when in need of a drain, a catheter drain can be placed with is minimally invasive<sup>4-6</sup>. Common approaches for percutaneous CT guided needle aspiration to retropharyngeal and parapharyngeal space infections are transpterygoid and retrocarotid approaches<sup>3</sup>. For transpterygoid approach the needle is passed under the parotid duct, anterior to the mandibular ramus and through the masticator and prestyloid parapharyngeal spaces into the retropharyngeal space. In case of retrocarotid approach where large collections displaced the carotid artery and jugular vein latero-anteriorly this approach allows the needle to be placed behind these major vessels through the lateral aspect of the prevertebral space. The needle is passed through the sternocleidomastoid muscle and scalenes behind the displaced carotid sheath<sup>7</sup>. Various other interventional aids such as ultrasonography and magnetic resonance imaging guided needle aspiration are also implemented in the management of deep neck space infection. Various comparative studies between ultrasonography, CT and MRI have been published. Though ultrasonography is said to have a sensitivity of 95% and specificity of 75% false positive results may occur because inflammatory or lymphomatous adenopathy can occasionally appear cystic and false negative for abscess can occur because a truly cystic lesion may appear solid if the fluid filled within the cyst is atypical and contain crystals or proteinaceous debris. Now ultrasonography guided needle aspiration is more used for intraoperative localization of abscess<sup>8,9</sup>. On the other hand MRI provides better resolution for soft tissue and blood vessels. They are invaluable in defining the boundaries of infection, involvement of great vessels and internal jugular vein thrombosis, tracheal compression and mediastinal spread. Since it is more expensive and relatively time consuming CT is used as a routine interventional aid<sup>9,10</sup>. The only limitation of percutaneous CT guided needle aspiration is towards vascular mass like hemangioma, paraganglioma, arteriovenous malformation or aneurysm to avoid internal bleed.

Although conventional surgical drainage and percutaneous CT guided needle aspiration carry some of the same risks such as hematoma and possible damage to the neurovascular bundle over all we find percutaneous CT guided needle aspiration more quick and accurate procedure both as a diagnostic and therapeutic tool in the management of deep neck space infection.

**Acknowledgement:** We sincerely thank Dr. K.G. Srinivasan M.D; R.D Director and Senior Consultant of K.G.S. Scans for helping us in the CT guided aspiration technique.

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