

Broken Dental Needle During Administration of Inferior Alveolar Nerve Block: a Case Report and Review of Literature

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Abstract

Administration of local anesthesia using dental needles is a daily routine in the dental clinic which is rarely accompanied with complications. We therefore present a 7 year old patient with accidental broken dental needle that occurred in an attempt to give local anaesthesia in a referral Centre. Plain radiographs revealed a radio-opaque structure around the zygomatic arch extending posteriorly to the mastoid air cells which enhanced surgical retrieval under general anaesthesia. This is the first time such a case is being encountered and reported in Ilorin. This case highlights absolute indication and method for surgical retrieval and suggestions for prevention of such occurrences in the future were discussed.

Key word : Dental needle, Inferior alveolar nerve block, Surgical retrieval

Introduction

Metal instruments used in dental practice may be subjected to considerable wear and tear and subsequent breakage¹. Needle breakage during administration of local anesthesia has now become a rare occurrence compared to the early part of this century when it was relatively more common². In a study by Blum over a period of 14 years, from 1914 -1928, a hundred cases of broken needles were reported³. Since the introduction of modern disposable stainless flexible alloys in the early 1960s, such events have become relatively rare⁴.

Various reasons can be attributed for breakage of dental needles⁵: Weakness of the alloy, narrowness of the needle, reusage of the needle, incorrect injection technique such as bending of the needle, sudden jerky movement of the patient or practitioner and manufacturer defects⁵.

Broken dental needles usually result in great anxiety by the patient, parents / guardian and the Dental Surgeon. Preventing dental needle breakage is important as it can be a great traumatic experience for the patient.

Surgical removal of a broken dental needle can be a difficult procedure due to proximity to vital anatomical structures of the region. Various surgical techniques have also been used in the retrieval of a broken dental needle.

This case report describes the occurrence of a broken dental needle in a 7- year old patient in the pterygomandibular space and the method of surgical removal

Case Report:

A 7- year old patient was referred to our institution on account of pain on the right side of the face secondary to a broken dental needle during administration of inferior alveolar nerve block about 2 weeks previously. The dental needle got broken in an attempt to administer an inferior alveolar nerve block in order to extract a badly carious tooth in the referring Center. The patient was reported to have jumped from the dental chair during the injection, resulting in the breakage of the needle. An attempt was made to retrieve the broken dental needle but it proved abortive at the referring center. The parent was informed about the incident. The consequence and the risk of keeping the needle fragment in tissues were explained to the parent. Treatment options were also explained to the parent. Radiographs were taken to identify the location of the fragment. Examination revealed a healthy girl with an

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obvious right preauricular swelling extending down to the submandibular region. There was no associated lymphadenopathy. No visible pathology was seen intraorally. Plain radiographs revealed a radio-opaque structure around the zygomatic arch extending posteriorly to the mastoid air cells (Figure 1). Patient could not afford advanced imaging technique ie CTSCAN. The patient was prepared for surgical retrieval of the dental needle fragment following baseline investigations. Packed Cell Volume as well as serum electrolytes, urea and creatinine were done and found to be within normal range. Blood was also cross matched for the procedure.

Procedure

The patient was positioned supine on the operating table. Routine skin preparation using 70% alcohol and iodine and draping was done under induction of general anaesthesia and endotracheal intubation. Cefuroxime 500mg and 200mg of Metronidazole were given intravenously prior to commencement of the procedure. Intraoperatively, 4mg of Dexamethasone and 500mg of Paracetamol were also given intravenously. The procedure lasted about 2hrs. There was no transfusion of blood.

An intraoral vertical incision along the ascending ramus was made and extended with a transverse incision along the buccal mucosa below the occlusal level of the posterior teeth. Blunt dissection was done to expose the ascending ramus and coronoid process. As the incision along the buccal mucosa was deepened, the buccal fat pad was exposed and this was gently tensed out to expose the tip of the needle. The 27 G needle

fragment was pulled out with haemostatic forceps (Figure 2). The operation site was irrigated with normal saline and sutured in layers with interrupted 3/0 vicryl sutures.

The procedure lasted about 2hrs. There was no transfusion of blood. The patient was maintained on Cefuroxime 500mg 12hrly and 200mg of Metronidazole 8hrly and paracetamol 500mg 8hrly for 48hours and encouraged to gargle with warm saline mouth rinse before and after each meal. She was discharged after a week home on oral medications: Augmentin 375mg 12 hrly; Metronidazole 200mg 8hrly and paracetamol 500mg 8hrly for one week. A moderate trismus was noticed. Patient was encouraged to exercise her jaw and was reviewed regularly on outpatient basis for two weeks.

Discussion

Inferior alveolar nerve blocks are administered routinely for a variety of dental and oral surgical procedures. Breakage of dental needles, though rare, may occur during administration of inferior nerve block prior to dental procedures. Local anaesthetic administration is the most common procedure in dental practice in many parts of the world^{2,5,6}.

Although needle breakage is uncommon nowadays, it can be a stressful event for the patient and dentist alike and this report serves as a reminder^{1,2}. Unexpected movement of the patient during administration of local anaesthesia, use of inappropriate needles, repeated needle use, and redirection of the needle during anaesthesia are the most common causes of needle breakage⁴. In this case, the patient was reported to have



Figure 2: Retrieved Broken Needle



Figure 1: Lateral view of the skull showing location of needle in the pterygomandibular space.

jumped suddenly while receiving the nerve block following which the needle got broken. In the event of needle breakage, every effort should be made to retrieve the needle immediately. The use of a fine hemostat may be useful if the broken end of the needle is visible intra orally. If the needle disappears completely and is non retrievable; as reported in this case the following management protocol should be followed.

Management protocol/algorithm

The following table on management protocol was developed by Naomi *et al*³

If a needle is broken during administration of an inferior alveolar block:

If it is still visible

Define the needle entry point

Attempt retrieval with a fine artery forceps

If it is not visible

Define the entry point with mouth open

Reassure the patient

Caution against excessive mouth opening which may cause the needle to move deeper into the tissues.

Mark the site where needle penetration occurred with an indelible marker

Arrange referral to a maxillofacial surgeon

Send the remainder of the needle and the hub and a fresh needle with the patient so as to estimate length of remaining needle

Write accurate notes concerning the event

Follow up care of the patient

Inform your dental defence company if any

Discuss the management of the patient with your team³

Needle Factors

The prevention of broken needles begins before any dental procedure as routine needles inspection and discarding those with any defect. The various factors that have been found to be responsible for needle fracture include the following:

1. Repeated punctures with the same needle should be avoided, because it makes it weak and susceptible to breakage¹.

2. The bending of needle before its introduction into the soft tissues can make it become more susceptible to fracture, especially when it makes contact with the bone.

3. The full introduction of the needle inside the tissue and changes in the direction of the needle pathway inside the tissue also increases the chances of fractures.

4. The caliber and needle size used for inferior alveolar nerve block is a divergent factor. Needles shorter than 42 mm or smaller than 25G should be used for this block. Needle caliber less than 30 G are stringer, presents minimal stiffness therefore should not be used for nerve blocks because they are more susceptible to breakage. The use of needles with Caliber of 27 and 35 mm for the inferior alveolar nerve block, and avoiding the total introduction of needles to prevent fractures have been recommended³. The 27G needle used by the dentist in this report has also been shown to be more difficult to direct properly through tissue because of its inherent weakness and flexibility⁵.

5. False technique include aggressive insertion of a needle into the tissue, sudden changes in the direction inside the tissue or a too deep penetration of the needle⁷

Patient Factors

The patient cooperation is essential in order to avoid any sudden or unexpected movement during anesthesia that can contribute to the needle fracture as observed in this case. Aggressive insertion can lead to sudden movement of the patient.

In our environment there is increasing cases of Attention Deficit Hyperactive Disorder (ADHD) Autistic Spectrum Disorders (ASD) patients there is therefore the need to learn how to identify and manage the anxious and hyperactive child that comes for dental procedures⁸.

Radiological Factors

Various methods are available in the literature on locating a broken needle in the pterygomandibular space. Plain radiographs taken at right angles to each other (dental panoramic radiograph and postero anterior view of the mandible) are usually the first choice. Others are stereotactic devices and image intensifiers. There has been reported use of C-arm digital fluoroscopes which involves taking multiple fluoroscopic images to accurately locate the needle. The gold standard to accurately establish needle position are 3 D CT scans^{4,5,9}.

However, in this study posterior anterior view and lateral oblique view were used due to paucity of funds.

Surgical Techniques

Generally two surgical approaches have been advocated for surgical exploration¹⁰. The first method involves a vertical mucosal incision on the medial aspect of the mandibular ramus with blunt supra-periosteal dissection. The second method relies on an incision along the external oblique ridge followed by sub periosteal dissection. The broken needle may then be explored by blunt supra -periosteal dissection. The former technique combined with transverse incision along buccal mucosal were employed in this case. This helped to identify and protect the inferior alveolar and lingual nerves.

Complication

There is some controversy in the literature regarding the removal of broken dental needles. Some authors have suggested that removal is not necessary unless the patient developed symptoms such as pain, infection, numbness, dysphagia, trismus, and swelling^{11,12,13,14}. On the other hand, many authors have suggested removal on account of the possibility of needle migration or infection^{5,15,16}.

Other complications such as the needle migrating towards vital structures as far as the skull base including blood vessels or nerves can occur^{1, 13}. Possible sites that could be affected by migration include the lateral pharyngeal space, where the styloglossus muscle, the ascending pharyngeal artery and the external carotid all lie¹. It is therefore recommended that the needle should be removed to alleviate patient anxiety and decrease the possibility of further complication.

Conclusion

Dental needle breakage is a rare complication in modern practice. Children have been known to be very fearful and restless while taking injections which may predispose to dental needle breakage. As reported in this case It is imperative that the Dental Surgeon should be more conversant with behavioural technique in the management of the restless and hyperactive children. Two major surgical techniques have been reported in literature for the retrieval of broken dental needle in the pterygomandibular space. One of these was employed in this case. Surgical retrieval should

be done when it is absolutely indicated as in this case. The use of advanced imaging techniques have been advocated for proper identification and ease of surgical retrieval, however this advantage could not be utilized in this case due to financial constraint.

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