CASE REPORT

Endovascular retrieval of dental needle retained in the internal carotid artery

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SUMMARY

Intravascular foreign bodies are a known complication of medical and dental procedures. Dental anesthetic needles may be broken off and retained in the oropharynx. These needles have occasionally been reported to migrate through the oral mucosa in to deeper structures. Here we present the case of a 57-year-old man who had a retained dental needle that had migrated into his internal carotid artery. The needle was removed using endovascular techniques. To our knowledge, this is the first report of a retained dental needle being retrieved using this method. We review the literature on intravascular foreign bodies, retained dental needles, and endovascular techniques for retrieval of such foreign bodies.

BACKGROUND

Intravascular foreign bodies (IFB) are a known complication of numerous medical procedures, such as central lines, arterial lines, and endovascular procedures. The technology for endovascular retrieval of IFBs has progressed significantly over the past few decades. However, the literature is sparse and inconsistent on the current indications and recommendations for the use of these techniques.¹⁻³

The occurrence of a broken or lost anesthetic needle is a reported complication of dental procedures that require local anesthesia.⁴ These events can have clinically significant sequelae due to the proximity of the oral cavity to critical neurovascular structures.⁴⁻⁵ However, to our knowledge, there have been no prior reports of a retained dental needle migrating into the cervical carotid artery.

We present the case of a 57-year-old man who had an anesthetic needle fractured and lost inside his oral cavity during a dental procedure. The needle migrated posteriorly and was found to be penetrating the internal carotid artery on presentation to our institution. An initial attempt at transoral retrieval was unsuccessful and resulted in further migration of the needle so that the end of it was within the arterial lumen. Retrieval was then successful using endovascular techniques.

To our knowledge, this is the first reported case of a broken dental needle migrating through the neck and penetrating the internal carotid artery, and the first case of an intravascular needle being retrieved using the endovascular techniques described in this report.

CASE PRESENTATION

A 57-year-old man presented with right-sided neck pain, facial pain, and trismus. He had no significant past medical history. Two weeks prior to presentation, he underwent a dental procedure in which a local anesthetic needle was fractured in his oropharynx without an attempt at retrieval. A CT scan (figure 1) demonstrated a 2 cm by 1 mm foreign body consistent with a needle fragment penetrating the right internal carotid artery with the proximal and distal ends outside of the lumen.

Initially, he underwent a transoral exploratory surgery by vascular surgery and otolaryngology. This procedure was aborted due to the inability to identify the needle. A second CT angiogram showed the needle had migrated further into the jugular foramen as a result of the surgical manipulation (figure 2). The proximal end of the needle was now entirely within the cervical internal carotid arterial lumen, making an attempt at endovascular retrieval possible.

Under general anesthesia, an 8 F FlowGate (Stryker Neurovascular, Fremont, California, USA) balloon guide catheter was deployed in the right internal carotid artery through a 9 F short femoral

Figure 1 CT scan showing the needle fragment adjacent to the right internal carotid artery, extending into the jugular foramen.

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Figure 2 CT scan following exploratory surgery showing the metallic fragment entering the jugular foramen.

sheath ([figure 3](#)). A 4 mm gooseneck microsnare (ev3 Endovascular Inc, Plymouth, Minnesota, USA) was used to capture the proximal portion of the needle within the arterial lumen. Proximal flow arrest was accomplished by inflating the balloon on the guide catheter. The needle was slowly pulled proximally within the carotid artery until the needle was oriented longitudinally. In this orientation, however, the proximal needle end became embedded in the intima. We were unable to withdraw it into the guide catheter. A second snare was then used to capture the distal end. This enabled manipulation of the needle using the two snares, and the needle was advanced forward into the cervico-petrous junction, freeing the back end from the intima and allowing the needle to be pulled into the guide catheter. The FlowGate balloon was deflated and the catheter was removed with the two snares and the needle in the catheter lumen. Angiography showed a retrograde non-flow limiting grade 1 internal carotid artery dissection with no contrast extravasation ([figure 4](#)).

OUTCOME AND FOLLOW-UP

The patient received verapamil intra-arterially through the FlowGate catheter to treat vasospasm. A subsequent run showed significant improvement in vasospasm. The patient received an Integrillin bolus, aspirin, and clopidogrel following the procedure ([figure 5](#)).

The patient had an extended intensive care unit stay post-operatively secondary to pneumonia. He was ultimately discharged home neurologically intact.

Figure 4 Grade 1 dissection of the distal right cervical internal carotid artery.

DISCUSSION

Retained anesthetic needles secondary to breakage are a well reported complication of local anesthesia in the oral cavity in the dental literature. The most common cause of a retained dental needle is attempted inferior alveolar nerve blocks.^{4 5} Needles fractured during this procedure are almost always found within the pterygomandibular region of the infratemporal fossa,⁶ which serves as the main inlet and outlet for the intracranial neurovasculature.⁷

It is presumed that migration of foreign bodies through the aerodigestive tract and into adjacent structures is caused by repetitive contracting of the pharynx during chewing and swallowing.⁴ Thus any foreign body that is able to penetrate the mucosa of the upper digestive tract may be able to migrate through adjacent tissues, including vasculature, and cause further damage. There are rare reports of ingested foreign

Figure 3 (A–D) Endovascular retrieval of the needle using a gooseneck microsnare and FlowGate balloon catheter.

Figure 5 Sagittal CT angiogram showing the tip of the needle located in the cervical carotid artery.

bodies, predominantly fish bones or metallic objects, migrating through the esophagus and damaging the common carotid artery or internal jugular vein at the level of the neck.^{8–11} In each of these cases, the foreign body was removed operatively.

There has been a recent report of a retained dental needle migrating across the skull base and penetrating the cochlea, causing hearing loss.⁶ Additionally, there is a report of an accidental ingestion of a headscarf pin with migration through the vertebral artery.¹² In both cases, the foreign bodies were removed with open surgery. However, there have not been any reports of migrating retained anesthetic needles damaging vascular structures.⁴ A recent review of the endovascular literature by Schechter *et al*² found 127 case reports and 21 case series of five patients or more since 2000 with retained IFBs. None found a needle to be the retained IFB.

As endovascular intervention has increased in popularity, so has the incidence of retained IFBs.² The nitinol gooseneck snare was first described by Yedlicka *et al*¹³ and features a snare loop at 90° to the catheter, allowing for greater mobility of the snare to effectively capture the IFB. This device can be used by itself to grasp either the proximal or distal end of the IFB, or it can be used in conjunction with a separate guidewire that can aid in positioning and grasping the IFB. However, a noted weakness of the gooseneck snare is its relatively weak grip capabilities.¹ Despite this, a recent review by Schechter *et al*² found the loop snare to be used in more than 90% of successful IFB retrievals using endovascular techniques. Balloon catheters may be used alone or in conjunction with loop snares to retrieve devices, such as endovascular stents, with an important factor being choosing a balloon of the appropriate size.¹⁴ Balloon guide catheters can be used to eliminate the pulsatile forward arterial blood pressure and decrease the chance of distal migration of IFBs. Additionally, balloon catheters may be used in aiding loop snares to grasp IFBs, or may help to position IFBs into a location more favorable for open surgical removal.¹

To date, there are few reports of retained objects migrating through the aerodigestive tract and into the vasculature that were removed with open surgery, and no prior reports of such objects being removed using endovascular techniques.^{8–11} In each of the reported cases, the authors stress the importance of preoperative planning using thin cut CT scans as well as conventional angiography to properly locate the foreign body, define the regional anatomy, and develop an approach to removal.

We have presented the case of a 57-year-old man with a retained intravascular foreign body in the carotid artery that

was removed using endovascular techniques. To our knowledge, this is the first report of this technique. We have reviewed the literature, indications, and technical points for this unique case.

Learning points

- ▶ Intravascular foreign bodies (IFBs) are a known complication of numerous medical procedures, such as central lines, arterial lines, and endovascular procedures.
- ▶ Any foreign body that can penetrate the mucosa of the upper digestive tract may be able to migrate through adjacent tissues, including vasculature, and cause further damage.
- ▶ The technology for endovascular retrieval of IFBs has progressed significantly over the past few decades.
- ▶ However, the literature is sparse and inconsistent on the current indications and recommendations for the use of these techniques.

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Competing interests None declared.

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