Case Report

Fluoroscope-aided retrograde placement of guide wire for tracheal intubation in patients with limited mouth opening

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Passing a retrograde catheter/wire into the pharynx through a cricothyroid puncture can facilitate tracheal intubation in difficult situations where either a flexible fibre-optic bronchoscope or an expert user of such a device is not available. Some mouth opening is essential for the oral and/or nasal retrieval of the catheter/wire from the pharynx. Two patients with temporo-mandibular joint (TMJ) ankylosis and extremely limited mouth opening required gap arthroplasty of the TMJ under general anaesthesia. Because we did not have a flexible fibre-optic bronchoscope, we performed fluoroscopy-assisted nasal retrieval of the guide wire passed up through a cricothyroid puncture and subsequently accomplished wire-guided naso-tracheal intubation. In the absence of a flexible fibre-optic bronchoscope, this technique is a very useful aid to intubation in patients with limited mouth opening.


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Passing a retrograde catheter/wire through a cricothyroid puncture into the pharynx can facilitate tracheal intubation in difficult cases.1,2 This technique of intubation has been applied successfully to secure difficult airways in elective and emergency situations.3,4 However, some degree of mouth opening is essential to bring out the catheter/wire from the pharynx. We performed nasotracheal intubation in two patients with temporomandibular joint (TMJ) ankylosis and extremely limited mouth opening. The following case reports describe the technique in detail.

Case 1

A 10-yr-old ASA I male (weight 23 kg, height 115 cm) presented with mouth opening of about 2 mm (Fig. 1). A diagnosis of left-sided, post-infective, fibrous TMJ ankylosis was established from history, clinical findings, and imaging studies. He was to undergo gap arthroplasty of the left TMJ under general anaesthesia (GA). He had facial asymmetry along with a retracted mandible. The mento-thyroid and mento-hyoid distances were 2.0 and 1.5 cm, respectively. The patient had normal neck mobility and patent nostrils. There was no history suggestive of change of voice, breathlessness, or snoring during sleep.

In the absence of a flexible fibre-optic bronchoscope, we planned to place an epidural catheter through a cricothyroid puncture and bring it out from the hypopharynx by applying suction on the epidural catheter through a suction catheter passed through a nostril.5 In this difficult airway situation, we chose to perform the procedure in the conscious patient following airway block and topical anaesthesia. The procedure was explained to the patient and his parents. They were also informed that they had a choice to go to another centre where fibre-optic intubation facilities were available. Because of economic constraints, they insisted on undergoing the operation in our institute. Possible failure of the technique requiring further interventions such as blind intubation attempts and tracheostomy were also explained and consent for the procedure and tracheostomy obtained. On the night before and the morning of surgery, he received ranitidine 75 mg orally. He also received nasal decongestant (xylometazoline 2%), and glycopyrrolate 0.1 mg (i.m.) 1 h before the procedure. In the operating theatre, a 20 G i.v. cannula was placed in the left arm of the patient and monitoring commenced. Following application of topical anaesthesia and airway block, cricothyrotomy was performed with a 16 G i.v. cannula and an 18 G epidural catheter (SIMS Portex Limited, Kent, UK) was inserted through
the cannula into the pharynx. A 6.5-mm nasopharyngeal airway (SIMS Portex Limited) was inserted into the left nostril for the insertion of the 14 FG suction catheter, with a terminal opening, to suck the catheter from the pharynx. After having inserted 1.5–2.0 cm of the suction catheter (14 FG) through the nasopharyngeal airway, we felt resistance, which could not be overcome after application of lubricating jelly. We attempted the same procedure through the opposite nostril without success. A 7-mm nasopharyngeal airway was too big to pass through either of the nostrils. We reinserted the 6.5-mm airway into the left nostril and introduced a narrower (12 FG) suction catheter through it. The suction catheter fitted snugly within the lumen of the airway. We tried to retrieve the epidural catheter by applying a negative pressure (0.5–0.6 bar) through the suction catheter and withdrawing it, while maintaining a cephalad push on the epidural catheter at the cricothyroid puncture site. We failed to bring the epidural catheter out of the nostril over three consecutive attempts, though, on each occasion, we could establish a contact between both the catheters.

Before opting for blind nasal intubation, or tracheostomy in case of failure, we attempted to place a central venous catheter guide wire, under fluoroscopic guidance, through the cricothyroid puncture and pass it out through a nostril for subsequent wire-guided nasotracheal intubation. A 50 cm guide wire was removed from a 16 G central venous catheter set (Vygon, Ecouen-France). The straight end of a guide wire was introduced into the pharynx through the cricothyroid puncture cannula and advanced cephalad while keeping the guide wire within the dark shadow (indicating the pharyngeal passage containing air) as seen in the lateral view during fluoroscopy (Fig. 2). It could be threaded into the highest portion of the nasopharynx without any difficulty but there met resistance. We withdrew the guide wire into the nasopharynx and placed airways in both the nostrils. On this occasion, the wire came out through the left nostril without any resistance (Fig. 3). We brought out the guide wire further and subsequent wire-guided nasotracheal intubation was accomplished uneventfully with a 6-mm PVC cuffed tracheal tube (Rusch Inc., Duluth, USA).

After checking for bilateral air entry and confirmation by $E'_{\text{CO}_2}$, we administered balanced GA and intermittent positive pressure ventilation with nitrous oxide and oxygen (70:30) with a variable inspiratory concentration of halothane (0.5–1%). The mouth opening following the surgery was 33 mm. On the completion of surgery, residual neuromuscular block was antagonized followed by tracheal extubation. The postoperative period was uneventful.

**Case 2**

This 19-yr-old ASA I male (55 kg, 158 cm) presented with a long history of difficulty in mouth opening subsequent to a fall on his chin when he was 8 yr old. A diagnosis of post-traumatic, bilateral, bony TMJ ankylosis was established. Gap arthroplasty of the ankylosed joints under GA was planned. His mouth opening was about 3 mm and there was retrognathia too. The mentothyroid and mentohyoid distances were 4 and 3 cm, respectively. The nostrils were patent and he did not have any difficulty in breathing when awake or while sleeping.
We planned to secure his airway using the same technique as in our previous patient. The procedure and the possibility of tracheostomy were explained to him and informed consent was obtained. Pre-anaesthetic preparation was similar to that in our earlier patient. In the operating theatre, i.v. access and monitoring were established. Using the same technique as in the previous patient, the patient’s airway was anaesthetized and a guide wire introduced into the trachea through a 16 G cricothyrotomy cannula. It was then advanced under fluoroscopic guidance, initially towards the oral cavity, but after withdrawal and flexion of neck it reached the nasopharynx and with further advancement, came out the right nostril. Unlike that in the first case, there was no resistance during advancement and a nasopharyngeal airway was not needed (Fig. 4). Subsequently, wire-guided nasotracheal intubation with a 7.5-mm cuffed PVC tube was accomplished and GA was commenced. The intra-operative period was uneventful and mouth opening of 35 mm was achieved.

Discussion
In the absence of a fibre-optic bronchoscope, the techniques for endotracheal intubation in patients with restricted mouth opening are limited. Because of the frequently associated airway anomaly, failure of blind nasal intubation is not uncommon. Retrieving a catheter/wire from the pharynx (retrograde placement) through the nose can be used for subsequent catheter or wire-guided tracheal intubation. A pharyngeal loop can also be used for tracheal intubation in such patients. However, for all these manoeuvres, some degree of mouth opening is essential. Both of our patients had virtually no mouth opening, thus, these intubation techniques were not suitable.

We have described previously, under similar circumstances, retrieval of a catheter from the pharynx using suction. In the first patient, this failed, because of the inability to pass a suction catheter of adequate size through the nasopharyngeal airway. A finer suction catheter did pass through but we were unable to pull through the epidural catheter. Most probably, the narrow nasal passage compressed the wall of the soft airway leading to a decrease in the size of its lumen.

We found the fluoroscope-assisted, retrograde passage of guide wire to be very helpful for the subsequent wire-guided tracheal intubation. We inserted the straight end of the guide wire into the pharynx, instead of the malleable curved end, as it was easier to manoeuvre in the right direction. The smooth tip of the wire reduced any risk of injury to the soft tissues. With the aid of fluoroscope, the desired direction for the guide wire could easily be achieved and altering the position of head and neck in the second case also helped.

In the first patient we encountered resistance in bringing the wire out of the nasal cavity but this was overcome by use of a nasopharyngeal airway. The narrowest site in the nasal airway is at the nasal valve, formed by the anterior portion of the inferior turbinate and the corresponding nasal septum. A nasopharyngeal airway may not be required, particularly in an adult.

Ideally, a flexible fibre-optic bronchoscope should be used for tracheal intubation of such patients. Unfortunately, because of the high purchase and maintenance costs of fibre-optic devices, few centres in the developing world have such facilities. However, in the presence of airway bleeding, fibre-optic bronchoscopy may fail and a suitable alternative is required, especially in the developing world where patients with no/inadequate mouth opening present for various surgical procedures in local hospitals.

In the absence of a fibre-optic bronchoscope, few other methods of airway management other than blind nasotracheal intubation and tracheostomy are available for patients with extremely limited mouth opening. Thus, we conclude, that the fluoroscope-assisted and wire-guided retrograde technique of tracheal intubation can be a suitable alternative of airway management in these patients.
References

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