Fluoroscopy assisted tracheal intubation in a case of anticipated difficult airway: Fail safe devices can also fail

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ABSTRACT

Difficulty in airway management is the most important cause of major anesthesia-related morbidity and mortality. Unexpected difficulties may arise even with proper preanesthesia planning. Here, we report a case of anticipated difficult airway primarily planned for flexible fibreoptic bronchoscope assisted intubation, but due to unexpected failure of light source, fluoroscopy was used, and the airway was successfully secured.

Key words: Difficult airway, fluoroscope, osteogenesis imperfecta

INTRODUCTION

Anesthesia management outside the operating room is especially challenging to the attending anesthesiologist. Sudden difficulties may arise even after meticulous preanesthesia planning. Here, we present a case with anticipated difficult intubation planned for fibreoptic airway management in interventional radiology suite. There was a sudden failure of fibreoptic bronchoscope (FOB) light source, and we were able to secure the airway with the help of fluoroscopic imaging that was readily available. Written consent was obtained from the patient’s guardian for publication of this case report.

CASE REPORT

A 50-year-old male patient diagnosed to have dural arteriovenous fistula was scheduled to undergo embolization procedure under fluoroscopic guidance. He was a known case of osteogenesis imperfecta with multiple fractures of limb, surgically corrected in the past. He had no other co-morbid illness. Airway examination revealed restricted neck movements for both flexion and extension, reduced thyromental distance (5 cm) and modified Mallampati score of 3. His interdental distance was around 2.5 cm. He had dental implants in upper central incisors, and his lateral incisors were loose. Except for chest wall deformity (pectus carinatum) clinical examination was normal. Cardiac evaluation and laboratory investigations were within normal limits. In view of anticipated difficult airway, awake fibreoptic scope assisted intubation was planned; however, the patient did not give consent for the same. Patient had two surgeries under general anesthesia for correction of fractures. Review of the anesthetic records showed use of suxamethonium without any adverse events like bone fractures and malignant hyperthermia. So in
view of anticipated difficult airway we planned fibreoptic scope assisted intubation after induction and paralyzing with suxamethonium. Difficult airway cart was prepared, thoroughly checked and kept ready for any adverse course.

On the day of intervention injection glycopyrrolate, 0.2 mg was given through intramuscular route 45 min prior to the procedure. Patient was shifted to imaging suite, and standard monitors were applied. Intravenous access was obtained with 18-gauge cannula. Patient was preoxygenated till EtO₂ was around 95 mmHg. Injection fentanyl 200 mcg, and injection propofol 120 mg was given through intravenous route. After confirmation of adequate mask ventilation, patient was paralyzed with 100 mg of injection suxamethonium. Olympus airway (bite block) was carefully placed avoiding damage to the dentition. FOB (KARI STORZ, Tuttlingen, Germany) was introduced in midline through the Olympus airway. When the tip of FOB was in the pharyngeal area, there was a sudden failure of light source. The main operating room complex was considerably far from the radiology suite, and we could not arrange alternative light source immediately. Although the equipment for invasive airway access were kept ready, we did not opt for the surgical airway as mask ventilation was adequate. We continued facemask ventilation with 100% oxygen. As the patient did not recover from suxamethonium for more than 5 min we planned for alternative techniques for airway access. We introduced the FOB under fluoroscopic guidance (lateral view). The hyoid bone, thyroid cartilage, and the upper trachea were identified. The tip of the FOB was manipulated with conventional controls in the handle and slowly advanced through the thyroid cartilage and the trachea under fluoroscopic imaging [Figure 1]. The bronchoscope was removed, and patient connected to anesthesia ventilator. Position of the endotracheal tube was confirmed by auscultation, EtCO₂ trace, and antero-posterior X-ray imaging. Patient recovered from suxamethonium approximately after 25 min. Rest of the procedure was uneventful.

**DISCUSSION**

Osteogenesis imperfecta is a rare autosomal dominant inherited connective tissue disorder caused by mutations in the genes that code for the type I procollagen. It leads to many anesthetic challenges with regard to intubation and positioning of the patient.[1] Short neck with restricted movements makes intubation attempts futile. Excessive maneuvering of the cervical spine during airway management may result in cervical spine dislocation or fracture. Aggressive intubation attempts may lead to mandibular fracture and tooth dislodgement because of the fragile nature of the bony elements. Hence, FOB appears to be the ideal aid for intubation in these patients.

As our patient had predictors of difficult intubation, we opted for fiberoptic guided intubation. Although we have checked the functioning of FOB before induction of anesthesia, there was a sudden failure of the light source during intubation attempt. As mask ventilation was adequate, and we had paralyzed with short acting suxamethonium, we did not opt for emergency invasive airway access. Since there was a delay in recovery from paralysis, we considered for alternative options. We had Macintosh laryngoscope, McCoy laryngoscope, rigid video laryngoscope (Pentax AWS), laryngeal mask airways and gum elastic bougie in the airway cart. The backup equipment, what we had, requires adequate mouth opening and/or cervical spine movements. Guiding the scope over or parallel to a retrograde guide wire is widely quoted in literature in difficult fiberoptic assisted intubations.[2] In our case, we could not use this technique as we were not prepared for retrograde intubation and without the light source and visual guidance passing the FOB over the guide wire might lead to airway trauma. As the fluoroscopy machine was in functional mode, and the attending anesthesiologists and radiologist were wearing radiation protective shield we considered fluoroscopy guided intubation. The shaft of the FOB unit houses helical steel wires (Bowden cable) connecting the control lever in the handle to the flexible tip of the bronchoscope. The outer housing of the shaft is also reinforced by spiral metal wires. These radiopaque components in the FOB aids in a good visualization under fluoroscopic imaging. With the controls in the handle, we were able to guide the tip of the scope into the trachea under fluoroscopic guidance.

Apart from interventional radiology suite fluoroscopic imaging modality is widely available in operating rooms with the conventional C-arm X-ray machines.

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![Figure 1: Fluoroscopic view of upper airway with fibreoptic bronchoscope in situ](image-url)
Fluoroscopic technique is easy to perform. This modality can be utilized in anticipated and unanticipated difficult airways. This technique could also be extrapolated to pass gum elastic bougie under fluoroscopy guidance and to railroad endotracheal tube once position of bougie is confirmed.

CONCLUSION

Management of the difficult airway remains one of the challenging tasks for anesthesia care providers. Sudden difficulties may arise even in a controlled scenario. Our case illustrates that fluoroscopy assisted intubation can be an alternate and a safe technique in remote places where the availability of resources are limited or when there is unexpected failure of conventional devices.

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