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Case Report

Difficult Airway Management with Awake Fiberoptic Intubation and Cross Table Ventilation in a Case of Acquired TEF with Severe Subglottic Stenosis

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ABSTRACT

We report a case of 30-year male who presented with Acquired Tracheoesophageal Fistula with subglottic stenosis and Aspiration Pneumonitis. Patient was managed with Feeding Jejunostomy, Tracheoesophageal Fistula repair and Tracheoplasty, after which patient recovered well. Difficult airway was managed by Awake Fiberoptic Intubation and cross-table ventilation through flexometallic tube intraoperatively during TEF repair.

Introduction

Tracheoesophageal Fistula (TEF) is a pathological connection between the trachea and the oesophagus leading to spillover of oral and gastric secretions into respiratory tract which causes pneumonitis [1]. Tracheoesophageal Fistula can be classified as Congenital and Acquired. Acquired Tracheoesophageal Fistula can be malignant and benign depending on etiology. The abnormal Tracheoesophageal communication causes recurrent pulmonary infections and inability to feed the patient. Definitive management is the surgical repair of tracheoesophageal fistula. In our case anaesthetic concerns were difficult airway, sharing of airway with surgeon and cross-table ventilation.

Case Report

A 30-years old male patient was referred to our hospital for Tracheoesophageal Fistula repair surgery. Patient had a history of road traffic accident with head injury for which he was intubated and required ventilatory support. Tracheostomy was done due to prolonged ventilation. After recovery, tracheostomy tube was removed and then patient was discharged from private hospital.

Patient came to our institution with complaints of difficulty in breathing and productive cough with mucoid expectoration, which was more on lying down, while eating and drinking. Patient also complained of weight loss due to decreased oral intake. Patient was then thoroughly examined and investigated. Room air saturation was 94-95%. Air entry was decreased bilaterally on bases of lungs and conducted sounds were present. On Airway examination, mouth opening was adequate with MPC grade 2 with adequate neck movements and tracheostomy scar was noted. All routine laboratory investigations were within normal limits.

On bronchoscopy, a stenotic segment was seen 2.5 cm below vocal cords (subglottic) of length 1.8 cm, approximately less than 6mm in dimension. Tracheoesophageal fistula was visible at the site of previous tracheostomy just distal to stenotic segment. Adult bronchoscope could not be passed further through stenotic segment. X ray Neck AP and lateral view showed

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airway narrowing. Chest X-ray showed B/L infiltrates which were more on right lower zone.

On investigation, HRCT chest showed bilateral ground glass consolidation and few centrilobular opacities seen in both lungs mainly involving both lower lobes and right middle lobe indicating aspiration pneumonitis. Communication was seen between trachea and cervical esophagus at level of C5-C6 intervertebral disc. There was severe narrowing of trachea at this level for a length of 1.8cm.TEF was noted just below subglottic narrowing with defect measuring around 8mm. Upper GI endoscopy was done which confirmed the presence of TEF of size 9mm at 19cm from upper incisors.

Due to acquired Tracheoesophageal Fistula patient oral intake was decreased, so Feeding Jejunostomy was done for improving nutritional status of the patient. Aspiration pneumonia was treated with antibiotics and anti - aspiration prophylaxis was started.

After adequate optimization with thorough clinical examination, investigations and informed written consent, patient was posted for Tracheoesophageal Fistula repair with Tracheoplasty. Anesthetic challenges included inadequate mask ventilation due to fistula, difficult intubation due to severe subglottic stenosis and shared airway. We planned for awake Pediatric Fiberoptic intubation with smaller size cuffed ETT no. 5.5 in view of tracheal stenosis, as adult fiberoptic bronchoscope could not be passed due to subglottic stenosis in last attempt during investigation. We explained the procedure of awake fiberoptic intubation to the patient and allayed all his anxiety.

The patient was nebulized with Lignocaine 4% solution half hour before surgery. Difficult airway cart, crash cart trolley along with pediatric fiberoptic bronchoscope and emergency tracheostomy set was kept ready in the operation theatre. After confirming nil by oral status and taking informed written consent, patient was shifted inside operation theatre. Standard ASA monitors including ECG, NIBP and pulse oximeter were attached. Intravenous access with large bore intravenous canula was secured and ringer lactate was started.

Airway blocks included bilateral Superior Laryngeal nerve block and transtracheal block with 2% Lignocaine. Premedication Inj Glycopyrrolate 0.2mg iv, Inj Midazolam 1mg iv, Inj Ondansetron 4mg iv, inj Hydrocortisone 100mg iv were given. Throughout the procedure supplemental oxygenation was provided. Conscious sedation was provided with Inj dexmedetomidine 40mcg iv bolus. Pediatric fiberoptic bronchoscope was loaded with cuffed ETT no. 5.5. Awake fiberoptic bronchoscopy attempted via nasal cavity by spray as you go technique with 2% Lignocaine spray. Vocal cords were then identified, and scope was advanced beyond cords, cuffed ETT no. 5.5was advanced gently through subglottic stenosis with tip beyond TEF. ETT tube was secured after confirmation with auscultation and ETCo2 graph. Induction was done by giving Inj Propofol 100mg iv and Inj Vecuronium 5mg iv and anesthesia was maintained on 50% oxygen, 50%Air and Sevoflurane (1%-2%) with IPPV on volume AC mode. Intraoperative Inj Fentanyl 50mcg iv and Inj Paracetamol 1gm iv were administered for analgesia.

Position of the patient was supine with neck in extension. Under all aseptic precautions, using anterior cervical approach a transverse neck incision was taken by surgeon. Straps muscles were visualized and retracted laterally. After visualization of trachea, it was transected distally till the fistula, a sterile Flexometallic tube (FMT) no. 8 was inserted directly in distal trachea through tracheal incision and connected to sterile Bains circuit (Fig-1). After checking bilateral breath sounds and optimal ventilation, distal FMT was secured with stay sutures to avoid endobronchial intubation and accidental extubation. The ETT tube (proximal tube) which was inserted through right nostril was withdrawn upto cricopharynx after cuff deflation. An umbilical tape was tied to the Murphy's eye of ETT by surgeon. This umbilical tape will be used as conduit to guide the further insertion of FMT via oral cavity. Patient was then, ventilated by sterile Bain's circuit via FMT (Cross-table manually assisted ventilation).

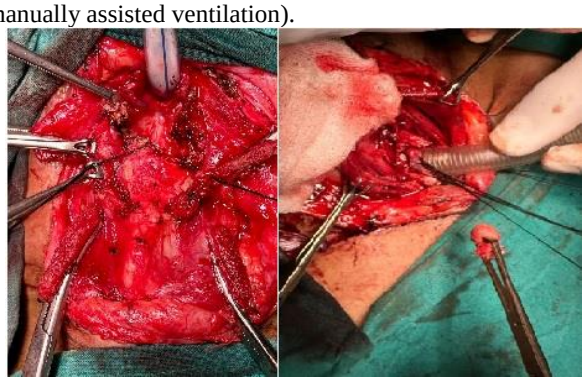

Figure 1- Cross Table Ventilation with Flexo-metallic tube

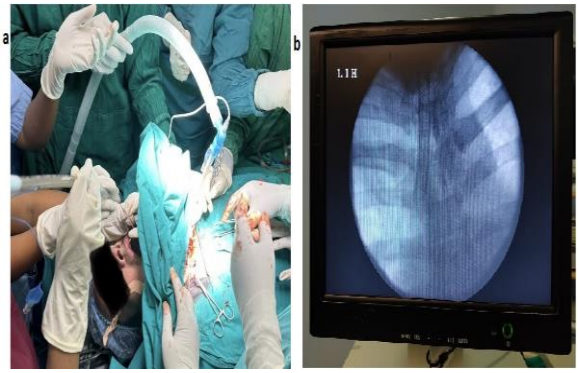

Figure 2- (a) Intra-op positioning of ET tube; (b) Confirmation with C-arm

Discussion

An Acquired benign Tracheoesophageal Fistula can become life threatening due to repeated tracheal soiling causing tracheobronchial contamination which can lead to pulmonary sepsis. Benign TOF occurs in the setting of

prolonged mechanical ventilation via endotracheal tube or tracheostomy tube; excessive cuff pressure of endotracheal tube or tracheostomy tube; blunt trauma to the chest or the neck; traumatic airway injury; granulomatous mediastinal infections; stent-related injuries; and ingestion of foreign bodies or corrosive products [2].The risk of developing an acquired TOF increases with predisposing risk factors like prolonged mechanical ventilation, hypotension, steroid therapy, nasogastric tubes, respiratory infection etc. Of the non-malignant reports of acquired TOF in the literature, more than 75% are the result of endotracheal cuff-related trauma in patients subjected to prolonged mechanical ventilation [3]. Although introduction of high volume and low-pressure Endotracheal tube cuffs reduced the incidence of this complications however, TEF still seen with history of prolonged intubation.

The pathogenic mechanism of chronic trauma due to prolonged tracheal intubation is the pressure resulted from hyper inflated ETT cuff on posterior membranous wall, most often against a rigid nasogastric tube, causing ischemic necrosis which affects the anterior wall of oesophagus resulting in abnormal communication and may result in tracheal stenosis [4]. Our patient had both history of intubation with prolonged mechanical ventilation and tracheostomy which may have resulted in development of TEF.

Symptoms in non-ventilated patients include uncontrolled coughing after swallowing (Ono's sign), acute dysphagia, dyspnea, pneumonia, and weight loss. In ventilated patients continued air leak with loss of tidal volume, worsening oxygenation, persistent tracheal soiling, recurrent pulmonary sepsis, and repeated failure to wean can be observed [5]. Diagnosis can be made by history, Chest Xray, endoscopy, CT scan and Bronchoscopy. Several different surgical approaches are described for repair of TOF, including direct closure of the tracheal and oesophageal defects with or without a muscle flap, tracheal resection and anastomosis with primary oesophageal closure, tracheal closure with an oesophageal or synthetic patch and oesophageal diversion [6]. Non-operative management include use of oesophageal metal stent, airway stents, Tracheal T tubes and endoscopic glue injections. Small fistula with normal trachea can be simply resected and tracheal and esophageal defects closed. Large defects with circumferential tracheal damage or stenosis of tracheal segment required resection of damaged part of trachea with end to end tracheal anastomosis [7]. Our patient presented with large TEF and sub glottic stenosis, surgical management with tracheal resection and primary TEF closure was treatment of choice. We discussed the case and formulated the plan of anesthesia during different steps of surgery in details with surgeon.

Taylor Elser et.al described surgical techniques to repair TEF with cross table ventilation through FMT placed in distal trachea [8]. They recommended this technique as it provides greater exposure and has lower risk of devascularization and recurrent laryngeal nerve injury during surgical repair. We used similar surgical technique and anesthetic management of ventilation for successful closure of TEF in our patient.

One of the major concerns in our case was severe subglottic stenosis so we decided for awake paediatric fiberoptic bronchoscopy with smaller size of endotracheal tube which can be negotiated through the subglottic stenosis. We were able to negotiate and avoided trauma and bleeding during fiberoptic intubation. We preferred nasal route for fiberoptic intubation as we have more experience than oral route. We managed to pass ETT beyond TEF and ventilate the patient adequately. Other major challenge was intraoperative change of ETT tube and cross table ventilation. We maintained clear communication and good coordination with the surgeon during endotracheal tube changing procedure making sure that airway was secured during the entire procedure. Successful management of acquired TEF requires comprehensive approach with preoperative optimization, detailed planning and execution, skilled surgical and anaesthesia team, postoperative vigilant monitoring, and intensive care.

Conclusion

Acquired Tracheoesophageal Fistula after prolonged intubation and prolonged tracheostomy is a rare complication. Involvement of multidisciplinary team, surgical plan and good communication with surgeons are the important considerations in management of tracheoesophageal fistula repair. Skilled surgical management with postoperative care in ICU and specialized centers can provide better outcome in such cases.

Acknowledgements

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