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Case Report

Difficult Tracheostomy in Fixed Flexed Neck due to Ankylosing Spondylitis: How we did it?

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Abstract

Introduction: Ankylosing spondylosis is a chronic inflammatory condition leading to multiple organ involvement. Cervical spine involvement leads to fixed flexion deformity posing difficulty in accessing anterior neck and airway. We describe a technically difficult tracheostomy in a patient with fixed flexion deformity of neck due to ankylosing spondylitis.

Method: Description of the case report, importance of using computer tomography scanning and three-dimensional modelling and technique of surgical tracheostomy.

Conclusion: Safe tracheostomy can be performed in difficult to access anterior neck by a multi-disciplinary approach.

Keywords: Ankylosing Spondylitis; Tracheostomy

Introduction

Ankylosing spondylosis is a chronic debilitation conditions affecting various organs including cervical spine. In progressive disease, the cervical spine transforms into a fixed flexed posture with hardly any extension. We report a challenging case report of a patient with ankylosing spondylosis and severe fixed flexion deformity, multiple co-morbidities needing surgical tracheostomy. We discuss the importance of medical optimisation, use of various investigative procedures in pre-planning and the technique of surgical tracheostomy which was deemed impossible.

Case Report

A forty-eight years old gentlemen with severe ankylosing spondylitis was admitted in intensive care unit after sustaining an out of hospital cardiac arrest. He had to be intubated and ventilated in the intensive care unit. Fibre-optic guided nasal intubation was carried out due to difficulty in access from the oral route. His other co-morbidities included left ventricle dysfunction, aortic stenosis, previous anterior uveitis, osteoarthritis of knee and platelet dysfunction. His medications included aspirin and clopidogrel. He failed extubating numerous times so a surgical tracheostomy was planned. On examination the neck was in a fixed flexed posture with hardly any anterior neck space due to fixed flexion deformity of the neck, the distance from chin to chest was 3cm (Figure 1). There were no possible passive movements of the neck. The thyroid cartilage was felt just above the supra sternal notch. Computer tomography (CT) scan of the neck revealed the severity of flexion deformity of the cervical spine, position of cervical trachea (Figure 2). Percutaneous dilatational tracheostomy could not be performed due to limited access. Following review by the ENT (Ear, Nose and Throat) team; difficulties in access and safety of the procedure was given an additional thought. Expertise from the cardiothoracic surgical team was sought, who felt that removing the manubrium will lead to exposure of the great vessels in the thoracic inlet thereby making tracheostomy unsafe. At this stage, three-dimensional imaging and modelling (Figure 3) was carried out using the CT scans to plan surgical tracheostomy via cervical approach. Through optimisation of the patient was achieved by stabilising his cardiac, respiratory issues, reducing oedema, improving haemodynamic status. Clotting issues were corrected by stopping clopidogrel and aspirin. Platelet dysfunction was corrected by administering platelets an hour before the surgery. A multi-disciplinary approach with ENT, intensive care, anaesthetics was adopted. The procedure of surgical tracheostomy was planned in the operating room.

Figure 1: Pre-tracheostomy.

Figure 2: Ct scan of the neck lateral view.

Figure 3: Three-dimensional model showing the airway.

Positioning

A head rest was placed and the patient was positioned in trendelenburg, making the neck horizontal. Soft tissue of chin and supra hyoid neck was retracted superiorly by using a common surgical tape and gauge under the chin. Stay silk sutures were placed over the infraclavicular skin to retract the soft tissue inferiorly. This manoeuvre slightly improved the access to the neck.

Incision

A horizontal skin crease incision one centimetre above the suprasternal notch was carried out to reflect the sub cutaneous tissue.

Exposure

Following incision sub platysmal skin flaps were elevated. The subcutaneous fat was excised and the strap muscles were divided in the midline and horizontally. Thyroid cartilage was identified and dissection proceeded inferiorly towards anterior tracheal wall staying close to anterior thyroid and cricoid cartilages. Cricoid cartilage was identified and stay sutures were placed over both sides of anterior cricoid cartilage. Using these sutures, the laryngeal framework was pulled superiorly. This brought the upper trachea into the neck. Thyroid isthmus was identified and divided in midline and part of isthmus in front of the trachea was excised. This approach gave us good exposure of the trachea. Tracheal rings were identified and incision over the second, third tracheal rings was performed. A small piece of tracheal cartilage was excised and tracheal window was fashioned. Stay sutures were placed between the tracheostoma and the skin edges. Subcutaneous fat reduction, excision of thyroid isthmus permitted skin edges to be in closer proximity to the trachea. Care was taken not to create undue tension on the trachea. An adjustable flange cuffed portex® tracheostomy tube size 7 was placed into the tracheostoma (Figure 4, 5). The position of the tube was confirmed to be 2.5 cm above the carina using a flexible fibreoptic scope. Postoperatively the patient was in intensive care for his medical ailments. The tracheostomy tube was changed to a shiley® XLT (extended-length tracheostomy tube) size 7, uncuffed, fenestrated, with a disposable inner cannula. The patient could phonate. The patient had no issues with his tracheostomy tube. The patient gradually made progress in terms of his neurology and cardiac issues. The tracheostomy was occluded with a shiley® speaking valve and decannulated 3 weeks later. The tracheostoma has healed by second intention. The patient did not have any problems with breathing, swallowing or voice. The patient was discharged home following further improvement in his medical condition and following mobilisation. Three months post procedure, the patient was reviewed and was noted to have no problems with his breathing, swallowing and voice. Fibre optic nasendoscopy revealed normal larynx apart from sluggish left vocal cord mobility, this however seems to be improving. Expertise from the spine surgical team is being sought and the patient is undergoing treatment for his other medical ailments. Performing tracheostomy in this difficult situation has helped in extubating the patient and weaning him from the ventilator, thereby reducing the risks associated with artificial ventilation. Tracheostomy in this situation was possible only after thorough medical optimisation and meticulous pre-planning.

Figure 4: Tracheostoma with tracheostomy tube.

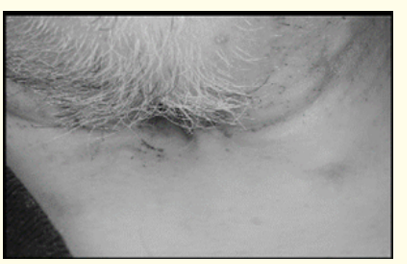

Figure 5: Tracheostoma.

Discussion

Ankylosing spondylosis (AS) is a seronegative inflammatory condition of axial skeleton of unknown aetiology. AS is part of a spectrum of axial spondyloarthritis (SpA) which includes ankylosing spondylitis (AS), psoriatic arthritis, arthritis or spondylitis with inflammatory bowel disease (IBD), and reactive arthritis [1].

The joint inflammation is accompanied by enthesopathy which is Inflammation of the site of insertion of tendons in the paravertebral zygapophyseal joints and disk spaces. This is the key pathological finding in SpA [2]. Inflammation and enthesopathy leads fusion of the joints. This leads to kyphotic fixed deformity of spine. The deformities as a result of inflammation of joints, spine and hips leads to severe functional impairment in about 30% of patients [3]. AS commonly affects males (M: F=3:1) in second through fourth decade. The incidence is 0.3% worldwide [4]. 80-95% of patients with AS are HLA-B27 (Human Leukocyte Antigen) positive [5]. There may be other aetiological factors such as environmental, genetic [6] or subsequent infection with klebsiella pneumoniae infection in HLA-B27 individuals [7]. Diagnosis of axial SpA is by clinical history, blood tests to detect HLA-B27, imaging of the spine. The Assessment of Spondyloarthritis international Society classification criteria for axial spondyloarthritis can be reliably used for the classification, diagnosis of axial spondyloarthritis (SpA) [8].

Fixed cervical spine poses problems especially in airway management due to poor access. Intubation and ventilation in patients with fixed flexion deformity of the neck can be very challenging due to poor access. This can be even more difficult during emergency or when multiple systems are involved which can cause peripheral oedema, clotting issues. All these factors need to be taken into consideration when securing airway in these patients.

Percutaneous tracheostomy (PDT) is a safe procedure performed by the intensivists [9]. It can be done with minimal access and less use of resources. A systematic review and meta-analysis of PDT versus surgical tracheostomy in critically ill patients by Delaney., *et al*. [10] found no statistically different significance in bleeding, infection and mortality between the two procedures. Percutaneous tracheostomies have been performed by various institutes in ankylosing spondylitis [11]. Following review of computer tomography scans and 3-dimensional printing, it was deemed unsafe to perform percutaneous tracheostomy in the above patient. However, these imaging modalities helped in planning an open surgical tracheostomy. In a difficult to access neck, surgical tracheostomy via thoracic approach has been described in the literature [12]. We explored a similar option with our local cardiothoracic team, who felt that it is not technically possible to approach the trachea without posing risk to major blood vessels. On initial assessment the patient cardiac function was poor, this added to the peripheral oedema. To reduce dependent oedema the patient was kept head up for few days whilst cardiac function was optimised. The family were involved in all discussions and were clearly explained all the possible complications. Complete optimisation of the all systems including clotting helped us to proceed for the surgery.

Access to the trachea was improved by positioning and surgical exposure as described above. We have there by shown that despite poor cervical trachea due to neck flexion, trachea can be pulled from the thorax and safe tracheostomy can be performed. During this procedure there may have been some traction of the recurrent laryngeal nerve on the left side despite placing cricoid sutures anteriorly. This however is improving and the patient has not reported any voice or swallowing issues. One of the biggest concerns is the displacement of tracheostoma under the soft tissues, making tracheostomy tube change very difficult or risk of losing an airway. Suturing the wall of the trachea to the skin would have been extremely helpful, this however was not performed as the trachea was very deep and the sutures were causing trachea to kink, thereby altering the shape of the tracheal lumen. Stay sutures between trachea and strap muscles were placed so that tracheostoma does not get displaced between soft tissues. Sub cutaneous fat reduction helps in reducing the depth of the tracheostoma. In these situations, an extended length tracheostomy tube is very useful. Portex® adjustable flange tube offers a good range of adjustable length of the tracheostomy tube. The company also manufactures disposable inner cannulas. This tube, however require careful monitoring by trained health professionals. Once patient's general health and neurology improves, the tracheostomy tube can be changed to a un cuffed fenestrated longer tracheostomy tubes. We have found the use of Shiley® extra-long length (XLT) and tracoe twist® very useful in this situation. The first tracheostomy tube change has to be performed by a senior member of ENT surgical team as there is potential for losing the stoma tract and thereby causing airway problems.

Conclusion

Surgical tracheostomy has helped our patient to be extubated and wean him from ventilator. This has reduced the risks of ventilator associated complications in our patient with numerous comorbidities. Medical optimisation has helped in reducing tissue oedema and correcting clotting. Surgical tracheostomy was possible only after medical optimisation, through pre-planning with CT scans and three-dimensional modelling and the surgical technique. A multi-disciplinary approach has been the key to successful and safe tracheostomy in this patient care.

Summary

- Ankylosing spondylitis is a chronic inflammatory condition which can lead to fixed flexion deformity of neck.
- This deformity leads to difficulty in accessing anterior neck making tracheostomy or access to airway difficult.
- Tracheostomy can be performed safely by appropriate pre planning using 3d -modelling, CT scans and medical optimisation.

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