

Anaesthetic Management of a Case of Ankylosing Spondylitis for Total Hip Replacement Surgery - A Case Report

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Abstract: Management of a case of ankylosing spondylitis can be very challenging when the airway and the central neuraxial blockade, both are difficult. A 23-year-old male patient with history of ankylosing spondylitis (AS) for 6 years presented for hip replacement surgery. Airway management in ankylosing spondylitis patients presents the most serious array of intubation and airway hazards imaginable, which is secondary to decrease in cervical spine mobility and possible temporo-mandibular joint disease. The reasons cited include inability to gain neuraxial access and then need for urgent airway control in case of complication of regional anaesthesia.

Keywords: Ankylosing spondylitis (AS); Anti-tubercular treatment (ATT); Patient positioning; 'Bamboo spine'; Difficult intubation

1. Introduction

Ankylosing spondylitis is a disease characterized by inflammation and fusion of the sacro-iliac joint and lumbar vertebrae with involvement of the thoracic and cervical spine. It is insidious in onset. The pathological process is one of infiltration of granulation tissue into bony insertions of ligaments and joint capsules. It further progresses to fibrosis, ossification and ankylosis. The uniform development of widespread annular fibrous ossification and the formation of bony bridges (syndesmophytes) are largely responsible for the classic radiographic appearance of the "bamboo spine" of end-stage ankylosing spondylitis.



Figure 1: Antero-posterior radiograph of lumbosacral spine. Fusion of sacroiliac joints, vertebrae with bridging syndesmophytes (shown by arrows), dagger sign (ossification of anterior longitudinal ligament and interspinous ligament) and tram track sign (syndesmophytes and ossified ligaments looking like tram tracks) are seen

The closely applied posterior longitudinal ligament and more remote interspinous ligaments may become converted to continuous bony bars, augmenting the spinal rigidity. It is a systemic disorder and a proportion of patients may develop non-articular manifestations of the inflammatory process. It is commonest in males with a high proportion carrying tissue type antigen HLAB27. The manifestations include backache and stiffness with the possibilities of spinal cord compression, atlantoaxial subluxation or cervical fracture.

Clinical diagnosis with supportive diagnostic investigations is the hallmark of this disease.

Spinal and extradural anaesthesia are usually technically difficult. Tracheal intubation may be difficult due to a stiff or rigid neck or temporomandibular joint (TMJ) involvement. If thoracic or costovertebral joints are severely affected it results in restricted ventilation. This case report details the problems faced by the anaesthesiologist in positioning the patient, difficulty in administering neuraxial block and how difficult intubation was overcome without using the fiberoptic means for intubating, which had been kept as a last resort.

2. Case Report

A 23-year-old male patient came for pre anaesthetic check up, posted for left total hip placement. Patient was suffering from severe left hip ankylosing spondylitis since 6 years following a septic arthritis, with inability to sit cross legged and inability to walk. Patient had pulmonary tuberculosis 8 years back which was treated successfully with ATT for a period of 2 years. No significant family history.

His pulse rate was 86 beats per minute and BP was 120/80mm of Hg. X-ray showed cervical spondylitis, kyphosis of the thoraco lumbar spine, total ankylosis of spine along with ankylosis of left hip joints.

The patient had a trendelenburg gait (ambulation with crutches) with an adducted and flexed left hip. Left ASIS was at the higher level. Muscle wasting and lower limb shortening was present. Movements of spine were restricted. Neck movements were restricted and he was unable to extend, flex or rotate the neck, he had kyphosis of the thoraco lumbar spine. His airway assessment showed restricted mouth opening of 3cms with ankylosis of temporomandibular joint and a Mallampatti grade 3 score with anticipated difficult intubation.



His pulmonary function tests showed mild restrictive airway disease. Other investigations like haemogram, Blood Sugars and ECG were within normal limits. Cardiopulmonary and neurological examination was normal. Equipment To assist or maintain airway was immediately available.

A difficult intubation cart was kept ready, which had a selection of oropharyngeal airway, Nasopharyngeal airway, gum elastic bougie, Laryngeal mask airway, fiberoptic laryngoscope, cricothyroidotomy needle and surgical set for tracheostomy, was kept ready. After the consent for anaesthesia was obtained, patient was shifted to O. T. With an aim to avoid airway manipulation because patient had history to pulmonary tuberculosis which results in reduced pulmonary compliance, few attempts of epidural (for catheter insertion) and sub arachnoid block were made but proved impossible because of the rigid and deformed spine.

We had kept fiberoptic intubation option as the last resort, so that we could have the experience of intubating such a challenging case in the conventional way, just as we would do in the absence of a sophisticated setting. Pre oxygenation was done for 3 min with 100% O₂ after pre medication with fentanyl 50 mcg and glycopyrrolate 0.2mg. Induction was done with propofol 2mg. kg-1 and 1mg. kg-1 succinylcholine was given after confirming the possibility of adequate mask ventilation. Laryngoscopy was performed with another assistant giving firm pressure over the cricoid and anterior larynx so as to bring the trachea into the intubating plane. Vocal cords could not be visualized. Attempt was made with no.7 oral endotracheal tube with a stylette, with the hand above the neck acting as a firm guide to confirm the correct positioning of the tube. Bilateral air entry was equal and was confirmed by capnography. Patient was maintained on N₂O and O₂ with controlled ventilation and vecuronium, fentanyl 100 mcg and midazolam 1mg were administered. During the 3h procedure patient received 1500ml of Ringer lactate and 500ml of DNS. Total blood loss was 3500ml. After reversal with neostigmine 2.5 mg and glycopyrrolate 0.5mg patient was extubated after

suctioning the oral cavity, patient maintained 99% saturation on room air. Chest was clear bilaterally. The patient's post operative course was unremarkable.

3. Discussion

Ankylosing spondylitis (AS) is a disease that may deform any portion of the spine and may be encountered in patients who present for corrective surgery of the hips or knees. The uniform development of widespread annular fibrous ossification and the formation of bony bridges (syndesmophytes) are largely responsible for the classic radiographic appearance of the "bamboo spine" of end-stage ankylosing spondylitis. The closely applied posterior longitudinal ligament and more remote interspinous ligaments may become converted to continuous bony bars, augmenting the spinal rigidity. These pathological changes can make airway management and mid-line placement of epidural or spinal needles difficult or impossible.

The aetiology of AS is unknown but numerous bacteria and viruses have been blamed for inducing disease in genetically susceptible individuals. A strong association has been found between a genetic marker HLAB27 and AS. The incidence of HLA-B27 is less than one percent in general population whereas it is present in more than 85% of patients with AS. The diagnosis of AS is made clinically according to accepted criteria. A small proportion of sufferers develop complete spinal ankylosis with or without extraarticular complications. There is restricted movement of the costovertebral joints, which reduces vital capacity and ventilation becomes progressively dependent on diaphragmatic function. This results in a death rate from respiratory causes 2.5 to 3 times higher than normal. Stiffness of the cervical spine, atlanto-occipital, temporomandibular and cricoarytenoid joints may cause problems with trachea intubation.

Extra-articular manifestations in AS:

In addition to articular symptoms. A patient with ankylosing spondylitis may have the following extra-articular manifestations:

- a) Ocular: About 25 percent patients with ankylosing spondylitis develop at least one attack of acute iritis some times during the natural history of the disease. Many suffer from recurrent episodes which may result in scarring and depigmentation of the iris.
- b) Cardiovascular: Patients with ankylosing spondylitis, especially those with long standing illness, develop cardiovascular manifestations in the form of aortic incompetence, cardiomegaly, conduction defects, pericarditis etc.
- c) Neurological: Patients may develop spontaneous dislocation and subluxation of the atlanto-axial joint or fractures of the cervical spine with trivial trauma, and may present with signs and symptoms of spinal cord compression.
- d) Pulmonary: The involvement of the costovertebral joints lead to painless restriction of the thoracic cage. This can be detected clinically by diminished chest expansion, or by performing pulmonary function test (PFT). Bilateral apical lobe fibrosis with cavitation may also occur, which remarkably simulate tuberculosis on the X-ray.
- e) Systemic: Generalized osteoporosis occurs commonly, occasionally, a patient may develop amyloidosis. Most anaesthesia – related problems occur because of difficult tracheal intubation.

Positioning

There is an ever-present risk of spine fracture and cervical spine instability in these patients. Careful positioning is imperative not only during the operation, but also in the intensive care unit (ICU) because of increased risk of iatrogenic injury. In some patients with kyphotic deformities, the presence of a highly curved spine prohibits achievement of a free-hanging abdomen. This applies especially, if the abdomen is not supported, and then there is an increase in peak inspiratory pressure and ventilation problems. To compensate, generous additional padding may be used to relieve the pressure and cause a resultant increase in central venous pressure, leading to distension of the epidural venous plexus.

Anesthetic Considerations

The management of difficult intubation has been simplified as more experience is gained with fiberoptic technique. A planned and unhurried fiberoptic intubation represents a safe, predictive alternative management strategy for patients with AS. Concern also exists that if the tracheal intubation has been difficult, the extubation may be hazardous.

Regional anaesthesia is a valuable option if the scope of the surgery is appropriate. It requires the surgery to be defined precisely in duration and site, patient acceptance, easy and accessible anatomy and to incorporate both intraoperative and postoperative analgesia into a single approach. Use of regional anaesthesia in AS is not new and has been used for appropriate surgery. Wittman and Ring considered epidural or spinal anaesthesia to be contra-indicated in AS because the placement of an epidural or spinal needle may be difficult or impossible due to ossification of interspinous

ligaments and bony bridges and tracheal intubation may still be required should there be a complication from the regional technique, such as intravenous injection of local anaesthetic or a very high block.

Management of anaesthesia in patients with ankylosing spondylitis is influenced by the magnitude of upper airway involvement by the disease, the presence of restrictive patterns of breathing due to costochondral rigidity and flexion deformity of the thoracic spine, and the degree of cardiac involvement. Awake fiberoptic tracheal intubation is performed if the spinal column deformity is extensive. Excessive manipulation of the cervical spine could injure the spinal cord. Intraoperatively, ventilation of the lungs should be supported, as the chest wall is stiff and breathing is diaphragmatic. Neurologic monitoring should be considered. Epidural or spinal anaesthesia is an acceptable alternative to general anaesthesia in the presence of ankylosing spondylitis and perineal or lowerlimb surgery. Regional anaesthesia may be technically difficult owing to limited joints mobility and closed interspinous spaces, although ossification of the ligamentum flavum is uncommon in these patients.

4. Conclusion

Although surgery is commonly recommended for ankylosing spondylitis patients, who have spinal fractures or deformities, these patients pose several intraoperative challenges are posed that may lead to significant complications and death if not recognized and efficiently managed. In every plan for anesthesia, all necessary precautions should be taken to avoid complications. The anesthesiologist should consider a safe and useful alternative option for airway management in patients with severe ankylosing spondylitis. However, neuraxial techniques should not be regarded as unachievable even in complex cases. Thorough discussion is required among the patient, orthopedic surgeon and anesthesiologist, about the potential risks and benefits of general compared with regional anaesthesia.

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