



## CHALLENGES OF 'RIGID AIRWAY' IN ANKYLOSING SPONDYLITIS: A CASE SERIES

### Anaesthesiology

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### ABSTRACT

Ankylosing spondylitis is the complex, multisystemic disorder primarily involving the axial skeleton. Uniform progressive fibrous ossification of articular and para-articular tissue results in bony ankylosis, loses flexibility of spine, ultimately leading to structural and functional impairment. Temporomandibular joint ankylosis with limited neck mobility due to fused cervical spine makes airway management challenging for anesthesiologist. Axial skeletal changes pose neuraxial anesthesia technically demanding and difficulty in positioning. These patients may require surgery for hip or spine deformity. We report a series of three ankylosing spondylitis cases with difficulties faced in securing airway and how we managed it successfully. Thorough knowledge of the disease process, familiarity with established airway techniques and choosing the most appropriate airway equipment at the right time is crucial.

### KEYWORDS

Ankylosing spondylitis, General Anesthesia, Difficult Airway

#### INTRODUCTION:

Ankylosing spondylitis (AS) is an autoimmune chronic inflammatory spondyloarthropathy mainly affecting spine and sacroiliac joints, eventually causing fusion and rigidity of spine.<sup>[1]</sup> It has varied prognosis ranging from mild to progressive debilitation.

The disease itself has unique challenges for anesthesia as potentially difficult airway due to stiffness of cervical spine and temporomandibular joint, technically demanding regional blocks, concerns about positioning due to acutely curved rigid spine and possess risk of fractures. Cardiorespiratory involvement as conduction defects, costovertebral joint arthritis leads to restrictive pulmonary pathology..

Over the period from June 2021 to Nov 2022, we anaesthetized 11 patients of AS out of which we highlight problems encountered in airway management in three cases that required general anaesthesia. Patients were in age group from 17 to 70 years with involvement of spine at different levels presented either for deformity correction or for coincidental surgeries. Written informed consent was taken from all patients for anesthesia and use of image for publication purpose. Difficult airway cart including fiberoptic bronchoscope and tracheostomy were kept ready in all cases.

#### Case History: Case 1.

Seventeen year old boy with kyphosis of thoracolumbar spine (image 1) from six years, flexion deformity of both knees presented with radicular pain in lower limbs. He was diagnosed as Juvenile Ankylosing Spondylitis, was scheduled for D10-L4 thoracolumbar fixation with osteotomy. Preoperative systemic examination including impulse oscillometric tidal breathing analysis was normal. Airway examination showed mouth opening of three fingers, Mallampati grade II and adequate neck movements.

Supine position was given with utmost care by placing three pillows under the head, two pillows under knees. Premedicated with IV fentanyl 1 mcg/kg, IV glycopyrrolate 4 mcg/kg. On check laryngoscopy with C-MAC videolaryngoscope under the effect of IV propofol 2 mg/kg and sevoflurane (2-4%) with spontaneous respiration, Percentage of glottic opening (POGO) score was 25 % with application of external laryngeal pressure. After confirming mask ventilation, IV atracurium 0.5 mg/kg given and bougie guided intubation was done. Along with standard monitoring Bispectral Index

and Neurophysiological Monitoring was done intraoperatively. Patient was maintained on Total Intravenous Anaesthesia. Intraoperative course and extubation was uneventful.



Image 1: X-ray AP/Lateral Thoracolumbar spine

#### Case 2:

Sixty five year male diagnosed AS since 15 years, unable to stand straight, lie supine or prone as shown in image 2, used to take three-four pillows to support the neck while lying down. Airway examination revealed mouth opening three fingers, Mallampati grade III with gross restriction of neck movements especially extension less than 15 degrees. He was scheduled for Percutaneous Nephrolithotomy (PCNL) but as prone position was not possible, surgery was planned in a semilateral position. First, we attempted combined spinal epidural in sitting position by both midline and paramedian approaches under ultrasound guidance. After failed trials of same, we planned general anesthesia with I Gel.



Image 2: Patient in prone and supine position

Supine position was given by keeping three pillows under patients head to accommodate curvilinear spine. For inserting I Gel, operating table was taken complete down, in Trendelenberg position to get better access to patient's face. Two attempts of I Gel insertion failed, after which table was placed in 30-40 degree head up, anesthesiologist stood facing the patients face and able to put Ambu-Aura Laryngeal Mask Airway (LMA) size four with this modified technique. Surgery went uneventful.

### Case 3

Seventy year male with cervical spine injury, presented with quadriparesis, diagnosed having C4-C6 intervertebral disc desiccation with cord compression, was posted for emergency anterior cervical decompression and fixation. Airway examination showed broad jaw, mouth opening three fingers, Mallampati grade III with cervical collar in situ. We couldn't assess neck movements. Anticipating possibility of prolonged postoperative mechanical ventilation and anterior surgical approach precluded preoperative tracheostomy, it was planned postoperatively.

Anesthesia was induced with IV propofol 2 mg/kg and IV rocuronium 1 mg/kg. On direct laryngoscopy using Mac-Coy blade with inline stabilization, POGO score was zero. Successive intubation with videolaryngoscope and bougie were attempted, however endotracheal tube couldn't be negotiated below the epiglottis. Meanwhile SPO2 dropped upto 80-85%. Efforts of mask ventilation were inadequate to maintain SPO2 more than 90%. So emergency tracheostomy was done. Ryles tube insertion was also tough in this patient. Postoperatively patient shifted to ICU, tracheostomy was decannulated on tenth day.

### DISCUSSION:

Ankylosing spondylitis may deform any portion of spine. Widespread annular fibrous ossification and formation of bony bridges gives classical appearance of 'Bamboo spine'. Progressive cervical spine involvement decreases neck extension leading to 'chin on chest' deformity.<sup>[2]</sup> These changes make both airway management and regional anesthesia challenging.

Preoperative evaluation should focus on severity and extent of the disease, degree of airway involvement, cardiopulmonary compromise, difficult positioning, impossible sniffing position, access to neuraxis. Documentation of pre-existing neurodeficits is mandatory.

In our first case only thoracolumbar spine was affected so we planned direct laryngoscopy with C-MAC videolaryngoscope and successfully intubated the patient. Here we emphasize mainly on importance of thorough preoperative airway examination, assessing range of neck movements, attaining appropriate position and special tests as Impulse Oscillometry which needs minimum patient co-operation for assessment of lung function which needs minimum patient cooperation.

Lai H Y successfully performed nasotracheal intubations with Glidescope videolaryngoscope in ankylosing spondylitis patients and concluded that it provides better view with improved Cormac Lehane grade and POGO score.<sup>[3]</sup> Wei -can Chen used double visualization intubation strategy with videolaryngoscope they guided endotracheal tube using lighted stylet.<sup>[4]</sup>

In second case central neuraxial block was attempted for PCNL under ultrasound guidance, but could not succeed. Regional anesthesia in AS can be safer option but skeletal changes makes neuraxial placement difficult. Kotekar Nalini reported a case of severe AS posted for hip replacement where they found spinal epidural impossible even after many attempts.<sup>[5]</sup>

Here sniffing position for intubation was impossible owing to stiff neck. Intubating laryngeal mask (ILM) and classic LMA have been used in AS patients with the advantage of trachea being intubated without head neck movement.<sup>[1]</sup> Hence we planned and secured the airway with laryngeal mask. 'Face To Face'<sup>[6]</sup> approach helped in inserting AmbuAura LMA which has preformed shape, that fits congruent to anatomic curvature of oropharynx.

However insertion of LMA may be impossible in severe flexion deformities. Ishimura found LMA insertion impossible when angle between oral and pharyngeal axes was smaller than 90 degree at back

of tongue.<sup>[7]</sup> Gonul Olmez suggested to measure oropharyngeal axis radiologically in AS patients and can be used as predictor of difficult LMA insertion.<sup>[8]</sup>

Securing airway in traumatic cervical spine itself is the task for anesthesiologist. Our third patient had cervical injury leading to neurodeficit was posted in emergency where we failed to communicate with surgeon about detailed radiological imaging which showed ankylosis of costovertebral joints along with large anterior osteophyte at C4 level indenting oesophagus, shown in image 3.

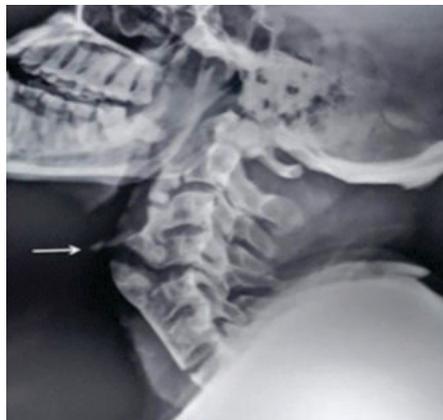


Image 3: osteophyte at C4 level.

Here costovertebral arthropathy hampered the chest compliance causing difficult mask ventilation. Pre-existing osteophyte might caused problem in negotiating the endotracheal tube below epiglottis. We landed in 'Can't intubate Can't Ventilate' situation which required tracheostomy preoperatively. Retrospectively patients relatives also gave history of decreased neck movements, favouring AS. Even though Awake Fiberoptic Intubation (AFOI) is the gold standard and safest option for securing definitive airway in AS patients with involvement of cervical spine, large osteophytes as in our case might hinder the success of AFOI. Miki Lida found extreme difficulty in advancing fiberscope in trachea due to cervical osteophyte impinging posterior pharyngeal wall. They suggested tracheostomy in such cases to avoid catastrophe.<sup>[9]</sup>

Eipe Naveen reported the case of long standing AS with dysphagia due to osteophyte at epiglottis level, scheduled for cervical decompression. They performed awake fiberoptic intubation through split nasopharyngeal airway ensuring oxygenation via modified nasal trumpet inserted in other nare.<sup>[10]</sup>

AS patients are at greater risk of spine fractures following trauma due to stiffness, kyphosis and osteoporotic bones, common in cervico-thoracic junction.<sup>[11]</sup> Airway handling with excessive neck extension can cause cervical injury. Alexander Epaud reported case of C5-C6 fracture after videolaryngoscopy in 80 year old patient of AS.<sup>[12]</sup> So forcible movements should be avoided.

### CONCLUSION

Ankylosing Spondylitis pose tremendous challenges for anesthesiologists. Meticulous preoperative assessment, well planned case based strategy with back-up plan, selection of appropriate airway management techniques, interdisciplinary communication will help in safe conduct of anesthesia and to overcome challenges which come hand in hand in such high risk cases.

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