



Taylor Approach of Spinal Anaesthesia in a case of Ankylosing Spondylitis for Hip Fracture Surgery

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Abstract: Ankylosing Spondylitis (AS) is a chronic inflammatory rheumatic disease with male prevalence. It primarily affects axial joints manifesting as stiffness of the spine, and also affects peripheral joints. It has a strong genetic predisposition associated with human leukocyte antigen B27. Patient with ankylosing spondylitis is a challenge to anaesthesiologists in terms of airway management and neuraxial blocks. Modified paramedian approach (Taylor approach) of spinal anaesthesia can be used as an alternative to technically difficult cases in patients undergoing lower limb surgeries.

Keywords: Ankylosing Spondylitis, Spinal Anaesthesia, Taylor approach.

Introduction: Ankylosing spondylitis (also known as Bechterew disease, Marie Strumpell disease), an autoimmune seronegative spondyloarthropathy is a painful chronic inflammatory arthritis punctuated by exacerbations and quiescent periods¹. The inflammatory process usually begins at the sacroiliac joints and spreads upwards to involve the spine and costovertebral joints leading to classical 'bamboo spine'. The uniform development of widespread annular fibrous ossification involves the joint cartilage and disc space of the axial skeleton, with eventual ankylosis. The formation of bony ridges (syndesmophytes) is largely responsible for the classic radiographic appearance of the bamboo spine of end-stage of ankylosing spondylitis. Prevalence estimates vary between 0.1% and 2% in different populations. The male:female ratio is around 5:1 and the peak age of onset is at 15 -35 years. The disease is likely to be triggered by an unknown environmental factor in patients who are genetically predisposed². About 90-95% of white western European patients with ankylosing spondylitis have the tissue human leukocyte antigen B 27(HLA-B27)³. Recently, two more genes have been identified associated with AS, called ARTS1⁴ and IL23R⁵ which seem to play a role in influencing immune function.



The course of this disease is extremely variable, ranging from the individuals with mild stiffness and radiographically equivocal sacroilitis to the patients with a totally fused spine and severe bilateral hip arthritis, accompanied by severe peripheral arthritis and extra-articular manifestations (Table-1)⁶. In daily practice, a presumptive clinical diagnosis of AS is usually supported by radiologic evidence of sacroilitis. The modified New York criteria use a combination of clinical and radiological data to confirm diagnosis of AS (Table-2)⁷.

<ul style="list-style-type: none"> • Anterior uveitis (25%) and conjunctivitis (20%) • Prostatitis (80%)-usually asymptomatic • Cardiovascular disease <ul style="list-style-type: none"> ○ Aortic incompetence ○ Mitral incompetence ○ Cardiac conduction defects ○ Pericarditis • Amyloidosis • Atypical upper lobe pulmonary fibrosis <p>Table 1: Extra-articular features of AS</p>	<p>Clinical Criteria</p> <ol style="list-style-type: none"> 1. Low back pain of at least 3 months duration improved by exercise or not relieved by rest 2. Limitation of lumbar spine in sagittal and frontal planes 3. Chest expansion decreased relative to normal values for age and sex <p>Radiological Criteria</p> <ol style="list-style-type: none"> 1. Bilateral sacroilitis grade 2 or 4 2. Unilateral sacroilitis grade 3 or 4 <p>Definite AS if the radiological criterion is associated with at least 1 clinical criterion.</p> <p>Table 2: Modified New York (1984) Criteria for AS</p>
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Sacroilitis is the hallmark of the disease. MRI of sacroiliac joints has been proposed to allow early stage diagnosis and shown to be more sensitive than either plain radiography or computed tomography in detecting sacroilitis⁸.

Traditionally, the treatment begins with physiotherapy, regular use of non-steroidal anti-inflammatory drugs, local corticosteroids and injections and sometimes sulphasalazine. The advent of anti tumour necrosis factor α agents has revolutionised the medical management of the disease. New evidence based recommendations for the management of ankylosing spondylitis have been proposed by the International Assessment in ankylosing spondylitis working group in collaboration with the European League Against Rheumatism⁹.

Case Report: A 45 years old average built male patient was posted for hip fracture surgery. He had a history of severe AS for past 10 years affecting whole vertebral column. The disease was so severe that he had a “leaning forward” look of his back and was unable to bend sideways. Pre-anaesthetic assessment revealed about 2 finger breadths interdenture distance, thyromental distance of 2.5 cm and Mallampati score of grade III, with possibility of extremely difficult tracheal intubation. A thorough pre-operative assessment ruled out involvement of other organs. His ejection fraction was 60% and pulmonary function tests revealed FEV1/FVC ratio of 80%. On auscultation all the lung fields were bilaterally clear. X-ray of vertebral column and sacroiliac joints showed cervical

spondylitis, kyphosis of the thoracolumber spine, total ankylosis of spine along with ankylosis of the both hip joints (Fig 1). Dorsolumbar and lumbosacral spine showed presence of anterior and posterior longitudinal ligament calcification with syndesmophytes suggestive of 'bamboo spine'. The distance between his occipital protuberance and bed was around 30 cm in the supine position, which he used to compensate by applying three pillows under his head while lying supine (Fig 2).

The patient was preloaded with Ringer Lactate 10 ml/kg preoperatively and was shifted to OT on a trolley in supine position with 2 pillows under the back and head. Care was taken to avoid fractures while positioning. The patient was placed in lateral position and few attempts of sub arachnoid block (SAB) were made which failed because of the rigid and deformed spine. The patient was then placed in sitting position but the position was not satisfactory for the conventional approach for the spinal anaesthesia as we were not able to appreciate interspinous spaces. We decided to use Taylor approach (modified paramedian technique at the level of L5-S1) for SAB. The 23G needle was in the sub-arachnoid space in the first attempt and free flow of CSF was obtained. Then, 2.5 ml of 0.5% heavy bupivacaine was injected. Adequate block was obtained upto T6 level and the surgical procedure lasted for 45 minutes. The patient did not require any airway intervention and his vitals and hospital stay remained uneventful.

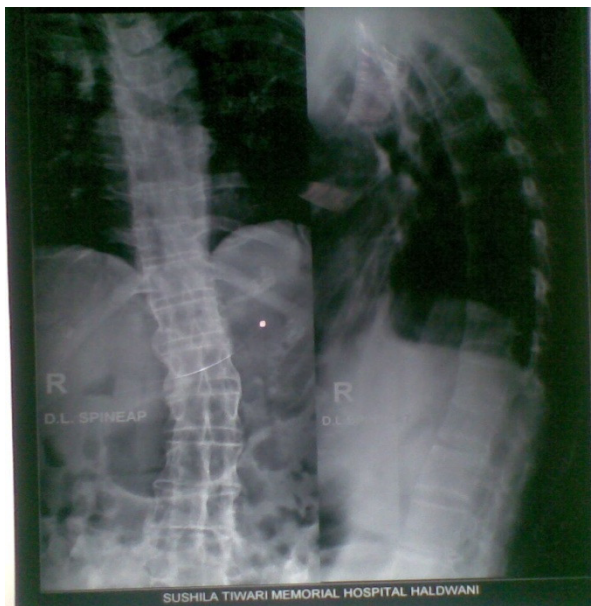


Fig 1: AP and Lateral view of spine
(Bamboo Spine)



Fig 2: Restricted mouth opening and stiffness of spine secondary to disease

Discussion: The trend has been to deal with the airway challenge and avoid neuraxial anaesthesia in the patients of AS. The Literature supports definitive airway management and many authors consider regional anaesthesia to be contraindicated. The reasons cited include inability to gain neuraxial access and the need for urgent airway control in case of complication of regional anaesthesia¹⁰. However, epidural or spinal anaesthesia is an acceptable alternative to general anaesthesia in the presence of ankylosing spondylitis for perineal or lower limb surgery¹⁰. If a central
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neuraxial blockade is chosen as the anaesthetic technique, the likelihood of successful spinal anaesthesia seems higher than other neuraxial interventions¹¹. The radiographic pictures of this patient revealed the classic 'bamboo spine' of end stage Ankylosing spondylitis along with more remote interspinous ligaments converting into continuous bony bars, augmenting the spinal rigidity. Ossification of interspinous ligaments and formation of syndesmophytes between the vertebrae make the placement of a spinal or epidural needle difficult or impossible in case of lumbar spine involvement, although ligamentum flavum ossification is uncommon. These pathological changes can make airway management and mid-line placement of epidural or spinal needles difficult or impossible. General anaesthesia in this patient carries the risk of failed intubation and cervical spine injury hence fiberoptic intubation is recommended. Fiberoptic bronchoscope was not available in our institute, though difficult airway cart with alternative devices were kept ready. Difficulty in managing the airway is the single most important cause of major anaesthesia-related morbidity and mortality. The criteria that predict difficult airways should be reviewed such as the Mallampati test, Wilson index, thyromental distance, sternomental distance, the degree of head and neck movements and mouth opening¹². Sciubba DM et al recommended that radiographic studies be conducted prior to intubation of any patient with AS, so that presence of obstructive entities can be determined¹³.

Technical difficult and multiple attempts at central neuraxial blockade are associated with a higher risk of complications, including spinal hematoma. Therefore, patients need to be followed up for signs and symptoms of a developing spinal hematoma during the early (24 hrs) and late (one week) postoperative phases¹⁴. The spinal hematoma may also be related to concurrent NSAIDS therapy. Pre-anaesthetic assessment of this patient revealed that he required three pillows to support his head due to the involvement of spine. The patient was placed in sitting position but it was found to be unsuitable for the conventional approach of spinal anaesthesia. While attempting the regional anaesthesia, one should avoid putting too much pressure on the back for obtaining optimal position for spinal anaesthesia due to the risk of vertebral fractures. The fractures in Ankylosing spondylitis most commonly occur at the thoracolumbar and cervicothoracic junctions with minimal trauma², the two main sites used by anaesthesiologists either for airway management or neuraxial anaesthesia. The Taylor approach of spinal anaesthesia is an alternate safe approach in elderly patients with severe scoliosis and kyphoscoliosis with a success rate of 100%¹⁵. Following unsuccessful standard midline spinal anaesthesia approach we decided to attempt Taylor approach, which is a modification of the paramedian approach for spinal anaesthesia. It is carried out at L5-S1 interspace, the largest interlaminar space of the vertebral column. Spinal needle is inserted in a cephalomedial direction through a skin wheal raised 1 cm medial and 1 cm caudal to the lowermost prominence of the postero-superior iliac spine¹⁶. Kumar CM showed that spinal anaesthesia by the lateral approach is a feasible and useful technique for lower limb surgery in AS patients¹⁷. Several textbook of anaesthesia consider that any form of anaesthesia, whether general or more particularly regional, is hazardous despite reports of successful use of caudal epidural anaesthesia¹⁸. The excessive cephalad spread of the neural blockade during epidural or spinal anaesthesia may result in high motor blockade, may affect innervations of the diaphragm and acute cardiovascular effects of sympathetic blockade¹⁷.



Preoperative cardiorespiratory evaluation (ECG, ECHO, PFTs) is essential to determine the risk in valvular and conduction cardiac defects. The sudden and intense variation in systemic vascular resistance caused by the spinal anaesthesia is not tolerated by patients with these problems. External cardiac massage in the presence of a rigid thoracic wall may be ineffective. Our patient had reduction of chest expansion. Pulmonary function tests of patient revealed restrictive lung disease with otherwise normal lung fields. Therefore the possibility of requirement of tracheostomy and post-operative ventilator support was discussed and the consent for the same was taken.

Traditional landmark guided neuraxial blockade technique can be extremely challenging in patients with abnormal spinal deformity. Pre-operative ultrasonography of lumbar spine may facilitate successful central neuraxial blockade in such patients, by indicating the presence and location of a soft tissue window into the vertebral canal¹⁸. Chin and Chan have used the ultrasonography as a preoperative tool to assess the feasibility of a central neuraxial blockade in an AS patient¹⁹.

Conclusion: Neuraxial techniques should not be regarded as unachievable even in technically complex cases. A thorough pre-operative assessment is essential to evaluate the severity of the disease and to decide the anaesthesia technique. Subarachnoid block using a Taylor approach has been advocated as an alternative when general anaesthesia and conventional spinal anaesthesia seems to be technically impossible.

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