

Anaesthetic Management of a Patient with Anticipated Difficult Airway/Difficult Laryngoscopy/Difficult Spine? Ankylosing Spondylitis Posted for Bilateral Total Hip Replacement

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Abstract

Background: Ankylosing spondylitis (AS) creates notable problems for anaesthesia because spinal movement is reduced, neck flexibility is poor, and the risk of difficult intubation increases. Such structural changes make it harder to handle breathing pathways, adjust patient position, or reach the neuraxis - especially in extensive joint surgeries like double hip replacements. Current rules for managing airways emphasize careful planning, anticipating complications, and preparedness with backup options. Here, choosing an approach that limits interference with the airway becomes essential to reduce surgical risks. **Case Presentation:** A 65-year-old male with long-standing bilateral osteoarthritis of the hips and recently diagnosed type 2 diabetes mellitus presented with severe hip pain and functional limitation. Pre-anaesthetic evaluation revealed a Mallampati grade III airway, restricted neck flexion and extension, and features suggestive of an anticipated difficult airway. Cardiovascular and respiratory examinations were unremarkable, and echocardiography showed a left ventricular ejection fraction of 58%. Given the predicted airway difficulty and limited spinal mobility, a combined spinal-epidural technique was selected. An epidural catheter was placed at L2-L3, followed by a paramedian subarachnoid block with 3.2 mL of 0.5% bupivacaine and 120 µg buprenorphine. Adequate surgical anesthesia was reached, so a bilateral total hip replacement could continue smoothly using regional anesthesia. The patient's recovery after surgery stayed steady - pain control worked well, while there were neither breathing issues nor nerve-related problems. **Discussion:** The team here emphasizes how regional anaesthesia can help in AS cases when airway handling is risky. Studies show varying results depending on the severity of spinal changes. However, some papers mention the need for awake fiberoptic intubation, video-assisted laryngoscopy, or X-ray-guided nerve blocks. This individual's milder limitations made it possible to use spinal anesthesia safely - no shift to full sedation required. Looking at earlier examples supports the idea that central nerve methods may improve blood pressure control and reduce breathing issues after surgery in similar situations. **Conclusion:** This example highlights why spotting breathing and spinal issues early in AS matters - regional anaesthesia should be considered if possible. Planning tailored to the individual, adherence to airway protocols, and team-based care help improve outcomes for patients expected to have difficult intubation during major bone operations.

MeSH Terms: Ankylosing Spondylitis; Airway Management; Difficult Laryngoscopy; Neuraxial Anesthesia; Total Hip Replacement.

Keywords: Ankylosing Spondylitis; Airway Management; Difficult Laryngoscopy; Neuraxial Anesthesia; Total Hip Replacement.

Received: 19 February 2026

Revised: 28 February 2026

Accepted: 16 March 2026

Published: 23 March 2026

INTRODUCTION

The existence of a predicted tough airway in someone with spine-related issues creates serious concerns for anaesthesia providers - especially during extensive bone surgeries like double hip replacements. Ankylosing spondylitis (AS), a long-term inflammatory joint condition affecting the spine, involves gradual hardening of spinal ligaments and the fusion of vertebrae, leading to fixed forward-bending postures and severely reduced neck movement. Such structural changes hinder a clear view of the airway, interfere with breathing support via face mask, make tube placement more difficult, limit options for nerve-targeted pain relief techniques, and restrict safe body alignment - all of which increase complexity in surgical care.

Managing hard-to-secure airways follows clear steps backed by research, which help prevent low oxygen levels and

reduce risks during surgery. The 2015 DAS framework still plays a key role for adults; it outlines how to move step-by-step - from best-effort intubation, toward using supraglottic devices, restoring breathing, or making an emergency neck opening if needed.^[1] In contrast, the ASA's 2022 update placed greater emphasis on predicting problems before surgery, accounting for

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DOI:

10.21276/amit.2026.v13.i1.436

How to cite this article: Patankar V, Selvi A, Ravi B. Anaesthetic Management of a Patient with Anticipated Difficult Airway/Difficult Laryngoscopy/Difficult Spine? Ankylosing Spondylitis Posted for Bilateral Total Hip Replacement. Acta Med Int. 2026;13(1):762-767.

teamwork factors, and using tools such as video-assisted scopes or conscious intubation in high-risk cases.^[2] Later, the revised 2025 DAS guidance improved decision-making logic, prioritized approaches to maintaining oxygen delivery, and adjusted coordination across healthcare teams facing unexpected intubation challenges.^[3]

The Indian setting strengthens the case for using algorithms in clinical routines. Because resources differ widely, the All India Difficult Airway Association (AIDAA) developed practical guidance based on expert agreement. During the pandemic, their advice stressed teamwork readiness, reducing airborne particles, and clear thinking when managing airways.^[4] By 2025, AIDAA updated these protocols for adult patients undergoing general anaesthesia, highlighting checks before surgery, selecting the primary and backup methods, and identifying potential airway failure early.^[5] Such local standards matter greatly in scenarios like this, especially when tough airways are combined with spine issues.

Patients with ankylosing spondylitis face difficulties that go beyond managing the airway. Due to stiff vertebrae in both the neck and lower back regions, proper alignment for laryngoscopy becomes difficult, making standard intubation methods less effective. Studies show these individuals have a greater chance of spinal fractures, joint misalignment at the top of the spine, or nerve damage when their airways are handled. A report by Zakaryan and Ginosyan highlights how fragile such cases can be during bone-related surgeries, especially because breathing issues after surgery and unstable blood circulation occur more often.^[6] In parallel, findings from Peng et al.'s 2025 analysis of people with extreme forward bending spines showed that distorted anatomy led clinicians to adjust anaesthesia onset plans, the tools used, and the tracking of vital signs before and after procedures.^[7]

Also, people with AS may require new ways to position the body during procedures - this helps manage breathing and gives surgeons better access. In 2024, Mahaseth's team showed that tailored padding and adjusted postures reduced neck strain and improved safety under anaesthesia in those with severe spine issues.^[8] These findings highlight the importance of adapting plans to each patient, involving specialists early, yet remaining flexible when anatomy makes usual methods unsuitable.

In cases of bilateral hip replacement, problems increase. Because interspinous spaces can be closed and ligaments hardened, regional anaesthesia might not work well; in contrast, general anaesthesia could be limited by limited airway access. Thus, choosing the right method means weighing possible breathing difficulties against the realism of a spinal or epidural block - this calls for careful evaluation, readiness to switch approaches, and open coordination between anaesthetists and surgeons.

This case describes how a 65-year-old man with ankylosing spondylitis - leading to expected airway challenges, limited neck movement, and spinal complexity - was managed around surgery for double hip replacement. Instead of standard approaches, adjustments were made based on global and local guidelines and physical limitations. The approach

highlights real-world anaesthesia choices for complex bone procedures, focusing on patient safety. By matching care plans to individual anatomy, risks were addressed without relying on routine protocols.

Detailed case report:

A 65-year-old man reported gradually increasing pain in both hips. Although he'd dealt with hip osteoarthritis for around eight years, his symptoms were manageable - until five days before hospitalization, that is, when discomfort intensified sharply, limiting movement and leading him to seek care. No previous surgeries or ongoing health conditions were noted at intake. At the time of evaluation, blood tests revealed recently identified type 2 diabetes; however, treatment had not begun. No known cases of diabetes, high blood pressure, thyroid issues, TB, or asthma in the family. Patient looked fairly well-developed and fed, alert, aware of surroundings, and willing to engage, showing no evidence of organ system failure.

Airway assessment revealed possible intubation challenges. Although oral aperture went beyond three fingers' width, thyromental span similarly surpassed that measure - still, Mallampati score stood at class III. Neck movement was limited; bending forward and backward was stiff, as is typical in ankylosing spondylitis. Additionally, he wore a top denture. Cardiac exam revealed regular rhythms, no abnormal noises heard. Lungs were clear, with normal breath sounds across all zones; neurological exam found no focal deficits. The abdomen appeared swollen, with fullness extending into the upper abdomen; however, there was no sharp pain on touch. While lying on his side, his blood pressure was 120/70 mmHg, but dropped to 100/60 mmHg when flat on his back. Pulse registered 100 beats per minute, breaths counted at 32 per minute, oxygen level stayed at 97% without supplemental air. Capillary refill lasted 15 seconds. Lab results appeared normal; however, HbA1c was 10.20%, indicating unstable glycemic control. The ECG showed a fast heart rhythm originating from the sinus node; meanwhile, echocardiography showed a 58% ejection fraction and preserved ventricular function. Considering his overall condition, he received an ASA class III rating. Before proceeding, informed consent was documented for high-risk procedures, following discussion about challenges securing the airway, chance of needing breathing support after surgery, use of drugs to maintain circulation, risk of irregular heartbeats during operation, sudden cardiac events, and necessity for close monitoring in the ICU afterward.

Due to limited neck motion plus expected challenges with intubation, the anaesthesia group chose a spinal-epidural approach to prevent needing full sedation if possible. On July 13, 2024, surgery began for both hips. Once in the theatre, standard monitoring per ASA guidelines was established; initial vital signs were recorded. An IV access site (20G, large-bore) was placed securely. Using sterile care, an epidural catheter was inserted into L2-L3 through an 18-G Tuohy needle by the loss-of-resistance method. The catheter stayed in place at 11 cm. Next, while the patient lay on their left side, a 23-gauge Quincke needle entered via a paramedian route into the subarachnoid area. Clear cerebrospinal fluid drainage confirmed proper positioning. Instead of combining agents separately, 3.2 mL of 0.5% bupivacaine containing 120 mcg buprenorphine was injected directly into the space. This led to effective numbness and muscle

relaxation. The operation continued smoothly using only regional blockage; no switch to full sedation was required. Following surgery, the patient went to the surgical ICU due to concerns about airway management, existing diabetes, and the extensive procedure. Recovery proceeded without issues;

there were no problems with breathing, blood pressure, or brain function. On day two after the operation, the epidural tube was removed. Pain remained well-managed, and heart and lung function remained steady throughout the recovery phase.

Table 1: Key Clinical Parameters

Parameter	Extracted Value
Blood Pressure (Left Lateral)	120/70 mmHg
Blood Pressure (Supine)	100/60 mmHg
Pulse Rate	100/min
Respiratory Rate	32/min
SpO ₂ on Room Air	97%
HbA1c	10.20%
Ejection Fraction (2D Echo)	58%



Figure 1: Cervical spine radiograph (AP and lateral views) showing reduced cervical mobility with degenerative changes.



Figure 2: Pelvic radiograph demonstrating bilateral hip joint remodeling with osteoarthritic changes.

Image demonstrating bilateral hip joint remodeling with advanced osteoarthritic changes, correlating with the patient's severe functional limitation requiring bilateral total hip replacement.

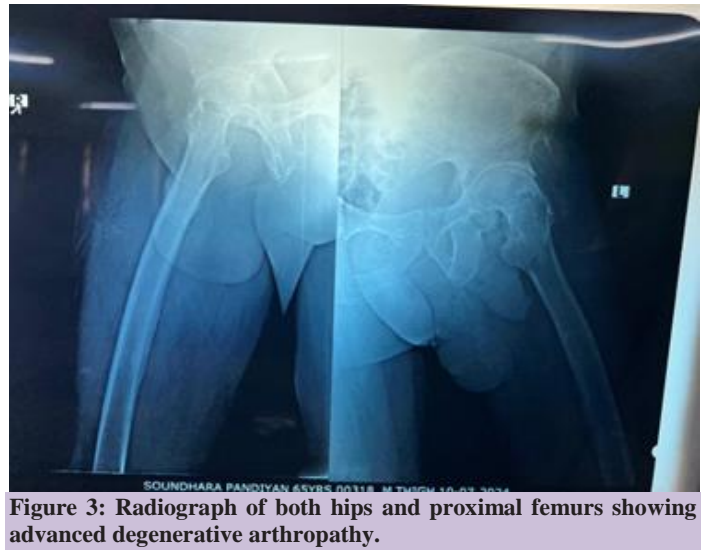


Figure 3: Radiograph of both hips and proximal femurs showing advanced degenerative arthropathy.

Radiographic view showing advanced degenerative arthropathy with joint-space narrowing and deformity, confirming end-stage hip disease.



Figure 4: Chest radiograph (PA view) showing normal lung fields with prominent costochondral calcification.

Chest X-ray showing clear lung fields with prominent costochondral calcification, often associated with chronic

inflammatory disorders, including ankylosing spondylitis.



Figure 5: Clinical photograph showing enlarged, dry tongue with coating (for systemic evaluation).

Clinical image showing a Mallampati Grade 4 airway, indicating a high-risk, difficult airway with only the hard palate visible. This classification significantly increases the likelihood of difficult laryngoscopy and intubation in patients with ankylosing spondylitis or cervical rigidity.



Figure 6: Clinical Photograph Demonstrating Restricted Neck Extension

Clinical image showing marked restriction of neck extension,

with the patient unable to achieve the normal atlanto-occipital extension required for optimal laryngoscopic positioning. This reduced cervical mobility is characteristic of ankylosing spondylitis and contributes significantly to the anticipated difficult airway profile.

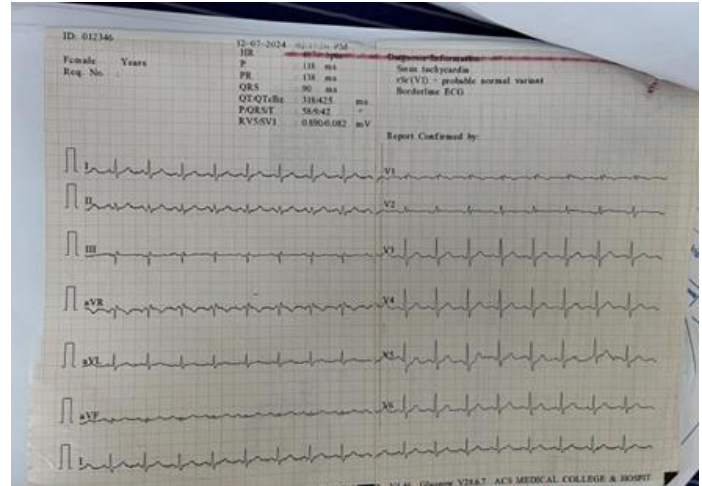


Figure 7: Twelve-lead ECG showing sinus tachycardia with normal axis and borderline findings.

ECG demonstrating sinus tachycardia with normal axis and borderline changes, consistent with the patient's preoperative evaluation findings.

DISCUSSION

It is a headache to handle an AS patient with anaesthesia due to progressive spinal rigidity, airway distortion, and limited cervical mobility. A combined spinal-epidural technique was used successfully in the current case, which is different from many reports where patients were intubated due to severe deformity or limited mouth opening. In most published reports, airway intervention was unavoidable due to severe deformity or limited mouth opening. However, in this case, the combined spinal-epidural technique was successfully used, thereby avoiding general anaesthesia and airway manipulation.

Channabasappa et al. reported three AS patients in whom fluoroscopy-guided transforaminal epidural anaesthesia achieved successful neuraxial blockade in all cases. In contrast, midline spinal attempts failed due to fused ligaments.^[9] Their accomplishment rate is the same as in the current case, where the paramedian method was used for easy intrathecal access without imaging guidance. Compared with their group, our patient's spine was moderately mobile, allowing the neuraxial to be placed without fluoroscopy, indicating that early recognition of spine flexibility helps determine the need for imaging guidance.

Kumar et al. raised airway issues and referred a case of AS with traumatic cervical spine injury in which awake fiberoptic intubation was performed because of almost complete neck extension loss.^[10] On the other hand, our patient had a little but not complete cervical movement and was also able to open his mouth more than 3 fingers; thus, airway intervention was totally avoided by giving regional anaesthesia. Comparing the two cases shows that the extent of deformity is the major factor determining

the airway approach.

The role of video-assisted devices was highlighted by Limalvin and Kurniawan, who used a videolaryngoscope to successfully intubate a patient with a Cormack–Lehane grade 3 view on direct laryngoscopy.^[11] Their work implies that video tools greatly facilitate glottic visualization when the neck cannot be flexed or extended. Although intubation was not done in our case, the limited neck extension and Mallampati grade III airway of our patient were similar to those of their patient; if regional anaesthesia had failed, they were prepared to use videolaryngoscopy.

Heroabadi et al. noted that AS patients undergoing corrective spine surgery experienced significant haemodynamic changes during induction, with systolic blood pressure dropping by 20–25% on average, requiring vasopressor support.^[12] On the other hand, the patient in our case was haemodynamically stable throughout the operation under neuraxial anaesthesia. This comparison shows that regional methods may provide cardiovascular stability, unlike general anaesthesia, in AS patients with stiff thoracic cages and reduced lung capacity.

In the Indian setting, Kamat et al. reported a situation where cervical myelopathy due to AS had severely limited both airway access and positioning, thus making awake fiberoptic intubation the only option.^[13] Although our patient also had limited neck movement, the absence of neurological involvement made regional anaesthesia safer. It reduced the need for airway manipulation, thereby demonstrating that disease severity influences anesthetic planning.

Mustafa's study found that limited atlanto-occipital extension ($<15^\circ$) is one of the major factors contributing to difficult laryngoscopy in AS.^[14] The limited cervical extension in our case is consistent with his statement; however, the possibility of neuraxial blockade made airway instrumentation unnecessary. This alternative route shows how pre-operative assessment can change the anaesthetic plan from one involving airway-dependent methods to another.

For instance, Brezic et al. talked about a patient with extremely severe deformities who was unable to be intubated by either videolaryngoscopy or fiberoptic bronchoscopy. They thus underwent blind nasotracheal intubation, which was successful on the third attempt.^[15] That is a position at one end of the spectrum of airway difficulty, which is very different from our patient's case, whose anatomical limitations were only moderately limiting. Therefore, he could still be conducted safely under regional anaesthesia.

Likewise, Rebai et al. emphasised the reliance on resources and staged airway planning when airway visualisation is impossible due to deformities, as they recounted several unsuccessful laryngoscopy attempts before an awake intubation was finally accomplished.^[16] Their story describes a very high level of airway difficulty, whereas our patient had an intermediate level.

Moreover, anaesthetic considerations in AS extend beyond the intraoperative period and include the postoperative phase, especially after hip arthroplasty. Yuliana et al. observed that AS patients undergoing total hip replacement reported higher postoperative pain levels (average VAS 6–7) and, therefore,

were more likely to require multimodal analgesia including epidural infusions.^[17] This discovery corroborates the analgesic effect of the combined spinal–epidural technique employed in our patient, as the postoperative pain was adequately relieved.

In the end, Zhang et al. found that intraspinal anaesthesia led to more stable haemodynamics, a lower incidence of postoperative hypoxia (5% vs 18% under general anaesthesia), and decreased opioid requirements in patients undergoing total hip arthroplasty.^[18] Actually, their findings are in line with the successful outcome of our case, where spinal epidural anaesthesia was the reason for stable intraoperative parameters and no airway-related complications.

Most of the literature on AS cases that necessitate general anaesthesia has in common that direct laryngoscopy fails, advanced airway devices are required, or fluoroscopically assisted neuraxial approaches are used in patients with fused interspaces. This patient, on the other hand, had a moderately challenging rather than a severely anatomical profile, thus allowing him to undergo successful regional anaesthesia without any airway instrumentation. The current case, compared with other published reports, demonstrates that recognizing difficult spine and difficult airway early and choosing neuraxial methods, if possible, can lower the perioperative risk for AS patients undergoing major joint replacement surgery.

CONCLUSION

Anaesthetic management in ankylosing spondylitis requires anticipating airway distortion, limited cervical mobility, and changes in spinal anatomy. This case illustrates that, with a thorough preoperative check and proper planning, regional methods such as combined spinal–epidural anaesthesia can be used safely and effectively, thereby avoiding the risk of difficult laryngoscopy. Compared with cases requiring awake fiberoptic intubation, videolaryngoscopy, or fluoroscopic neuraxial access due to severe deformities, this patient's moderate anatomical limitations allowed a less invasive and more stable approach.

The completion of bilateral total hip replacement without the use of airway instrumentation is a powerful testament to the importance of individualized anesthetic planning, multidisciplinary communication, and readiness with alternative strategies in case regional techniques fail. In the end, this case demonstrates that early recognition of airway and spine issues, careful selection of the technique, and close perioperative monitoring go a long way toward ensuring safe outcomes in patients with ankylosing spondylitis undergoing major orthopaedic surgery.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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