

Original article

ANESTHETIC CONSIDERATIONS IN SEVERE ANKYLOSING SPONDYLITIS

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Abstract Ankylosing spondylitis (AS) is a chronic, usually progressive inflammatory disease involving articulations of the spine and adjacent tissue. It is most common in males, with a high proportion carrying tissue type antigen HLA B27. The diagnosis of AS is made clinically according to accepted criteria. 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 bridges (syndesmophytes) is largely responsible for the classic radiographic appearance of the bamboo spine of end stage ankylosing spondylitis, as shown in Figure 1. Arthritis and ankylosis may also develop in the hips, shoulders, and costovertebral joints, with or without extraarticular complications.

Organs commonly affected by AS, other than the axial spine and other joints, are the heart, lungs, colon, and kidney. Very rare complications involve neurologic conditions such as cauda equina syndrome. AS may be encountered by patients who present with spinal fractures or deformities and corrective surgery of the hips or knees. Handling of the airways and access to the neuroaxis can be very difficult. Several textbooks on anesthesia consider that any form of anesthesia, whether general or more particularly regional, is hazardous. **Chiang Mai Medical Journal 2009;48(2):57-63.**

Keywords: Ankylosing spondylitis, bamboo spine, airway management

Anesthetic Considerations

The most common presenting symptom of patients with ankylosing spondylitis is low back pain. The pain pattern is a characteristic of bilateral sacroiliitis. With time, the back pain progresses up the spine and affects the rib cage. Chronic spondylitis and ankylosis

cause forward curvature of the thoracic spine, thus limiting breathing capacity. Spondylitis can also affect the areas where ribs attach to the upper spine, limiting lung capacity even further. The stiffness of thoracic ribs results in ventilation being mainly diaphragm-driven. The cervical spine is ankylosed late

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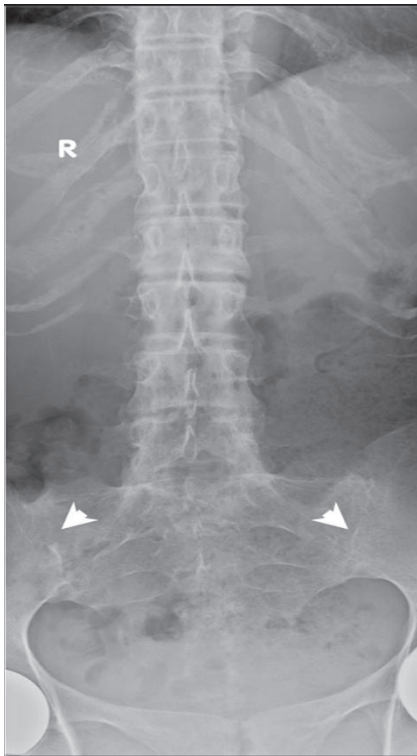


Figure 1. Classic radiographic appearance of bamboo spine in end stage ankylosing spondylitis

in the course of the disease, leading to restriction in neck movement and head rotation. Once fused, the pain in the spine disappears, but the patient has complete loss of spine mobility. A sudden onset of pain and mobility in the spinal area of these patients can indicate bone breakage. The lower neck (cervical spine) is the most common area for such fractures.⁽¹⁾ Radiographs are the single most important imaging technique for the detection, diagnosis, and follow-up monitoring of patients.⁽²⁾ Arthritis in joints other than the spine can occur at the hips, knees, and ankles. Other areas of the body affected include the eyes, heart, lungs, and occasionally the kidneys. No cure is known for AS, although treatment and

medications that reduce inflammation or suppress immunity are available to alleviate symptoms and pain. Physical therapy and exercise help to improve posture, spine mobility, and lung capacity.⁽¹⁾

AS can range from mild to progressively debilitating and from medically controlled to refractive. In severe cases, surgery can be an option in the form of joint replacements, particularly in the knees and hips.⁽³⁾ Patients with severe AS present specific challenges to the anesthesiologist. The anesthetic consideration should focus on the extension of the disease, degree of upper airway involvement, difficulty with positioning and increased technical difficulty with neuraxial anesthesia.⁽⁴⁾ Patients with AS, who have cardiac and pulmonary disease, are therefore at increased anesthetic risk. Anesthetic management must be planned case by case, which requires a combination of the knowledge, skills and judgment of the anesthesiologist. However, it should be kept in mind that technical difficulties can also increase the risk of complications.

Airway management

Stiffness of the cervical spine, atlanto-occipital, temporo-mandibular and crico-arytenoid joints may cause problems with tracheal intubation.⁽⁵⁾ Cervical spine involvement may range from limitation of movement to complete ankylosis (Fig. 2), and fixing the vertebra in a fixed position may be performed, often with a rotational component. The sniff position may be impossible to attain, and the proximity of the chest and chin may hinder mouth opening. When preoperative assessments show limited ability to open the mouth or move the neck, options for intubation are reduced.⁽⁶⁾ The



Figure 2. Formation of bony bridges (syndesmophytes) at the cervical spine level to complete ankylosis; fixing the vertebra in a fixed position.

cervical vertebra are prone to fractures, especially with hyperextension, and injuries may be occult. Patients may also have unstable atlantooccipital joints and spinal stenosis. Finally, large anterior osteophytes may distort the airway and impair recognition of laryngeal structures.⁽⁷⁾ Sciubba DM et al. recommend that radiographic studies be conducted prior to intubation of any patient with AS, so that the presence of obstructive entities can be determined.⁽⁶⁾

AS patients usually have no problem with difficult face mask ventilation, but most experience difficult laryngoscopy and intubation. A patient, who is likely to have upper airway problems immediately after loss of consciousness, requires an anesthetic plan, in which tracheal intubation is accomplished before anesthetic induction or immediately after an expeditious induction.^(8,5) Indirect

laryngoscopy is a most useful examination in such cases and a reliable indicator of probable intubation difficulty from any cause.⁽⁹⁾ The difficult airway represents a complex interaction between patient factors, the clinical setting, and the skills of the practitioner.⁽¹⁰⁾

Some reports show the success of tracheal intubation in severe AS patients. One such case, posted for hip replacement surgery, successfully intubated after the third blind attempt with an acutely curved endotracheal tube. An assistant stabilized the head, so that undue manipulation of the head and neck was avoided.⁽⁴⁾ Michael NG and colleagues reported on the airway management of a patient with AS, who had suffered a cardiopulmonary arrest. Failure of the first direct laryngoscopy was not surprising, but the ease of a second laryngoscopy in the Trendelenburg position was completely unexpected.⁽⁷⁾

Various other approaches are available for securing the airway in patients with AS, including blind nasal intubation, fiberoptic bronchoscopy, lighted stylet intubation, Bullard laryngoscopy, retrograde intubation, intubating laryngeal mask airway, Glidescope and tracheostomy. The management of difficult intubation has been simplified, as more experience is gained with fiberoptic techniques. Awake fiberoptic tracheal intubation is performed if damage to the spinal column is extensive.⁽¹¹⁾ However, some patients refuse awake intubation and prefer their airway management under general anesthesia. If intubation fails, percutaneous transtracheal jet ventilation (PTJV) may be used as a rapid, effective means of achieving ventilation.⁽¹²⁾ As a special consideration for patients with AS, informed consent should include obtaining permission for a tracheostomy in

the event of obstructive cervical osteophyte or severe cervical flexion deformity that prevents successful intubation.⁽¹³⁾

Cardiovascular system

Cardiovascular complications are present in up to 3.5% of patients after 15 years of disease, and 10% after 30 years.⁽¹⁴⁾ Cardiac evaluation (ECG and electrocardiography) is essential to determine the cardiovascular risk. Aortic regurgitation and bundle branch block may develop, necessitating aortic valve replacement or pacemaker insertion.⁽¹⁵⁾ External cardiac massage in the presence of a rigid thoracic wall may be ineffective.⁽¹⁶⁾

Pulmonary function

Lung fibrosis is the most common pulmonary complication. Chest x-rays may show apical fibrosis, sometimes mimicking tuberculosis. There is restricted movement of the costovertebral joints, which reduces vital capacity, and ventilation becomes progressively dependent on diaphragmatic function. Pulmonary function testing may reveal a restrictive lung defect. This results in a death rate from respiratory causes of 2.5 to 3 times higher than normal.⁽¹⁷⁾

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,⁽¹⁸⁾ 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 inspira-

tory 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.⁽⁶⁾

Regional and Peripheral Anesthesia

Regional anesthesia may be technically difficult or impossible, due to limited joint mobility and closed interspinous spaces, although ossification of the ligamentum flavum is uncommon in these patients.⁽¹⁹⁾ Tracheal intubation may still be required, due to complication of epidural or spinal anesthesia, such as intravenous injection of local anesthetic or a very high block.⁽⁹⁾ The cephalad spread of the neural blockade, produced by epidural or spinal techniques is a matter of concern because of unpredictable high motor blockade, which may affect innervations of the diaphragm and acute cardiovascular effects of sympathetic blockade.⁽²⁰⁾ However, epidural or spinal anesthesia is an acceptable alternative to general anesthesia in the presence of ankylosing spondylitis and perineal or lower limb surgery.⁽⁴⁾ In patients who can still move the neck, fusion of the lumbar spine may be incomplete,⁽¹⁸⁾ enabling epidural or spinal anesthesia to be performed successfully. If a central neuraxial blockade is chosen as the anesthetic technique, likelihood of successful spinal anesthesia seems higher than other neuraxial interventions.⁽²¹⁾ Kumar CM showed that spinal anesthesia by the lateral approach is a feasible and useful technique for lower limb surgery in AS patients.⁽²⁰⁾

Technical difficulties can also increase the risk of complications. There have been some reported cases of spinal hematoma after

epidural anesthesia and a case of seizures after accidental intraosseous injection in caudal anesthesia.⁽²²⁾ Therefore, patients were followed up for signs and symptoms of a developing spinal hematoma during the early (24 hours) and late (one week) postoperative phases. Peripheral blocks are also difficult to perform, due to adequate positioning of the patient being impossible.⁽²³⁾ (Figure 3). For upper limb surgery, the axillary rather than interscalene blocks is sometimes preferred, when using regional techniques in the upper extremities.⁽²⁴⁾

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.⁽⁶⁾ 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 anesthesia.

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References

1. Shiel WC Jr. Ankylosing spondylitis. http://www.medicinenet.com/ankylosing_spondylitis/article.htm

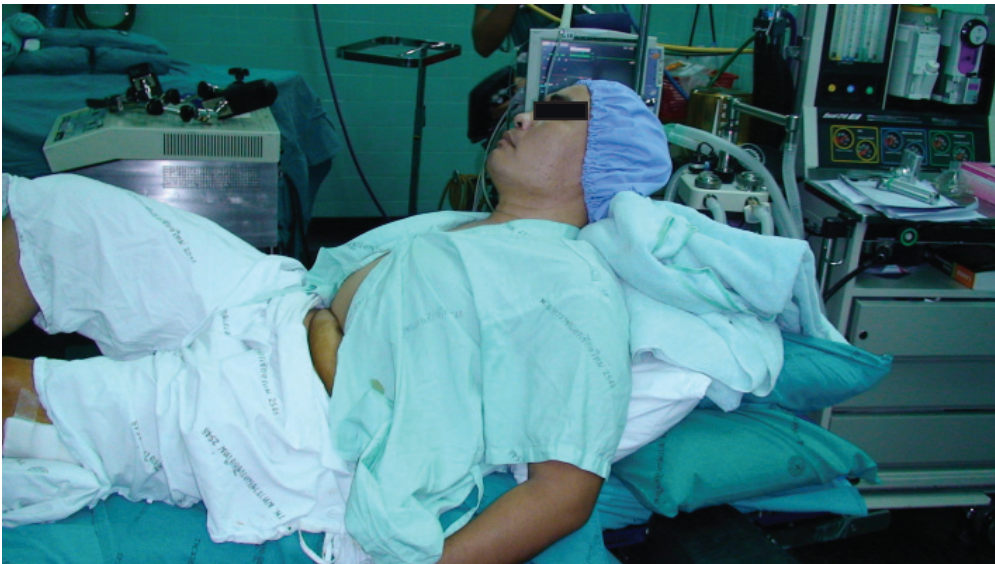


Figure 3. With ossification and stiffening of the spine, this patient is in the fixed, flexed posture. Regional and peripheral blocks may be difficult to perform, due to adequate positioning of the patient being impossible.

2. Ankylosing spondylitis. Peh WCG. <http://www.emedicine.medscape.com/article/386639-overview>
3. Ankylosingspondylitis. http://www.en.wikipedia.org/wiki/Ankylosing_spondylitis
4. Kotekar N, Nagalakshmi NV, Gururaj, Rehman M. A case of severe ankylosing spondylitis posted for hip replacement therapy. *Indian journal of anesthesia* 2007;51(6):546-9.
5. Simmon EH. The surgical correction of flexion deformity of cervical spine in ankylosing spondylitis. *Clin Orthop* 1972;86:132-43.
6. Sciubba DM, Nelson C, Hsieh P, Gokaslan ZL, Ondra S, Bydon A. Perioperative challenges in the surgical management of ankylosing spondylitis. *Neurosurg focus* 2008;24(1): E10.
7. Michael NG, Hastings RH. Successful direct laryngoscopy assisted by posture in a patient with ankylosing spondylitis. *Anesth Analg* 1998;87:1436-7.
8. Bluestone R. Arthritis and allied conditions. In: McCarty DJ, editor. *A Textbook of Rheumatology*. Philadelphia: Lee and Febiger; 1979. p. 610-32.
9. Wittmann FW, Ring PA. Anaesthesia for hip replacement in ankylosing spondylitis. *Journal of royal society of medicine* 1986;79:457-60.
10. Practice guidelines for management of the difficult airway. An update report by the American Society of Anesthesiologists Task Force on management of the difficult airway. *Anesthesiology* 2003;98:1269-77.
11. Schelew BL, Vaghadia H. Ankylosing spondylitis and neuraxial anaesthesia: a 10 year review. *Can J Anaesth* 1996;43:65-8.
12. Smith RB, Shaer WB, Pfaeffle H. Percutaneous transtracheal ventilation for anaesthesia and resuscitation: a review and report of complications. *Can Anaesth Soc J* 1975;22:607-12.
13. Cesur M, Alici HA, Erdem AF: An unusual cause of difficult intubation in a patient with a large cervical anterior osteophyte: a case report. *Acta Anaesthesiol Scand* 2005;49:264-6.
14. Reginster JY, Damas P, Franchimont P. Anesthetic risks in osteoarticular disorders. *Clin Rheumatol* 1985;4:30-8.
15. Bukley BH, Roberts WC. Ankylosing spondylitis and aortic regurgitation. Description of the characteristic cardiovascular lesion from study of eight necropsy patients. *Circulation* 1973;48:1014.
16. Popitz MD. Anesthetic implications of chronic disease of the cervical spine. *Anesth Analg* 1997;84:672-83.
17. Salathe M, Johr M. Unsuspected cervical fractures: A common problem in ankylosing spondylitis. *Anesthesiology* 1989;70:869-70.
18. Viitanen JV, Kokko ML, Lehtinen K, et al. Correlation between mobility restrictions and radiologic changes in ankylosing spondylitis. *Spine* 1995;20:492-6.
19. Stoelting RK, Dierdorf SF. *Skin and musculoskeletal disease: Anesthesia and co-existing disease*. 4th ed. Philadelphia: Churchill Livingstone; 2002. p. 532.
20. Kumar CM, Mehta M. Ankylosing spondylitis: lateral approach to spinal anesthesia for lower limb surgery. *Can J Anaesth* 1995;42:73-6.
21. Canakci A, Unsal M, Aydemir A, Ates Y. Successful spinal anesthesia in a case of ankylosing spondylitis. *T Klin J Med Sci* 2001;21:307-10.
22. Weber S. Caudal anesthesia complicated by intraosseous injection in a patient with ankylosing spondylitis. *Anesthesiology* 1985;63:716-7.
23. Hinnerk W. Epidural anesthesia and spinal hematoma. *Can J Anaesth* 1996;43:1260-71.
24. Sharrock NE, Beckman JD, Inda EC, Savarese JJ. Anesthesia for orthopedic surgery. In: Miller RD, editor. *Miller's Anesthesia* 6th ed. Philadelphia: Elsevier; 2005. p. 2411.

ข้อควรพิจารณาทางวิสัญญีในผู้ป่วยโรคข้อสันหลังอักเสบเรื้อรังที่รุนแรง

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บทคัดย่อ ข้อสันหลังอักเสบเรื้อรัง (ankylosing spondylitis) เป็นโรคที่เกิดจากการอักเสบที่ข้อต่อกระดูกสันหลังและเนื้อเยื่อใกล้เคียง พบมากในเพศชายที่มีปฏิกิริยาของระบบภูมิคุ้มกันของร่างกาย ชนิด HLA B27 ซึ่งวินิจฉัยโรคตามอาการแสดงที่เข้าตามเกณฑ์การวินิจฉัย มักเกิดการกลาย เป็นกระดูกของเนื้อเยื่อไฟบรัสโดยรอบกระดูกอ่อนของข้อต่อและช่องระหว่างกระดูกตลอดแกนกระดูกสันหลัง จนในที่สุดทำให้ข้อต่อติดกันจึงเคลื่อนไหวและเหยียดไม่ได้ การงอกใหม่ ของกระดูกจากเอ็นทำให้เกิดลักษณะเฉพาะพบได้จางของภาพถ่ายรังสีที่เรียกว่า กระดูกสันหลังแบบ bamboo spine ซึ่งแสดงถึงภาวะสุดท้ายของโรค ข้ออักเสบและข้อต่อติดกันอาจเกิดขึ้นที่ข้อ สะโพก หัวไหล่ และข้อต่อระหว่างกระดูกซี่โครงและกระดูกสันหลัง โดยอาจมีภาวะแทรกซ้อน นอกข้อกระดูกอื่นๆ ร่วมด้วยหรือไม่ก็ได้ อวัยวะอื่นที่พบอาการร่วมของโรคนี้ได้แก่ หัวใจ ปอด ลำไส้และไต ภาวะแทรกซ้อนที่พบได้ไม่บ่อยที่เกี่ยวข้องกับระบบประสาท เช่น cauda equina syndrome โดยผู้ป่วยโรคข้อสันหลังอักเสบเรื้อรังนี้อาจมาพบแพทย์ด้วยอาการของการหักของกระดูกสันหลัง หรืออาการผิดปกติ และต้องการการผ่าตัดสำหรับระยะท้ายของโรคที่มีการติดเชื้อของข้อสะโพกและข้อเข่า ซึ่งการจัดการทางเดินหายใจและการทำหัตถการเกี่ยวกับประสาทไขสันหลัง อาจทำได้ยากมาก ตำราด้านวิสัญญีวิทยาหลายเล่ม กล่าวถึงสิ่งที่ควรพิจารณาเกี่ยวกับรูปแบบ การให้ยาทางวิสัญญี ไม่ว่า การระงับความรู้สึกแบบทั่วร่างหรือการระงับความรู้สึกเฉพาะส่วนต่าง มีข้อควรระวังถึงอันตรายที่อาจเกิดขึ้นได้ เชียงใหม่เวชสาร 2552;48(2):57-63.

คำสำคัญ: ข้อสันหลังอักเสบเรื้อรัง กระดูกสันหลังแบบ bamboo spine การจัดการทางเดินหายใจ
