Tracheal intubation of patients with unstable cervical fractures is risky because of subsequent neurological sequelae. Patients with extensive ankylosing spondylitis are susceptible to fractures of the cervical spine following relatively minor trauma, including even events they do not remember.¹⁻¹¹ If a neurological deficit occurs, the prognosis is poor and the mortality high. We report a case of emergency tracheal intubation of a patient with unsuspected ankylosing spondylitis and subsequent quadriplegia.

**REPORT OF A CASE**

An anesthesiologist of our ambulance service was called to see a man who had lost consciousness after a short period of feeling mildly ill. He had been standing at a window and his colleagues had placed him on the floor to prevent him from falling down. On arrival, the anesthesiologist found the patient apneic and deeply cyanotic with his head resting on a small box, probably because of his kyphoscoliosis. The factory nurse was attempting to ventilate him vigorously via a mask, pumping large amounts of air into the stomach and pushing his head onto the box. The radial pulse was weak and regular by palpation, and the pupils showed isocoria and were reactive. Even in the skilled hands of the anesthesiologist, ventilation via a mask was insufficient. Therefore, tracheal intubation was immediately performed: due to jaw rigidity, 100 mg of succinylcholine was given iv, although the rest of his body seemed to be relaxed; his trachea was then intubated with some difficulty in two attempts using a no. 3 Macintosh blade and a 32 F oral red rubber tube without stylette. With controlled ventilation, his color became normal; soon afterward, spontaneous diaphragmatic breathing began and ventilation was assisted. The arterial blood pressure was 170/110 mmHg. Sedation was achieved with small increments of midazolam iv.

The patient was brought to the hospital in stable condition. When he opened his eyes on command and was breathing sufficiently via a continuous positive airway pressure system, as confirmed by analysis of arterial blood gases, extubation of the trachea was performed. The patient then complained of heavy arms. Neurological examination showed quadriplegia at the level of C6. A roentgenographic film of the cervical spine showed a luxation of C6 with widening of C5/6 disc space by 1.5 cm. The spinal dislocation was reduced and stabilized surgically.

The patient had suffered from ankylosing spondylitis since 1987. The cause of the unconsciousness remained unclear. A perfusion scan of the lungs showed no evidence of a pulmonary embolism. Sinus rhythm, first-degree atrioventricular block, and some evidence of anterolateral ischemia were seen on electrocardiogram. The cardiac enzymes remained normal.

The patient was transferred to a rehabilitation center postoperatively, from where he was discharged 9 months later showing some improvement but still quadriplegic at the C7 level.

**DISCUSSION**

Ankylosing spondylitis is an inflammatory arthropathy with infiltration of granulation tissue into the bony insertions of ligaments and joint capsules. The overall incidence is about 1.6% of the population. Most often the primary sites of involvement are the sacroiliac joints and the spinal column. Only a small proportion of patients develop severe disease with complete ankylosis, the so-called "bamboo" spine.¹² If the duration of the disease is 16 yr or more, 75% of patients develop cervical ankylosis and have a high risk of cervical fractures.¹³⁻¹⁴ Many people with ankylosing spondylitis also have extraspinous joint involvement and nonarticular manifestations of the inflammatory process.¹⁵ Of relevance to the anesthesiologist are: involvement of the temporomandibular joints with limited mouth opening; crico-arytenoid arthritis, which makes the vocal cords more susceptible to trauma; pulmonary involvement with fibrosis and restricted chest expansion; and cardiovascular involvement with valvular insufficiency and conduction defects.²⁻¹³

The tracheal intubation of a patient with fixed kyphosis of the cervical spine can be difficult, especially if involvement of the temporomandibular joints is present. In addition, these patients have an increased risk of an occult cervical fracture;¹ minor traumas are sufficient to fracture an ankylosed spine.¹³⁻¹⁵ Falling out of bed³ or from a chair,⁷ driving a motorcycle over rough terrain,⁶ simple falls to the floor,⁵,⁷,⁸,¹⁰ chiropractic manipulation of the neck,¹¹ and even events not remembered by the patient¹ can cause cervical fractures. A fracture due solely to tracheal intubation has not been published.

Most cervical lesions occur through the former intervertebral disk space between C5 and C7, although the fracture of a vertebral body is also not uncommon.¹,⁸ Because of the danger of undiagnosed fractures, Reginster et al. advise that every patient suffering from ankylosing spondylitis should have a radiograph of the spine pre-
operatively.6 On the other hand, an undislocated fracture, especially in the lower cervical region, is very difficult to recognize on a radiograph, so there is no way to completely rule out the possibility.1,3 Duncan and Simmons reported that 36% of patients with severe ankylosing spondylitis had evidence of a previous occult cervical fracture.16 Cervical spinal injuries in ankylosing spondylitis are accompanied by transection of or extensive injuries to the spinal cord in 50% of cases1,3,7 and epidural bleeding occurs in 14%.5,13 If a neurological deficit has occurred, the prognosis is poor and the mortality high: 50% of patients with quadriplegia die within 6 months from pulmonary complications.1,3,7

As has been shown in an experimental model of cervical fractures, after transection of the ligaments connecting C5 and C6, every movement of the head ends in dislocation of the fracture.10 Any chin lift, jaw thrust, use of an esophageal obturator airway, or orotracheal intubation pushes the cranial fragment of the cervical spine ventrally. In contrast, in the blind nasal approach, the cranial fragment can be dislocated dorsally by simply pushing the head onto the table for stabilization. The use of a cervical collar does not prevent dislocation, and serves only as a sign of an unstable cervical spine.19

Tracheal intubation of a patient with ankylosing spondylitis is thus best achieved by techniques that minimize neck movement.15 Therefore, both awake retrograde or fiberoptic transnasal tracheal intubation can be used safely.15,17,18,20,21,22 Awake tracheal intubation also has the advantage of permitting feedback from the patient after each manipulation and of stabilizing the fracture by muscle spasm.17,18

It is unclear which maneuver caused our patient's quadriplegia. The cervical fracture could have been pre-existing or might have been caused by laying him down roughly, by pushing the head against the box during mask ventilation, or by direct laryngoscopy. The neurological outcome undoubtedly deteriorated after intubation.

In summary, we report a case of emergency tracheal intubation of a patient suffering from ankylosing spondylitis with undiagnosed cervical fracture and subsequent quadriplegia. Every patient with long-standing ankylosing spondylitis has an increased risk of cervical fracture following relatively minor trauma. Therefore, fiberoptic transnasal or retrograde tracheal intubation of the awake patient is recommended.

REFERENCES