Spinal anesthesia for spine surgery is an emerging technique. Because of their lack of physiologic reserve, elderly patients are an appealing population for this technique. Unfortunately, the safe limits of spine surgery using spinal anesthesia for the geriatric population are not well defined. The authors describe an elderly patient with severe spine degeneration who elected for a 5-level lumbar spine fusion with spinal anesthesia. Adequate anesthesia was maintained throughout the procedure, which lasted 3 hours and 24 minutes. The patient experienced no perioperative complications. To the authors’ knowledge, this is one of the longest spine surgeries using spinal anesthesia. Also, the fusion procedure spans more vertebral levels than previously reported. Further investigation is needed to determine the safety of this technique. [Orthopedics. 2017; 40(5):e915-e917.]

Case Report

A 72-year-old woman presented with 20 years of worsening low back pain, radiating into her legs. Her medical history included previous lumbar decompression, atrial fibrillation, cardiac pacemaker, hypertension, hyperlipidemia, left kidney function decreased to approximately 20%, and endometrial cancer. She had a preoperative body mass index of 34.9 kg/m². Radiographs revealed significant lumbar degeneration (Figure 1) with severe stenosis at multiple levels.

After 9 months of appropriate nonoperative care, the patient sought surgical treatment. Because of her multiple comorbidities, the anesthesiologist, surgeon, and primary care physician opted to perform the surgery under spinal anesthesia.

Spinal anesthesia was administered with the patient sitting in a forward hunched posture. After injecting the subcutaneous tissues with 1% lidocaine, a 25-gauge needle was used to inject 15 mg...
of 0.5% isobaric bupivacaine and 0.3 mg of preservative-free morphine sulfate into the spinal canal at the L3-4 level. Intravenous fentanyl (150 µg) was injected at the beginning of the operation for additional anesthesia. Thereafter, the patient was positioned prone on a Jackson table with pads (Mizuho OSI, Union City, California) and received supplemental oxygen via nasal cannula.

Throughout the operation, mild sedation was achieved by propofol infusion at a rate of 80 µg/kg/min. Ephedrine (10 mg) was incrementally administered to maintain her blood pressure within 20% of baseline. Intraoperative neuromonitoring is not viable with this technique because the spinal anesthetic interrupts voltage-gated sodium channels in both motor and sensory neural synapses, effectively reducing transmission through the neuro-axis.4

Following exposure, pedicle screws were placed bilaterally from L1 to S1. Bilateral S2-iliac screws provided construct stability. Neurologic decompression was achieved from L3 to S1. Contoured titanium rods were placed longitudinally, and posterior arthrodesis was initiated using a combination of iliac crest bone graft, morselized local bone graft, cancellous autograft, and recombinant human bone morphogenetic protein-2 (INFUSE; Medtronic Sofamor Danek, Inc, Memphis, Tennessee) (Figure 2).

Time from incision to closure was 3 hours and 24 minutes. Estimated blood loss was 600 mL. The patient tolerated the procedure well without known complications and was transported to the postanesthesia care unit uneventfully. The patient ambulated on postoperative day 1 and experienced no complications during her 3-day admission. Thereafter, the patient was transferred to a rehabilitation unit for 21 days before being discharged home. She continued to do well without complications 6 months postoperatively.

**DISCUSSION**

The authors have presented a 72-year-old woman who underwent successful 5-level lumbar fusion under spinal anesthesia for treatment of degenerative scoliosis, severe spinal stenosis, and lumbar radiculopathy. This fusion procedure spanned more vertebral levels than previously reported with this anesthetic technique for a patient of any age. This was also one of the longest spine surgeries ever performed under spinal anesthesia.

There are few reports of spinal anesthesia for spine surgery for patients older than 70 years. The only study focusing primarily on this population reported the longest spine surgery with this anesthetic technique (210 minutes).4 Goddard et al1 reported a surgery lasting 198 minutes using this method, but the patient’s age was unknown. Prior to this report, no lumbar fusions performed under spinal anesthesia cited in the literature spanned more than 3 vertebral levels,3 let alone in the elderly population.

The current procedure lasted 3 hours and 24 minutes. Many clinicians, however, question whether spinal anesthesia is a viable option for procedures lasting greater than 3 hours because of the potential loss of anesthetic effect as the anesthetic agent is metabolized (bupivacaine half-life, 2.7 hours). For the current case, satisfactory anesthesia was maintained throughout the 5-level combined decompression and fusion procedure. If, hypothetically, the anesthetic effect of the bupivacaine had begun to wear off prior to the end of the procedure, additional administration of spinal anesthetic with lidocaine or bupivacaine could have been performed by the surgeon via an intrathecal injection through the surgical field using a 25-gauge needle. To date, supplemental administration of additional spinal anesthetic has not been required for any procedure at the authors’ institution. Conversion to general anesthesia also remains an option in the unexpected case of massive blood loss or severe hypotension.

There are concerns about airway monitoring during prolonged prone positioning with spinal anesthesia. In an effort to maintain steady, spontaneous respiration, the authors’ paradigm stresses minimal use of intraoperative narcotics and avoids intraoperative benzodiazepines. This limits suppression of respiratory drive and decreases the possibility of apnea. Aspiration risk is reduced compared with spinal anesthesia in the supine position because gravity allows secretion or vomit to be expelled through the mouth while in the prone position. The authors achieved light sedation with intraoperative propofol infusion at a rate of 80 µg/kg/min. In their experience, this protocol has not resulted in cases of respiratory compromise. If carbon dioxide monitoring were to suggest the development of airway compromise due to pharyngeal tissue movement, the anesthesiologist would respond by placing a nasopharyngeal airway. The potential for these factors to develop and require response underscores the importance of an anesthesiologist experienced
with spinal anesthesia and a strong surgeon–anesthesiologist relationship.

The literature has suggested that, compared with general anesthesia, spinal anesthesia may have intraoperative benefits for 1- to 3-level lumbar decompressions in adults, including decreased blood loss, lower mean heart rate, lower mean arterial pressure, and decreased variability in both mean heart rate and mean arterial pressure. Additionally, there are reported postoperative benefits, such as decreased dependence on narcotics and lower rates of both urinary retention and nausea. It is unknown whether these advantages can be extended to older adults and fusion procedures. Basques et al reported equipoise between the 2 techniques for hip fracture surgery for an elderly cohort. The current patient underwent a 5-level spine fusion with reasonable blood loss and no intraoperative or perioperative complications. She was transferred to a rehabilitation unit for continued therapy and management of her comorbidities. She returned home uneventfully.

The current patient did not have a history of cognitive dysfunction, and she completed her postoperative stay without mental status alterations, a concern among geriatric patients following general anesthesia. Postoperative delirium is associated with cognitive decline; preventing it may deter the onset of cognitive dysfunction in elderly patients. One randomized controlled trial found that a reduced depth of anesthesia decreased the incidence of postoperative delirium. Although unproven, spinal anesthesia may decrease the incidence of postoperative delirium by avoiding the heavy sedation associated with general anesthesia. This is a potential explanation for the patient’s postoperative mental acuity.

Conclusions
The authors have reported a lengthy, 5-level lumbar fusion using spinal anesthesia for a 72-year-old woman. This case report has presented spinal anesthesia as an option for longer, more invasive spine surgery for elderly patients who cannot tolerate general anesthesia. The result justifies further research investigating the safe limits of this technique.

References