

Epidural Anesthesia for Caesarean Section in a Patient With Achondroplasia

Lawrence Weinstein MD, Anne Shapiro MD, Andrew Karlin MD

INTRODUCTION

Patients with extremely short stature are commonly referred for elective C-sections due to cephalopelvic disproportion. The vast majority of planned Caesarean Sections are performed with spinal or combined spinal-epidural anesthesia due to its relative safety versus general anesthesia in the pregnant population. However, spinal anesthesia can be more complicated for patients with extremely short stature, as “standard” doses might result in an unpredictably high spinal block, with associated sequelae of profound hypotension and possible respiratory compromise. Further complicating management, parturients with achondroplasia are more likely to have difficult to manage airways. Here we present a case of successful neuraxial anesthesia for elective C-section via lumbar epidural in a case of maternal achondroplastic dwarfism.

CASE

26-year-old G1P0 female with past medical history significant for maternal achondroplastic dwarfism, presenting for elective primary C-section. Pregnancy course was notable for anemia of pregnancy but was otherwise uncomplicated. Patient denied history of anesthesia or family history of anesthesia-related complications. Complete obstetric anesthesia review of systems was negative including history of scoliosis, back pain and back surgery.

EXAM

P: 93, BP: 133/75, RR: 16, SpO2: 99% RA, Ht: 4’3”, Wt: 44 kg
Lungs: Clear to auscultation bilaterally with normal work of breathing
Heart: Regular rate and rhythm; no murmurs, rubs or gallops
Abdomen: Gravid, non-tender
Extremities: 2+ pulses, mild non-pitting LE edema
Musculoskeletal: examination of the lumbar spine revealed easy palpation of the spinous processes and no obvious scoliosis.
Airway: Mallampati I, good mouth opening, neck FROM, prognath able, inter-incisor distance > 4cm

DATA

Echo: Normal Echocardiogram.

EKG: Normal Sinus Rhythm

LABS within normal limits for pregnancy

PLAN

The patient was seen and evaluated by the anesthesia team at which time she expressed a strong desire to be awake for the delivery. The patient was counselled about the risk of unpredictable spread of spinal anesthesia doses and was amenable with the plan for lumbar epidural as primary anesthetic with careful titration of epidural local anesthetic boluses.

ANESTHETIC MANAGEMENT OF ACHONDROPLASIA

- Patients with short stature have undergone successful general anesthesia, epidural anesthesia and spinal anesthesia for cesarean section. However, general anesthesia appears to be preferred.
- **General anesthesia**
 - Airway concerns: associated with difficulty with mouth opening, macroglossia, atlanto-occipital fusion, cervical kyphosis and cervical instability,
 - Cardiopulmonary concerns: increased incidence of obstructive sleep apnea, restrictive lung disease and pulmonary hypertension
- **Epidural anesthesia**
 - Concerns: difficulty in positioning, landmark identification and catheter insertion due to lumbar kyphoscoliosis, narrow spinal canal and vertebral deformities.

	Wardall et al.	Cohen et al.	Carstoniu et al.	Lim et al.	Morrow et al.
Patient Height (cm)	111	122	119	114	120
Epidural Anesthetic	5ml 0.5% plain bupivacaine	9ml 3% chloroprocaine (additional 9cc chloroprocaine after 35 min)	8ml 2% lidocaine with epinephrine + 50mcg fentanyl	9ml 2% lidocaine with epinephrine	12ml 2% lidocaine with epinephrine + fentanyl 37.5mcg
Notes		Multiple attempts at placement, including wet tap	T11/T12 level due to difficult lumbar spine palpation	US-Guided	

Successful epidural anesthesia for cesarean section in case reports. All achieved goal sensory analgesia up to T4-T6 dermatome. Most cases had instances of pain with peritoneal retraction, but no cases required conversion to general anesthesia.⁶⁻¹⁰

- **Spinal anesthesia**
 - Concerns: obstructed CSF flow in spinal canal stenosis, unpredictable local anesthetic spread, similar technical difficulties as epidural anesthesia above.

	Inan et al.	Inan et al.	Li et al.	Rauf et al.	Mitra et al
Patient Height (cm)	145	147	104	106	120
Spinal Anesthetic	7.5mg hyperbaric bupivacaine + 75mcg morphine + 5mcg fentanyl	7.5mg hyperbaric bupivacaine + 75mcg morphine + 5mcg fentanyl	5mg hyperbaric bupivacaine + 10mcg fentanyl	5mg hyperbaric bupivacaine + 10mcg fentanyl	7mg hypobaric bupivacaine

Successful spinal anesthetics for cesarean section in case reports : All surgeries lasted at most 1 hour. All achieved goal sensory analgesia up to T4-T6 dermatome. Those that were done as a CSE did not require any epidural bolus administration.¹⁻⁴

INTRAOPERATIVE COURSE

- Single large bore IV inserted and premedicated with famotidine, ondansetron, sodium citrate
- Patient brought to OR and attached to standard monitors, placed in sitting position
- Epidural placed at L3-L4 interspace via obvious **loss of resistance to saline at 4 cm**
- Test dose negative (**2 cc lidocaine 2% with epinephrine 5mcg/cc**)
- Fentanyl 50mcg given via epidural
- Intermittent epidural dosing with increments of 2cc lidocaine 2% with sensory checks with ice every 2 minutes
- After total **8cc 2% lidocaine** given, exam showed T4 level bilaterally to ice with profound motor block
- Patient was prepped for surgery and case proceed uneventfully (total operative time 50 minutes).
- After initial boluses, no further requirement for additional epidural dosing
- At delivery concentrated oxytocin (40 units/NS 250 cc) infusion started to establish uterine tone
- EBL 300 cc, Total IV Fluids: Lactated Ringers 1000 cc
- Upon closure, IV ketorolac 30mg and epidural **morphine 1mg** was given for post-operative analgesia

DISCUSSION

Characteristic findings with achondroplasia may include typical facial features, disproportionate short stature, an exaggerated lumbar lordosis and increased risk for severe spinal deformity. These can increase the risk of anesthesia for dwarfism patients undergoing cesarean section. Factors such as macroglossia, cervical spine instability and rigidity and atypical laryngeal anatomy all increase risk for airway difficulty. With careful preoperative airway examination and advanced airway equipment readily available, general anesthesia can be performed safely. Although there are few case reports of achondroplastic patients undergoing cesarean section with neuraxial anesthesia, it appears to be a safe and effective option in patients with palpable anatomy and without major spinal deformity or cord compression.

Our patient had a reassuring airway exam with palpable lumbar spine anatomy and no evidence of major spinal deformity nor symptoms of cord compression. Thus, we were able to recommend epidural anesthesia for cesarean section with general anesthesia available as a backup plan if procedure was technically challenging or resulted in poor neuraxial spread.

Previous case reports have recommended height-based spinal anesthesia with a maximum dose of 0.06 mg/cm to minimize the risk of high spinal block necessitating emergency tracheal intubation. However, due to reports of failed spinal anesthesia alone, we recommend epidural catheter placement as a backup option if spinal anesthesia is performed. Our approach of titration of epidural lidocaine 2% with epinephrine with intermittent 2cc boluses was effective in limiting the surgical block to a T4 level.

CONCLUSION

The case demonstrates successful application of epidural anesthesia in a patient with very short stature secondary to achondroplasia. It reinforces the importance of recognizing situations in which neuraxial drug spread may be exaggerated and adjusting standard practice accordingly.

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