adolescents. It is indeed beyond doubt that spinal anesthesia can be used as a sole anesthetic technique or as an adjunct to general anesthesia in suitable surgeries for all ages.

A quick review of the anatomy of the spinal structures in children shows that the dural sac ends at S3 and conus medullaris at L3 in the newborns and achieves the adult levels of S2 and L1, respectively, after the first year of life (3). This difference in the anatomy has led to the recommendation that spinal anesthesia should be performed only below the level of the conus medullaris to avoid a spinal cord puncture in young children (4). There is little dilemma in infants, and all spinal anesthetics are presumably performed at L4-5 or below levels. However, in children older than 1 year, we are never too sure about the safe intervertebral space for a spinal puncture because of the interpatient variability in the anatomical development.

Ultrasound imaging has improved the safety profile of most of the central and peripheral nerve blocks both in adults and in children. Why should we not use the same before or during the procedure of spinal anesthesia in children below the age of 4–5 years to ensure safety to the spinal cord? Why should we ignore the possibility of an injury to the spinal cord contents?

Marhofer *et al.* (5), in a pilot study in infants and children, has shown that high resolution ultrasound view of the neuraxial structures can be achieved in children up to 8 years of age. They found that the use of the 5–10 MHz linear hockey stick probe from a longitudinal paramedian angle gives the best views. The anatomical structures are better visualized till up to 3 months of age after which the visibility decreases with advancing age.

We would recommend further studies on the use of preprocedural or real-time ultrasound imaging and the necessity of clear guidelines on the safe conduct of spinal anesthesia in young children.

Conflict of interest

No conflicts of interest declared.

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Paravertebral block for vascular ring operation in a patient with CHARGE syndrome

Sir—Anesthetic management of an infant with vascular ring and CHARGE syndrome can be challenging for an anesthesiologist. Weaning from mechanical ventilation should be carried out very carefully because respiratory support may be required for several weeks as a result of tracheomalacia and/or tracheal stenosis (1). CHARGE syndrome is an autosomal dominant disorder. In addition to typical features, airway abnormalities, including laryngomalacia, malformed larynx, and abnormal cranial nerve function have been reported as well (2). We report an infant affected by CHARGE syndrome presented with a double aortic arch and respiratory distress scheduled for vascular ring surgery. Anesthesia management was successfully performed on the patient by general anesthesia combined with paravertebral block (PVB).

An 8-month-old, 6.7 kg male child was admitted to our hospital with stridor, respiratory distress, dysphagia, and vomiting. Echocardiography identified a double aortic arch. Computerized tomography showed

Figure 1 Vascular ring and obstruction in the trachea on thorax CT scan.

that he had a double aortic arch and the vascular ring which compressed the trachea 50% above the carina (Figure 1). Physical examination revealed bilateral coloboma, high nasal bridge, short nose, unilateral posterior choanal atresia, small mouth, cleft palate, and dysmorphic ear at left, thus leading to the diagnosis of CHARGE syndrome.

Fiberoptic laryngoscopic examination carried out by an ENT showed cleft palate, anteroposterior flattening of the larynx, tall and hypertrophic arytenoids, and moderate saliva retention. He was scheduled for ligation and division of the left aortic arch. Equipment for difficult airways was available in the operating room. General anesthesia was slowly induced with propofol 2 mg·kg^{-1}, fentanyl 2 mcg·kg^{-1}, after mask ventilation was confirmed to be adequate, rocuronyum (0.6 mg·kg^{-1}) was given, and then, a 3.5-mm internal diameter endotracheal tube (ETT) was inserted. The tip of the ETT was placed just above the carina using fiberoptic bronchoscope that was passed through the ETT. Anesthesia was maintained by isoflurane in the O2/air with the aim of keeping Index of Consciousness (IOC) (Morpheus Medical, Barcelona, Spain) values within 40–60. PVB was performed in the left thoracotomy position. The Lönnqvist (3) technique was used, and needle insertion was made at high thoracic level (T6) lateral to spine process. Bolus of levobupivacaine 2.5 mg·ml^{-1} and 0.5 ml·kg^{-1} with adrenaline was injected. The mean isoflurane MAC value was 0.3–0.4%, and no rescue opioid analgesics were needed during the operation. After the completion of the operation, the patient was extubated within 2 min. No airway problem that may have resulted in reduced SpO2 was observed during or after the anesthesia. Face, Legs, Activity, Cry, Consolability (FLACC) score was utilized to measure postoperative pain in the intensive care unit until the patient was discharged. A FLACC score of 3 was first recorded at the 6th hour of postoperative period, and first rescue opioid needed (morphine 0.05 mg·kg^{-1} IV) to be injected at the time. Only one more dose of opioid was required throughout the entire postoperative period. The patient was discharged on the first postoperative day from intensive care unit and on the third postoperative day from hospital.

Depending on the preoperative fiberoptic examination results, we thought that (i) equipment for difficult airways should be available in the operating room, (ii) general anesthesia should be induced slowly, and (iii) neuromuscular blocking agent would be given after positive pressure ventilation was fully assessed. The anesthesia preparation course was uneventful without any need for fiberoptic intubation; however, at the end of the ETT, we performed fiberoptic examination to check the location of ETT as a precaution. We considered the possibility of need for extended ICU stay owing to the existing cardiac pathologies, accompanying hypotonia and increased secretion, thoracotomy pain, and residual effects of the anesthesia which all might have deferred early extubation. For this reason, we performed a left PVB, reduced the dosage of intraoperative and postoperative anesthetics and opioids, and consequently provided secured extubation and effective analgesia.

Paravertebral block reduces the use of opioids in the perioperative period in very small child with CHARGE syndrome who has vascular ring and may provide smooth and uneventful perioperative course.

Conflict of interest

No conflicts of interest declared.

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