Archives of Anesthesiology and Critical Care (Winter 2023); 9(1): 74-76.

Available online at http://aacc.tums.ac.ir

Case Report

Spinal Anaesthesia for Lower Limb Orthopaedic Surgery in a Child with Spastic Cerebral Palsy

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ARTICLE INFO

Article history:
Received 26 April 2022
Revised 17 May 2022
Accepted 31 May 2022

Keywords:
Cerebral palsy;
Spinal anaesthesia;
Microcephaly;
Orthopaedic surgery

ABSTRACT

Cerebral palsy (CP) refers to a spectrum of nonprogressive neurological disorders with disturbances in posture and movement, resulting from perinatal intrauterine insult to developing infant brain. Many conditions associated with CP require surgery. Such cases pose important gastrointestinal, respiratory, and other perioperative considerations. Anaesthetic management in these cases is delicate. Intraoperative complications including hypovolemia, hypothermia, muscle spasms, seizures, and delayed recovery might complicate the anaesthetic management. A thorough preanesthetic evaluation allows for a better intra- and post-operative care. Perioperative analgesia is important, particularly in orthopaedic surgeries one for pain relief. Here, we have discussed the successful management of a case of spastic CP for orthopaedic lower limb surgery.

Cerebral palsy [CP] refers to a spectrum of non-progressive neurological disorders with disturbances in posture and movement, resulting from perinatal intrauterine insult to developing infant birth.

It is associated with cognitive and neurosensory disturbances. The degree of disability in CP depends on the area of brain affected. Involvement of motor cortex leads to spasticity, abnormalities of basal ganglia cause athetosis and cerebellar defects resulting in ataxia. Spasticity can lead to contractures, spine deformities and chronic pain. Seizures are seen in almost 30% of CP cases, most common in spastic CP [1].

Psychological problems include intellectual disability which render an aspect of non-cooperation. It is also associated with developmental delay.

In CP along with neurological symptoms, gastroesophageal reflux is common which leads to a risk of aspiration. Also, increased salivation due to hyperactive salivary glands, tongue thrusting, impaired swallowing and poor head control adds up to the possible hazard of aspiration. Recurrent pneumonia and reactive airway disease are results of such chronic insults of aspiration. Thus, the anaesthesia providers to these patients should be well versed with the aetiology, pathophysiology and management of CP for smooth and safe conduct of anaesthetic course.

There are a very few case reports of CP patients undergoing regional anaesthesia for orthopaedic surgery. Here, we report an eight-year male, a case of spastic CP with seizure disorder and microcephaly and nutritional rickets posted for CRIF with nailing for right midshaft femur fracture under spinal anaesthesia with sedation. The various co-existing pathophysiological changes and the challenges encountered during administration of anaesthesia makes this case reportable.

Case Report

The patient was a diagnosed case of diplegic spastic CP with seizure disorder with nutritional rickets at the age of 2 years and was on Syp. Valproate for chronic seizures.

Pre-anaesthesia assessment revealed microcephaly with a difficult airway, short neck, macroglossia with buck teeth and multiple teeth being missing. Patient had no eye-to-eye contact with anaesthetist with an incoherent speech. The history was reported by the

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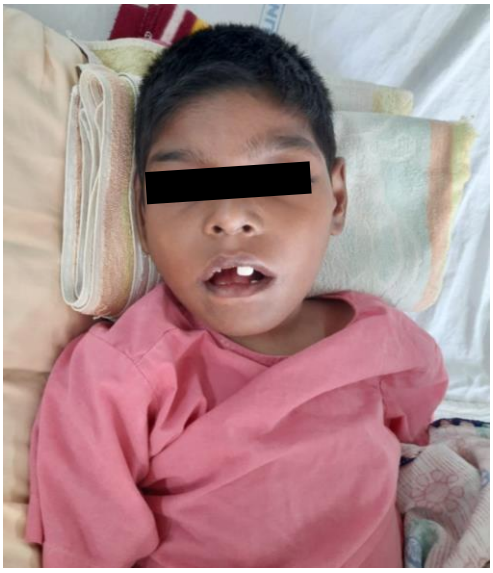
mother. The physical and airway assessment was made only after the mother pacified the child. A history of GTCS 3 days prior was also noted.

A multidisciplinary approach involving paediatrician and orthopaedic surgeon was considered immediately. A written, informed and valid consent was obtained from the parents. Gentle and sympathetic approach was made in explaining the risk-benefit ratio of surgery and proper counselling of the parents regarding anaesthesia.

After taking the patient inside the OT, standard non-invasive monitors were attached and baseline vitals were noted. As the patient was anxious, spinal block was combined with face mask sevoflurane-nitrous oxide anaesthesia. Intravenous access was secured and premedication involving antisialagogue, antacid and sedative titrated against weight of the patient was administered. We made sure that the intraoperative management was unhurried and meticulous. After sedation, patient was taken in lateral decubitus position while maintaining the spontaneous ventilation with bag and mask. Painting and draping were done and under all aseptic precautions, spinal anaesthesia block was administered in L3-L4 interspace with Inj. Bupivacaine 0.5% 6 mg along with Inj.Clonidine 2.5 mcg with a 27 G Quincke's needle. The sensory and motor blockade was assessed through pinprick sensation and movement of limbs respectively. The sensory blockade achieved was T10. Throughout the surgery, patient was maintained on spontaneous ventilation with bag and mask with O2+ sevoflurane+ N2O with minimum alveolar concentration (MAC) of 0.7. Surgery lasted for 50 minutes and motor recovery was observed immediately post-op as patient was able to move his limbs.

Figure 1- Image of the child showing microcephaly, missing teeth, buck teeth and short neck, all the characteristics indicating a difficult airway



Discussion

For general anaesthesia in CP cases, propofol is desirable for induction. Resistance to non-depolarizing muscle relaxants [2] is expected due to upregulation of Ach receptors with reduced duration of action. Succinylcholine can increase the potassium levels [3].

Pooled secretions in oropharynx impairs glottis view during laryngoscopy and also impairs mask and bag ventilation. Therefore, frequent suctioning may be necessary. Airway manipulation is avoided keeping in mind the difficult airway, microcephaly and risk of aspiration. However, rapid sequence induction (RSI) an be considered as these patients are prone for gastroesophageal reflux disease. During and post intubation, positioning of the patient may pose difficulty due to contractures and spasticity.

Increased sensitivity to narcotics has been observed in these patients. CP patients are prone to constipation. Hence, opioids through any route can accelerate this problem. Tramadol lowers seizure threshold and hence avoided. Other epileptogenic drugs such as ketamine, methohexital, etomidate should be avoided. MAC is lowered for these patients [4] due to chronic intake of anticonvulsants. Hence, volatile agents should be titrated accordingly to avoid excessive depth of anaesthesia.

Hypothermia is common and serious concern in these patients and occur due to altered thermoregulatory responses because of hypothalamic dysfunction, lack of insulation with muscle/fat and malnourishment. Acknowledging the serious side effects of peri-operative hypothermia, temperature monitoring has to be done very stringently. Measures to conserve temperature should include i.v. fluid warmers and warming blankets.

Regional anaesthesia techniques especially SAB are preferred as it is easier to perform and provides intra-op as well as post-op pain relief, thus reducing use of polypharmacy. The rapid onset of action, distribution of sensory and motor blockade guarantees high success rate. The recovery is smoother and faster as compared to general anaesthesia that involves airway manipulation and administration of many different drug.

Clonidine is an α2-agonist used in the treatment of spasticity [5-7] and autonomic dysfunction [8]. Clonidine may have a role in symptom treatment of children with single nerve injury (SNI) when associated problems include significant hypertonia or when features suggest autonomic dysfunction. Intrathecal clonidine improves intraoperative anaesthesia and postoperative analgesia as it possess anti-hyperalgesic properties [9]. It acts by inhibiting the release of substance P [10-11].

In this particular case, fast motor recovery was observed. Despite of reduced communication and cognitive skills, our patient was comfortable post-op which points out adequacy of Clonidine as an analgesic.

Conclusion

Anaesthesia for patients with cerebral palsy should be customized to suit their specialized pathophysiology and anatomy. For lower limb orthopaedic surgery in CP with microcephaly patient, spinal anaesthesia with clonidine as an adjunct can be administered safely where opioid sparing anaesthesia techniques are desirable. To conclude, surgeries of patients with CP can be done safely under regional anaesthesia with clonidine as an adjuvant, keeping in mind it's excellent peri-operative analgesic profile.

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