Available online at **www.ijmrhs.com**

ISSN No: 2319-5886

International Journal of Medical Research & Health Sciences, 2018, 7(11): 156-159

Excision of Lipomeningocele and Tethered Cord in 1-Year Old Child under TIVA

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ABSTRACT

Lipomeningocele is a rare neural tube defect with an incidence of 0.3 to 0.6 per 10,000 live births. It occurs when part of the spinal cord protrudes from the spinal column and forms a sac under the skin. Because the spinal cord does not close completely, the nerves get attached to the tissues and get damaged as the child develops due to undue stretching of the spinal cord resulting in impairment of the blood supply to the cord. To prevent subsequent neurological, urological and orthopedic deterioration timely surgical removal of the lipoma with detethering of the cord under general anesthesia is very important. The considerations, in this case, were a pediatric age group, prone position, neuromuscular monitoring during detethering and bleeding. This was a case of a 1-year old child undergoing lipomeningocele excision with detethering of cord under TIVA.

Keywords: Lipomeningocele, Pediatric, General anesthesia, TIVA, Neurological monitoring

INTRODUCTION

Lipomeningocele can be associated with VACTERL syndrome (vascular abnormalities, anal atresia, cardiac defect, tracheoesophageal fistula, renal and limb defects) [1-3]. Reasons for spinal MRI are lumbar skin lesions like sacral dimples, hairy tufts, fatty pads, which are often manifestations of lipomeningocele or dermal sinus tracts which are associated with tethered cord. The entire lipoma is usually not removed; rather the neurosurgeon works to detethering the spinal cord which means to detach the spinal cord from the tissues of the back [2]. The goal was to reduce the stretching on the spinal cord as the child grows. Neurological monitoring of lower extremity i.e motor and sensory responses and rectal sphincter monitoring was done. So muscle relaxants are to be avoided or allowed to dissipate after the initial dose [4]. Here we present a case of a 1-year old child with lipomeningocele excision and detethering of cord under general anesthesia.

Case Report

A 1-year old child weighing 8 kg came to the hospital with complaints of the fatty pad in the lumbar area since her birth. During pre-anesthetic check-up, she was a term healthy baby delivered by normal delivery. The developmental history milestones were appropriate for her age except she has not started walking. Bowel and bladder control was not attained yet, and no other comorbidities were observed. Her heart rate was 120/min, BP was 90/60 mmHg. MRI imaging showed a fatty mass in the lumbosacral area with tethering of the cord. All the blood investigations were within normal limits.

Surgery was planned to remove the lipoma with detethering of the cord. On the day of surgery, she was kept Nil by mouth (NBM) for 6 hours as per protocol and IV fluid with Isolyte P was started at a rate of 20 ml per hour. She was shifted to the OT, monitor ECG, SPO_2, NIBP (Non-invasive blood pressure) were attached and after preoxygenation, with 100% O_2 anesthesia was induced with injections glycopyrrolate 0.04 mg, fentanyl 30 mcg, propofol and atracurium and was intubated with 4 mm uncuffed ETT. After careful fixation of the ETT, she was positioned prone. Pressure points were padded. The abdomen was checked to be free from any pressure to prevent undue bleeding due to engorged epidural veins. L4,5, S1,2,3 nerve monitoring (MEPs) probes were placed and adhesive plasters were applied to prevent any displacement intra-operatively and the surgery was commenced.

Anesthesia was maintained with injection propofol infusion, oxygen, and N_2O for a MAC of 0.4. As muscle relaxants interfere with MEPs further dosing was avoided. Intraoperatively temperature was maintained with Bair-hugger and fluid warmer. Post-operatively analgesia was maintained with paracetamol suppository. In the surgery part, the lipoma was excised, thickened filum was identified and released from dura. Lumbar and sacral nerves were identified using the MEPs monitoring and any injuries were carefully avoided. The muscles selected here were Achilles' tendon, tibialis anterior and anal sphincter.

Intra-operative period was uneventful, the child was extubated after thorough suctioning and was shifted to the recovery room for observation. Postoperative motor recovery was good and satisfactorily confirmed as she started crawling in the immediate postoperative period.

Figure 1 T2 weighted MRI imaging showing lipomeningocele (large arrow) and tethered cord (smaller arrow)

DISCUSSION

Lipomeningocele is a type of neural tube defect [2]. They are a group of birth defects of the brain, spine and spinal cord. The exact cause of neural tube defects was unknown. Folic acid supplements before and during pregnancy help prevent such defects. Mothers who are obese, poorly controlled diabetes, on anti-epileptic medications are at a high risk. This type of spina bifida is associated with overlying fatty tumor. At birth, the skin is intact over the spinal cord and vertebral anomaly. There is associated muscle weakness, decreased sensation relevant to the spinal cord involved. Lower the defect higher is the level of physical functioning [5].

It can sometimes be detected by antenatal USG. More commonly it is found when children who have neurological symptoms in early years of life or skin symptoms like a fat collection in the back, hairy tufts, dimple above the buttocks. Patients may begin experiencing neurological deficits in early childhood, including numbness, difficulty in walking, weakness and back pain. In some cases, the symptoms may occur in adulthood. A detailed MRI is the definitive imaging evaluation for spinal-neural lipomas. Surgery in most cases includes detethering the spinal cord and reducing fatty mass to improve the outcomes. Complications of surgery are bleeding, CSF leak, infection, neurological deterioration.

Intraoperative evoked potentials were measured to avoid iatrogenic injury to the nervous system [6]. Sensory evoked potentials (SEPs) evaluate the integrity of ascending sensory tracts while motor evoked potentials (MEPs) deal with the functionality of descending motor pathways. The 3 SEP modalities were used clinically: somatosensory (SSEP), auditory (AEP), visual (VEP). The amplitude of these potentials was much smaller than that of the background EEG and was extracted from surrounding "noise" using signal averaging. All the anesthetics influence EP waveforms which were evidenced by an increase in latency and decrease in the amplitude. The IV boluses or abrupt changes in the MAC of volatile agents are detrimental as they can completely eliminate cortical EPs. Desflurane and Sevoflurane with MAC less than 1 without N_2O was compatible with cortical median nerve SSEP monitoring during scoliosis surgery. When combined with volatile agents N_2O exhibits profound depressant effects on SSEPs and VEPs. Propofol increases the latency and decreases the amplitude of cortical EPs, but is an important component of balanced IV neurosurgical anesthesia. Opioids produce minimal changes in SEP waveforms [7].

Trans-cranial electrical stimulation of the motor strip is a reliable method of producing intra-operative motor potentials that can be recorded from the spinal cord, peripheral nerve, and muscle. MEPs can also be recorded from EMG potentials. EMGs can be spontaneous EMG (sEMG) or triggered EMG (tEMG). MEPs are exquisitely sensitive to inhalation anesthetics. Propofol suppresses MEPs induced by single pulse stimulation. However adequate recordings can be obtained by controlling serum levels and increasing the pulse stimuli rates. Therefore as a component of TIVA, propofol provides acceptable conditions for MEPs monitoring. Muscle relaxants depress myoneural transmission, so avoided while monitoring MEPs. Short-acting neuromuscular blockers were used for intubation and allowed to dissipate during the surgery for the purpose of neurological monitoring.

N_2O can be used as an adjunct to propofol anesthesia without significant deleterious effect on MEPs during intra-operative monitoring provided concentrations were maintained below 50% [8,9]. Regarding the neurological monitoring, we used the NIM Nerve monitoring system [10]. It is an electromyographic (EMG) monitor used in intra-operatively during various surgeries wherein a nerve may be at a risk due to unintentional manipulation. Before the procedure is performed the NIM Nerve monitoring electrodes are placed in the appropriate muscle locations and these electrodes are connected to the NIM Nerve monitoring system, thereby continuous EMG activity from the muscles innervated by the affected nerve will be monitored. The surgeon uses the monopolar and bipolar stimulating probes and dissecting instruments which assist in the early identification of the nerve. When a particular nerve is activated, both visual alerts and audio feedback warns the surgeon to help minimize the injury to the nerves thereby preserving the nerve function and improving patient safety [11].

Overall the key factor is a good communication between neurophysiologist, anesthesiologist and the surgeon to improve the patient outcome.

Figure 2 Autoclaved reusable probes for MEP monitoring

CONCLUSION

Lipomeningocele is a type of closed neural tube defect. Early operation of lipomeningocele should be performed to prevent the development of neurological and urological deficits [12]. Lipomeningocele excision with detethering of cord with MEPs monitoring can be done successfully TIVA using propofol under general anesthesia with adjuvant N_2O less than 50%.

DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

[1] Sarris, Christina E., et al. "Lipomyelomeningocele: Pathology, treatment, and outcomes: A review." *Neurosurgical Focus,* Vol. 33, No. 4, 2012.

[2] Golisano Children's Hospital. "Lipomeningocele." Developmental and Behavioral Pediatrics, 2018.

[3] Jerome, E. Heidi. "Tethered spinal cord." *Handbook of Pediatric Anesthesia, 2015.*

[4] Cote, Charles J. *A practice of anesthesia for infants and children*. WB Saunders Company, 1993.

[5] John Hopkins Medicine. Health Library: Diseases and Conditions Collections. https://www.hopkinsmedicine.org/healthlibrary/amp/conditions/pediatrics/sp.

[6] Open Anesthesia. "Evoked potentials: anesthetic effects." http://www.openanesthesia.org/evoked_potentials_anesthetic_effects/.

[7] Kumar, A., A. Bhattacharya, and N. Makhija. "Evoked potential monitoring in anesthesia and analgesia." *Anaesthesia,* Vol. 55, No. 3, 2000, pp. 225-41.

[8] Jellinek, David, et al. "Effects of nitrous oxide on motor evoked potentials recorded from skeletal muscle in patients under total anesthesia with intravenously administered propofol." *Neurosurgery,* Vol. 29, No. 4, 1991, pp. 558-62.

[9] Bithal, Parmod Kumar. "Anaesthetic considerations for evoked potentials monitoring." *Journal of Neuroanaesthesiology and Critical Care,* Vol. 1, No. 1, 2014, pp. 2-12.

[10] Medtronic. "NIM nerve monitoring systems". Nerve Monitoring Products, United States.

[11] Huang, Sheng-Li, Wei Shi, and Li-Gen Zhang. "Surgical treatment for lipomyelomeningocele in children." *World Journal of Pediatrics,* Vol. 6, No. 4, 2010, pp. 361-65.

[12] National Organization for Rare Disorders. "*Tethered Cord Syndrome.*" 2007.