Interventional neuroradiology (IN) executes a diverse intervention from coiling of intracranial aneurysm to extracranial embolisation of spinal cord arterial venous malformations. In all these procedures, patients are required to be anaesthetised for zero motion during the “road mapping”\(^1\) of the vascular structure. This is more so important when spinal vascular structure is involved. Any wrong embolisation of this vasculature may lead to the spinal cord ischaemia and render the person paralytic.

Spinal cord vascular interventions especially of the thoracic and upper lumbar region have an inherent problem of artifacts due to upper limbs during imaging. For precise location of feeders and draining vessels of the vascular abnormalities, digital subtraction angiography (DSA) has to cover a large area in the vicinity of the abnormality and the upper limb by the patient’s side or over the chest invariably interferes with the imaging. So to overcome, the hands are usually abducted to 120° and beyond with elbows flexed about 90° [Figure 1]. This may lead to brachial plexus injury. But equipment for DSA does not permit to keep the hand in the position prescribed because this reduces their maneuverability. Moreover, intervention of spinal vessel is a prolonged procedure and positioning the upper limb inappropriately under muscle relaxant for such a long time may lead to permanent disability.

Proximally, the brachial plexus is anchored to vertebrae and prevertebral fascia, while distally it is anchored to the axillary sheath, stretching brachial plexus causing injury to the nerve.\(^2\) Several factors predispose to plexus injuries, including 90° or greater arm abduction, extension of the upper extremity, external rotation of the upper extremity.\(^3\) Pillai \textit{et al.} have mentioned the grave risk of plexus injury during IN if the arms are abducted beyond 90°.\(^4\) Preventive measures are to maintain flexion of all joints of the upper limbs below 90°.\(^5\) There are no specific guidelines in the literature to prevent plexus injury during spinal IN nor any modification have been made in the design and function of the imaging equipment to overcome interference from normally placed hands. It is imperative for everyone to have knowledge about this danger while performing spinal IN procedure and appropriate measures should be taken for carrying out intervention without injuring the neural structures.

REFERENCES

Crouzon syndrome is an autosomal dominant, genetic disorder characterized by craniofacial dysostosis. Perioperative management of these children for craniosynostosis surgery imposes lot of challenges for an anaesthesiologist including management of difficult airway, massive blood loss, hypothermia and difficult extubation. Immediate postoperative management is equally important for better outcome. Adequate pain relief and proper positioning after awakening is very important for successful extubation. Here, we want to highlight the immediate postoperative management of a child with Crouzon syndrome with bilateral nasal obstruction.

A one-and-half-year-old male child (10 kg), known case of Crouzon syndrome with bilateral choanal artesia was posted for fronto orbital advancement. Child had episodes of cyanosis while crying for which he was evaluated by cardiologist and congenital cyanotic heart diseases were ruled out. On examination, he had typical facial features of Crouzon syndrome (craniosynostosis, exophthalmos, hypertelorism and mid-face hypoplasia) with large tongue. He was breathing by mouth with loud snoring. Parents were asked about the child's usual sleeping position and found that the child used to sleep in prone position on the mother's chest. Since he was obstructing even during sleep and had history of cyanosis in the recent past, he was not given premedication in the ward.

After preparing the operating room (OR) with adequate equipments and drugs, the child was re-examined by the anaesthesiologist in the preoperative holding area. The child was crying and restless and intranasal midazolam (3 mg) was given while the child was monitored by the anaesthesiologist. After 10 minutes, child was calm and the stranger anxiety was completely relieved, child was taken in to the OR and induced with 100% oxygen and sevoflurane. While inducing the child in lateral position (partial obstruction of airway was noted), a 20 G intravenous (i.v) cannula was placed in the hand and anaesthesia was deepened with propofol (2 mg/kg) and fentanyl (2 µg/kg).

Adequate mask ventilation required insertion of oral airway. After placing the standard monitors [peripheral capillary oxygen saturation (SpO2), non-invasive blood pressure (NiBP), electrocardiography (ECG), end-tidal carbon dioxide (ETCO2)] patient was paralysed with atracurium and intubated with 4.5 mm endotracheal tube (ETT). A 22 G invasive arterial line and 20 G additional peripheral line was established. Anaesthesia was maintained with air, oxygen (FiO2 50%) and Isoflurane (1–1.1 Mac) and 5 ug/kg/min of atracurium. Surgery lasted for 6 hours with 250 ml of blood loss which was replaced with crystalloids (500 ml of RL and 350 ml of 0.9% NS) and 200 ml of blood. The child had received total of 7 µg/kg of fentanyl and 0.2 mg/kg of morphine and 2 doses of i.v paracetamol (15 mg/kg) during the start and at the end of procedure. Tranexamic acid was administered to minimise the blood loss (10 mg/kg bolus soon after induction followed by intraoperative infusion of 1 mg/kg/hr). Temperature was maintained between 36.3–36.9 °C throughout the procedure. At the end surgery, child was reversed with neostigmine (0.5 mg) and glycopyrrolate (0.1 mg). Child was extubated awake, and the vitals were stable. Since he was awake and was trying to sit up and move vigorously, we could not keep him in lateral position or prone position in the OR trolley. So the child was given 0.25 mg of i.v midazolam. While the child was sleeping,