tubing with minimal manipulation of head and neck structures can be performed. If one is unable to perform orotracheal intubation, an emergency tracheostomy should be performed in order to gain control of the airway. Removal of a nasal airway that has been placed in the anterior cranial fossa may result in uncontrollable hemorrhage from intracranial or extracranial vessels. Should an anesthesiologist encounter a situation in which a foreign body has been placed in the anterior cranial fossa through the nasal cavity, the object should be left in place and removed in a controlled fashion in the operating room in order to facilitate surgical intervention in the case of uncontrolled hemorrhage.

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Axillary Block for Vascular Insufficiency after Repair of Radial Club Hands in an Infant

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Vascular insufficiency may occur after a variety of surgical procedures and has been described after repair of congenital radial club hand.¹ Treatment of vascular insufficiency by use of sympathectomy has recently been reported in the pediatric population.²⁻⁵ We describe successful use of bilateral axillary blocks to relieve acute vascular insufficiency in a 7-month-old infant after surgical repair of radial club hands.

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CASE REPORT

A 7-month-old infant weighing 8.3 kg was admitted for bilateral centralization procedures on radial club hands. Past medical history was positive only for a small ventricular septal defect. After oral preanesthetic medication with meperidine and pentobarbital, anesthesia was induced with halothane, nitrous oxide, and oxygen and maintained with halothane in oxygen. The anesthetic course was uneventful, as was surgery on the right hand. A dressing and splint were applied and upper extremity tourniquet pressure released. The index finger reperfused, but even after 10 min all other fingers remained blanched. The dressing was loosened, but perfusion did not improve. When the fingers remained blanched for an additional 15 min, we elected to perform sympathectomy by axillary block of the brachial plexus.

The axillary area was draped and the skin pierced with a 20-G needle. A 24-G, insulated, short-level needle (Braun 48945012, Burron, Inc., Bethlehem, PA) then was inserted. This needle was used with a surgical nerve stimulator (WR Medical Electronic, Co., St. Paul, MN) at an initial setting of 2 stimuli/s and a starting current of 2.5 mA. At these settings, direct muscle stimulation was performed to verify proper grounding and function of equipment. The current was then decreased to 1.5 mA, and the plexus sheath was entered. brisk distal motor activity confirmed proper placement of the needle tip. Current was decreased to less than 0.8 mA with continued distal motor response. After negative aspiration, 5 ml 0.25% bupivacaine was injected. Within a few minutes, some perfusion was noted in the ischemic digits, and within 10 min normal color and capillary refill had been reestablished.
The same surgical procedure then was performed on the left hand. After tourniquet release, index finger perfusion was once again normal, but all other fingers remained blanched. After ten min of poor perfusion without improvement (and 2 h after the first injection), axillary block as described above was repeated. Capillary refill appeared within 3 min of injection, and perfusion was normal within 5 min.

Postoperatively the child did well; signs of mild pain appeared 8 h after the first axillary block. Vascular insufficiency did not recur. This patient has since undergone uncomplicated pollicization of both hands (separate procedures) with combined light general and regional anesthesia.

DISCUSSION

Sympathetic blockade is often recommended to improve blood flow to an extremity. Chronic vascular disease, intraarterial drug injection, and the sequelae of a variety of arterial injuries are reported to improve after sympathectomy. This therapeutic approach has recently been extended to the pediatric age group. Lower-extremity ischemia associated with meningococcemia has been treated by caudal epidural and lumbar sympathetic blocks. Vascular cannulation, a frequent cause of limb ischemia in the pediatric intensive care unit, has been reported to respond well to sympathectomy. Similarly, Lagade and Poppers have reported use of stellate ganglion block for arterial insufficiency in a 1,600-g infant.

In our case, we chose the axillary approach to sympathectomy. Axillary block is simple to perform even when the short, chubby neck of an infant makes stellate ganglion or interscalene techniques more difficult. Furthermore, axillary block provides postoperative analgesia, an advantage not afforded by stellate ganglion block. Interscalene or parascalené techniques also would provide analgesia and may have the advantage of being more removed from vascular structures. Other complications, though, such as phrenic nerve block, are more common with the latter techniques, and analgesia to the distal extremity may not be as reliable. Furthermore, with axillary block, vascular complications are rare even when perivascular techniques are used, and morbidity does not seem to occur.

Regardless of the approach chosen to the brachial plexus, use of the nerve stimulator facilitates performance of the block. The technique offers a fast, safe means of documenting approximation of nerve and needle tip, even in anesthetized patients. Vascular structures are not needed as landmarks, such that the already low incidence of vascular trespass is reduced. Similarly, since paresthesia is not elicited, neural injury can be reduced. Small insulated needles are readily available, and the use of a nerve stimulator is our technique of choice for all brachial plexus blocks in children.

The blood flow effect of epinephrine in solutions for perivascular blockade has also been a matter of some controversy. Although we routinely include 1:200,000 epinephrine in solution used for plexus blocks, we omitted it in the current case to help eliminate implication of the block as a cause for continued poor perfusion. The volume of solution used, 0.6 ml/kg body weight, is compatible with Dalens’s recommendation for plexus block in children.

Vascular insufficiency may occur in many types of surgery. Centralization of radial club hand has been complicated by this problem. The pattern of abnormal perfusion in the current report is easily understood in view of the arterial anatomy associated with this deformity. In our patient, as in most patients with radial club hand, the radial portion of the hand is perfused by the anterior interosseous artery. The radial artery and the normal vascular arch of the hand absent. Vascular insufficiency is therefore an important consideration. In this patient, the anterior interosseous artery continued to supply the index finger normally, whereas the area of distal ulnar circulation was compromised. Fortunately, sympathectomy was sufficient to relieve ischemia of both hands for this infant.

Argument can be made with this case, as with some of those in reports cited above, that the course of events without sympathectomy remains unknown. Would blood supply have returned spontaneously? Would the surgical repair have had to be abandoned, leading to a poor result? Evidence that sympathectomy is effective in vascular insufficiency is largely anecdotal, but it has led some authors to advocate regional block as the method of choice in any procedure with important circulatory considerations.

In summary, this case illustrates the technique and value of axillary block for sympathectomy in upper extremity vascular insufficiency, particularly acute postoperative insufficiency. This technique is applicable to all age groups. When vascular insufficiency occurs, a trial of therapeutic sympathetic blockade may be beneficial.

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Full text not provided.