# Lateral sagittal infraclavicular block is a clinically effective block in children

doi:10.1017/S026502150800450X

EDITOR:
Infraclavicular block is gaining popularity due to ease of performance and high success rate, also in children [1]. Following a magnetic resonance imaging (MRI) study in volunteers, Klaastad and colleagues [2] suggested that infraclavicular block could be accomplished by the 'lateral sagittal route' with ease and low risk of complications like pneumothorax. The lateral sagittal infraclavicular block (LSIB) technique is well accepted by adult patients, and in large clinical series using single-injection technique with the aid of a nerve stimulator, the block success rate ranges between 89.7% and 91% [3,4]. Until now only a case report [5] and a letter [6] have reported successful use of LSIB in children. The primary purpose of this study was to evaluate the clinical utility of LSIB in children undergoing upper extremity surgery under general anaesthesia.

After approval by Kocaeli University Ethics Committee and written informed consent from the parents, a prospective and descriptive study was performed on patients scheduled for elective or acute hand, forearm and elbow surgery. Consecutive children (age range 4–12 yr of age), ASA physical status I, having surgery between June 2005 and July 2007 were included in the study. All children included into the study were informed about the possible effects of the study including analgesia and motor block. More detailed verbal information was given and oral consent was obtained in older children. Children who could not cooperate, those who had a congenital or acquired brachial plexus defect/injury, patients with coagulopathy, allergy to any of the study drugs, with previous surgery or trauma that prevented the anatomic localization of the injection point were excluded from the study.

EMLA® cream (Astra Zeneca, Wedel, Germany) was applied to the non-injured hand for venous puncture. After insertion of a venous cannula, all patients received midazolam 0.05–0.1 mg $kg^{-1}$ intravenous for sedation. In the operating room, patients were monitored with electrocardiogram, non-invasive blood pressure and pulse oximetry. General anaesthesia was induced with propofol 1% and fentanyl 1 μg $kg^{-1}$ and a Proseal LMA was inserted. Anaesthesia was maintained with 1 : 1 $N_2O : O_2$, sevoflurane 1–2% and spontaneous ventilation. The lungs of all children were auscultated before and after infraclavicular block performances. A chest X-ray was planned as a security measure in case of clinical signs of pneumothorax. The puncture site was checked repeatedly to detect any swelling or haematoma formation.

With the anaesthesiologist standing behind the patient's shoulder, the arm to be blocked was adducted and the hand placed on the abdomen. The patient's head was turned to the side opposite to that on which the block was to be performed. The puncture site was immediately adjacent to the most medial point of the coracoid process and the anterior surface of the clavicle (Fig. 1). After antiseptic preparation of the area, a 22-G, 50 mm, insulated needle (Stimuplex A, B Braun Medical) was connected to the active lead of the nerve stimulator (Stimuplex HNS 11; B Braun Medical, Melsungen, Germany) and set to deliver 1.5 mA current impulses of 0.1 ms duration at a frequency of 2 Hz. A distinct distal motor response at the level of the hand or wrist at a current output ranging between 0.3 and 0.5 mA was obtained in all patients. The needle was inserted caudally in a sagittal plane, 20° dorsally (to the horizontal plane), until muscle twitches were observed in synchrony with the stimulation. Biceps twitches were ignored and the needle was advanced deeper until one of the following finger/wrist twitches were obtained: second and third finger flexion was accepted as a median nerve response, flexion of the fourth and fifth fingers as an ulnar nerve response and finger or wrist extension as a radial nerve response. During needle insertion and redirections, continuous aspiration was performed by an assistant to detect any possible intravascular puncture. All patients received 0.5 mL $kg^{-1}$ of bupivacaine 0.25% with adrenaline 5 μg $mL^{-1}$.

All blocks were performed by the same anaesthesiologist with experience in LSIB. Analgesia and motor block durations were recorded during 24 h. In the early postoperative period in the recovery unit, patients were asked if they had pain or not. Analgesia duration was defined as the interval

Correspondence to: Yavuz Gürkan, Kuruçeşme, Doruk Sitesi, C Blok D: 4, 41100, Kocaeli, Turkey. E-mail: yavuzg@superonline.com; Tel: +90 533 7106245; +90 262 3037056; Fax: +90 262 3038003

Accepted for publication 27 April 2008 EJA 4953
First published online 9 June 2008

**Figure 1.**
*Site of needle entry during a lateral sagittal infraclavicular block (left arm).*

between brachial plexus block and the first time the patient reported pain and required analgesia. The duration of the motor block was defined as the interval between the brachial plexus block and the first distal movement of the hands.

Each patient was followed up by the surgeon postoperatively and any possible late complication recorded (persistent pain or paraesthesia, haematoma, local infection at the site of needle entry, respiratory difficulty) by the surgeon. All data are presented as numbers, mean ± SD or median and ranges.

Eighty children (44 male and 36 female) undergoing hand, forearm and elbow surgery were included into the study. The median (range) age was 7 (4–12) yr and weight 20 (12–49) kg. All children received either orthopaedic or plastic surgery. Surgical procedures were nerve, tendon and vascular sutures, tumour excision, scar revision, ganglion excision, tendon transfer, contracture release (with z-plasty), tenolysis, amputations or osteosynthesis. Of the operations 39 were on the hand, 32 on the forearm and 9 on the elbow. Mean ± SD duration of surgery was 46 ± 21 min, depth of needle 3.1 ± 0.8 mm and number of needle redirections 2.7 ± 0.9. All of the patients were pain-free at awakening from general anaesthesia with a mean duration of analgesia of 13 ± 8 h and a mean duration of motor block of 6 ± 2 h. Vascular puncture was noticed in six patients. No other complications, including signs of local anaesthetic toxicity, residual paraesthesia and respiratory difficulty suggesting pneumothorax were observed.

The number of studies concerning the use infraclavicular block in children is limited [1,6,7]. Although the technique employed by Fleischman and colleagues [1] may seem similar to the LSIB technique, both the site of needle entry (0.5 cm distal to the coracoid process) and the angle of needle entry are quite different from the LSIB technique [2]. Although vascular puncture was not reported by Fleischmann and colleagues [2], a single case of haematoma formation was reported following vertical infraclavicular block in children [7]. We encountered six cases of vascular puncture using LSIB. The difference in the incidence of vascular puncture might be explained by the continuous aspiration during needle advancements.

The dorsal needle angle to the horizontal plane in our study was $19 \pm 9^\circ$ and thus was steeper than the $12^\circ$ and $10^\circ$ measured in the MRI study of the posterior and medial cords, respectively [2]. The range of needle dorsal angle in previous case reports with LSIB in children was also steeper than the suggestions following the MRI study [2,5,6]. This could be attributed to anatomical differences between children and adults as well as individual variation of weight, height and age of the children.

The mean ± SD time to perform the block was 2.3 ± 0.9 min compared to 4 min in an adult patient group [3]. In most cases, the number of needle redirections was limited to one or two, which is less than earlier report with adults.

In conclusion, LSIB is easy to perform in children due to distinct anatomical landmarks and except vascular puncture no complication was encountered in our 80 children.

*Y. Gürkan, D. Özdamar, M. Solak, K. Toker*
*Department of Anaesthesia*
*Kocaeli University Hospital*
*Kocaeli, Turkey*

## References

1. Fleischmann E, Marhofer P, Greher N, Waltl B, Sitzwohl C, Kapral S. Brachial plexus anaesthesia in children: lateral infraclavicular vs axillary approach. *Paediatr Anaesth* 2003; **13**: 103–108.
2. Klaastad Ø, Smith HJ, Smedby O *et al*. A novel infraclavicular brachial plexus block: the lateral and sagittal technique, developed by magnetic resonance imaging studies. *Anesth Analg* 2004; **98**: 252–256.
3. Koscielniak-Nielsen ZJ, Rasmussen H, Hesselbjerg L, Gurkan Y, Belhage B. Clinical evaluation of the lateral sagittal infraclavicular block developed by MRI studies. *Reg Anesth Pain Med* 2005; **30**: 329–334.
4. Gurkan Y, Hosten T, Solak M, Toker K. Lateral sagittal infraclavicular block: clinical experience in 380 patients. *Acta Anesthesiol Scand* 2008; **52**: 262–266.
5. Gurkan Y, Ozdamar D, Yılmaz AS, Toker K, Solak M. Infraclavicular block applications in paediatric patients. *Türk Anest Rean Der Dergisi* 2005; **33**: 480–483.



https://doi.org/10.1017/S026502150800450X Published online by Cambridge University Press

6. Sedeek KA, Goujard E. The lateral sagittal infraclavicular block in children. *Anesth Analg* 2007; **105**: 295–297.
7. Jose Maria DB, Tielens LKP. Vertical infraclavicular brachial plexus block in children: a preliminary study. *Paediatr Anaesth* 2004; 14: 931–935.

# Mental nerve injury following general anaesthesia

doi:10.1017/S0265021508004754

EDITOR:
A healthy 31-yr-old female with no previous medical history was scheduled for gynaecologic laparoscopy for primary sterility under general anaesthesia. Routine preoperative investigations were unremarkable. The patient was premedicated with 1 mg kg$^{-1}$ of hydroxyzine (Atarax®) administered orally one hour before the induction of anaesthesia. General anaesthesia was induced with 1 μg kg$^{-1}$ of fentanyl, 2.5 mg kg$^{-1}$ of propofol and 0.15 mg kg$^{-1}$ of cisatracurium. The patient was easily ventilated for 3 min via a size 4 clear face mask with soft adjustable cushion (VBM Medizintechnik GmbH, Einsteinstrasse 1. D-72172 Sulz a.N. Germany). No unusual or excessive pressure was exerted on the mask. Intubation of the trachea was easy and the endotracheal tube was fixed with a tape on the upper lip. Following intubation, a size 2 oropharyngeal (Guedel) airway (Intersurgical UK, Wokingham, UK) was inserted and fixed with a tape. The surgical procedure lasted 45 min. Intra- and postoperative course were uneventful and the patient was discharged home the same day. Twenty-four hours postoperatively, the patient presented to the anaesthetic department complaining of numbness in her middle lower lip. Clinical assessment showed a loss of temperature and touch perception at the level of her middle lower lip. The patient was followed up and the numbness regressed gradually from her chin cephalad. Complete remission occurred within 2 weeks.

## Discussion

In this case, paraesthesia/anaesthesia corresponded to the area of innervation of the upper branches of the mental nerves (branch of the mandibular division of trigeminal nerve). Only four cases of mental nerves injury following anaesthesia have been found in the literature [1–3]. In all reported cases, long lasting anaesthesia delivered via face mask with a difficulty to retain airway patency preceded the nerve injury. Damage to nerves of the head due to excessive pressure from an anaesthesia mask can be induced [2]. However in our case, the ventilation was easy and of short duration. Nevertheless, the patient still developed a mental nerve injury. The exact cause of this complication was not clear. Acute peripheral nerve damage is usually a result of chemical or physical injury. The patient's lips were in contact with no chemical substances during anaesthesia and surgery. It is possible that the numbness of the lower lip was related to excessive pressure exerted by the plastic oropharyngeal airway on the mental branch of the inferior alveolar nerve as it entered the mandibular foramen on the inner aspect of the mandibular ramus [1].

In conclusion, mental nerve injury following general anaesthesia may be related to prolonged and difficult ventilation with a face mask. It is also possible that pressure applied by the oropharyngeal airway at the level of the mandibular foramen may be an alternative mechanism. Although these nerve injuries usually showed complete remission within few weeks to several months [3], the loss of sensation for temperature and touch could lead to thermal injury and self-induced trauma to the lip and buccal mucosa [1]. Patients should be alerted to avoid injuries to the lip and mouth until any such numbness resolves.

*F. Richa, A. Yazigi, P. Yazbeck*
*Department of Anaesthesia and Intensive Care*
*Hotel-Dieu de France Hospital*
*Saint-Joseph University*
*Beirut, Lebanon*

Correspondence to: Freda Richa, Anaesthesia and Intensive Care Department, Hotel-Dieu de France Hospital, Saint-Joseph University, Alfred Naccache Street, Ashrafieh, Beirut, Lebanon. E-mail: fredrich24@yahoo.com; Tel: +961 3 872077; Fax: +961 1 615295

Accepted for publication 24 May 2008 EJA 5180
First published online 16 June 2008

## References

1. Azar I, Lear E. Lower lip numbness following general anesthesia. *Anesthesiology* 1986; **65**: 450–451.
2. Bhuiyan MS, Chapman M. Mental nerve injury following facemask anaesthesia. *Anaesthesia* 2006; **61**: 505–517.
3. Lorentz A, Podstawski H, Osswald PM. Lower lip numbness after general anesthesia. *Anaesthesist* 1988; **37**: 381–383.