

## Ultrasound-guided subcutaneous cervical plexus block for carotid endarterectomy in a patient with chronic obstructive pulmonary disease

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To the Editor:

Carotid endarterectomy (CEA) can be performed under regional anesthesia with superficial or deep cervical plexus block (CPB). An advantage of superficial CPB compared with deep CPB is reduced hemi-diaphragmatic paresis due to phrenic nerve block [1]. A subcutaneous block (superficial to the investing cervical fascia) is clinically effective in CEA because the investing cervical fascia is permeable [2, 3]. This is the first report of ultrasound (US)-guided subcutaneous CPB.

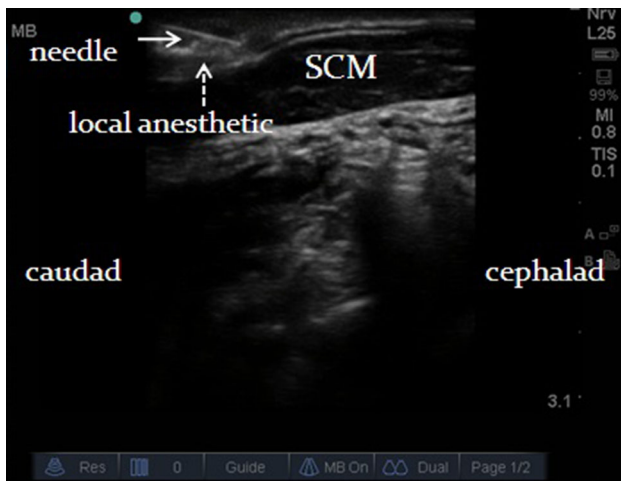
A 65-year-old man with severe stenosis of the right proximal internal carotid artery was scheduled for CEA. He had a history of severe chronic obstructive pulmonary disease. Pulmonary function test revealed a forced expiratory volume in 1 s of 0.69 L (%FEV<sub>1</sub>: 24 %, grade V in the Hugh–Jones classification). The patient received 1 mg midazolam in the operating room and was placed in the supine position with the head turned toward the nonoperative side. The carotid artery, internal jugular vein, sympathetic trunk, vagus nerve, and phrenic nerve were visualized in the coronal plane by use of a US machine (SonoSite M-Turbo®; SonoSite Bothell, USA) with a 6 to 13-MHz linear probe. For the subcutaneous block, a 50-mm long insulated needle (Stimuplex® A; B. Braun, Germany) connected to a nerve stimulator (0.5 mA) was

inserted subcutaneously adjacent to the posterior border of the sternocleidomastoid muscle, without penetrating the investing cervical fascia, by use of real-time US. We used the nerve stimulator to detect whether the needle had been positioned inadvertently in the deep cervical space; contractions of the neck muscles were not provoked by the 0.5-mA current. After negative aspiration, 5 mL 0.5 % ropivacaine with 5 µg/mL epinephrine was injected subcutaneously in a cephalad direction. Another 5 mL was injected in a caudad direction [4] (Fig. 1). Fifteen minutes after local anesthetic (LA) injection, the patient showed negative results on pinprick test of the mastoid process, ear lobe, and cricoid cartilage. The duration of surgery was 100 min. Except for mild pain during supraclavicular drain-tube insertion before wound closure, the patient did not complain of pain during the operation. Side effects, for example hoarseness, Horner's syndrome, and acute respiratory distress did not occur, and elevation of the hemi-diaphragm was not visible on postoperative radiography. After the surgery, the patient did not suffer any cardiopulmonary complications.

In a cadaveric study, Pandit et al. [5] demonstrated that the deep cervical fascia was permeable. Anatomical dissection revealed that dye injected below the investing fascia spread to the deep cervical space, coating the scalene muscles, phrenic nerve, and cervical nerve roots. On the basis of this fact, we considered that LA injected below the investing fascia can enter the deep cervical space and affect the phrenic nerve. LA is administered blind in the conventional technique, and this procedure may result in serious puncture-related complications. In our case, real-time US was important in preventing inadvertent deep block.

In conclusion, we suggest that US-guided subcutaneous CPB is potentially safe and clinically effective regional

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**Fig. 1** A 50-mm long insulated needle was inserted subcutaneously at the midpoint of the posterior border of the sternocleidomastoid muscle in a cephalad direction. Local anesthetic was diffused subcutaneously above the sternocleidomastoid muscle. *SCM*, sternocleidomastoid muscle. This image depicts the longitudinal view

anesthesia for CEA in patients with severe pulmonary dysfunction.

## References

1. Pandit JJ, Satya-Krishna R, Gratton P. Superficial or deep cervical plexus block, for carotid endarterectomy: a systematic review of complications. *Br J Anaesth.* 2007;99:159–69.
2. Nash L, Nicholson HD, Zhang M. Does the investing layer of the deep cervical fascia exist? *Anesthesiology.* 2005;103:962–8.
3. Ramachandran SK, Picton P, Shanks A, Dorje P, Pandit JJ. Comparison of intermediate vs subcutaneous cervical plexus block for carotid endarterectomy. *Br J Anaesth.* 2011;107:157–63.
4. Murphy TM. Somatic blockade of the head and neck. In: Cousins MJ, Bridenbaugh PO, editors. *Neural blockade in clinical anesthesia and management of pain.* 3rd ed. Philadelphia: Lippincott-Raven; 1998. p. 489–514.
5. Pandit JJ, Dutta D, Morris JF. Spread of injectate with superficial cervical plexus block in humans: an anatomical study. *Br J Anaesth.* 2003;9:733–5.