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Bilateral guided cervical block for Zenker diverticulum excision in a patient with ankylosing spondylitis

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Abstract
Patients with severe ankylosing spondylitis (AS) have difficulties in tracheal intubation. An 87-year-old man with severe AS was scheduled for Zenker diverticulum (ZD) excision. It was decided to proceed with combined bilateral cervical plexus blockade using a nerve stimulator. The surgery lasted about 3 h, with stable hemodynamics, ECG, and oxygen saturation. The use of a nerve stimulator-guided cervical block minimizes the risk of severe respiratory and/or airway compromise secondary to phrenic nerve or recurrent laryngeal nerve palsy, because it can elicit diaphragmatic muscle response, which helps to avoid the administration of local anesthetic directly to the area of the phrenic nerve, and guides correct needle placement. In conclusion, the nerve stimulator-guided bilateral cervical block in our ZD patient with AS was shown to be a safe and successful alternative anesthetic option.

Key words Zenker diverticulum · Ankylosing spondylitis · Cervical block · Nerve stimulator

Introduction

Patients with severe ankylosing spondylitis (AS) have difficulties in tracheal intubation due to cervical spine rigidity [1]. Zenker diverticulum (ZD) is a rare esophageal condition occurring classically in elderly men. Zenker diverticulum pouching is believed to result from dysfunction or spasm of the cricopharyngeus muscle [2,3]. Pulmonary aspiration of liquid or solid material during induction of general anesthesia in ZD patients could be a major concern for the anesthesiologist. To our knowledge, this is the first case report of a patient with severe AS who underwent ZD excision in which a nerve stimulator-guided bilateral cervical plexus nerve block (CPB) was used.

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Case report

An 87-year-old Caucasian man, weight 82 kg, height 180 cm, was scheduled for a ZD excision. The patient presented with severe AS resulting in a short stiff neck, neck motion limitation in all planes, and a Mallampati score of four. The semisitting position was the only acceptable one for the patient, who was considered to have difficult tracheal intubation (Fig. 1). The patient had a long-standing history (>10 years) of dysphagia for solid food and liquids. He complained of frequent episodes of food aspiration, coughing, vomiting, and weight loss of 10 kg over the past 6 months. Diagnosis of ZD was made by a barium swallow, showing an outpouching measuring about 4 × 5 cm (Fig. 2). Cautious awake endoscopy under topical anesthesia confirmed the diagnosis of ZD. The patient's medical history was positive for hypertension. However, during hospitalization the patient developed short-lived atrial fibrillation, which was managed medically with amiodarone, after which the patient maintained a regular sinus rhythm with infrequent premature atrial beats. Preoperative investigations showed electrolyte disturbance (sodium level was 122 $mEq \cdot l^{-1}$ and chloride was 89 $mEq \cdot l^{-1}$). Chest X-ray revealed bilateral central fibrotic or atelectatic strands with sclerotic aortic knob and normal heart. The patient was scheduled for surgery after correction of the electrolyte imbalance.

Before surgery, the options and risks of regional versus general anesthesia were discussed with the patient. An awake fiberoptic intubation was refused by

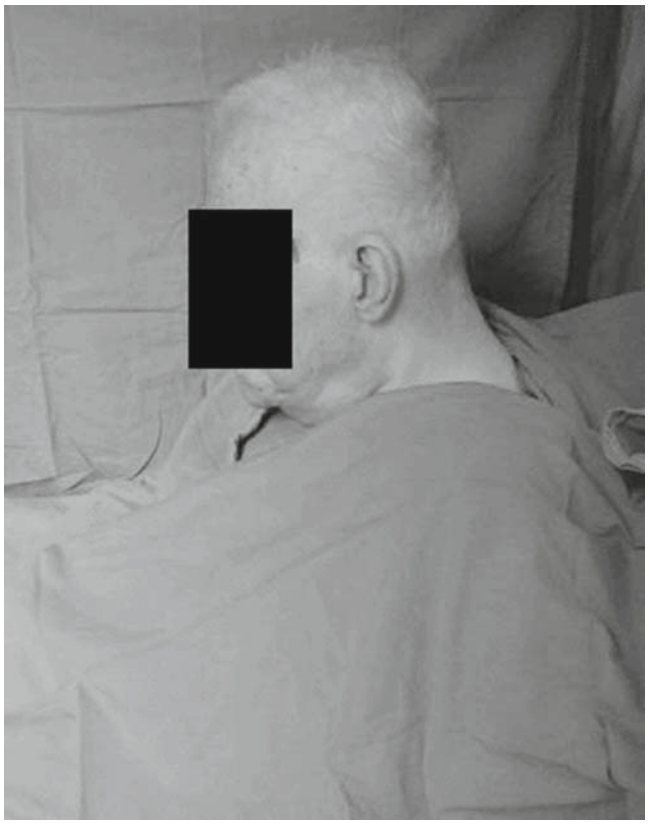

Fig. 1. Our patient in the semisitting position before the performance of nerve stimulator (NS)-guided combined deep and superficial cervical plexus blocks

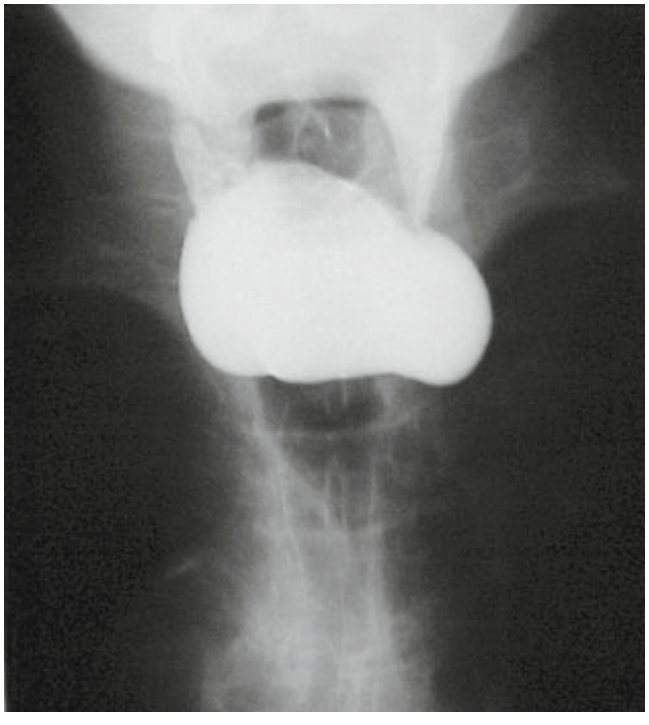

Fig. 2. Barium radiograph of Zenker diverticulum

the patient, who agreed to undergo the surgery under regional anesthesia. It was decided to proceed with combined bilateral superficial and modified deep CPB, using a nerve stimulator (Stimuplex DIG; Braun, Melsungen, Germany).

In the semisitting position, the patient was continuously monitored by ECG, pulse oximetry, and intraarterial blood pressure. Oxygen was applied with a face mask and a catheter was placed in the mask for monitoring the tidal CO_2. The cervical transverse processes (C2, C3, and C4) were located approximately 1 cm posterior to the posterior border of the sternocleidomastoid muscle The deep CPB was performed using a 24-G short bevel needle (50-mm Stimuplex cannulae; Braun) connected to a nerve stimulator. The needle was inserted at a right angle to the skin with a slight caudal direction at the C2 level to elicit twitches of the corresponding neck muscles, which guided correct needle placement and avoided the administration of local anesthetic at the site of the phrenic nerve. The procedure was then repeated at the C3 and C4 levels. The stimulation started with a current of 2.5 mA and gradually decreased until a current of 0.5 mA was used, while the neck muscle response was maintained. At this point, 5 ml of local anesthetic mixture (LAM) was injected over 2–3 min at each level.

Each 20 ml of the LAM contained: 12 ml of 2 % lidocaine, 6 ml of 0. 5 %, bupivacaine, 1 ml of 50 $\mu g \cdot ml^{-1}$ fentanyl, and 1 ml of 150 $\mu g \cdot ml^{-1}$ clonidine. This mixture has previously been reported to provide long-lasting postoperative pain relief after peripheral nerve blocks performed for various types of surgical interventions [4,5]. The deep cervical block was strengthening by a superficial cervical plexus block, which was performed by infiltrating 7 ml of LAM at the midpoint of the sternomastoid muscle. After 10 min, the anesthetic technique was repeated at the contralateral side of the neck after checking the phonation and making certain that chest auscultation was equal on both sides in order to eliminate any respiratory compromise secondary to recurrent laryngeal nerve and/or phrenic nerve palsy. In addition, infiltration of 3–5 ml of LAM was performed along the inferior border of the mandible bilaterally.

After 15 min, adequate regional anesthesia was achieved at the C2-C4 dermatomes, as shown by skin testing for pinprick and cold sensations. Surgery was started and the patient's diverticulum was resected via a left neck incision followed by a classical myotomy of the cricopharyngeus muscle. No supplemental local anesthesia or intravenous opioids were administered during the operative procedure. Surgery lasted for about 3 h, during which the patient maintained adequate oxygen saturation above 97% and normal tidal CO_2. As well, hemodynamics and ECG were stable throughout the surgery.

The postoperative course was uneventful and the patient was pain-free during the first 24 h. The patient resumed a regular diet gradually and was discharged home on the sixth postoperative day.

Discussion

Patients with severe AS have difficulties in tracheal intubation due to cervical spine rigidity. Cervical spine mobility is decreased and total rigidity in a flexed position may occur in severe cases, as was observed in our patient. Cervical spine vertebrae are prone to fractures, especially on hyperextension.

The anesthetic implications of ZD have been discussed by Thiagarajah et al. [6]. Regurgitation following induction of general anesthesia in a patient with ZD has been reported. Moreover, the application of cricoid pressure for general anesthesia may increase rather than decrease the risk of regurgitation in patients with ZD [7,8]. The most effective means of preventing aspiration is to avoid general anesthesia. Furthermore, it has been postulated that during difficult intubation (as in our patient), blind tracheal intubation attempts may perforate the pouch, resulting in mediastinitis [6]. The difficult tracheal intubation due to the severe AS and the presence of ZD prompted us to use a bilateral cervical block guided by a nerve stimulator as the first choice of anesthesia. Our technique of bilateral guided cervical block in patients undergoing ZD excision cannot be considered as the only possible anesthetic technique. General anesthesia following awake fiberoptic tracheal intubation is a suitable alternative. Furthermore, other methods of airway management such as the use of the Airtraq (Prodol Meditec, Vizcaya, Spain) or airway scope (Pentax-AWS, Pentax, Tokyo, Japan) have been suggested [9,10]. Awake tracheal intubation has been advised for ZD repair [6], and in patients having AS [1], but this option was rejected by our patient. During operation under nerve block, if an emergency state occurs in ventilation, jet ventilation should be available.

Combined superficial and deep CPB is a technique that was initially developed to avoid general anesthesia for carotid endarterectomy [11]. The use of a nerve stimulator during deep CPB was previously reported for carotid surgery by Mehta and Juneja [12], who used a single-injection technique. Also, regional anesthesia has already been used successfully to perform thyroidectomy with light sedation [13]. Our anesthetic technique was precise and satisfactory for both surgeon and patient.

In our patient the combination of deep CPB and infiltration of LAM along the inferior border of the mandible to block afferent branches from the cranial nerves (trigeminal and/or facial), appeared to reduce the pain associated with prolonged use of a retractor under the mandible at the cephalad end of the incision. Also, it decreased the need for supplemental IV analgesia or local anesthetic infiltration and reduced the postoperative pain.

In our patient, the total dose of the local anesthetic may have been be a little more than the recommended dose. However, Merle et al. [14] have shown that the use of a nerve stimulator during CPB decreased the peak serum concentration and significantly reduced the time to reach peak concentration of the local anesthetic; both of these factors being major determinants of the systemic toxicity of local anesthetics.

Potential serious complications associated with deep CPB include systemic toxicity of the local anesthetics; injection of drugs into the vertebral artery or subarachnoid or epidural spaces; and recurrent and phrenic nerve palsy. The incidence of these complications after deep CPB is reported to be 55%, and may be higher during bilateral CPB [9].

These complications could be prevented by using the nerve stimulator. In the case of intrathecal administration of the local anesthetics at reduced electrical current (0.4–0.6 mA) an exaggerated muscle response would be elicited once the needle is placed within the intrathecal area. In addition, injury of the blood vessels can be found by needle aspiration prior to injection. Further, the use of a nerve stimulator can elicit diaphragmatic muscle response, which helps to avoid the administration of the local anesthetic directly to the area of the phrenic nerve; thus minimizing the risk of severe respiratory and/or airway troubles secondary to phrenic nerve or recurrent laryngeal nerve palsy. For similar reasons, nerve block under ultrasound guidance is the most common method performed in the operation room.

In conclusion, the nerve stimulator-guided bilateral cervical block in our ZD patient with AS was shown to be a safe and successful alternative anesthetic option.

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