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Case Report
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# Effectiveness of Cervical Plexus Block in Unilateral Spinal Accessory Nerve Palsy After the Robot-Assisted Thyroid Surgery

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## Abstract

Patient who underwent robot-thyroid surgery could undergo postoperative nerve injury. Previous studies applied non-surgical therapy in nerve injury, with steroid injection or nerve block with local anesthetics and showed 5 to 13 months recovery time. In this case, we report successful recovery of spinal accessory nerve palsy after robot assisted thyroidectomy via retroarticular approach by using cervical plexus block. The patient gained full recovery of motor functions within three months.

**Keywords: Accessory nerve; Nerve block; Pain; Shoulder; Lidocaine**

## Introduction

Recently, incidence of thyroid cancer is increasing, and practice of surgery for thyroid cancer has been advanced over the decades [1]. Operative advances focus on reducing complications, improving cosmetic outcomes and better view of surgery [1]. Minimally invasive surgery is designed with novel endoscopic view including transaxillary, breast, retro-auricular, transoral approach, and these endoscopic approaches provide different surgical views and advantage of cosmetic outcomes, while complications relating access site has been reported [2]. Therefore, possible treatment options for managing complications related to access site is useful. In this case report, we present a case of treating accessory nerve palsy occurred after robot assisted thyroidectomy by intermediate cervical plexus block.

## Case Presentation

29-year-old women (weight 54 kg, body mass index 19.8 kg/m$^2$) with no underlying disease underwent robot-assisted right thyoidectomy via retro auricular approach for thyroid cancer. Prior to surgery, she had normal airway feature with good mouth opening. During induction of anesthesia, was induced with intravenous propofol 150 mg, with fentanyl 50 mcg, and rocuronium 50 mg. Intubation with tube size 7 mm was done smoothly, and anesthesia was maintained with sevoflurane and remifentanil 0.1-2 mcg/kg/min. During surgery, the vitals were maintained stable and the surgery lasted for 6 hours.

Robot-assisted right thyroidectomy via retro auricular approach was performed. A skin incision was done in right postauricular sulcus, and continued along the occipital hairline (Figure 1). The procedure was followed with flap elevation, and other anatomical structures including muscle, vessel, and nerve was dissected. Thyroidectomy and lymph node dissection was followed. After the surgery, the anesthetics were terminated, and the patient was extubated without any complication.

Three months later, the patient visited our pain clinic complaining of right shoulder pain. Her shoulder pain aggravated on abduction of shoulder joint. Her active shoulder joint forward flexion range of motion was slightly limited on right side or shoulder when compared to left side, (165° to 170°) and felt chilling pain on right side of shoulder. The nerve conduction study and electromyography suggested right spinal accessory nerve palsy on initial presentation to our pain center, the patient had problem with elevation of right arm, and right sided depression of scapula (Figure 2A). There was no sensory deficit on right shoulder and arm, but she had limitation in neck rotation to left, which was limited to 70°. We conducted the first right intermediate cervical plexus block session and right stellate ganglion block in the first visited day. Ten days later, the patient visited with improved pain on her shoulder and slight tingling sensation on her affected side

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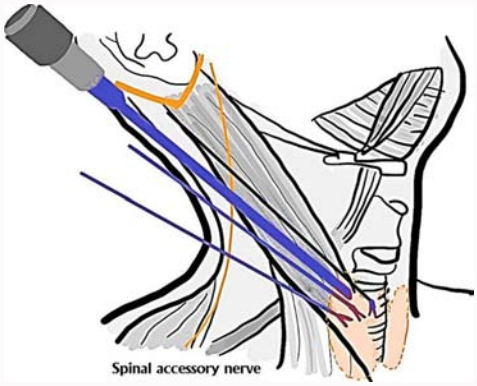


**Figure 1:** Three arms approach in retroauricular robot surgery. The spinal accessory nerve is traced laterally and inferiorly toward the lateral border of the sternocleidomastoid muscle.

of shoulder. On that day, we conducted the second stellate ganglion block. One month later from the first visit, the patient visited with improvement of pain on the affected side of shoulder, and improved elevation of trapezius, (Figure 2B) we performed the second session of right intermediate cervical plexus block. A week later, the patient revisited with much improved motion of trapezius and improved pain on affected side of shoulder. That day, we conducted the third session of intermediate cervical plexus block. Two months after the first visit from our center, the patient visited with near complete improvement of symptoms. The level of each scapula was equal, with normal rotation of movement in right shoulder (Figure 2C). The patient is well maintaining of good health without shoulder pain by now.

## Discussion

In this case report, we report successful treatment of iatrogenic SAN palsy with intermediate cervical plexus block. Our finding is meaningful for applicable modality for treating SAN palsy.

SAN innervates the Sternocleidomastoid (SCM) and trapezius muscle [3]. As the accessory nerve enters the deep surface of SCM muscle, it enters at site 5cm inferior to mastoid process apex, approximately [4]. The point is around midway between mastoid process and angle of mandible, and emerges form SCM muscle at a level of superior border of the thyroid cartilage [5]. Because of its superficial location in posterior cervical triangle, iatrogenic injury can be followed by procedure at the posterior triangle of the neck [6] (Figure 1). SAN injury can lead in dysfunction of elevating, rotating or retracing the scapula [7], leading to drop of shoulder, and scapula moved laterally and rotated downward.

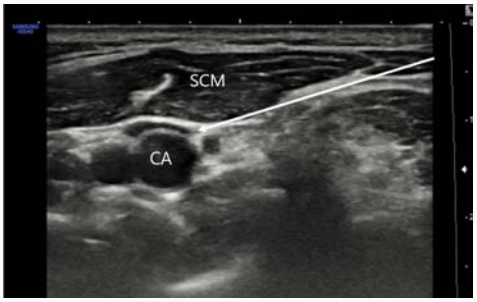


**Figure 3:** Ultrasound guided intermediate cervical plexus block. White arrow indicates passage of needle. Local anesthetics is spreaded between SCM muscle and prevertebral fascia. SCM; Sterno-cleido-mastoid muscle. CA; carotid artery.

Conventionally, two clinical treatment options were suggested for SAN injury. First option is surgical treatment. Surgical therapy is indicated when there is dense paralysis or absence of clinical improvement on serial examinations, or intraoperative identification of nerve-in-continuity [8]. It is important to reconstruct within 6 months after nerve injury, and partial recovery is expected when operation is done when surgery is done after 12 months of injury [9,10].

The second option is nonsurgical management. Conservative approach can be applied in mild, tolerable symptoms like pain in trapezius or scapulohumeral dysfuction. Patients should be advised to limit movement for nerve recovery, and botulinum toxin A injection in painful trigger point has been reported [11]. In conservation approach, recovery period as long as 12 months has been reported in previous literature [12].

We propose intermediate cervical plexus block as alternative conservative treatment modality for SAN palsy. SAN is small fiber of nerve that passes superficial to levator scapulae muscle. It is small sized nerve with diameter of 2 mm [13], which makes blocking difficult and expertise is needed. Cervical plexus block can be effective alternative for SAN block, as clinician do not need to identify small structures such as SAN (Figure 3).

There are three methods for conducting cervical plexus block, superficial, intermediate, deep [14]. We conducted intermediate cervical plexus block, which is consisted of injecting the local anesthetics to below the investing fascia, but superficial to the prevertebral fascia. Previous anatomical studies on SAN reported. SAN emerges from posterior border of SCM muscle and courses to posterior triangle, deep to the deep cervical fascia and superficial to prevertebral fasia and levator scapulae [15]. Therefore, intermediated cervical plexus block was adopted in this case, as needle is advanced

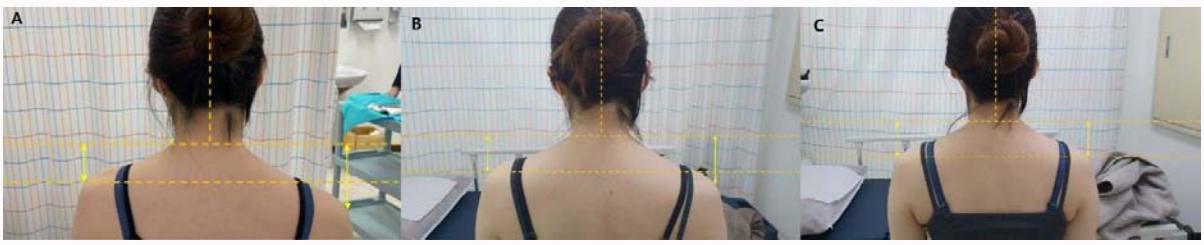


**Figure 2**: Depression of scapula improved after cervical plexus block. (A). Right scapular depression after surgery. (B). 1month follow-up after stellate ganglion block and cervical plexus block. (C). 2month follow-up after stellate ganglion block (2 times) and cervical plexus block (3 times).

deeper to SCM. Deep cervical plexus block has been reported with more incidence of complication [16], and was not adopted in this case report.

This case report shows intermediate cervical plexsus block can be used in iatrogenic SAN palsy patient. Our findings can widely applied to various operations involving cervical area.

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