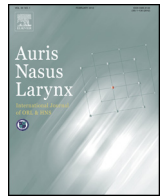




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Robot-assisted excision of branchial cleft cysts using a postauricular facelift approach

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ABSTRACT

Various approaches have been employed to avoid visible scars in the neck, along with the development of robotic and endoscopic techniques. We have employed a technique of robot-assisted excision of branchial cleft cyst (BCC) via a postauricular facelift approach. We present three patients with 2nd BCC who underwent robot-assisted excision of mass. All operations were performed successfully without complication. Postoperative cosmesis was excellent and all patients were satisfied with their scars which were concealed by hair and auricle. Robot-assisted excision of BCC is technically feasible and will be helpful for patients with BCC who wish to hide any visible scarring.

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1. Introduction

A trend towards minimally invasive and scarless surgery has developed over the last three decades in all fields of surgery including the head and neck area. Various approaches have been employed to avoid visible scars in the neck, along with the development of robotic and endoscopic techniques for thyroid, parathyroid, submandibular gland, benign neck mass, and neck dissection, using remote site incision on hidden areas such as axilla, breast, anterior chest, and the postauricular area [1–11]. There have been reports of the removal of upper neck masses via retroauricular, transaxillary or axillo-breast approaches, using endoscopy or direct vision to improve cosmesis instead of cervical incision of the skin overlying the lesion [3–6].

We have employed a technique of robot-assisted excision of branchial cleft cyst (BCC) via a postauricular facelift approach. We report below on the technical feasibility and safety of this novel procedure based on our experience of three cases.

2. Case report

Three cases of robot-assisted excision of second branchial cleft cysts via a gasless postauricular facelift approach using the da Vinci

surgical system (Intuitive Surgical Inc, Sunnyvale, CA, USA) were analyzed with a retrospective review of a prospectively maintained database. The patients studied were informed about the operative procedure, its advantages and disadvantages, and the possibility of conversion to open surgery. Written informed consent was obtained from each patient, and the study was approved by the Institutional Review Board of Hanyang University Hospital.

2.1. Case 1

A 25-year-old female patient presented with recurrence of a 5 cm × 5 cm cystic mass at the posterior-inferior aspect of the right submandibular gland. The mass had been previously diagnosed as a BCC and treated 4 times by OK-432 sclerotherapy over a two year period in another hospital. Neck computed tomography (CT) revealed a unilocular cystic mass in the upper third of the anterior border of the sternocleidomastoid (SCM) muscle (Fig. 1A). Because the patient requested a surgical procedure that would cause minimal scarring, robot-assisted excision using a postauricular facelift approach was performed. The mass was a 6 cm cyst, containing grayish tan materials. Final pathology was reported as BCC.

2.2. Case 2

A 26-year-old female patient attended our hospital for evaluation of a palpable neck mass that had been detected one year previously. Physical examination revealed a soft 6 cm mass palpable in the left level II area. Neck ultrasonography and CT

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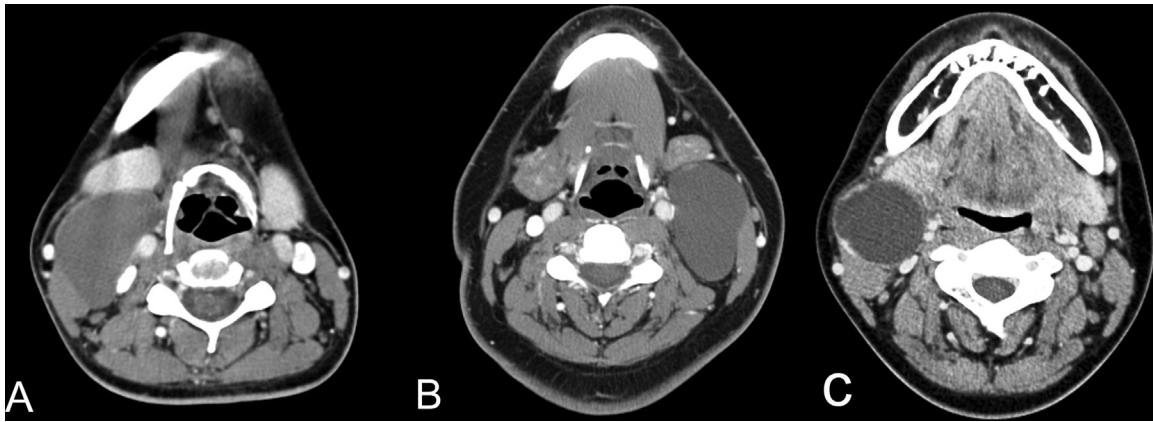


Fig. 1. Preoperative neck imaging. (A) Axial computed tomography (Case 1) reveals a 5 cm unilocular cystic mass in the posterior-inferior aspect of the right submandibular gland. (B) Axial computed tomography (Case 2) reveals a 6 cm cystic mass with suspicious internal septation in the left level II of the medial aspect of the upper sternocleidomastoid muscle. (C) Axial computed tomography (Case 3) reveals a 4 cm unilocular cystic mass between the right submandibular gland and sternocleidomastoid muscle.

showed a 6 cm × 5.3 cm sized cystic mass with suspicious internal septation (Fig. 1B). Fine needle aspiration cytology (FNAC) produced cystic fluid containing inflammatory cells. Robot-assisted excision via a postauricular facelift approach was performed. Intraoperative examination revealed a 6 cm cystic mass containing multiple pieces of grayish tissue in the anterior and medial portion of the left SCM muscle. The final pathology report was BCC.

2.3. Case 3

An 11-year-old female patient presented with a palpable submandibular area mass in the right level II area that had been detected one month previously. Neck ultrasonography and CT showed a 3.8 cm × 3.6 cm sized complicated cystic mass (Fig. 1C), suggesting a second BCC. Robot-assisted excision via a postauricular facelift approach was performed. Intraoperative examination revealed a 4 cm cystic unilocular mass between the right submandibular gland and SCM muscle. The final pathology report was BCC.

2.4. Surgical technique

In all cases, the patients were placed in the supine position under general anesthesia. The neck was slightly extended and the head turned to the side opposite the lesion. After the patient had been draped, a postauricular facelift incision was designed (Fig. 2A). A skin incision was made in the postauricular sulcus, curved posteriorly at the upper third of the auricle and continued along the occipital hairline with no horizontal portion. The hairline incision was not made inside the hair-bearing scalp to avoid a hairless scalp scar line which was evident postoperatively especially in short haired patients. The skin flap was elevated in the plane of the subplatysma level over the SCM muscle by monopolar cautery dissection under direct vision. Elevation was continued anteriorly to the midline of the neck, inferiorly to the level of cricoid cartilage, and superiorly to the lower border of the mandible. The external jugular vein and the great auricular nerve were preserved. The cyst in all cases was exposed anterior to and below the SCM muscle at the level of the carotid bifurcation. The posterior belly of the digastric muscle was then exposed, and the spinal accessory nerve was identified where it entered the SCM muscle. After adequate retraction of the SCM and digastric muscles, the upper part of the BCC and the level II lymph nodes were dissected under direct vision. After creating working space and exposing the second BCC, an external retractor was inserted to conserve the working space without CO₂ gas insufflations and

suspended using a lift system (Fig. 2B). The robotic arms were then docked. Three robotic arms were inserted through the postauricular facelift incision port; a dual channel 30 degree endoscope was placed in the center of the port, and Harmonic curved shears and a Maryland dissector were placed on either side of the endoscope (Fig. 2C).

After docking the robotic arms, the dissection was carried out by cutting through the capsule of the BCC with the Harmonic curved shears (Fig. 3A). An assistant retracted the SCM muscle with the retractor for better exposure of the cyst. The internal jugular vein and carotid artery were dissected from the BCC, while preserving the spinal accessory nerve (Fig. 3B), and the cyst was completely removed without rupture. Negative suction was applied for drainage, and the wound was closed.

All operations were performed successfully without hematoma or facial nerve, spinal accessory nerve, great auricular nerve, or hypoglossal nerve palsy. Total operation times were 155, 145, and 130 min, respectively. Docking time of the robotic arms in the three cases was 5–10 min. In the three cases, the capsule of the cyst was preserved, and the area drained 4 days after the operation, and the patients were discharged on postoperative day 5. Because the incision scars were concealed by hair and auricle, excellent cosmetic results were obtained. All patients were satisfied with their scars at 6 month follow-up (Fig. 4) and there was no evidence of recurrence.

3. Discussion

Second branchial cleft cysts usually occur between the ages of 10 and 50 years. They typically present as painless, round neck masses located along the upper third of the anterior border of the SCM muscle and often appear after upper respiratory infections [12]. Non-surgical treatment modalities include radiation therapy, repeated incision and drainage, and use of sclerotherapy with OK-432, but these approaches are not curative and are reported to increase recurrence rates [12,13]. Surgical resection is considered the definitive treatment. Careful exploration for an associated fistula tract must be performed, with complete excision of the entire tract if one is found. BCC have traditionally been resected through an incision over the entire protruding area. Minimally invasive endoscopic resection of BCC via small cervical incisions has been reported, but this approach still leaves a 2–3 cm long scar in the neck [14]. To avoid or hide scarring of the neck, endoscopically assisted axillo-breast and retroauricular approaches have been reported [5,6]. The different approaches

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