Retro-Auricular Thyroidectomy: An Open Approach

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Abstract Distant access robot-assisted thyroidectomy has gained popularity in recent years. Adoption of distant access procedures has been limited by cost, need for specialized training and expertise. We report our preliminary clinical experience with our modification of the retro-auricular thyroidectomy approach that allows adequate exposure for thyroid lobectomy without robotic or endoscopic assistance. This is a retrospective chart review of ten patients who have undergone retro-auricular thyroidectomies in the absence of robotic or endoscopic assistance. Ten patients were identified to have undergone this procedure over an 18-month period. All patients were female with average age 36 years (range 27–52). Six were right sided and 4 were left sided procedures. The average gland size was 4.2 cm (range 3.7–6 cm). The average nodule size was 2.1 cm (range 1.1–3.5 cm). The average operative time was 91 min (range 76–114 min). All patients had benign pathology on final histopathology. There were no conversions to open cervical thyroidectomy. Two patients had vocal cord paresis that resolved spontaneously. The average postoperative follow up was 3 months (range 1–7 months). Our technique for retro-auricular thyroidectomy is a safe, reproducible, and cost effective option for remote access thyroidectomy.

Keywords Retro-auricular thyroidectomy · Distant access thyroidectomy · Thyroidectomy

Background

In recent years, there has been a surge of innovation in developing alternative surgical approaches to the thyroid gland in an effort to completely eliminate a visible neck scar [1–9]. These innovative techniques have been made possible and even attractive to adopt due to technological advances in endoscopy and robotics [10, 11]. The introduction of the da Vinci robot has greatly improved the feasibility of performing several of these techniques, particularly the robotic trans-axillary thyroidectomy and robotic face-lift thyroidectomy emerging as the predominant techniques in the United States [5, 12].

Although robot assisted procedures have been shown to be effective and safe, [5, 12, 13] they add a cost and exclusivity to the procedure due to the fact that they can only be performed in the centers that have the specialized instrumentation and expertise to perform these procedures. Other factors that have prevented a universal adoption of robot-assisted procedures include the lack of approval for the use of da Vinci robotic system by the U.S. Food and Drug Administration for distant access thyroidectomy, cost, greater operative times, and novel complications unique to the procedures; such as brachial plexus neuropathy for trans-axillary thyroid surgery [11].

Our group was the first to describe the feasibility using a retro-auricular incision for removal of the ipsilateral thyroid gland using endoscopic assistance in a human cadaver study [2]. We demonstrated the technique provided adequate working space and an excellent endoscopic surgical view in a human cadaveric study [2]. Terris et al. [12, 13] were the first to demonstrate clinical feasibility and popularized the face-lift robot assisted thyroidectomy.

We present a modification of our retro-auricular technique that allows for a distant access thyroidectomy

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approach using open surgical techniques without endoscopic or robotic assistance. The aim of our study was to present an approach that is reproducible, cost effective, efficient, safe and avoids the need for specialized equipment; hence providing the benefits of distant access surgery for wider adoption in surgical practices.

Methods

A retrospective chart review was performed on patients undergoing retro-auricular open thyroidectomy in the Department of Otolaryngology Head Neck Surgery at Louisiana State University Health Sciences Center, New Orleans, Louisiana. An Institutional Review Board approval was obtained. Clinical and demographic data including age, sex, surgical indications, procedure times, complications, pathological data, and length of follow up were recorded.

All patients underwent the procedure in a supine position with the head rotated to the opposite side akin to a

Fig. 1 Retroauricular incision with 1–1.5 cm extension into a postero-lateral neck crease (*dotted line marks hairline*)

surgical position as achieved for a neck dissection. Recurrent Laryngeal nerve monitoring was performed in all cases using an EMG tube (NIM-2, Medtronic Inc.). The modification we employed to our existing description of the retro-auricular approach was an extension of the lower limb of the retro-auricular incision anteriorly into a horizontal limb of a posteriolateral neck crease. The modification of the incision provided the necessary access to enhance exposure and surgical access to allow open instrumentation and working space (Fig. 1). The incision follows the principles of standard face-lift approach incision that optimizes incision placement. With this approach the superior portion of the incision is hidden post-auricularly in the hairline and the most inferior portion is designed to fall in a natural skin crease. The operative steps of the procedure have been described in our publications on retro-auricular video-assisted thyroidectomy and are captured in Table 1 (Figs. 1, 2, 3, 4, 5) [2]. Harmonic Focus® and Harmonic Ace® (Ethicon Endo-Surgery, Inc.) were energy devices used in addition to standard surgical instrumentation and techniques to perform the thyroidectomy. All patients had a drain placement that was delivered through a separate post-auricular incision. Patients were discharged home after a 23-hour observation and were discharged on postoperative day 1 with the drain in place to facilitate adequate flap healing and to reduce the chance of delayed seromas or hematomas.

Results

Over an 18-month period 10 patients were identified to have undergone open retro-auricular thyroidectomy; all were female. The average age was 36 years (range 27–52 years). The average gland size was 4.2 cm (range of 3.7–6.0 cm). The average nodule size was 2.1 cm (range

Table 1 The patient is positioned supine with the head rotated to the opposite side akin to a surgical position achieved for a neck dissection

Retro-auricular incision with anterior extension of the lower limb into a posterior neck skin crease (Fig. 1)

Post auricular flap is developed over the great auricular nerve and external jugular vein. The platysma is identified and a sub-platysmal plane is developed over the SCM. Wide elevation is obtained to be able to feel the lower end of the SCM muscle and anteriorly to get well over the strap muscles (Fig. 2). The anterior border of the SCM muscle is delineated akin to a neck dissection. The external jugular vein is sacrificed if necessary to be able to roll back the SCM (Fig. 3)

The superior belly of the omohyoid muscles is identified and traced. The lateral straps are then elevated over the thyroid gland to be able to visualize the entire hemi thyroid lobe. The superior thyroid artery is identified and divided using a harmonic focus device

Surgical view of the thyroid is maintained using an external retractor

After division of the superior pole, the upper pole of the thyroid gland is dissected and released laterally from the superior parathyroid gland (Fig. 4). Lateral dissection can be continued to release middle thyroid vein and expose the inferior pole in a standard fashion. The medial edge of the superior pole and isthmus are also released and divided

The recurrent laryngeal nerve is either identified at the cricothyroid joint or the thyroid gland can be mobilized and rotated out of the trachea-esophageal groove and incorporated into the retractor to exposed the nerve for dissection (Fig. 5)

With the nerve in view, inferior dissection is completed. The inferior thyroid artery is delineated and then divided

The lower thyroid pedicle is divided and the gland delivered after releasing its attachments to the anterior tracheal wall

Fig. 2 Sub-platysmal flap raised over the sternocleidomastoid muscle. Asterisk shows the great auricular nerve

Fig. 3 Anterior border of the sternocleidomastoid delineated and retracted. During this step, the external jugular vein may need to be divided

1.1–3.5 cm). Six procedures were right-sided and 4 were left-sided. The operative time ranged from 76–114 min with an average of 91 min. All patients had benign pathology on final histopathological analysis, 6 were follicular adenoma, 4 were a hyperplastic nodule, and in addition, 1 of these patients had a background of lymphocytic thyroiditis. Two patients were found to have parathyroid glands in the specimen.

None of the patients required conversion to anterior cervical approach. There were no major complications such as a permanent recurrent laryngeal nerve injury, tracheal or esophageal injury or postoperative hematoma. Two patients had temporary vocal cord paresis, which resolved completely as confirmed on postoperative evaluation with in-office flexible laryngoscopy. None of the patients reported ear numbness. The great auricular nerve was preserved anatomically and functionally in all cases. The average post-

Fig. 4 The superior pole vessels are released with harmonic focus device and the pole is retracted; dissection of the thyroid gland is continued laterally and inferiorly using standard open dissection techniques

Fig. 5 Surgical view after removal of the hemi-thyroid showing the recurrent laryngeal nerve along its course in the tracheoesophageal groove

operative follow up was 3 months, with a range of 1–7 months (Table 2). On direct questioning, the all patients reported that they were satisfied with their surgical scar.

Discussion

Conventional cervical thyroid surgery described by Theodore Kocher continues to be the gold standard for thyroid surgery and has stood the test of time for over a century [14]. However, there has been a transformation in the surgical approaches to the thyroid gland in recent years with techniques developed to improve cosmetic outcomes by avoiding an anterior cervical scar [15, 16, 17].

Table 2 Demographic and Clinical Data

Patient	Age	Laterality	Complications	Pathology	Gland size (cm)	Nodule size (cm)	Follow up (Months)
1	52	Right	None	Hyperplastic nodule	5.8	1.1	7
2	47	Right	None	Hyperplastic nodule	3.9	1.4	3
3	29	Left	None	Follicular adenoma	4.0	1.9	5
4	43	Right	Temporary VC paresis	Follicular adenoma	4.5	2.6	3
5	27	Left	Temporary VC paresis	Hyperplastic nodule/lymphocytic thyroiditis	4.9	2.5	2
6	35	Left	None	Hyperplastic nodule	4.0	2.5	4
7	33	Right	None	Follicular adenoma	5.1	2.4	1.5
8	35	Right	None	Follicular adenoma	6.0	2.0	1
9	28	Right	None	Follicular adenoma	3.7	1.1	1
10	30	Left	None	Follicular adenoma	4.0	3.5	1F

Fig. 6 Retro-auricular incision; early and late post operative views

These distant access procedures have not been adopted widely for several reasons. They are exclusively available at specialty centers that have robotic technology and surgeons with specialized training who can perform these procedures. The procedures are associated with greater operative times, complications unique to the access (e.g. brachial plexus neuropathy) and are not as cost effective as the standard thyroid approach [11, 15]. In addition, the use of the robot is not FDA approved for distant access thyroidectomy, consequently inhibiting training of interested surgeons [13].

However, the reality is that today's patients seek out surgeons who can and will offer these novel options. Consequently, it is important to be able to have the ability to offer distant access thyroid surgery for those patients who fulfill selection criteria for such an approach and wish to avoid an anterior neck scar. We believe, that the open retro-auricular thyroidectomy bridges this gap by permitting distant access thyroid surgery for ipsilateral lobectomy that is cost effective, safe, efficient, and reproducible without the use of specialized equipment while at the same

time fulfilling the goal of avoidance of a cervical incision (Fig. 6).

In our original paper (2010), the retro-auricular approach for removal of the thyroid gland was conceived with several potential advantages in mind [2]. It provides a shorter distance to the thyroid resulting in decreased dissected surface area compared to the other remote-access techniques. The retraction of the neck flap allows adequate working space, giving direct access to the entire thyroid bed. The retro-auricular approach has easier positioning and it provides a more natural approach for head and neck surgeons. In addition, endoscopic visualization provides excellent detail of the surgical anatomy given the visual magnification and optimal illumination of modern systems. Potential drawbacks to the retro-auricular approach include dyesthesia of the earlobe, alopecia at the incision site, and at this time a bilateral facelift incision may be necessary if a total thyroidectomy is required. Our preliminary experience suggests that the current modification allows the same surgical goals to be accomplished without the need for video- (endoscopic) or robotic-assistance.

Our preliminary clinical series show our approach to be safe and comparable in terms of complication rates and operative times to distant access approaches with robotic or endoscopic assistance. Terris et al. [13] reported operative times of 97–193 min in their series. And similarly, Duncan et al. [5] reported average operative times of 138.5 min. In our series, in all cases, the recurrent laryngeal nerve was identified and preserved and was stimulated to confirm continuity at the completion of the case. However, surprisingly, two patients were noted to have minimal vocal cord paresis on postoperative office endoscopy that recovered spontaneously as confirmed with post-operative in-office flexible laryngoscopy.

The limitations of our study are its small sample size and limited follow up. However, our paper clearly

demonstrates the feasibility of distant access thyroid surgery using conventional surgical techniques.

Conclusion

The open approach retro-auricular thyroidectomy is a feasible, reproducible, and cost effective remote access thyroidectomy technique. This approach is a cost effective option for patients seeking distant access thyroid surgery in an environment where health care resources and access to advanced technology are limited.

Compliance with Ethical Standards

Conflict of interest The authors have no conflict of interest to declare.

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