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Strategies for Submandibular Gland Management in Rhytidectomy

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Abstract

Submandibular gland excision is a described, yet less commonly used technique in operative neck rejuvenation, because of the misconception that this technique carries too high a risk for its potential benefit. The following is a detailed description of the key anatomy regarding the glands and surrounding structures, the senior surgeon's technique, and an assessment of ten years of outcomes and complications.

Keywords: Submandibular gland; Rhytidectomy; Neck rejuvenation

Introduction

Ellenbogen and Karlin [1] Described five criteria for a youthful appearing neck: a distinct inferior mandibular, subhyoid depression, visible thyroid cartilage bulge, visible anterior border of the sternocleidomastoid muscle distinct in its entire course from mastoid to sternum and a cervicomental angle of between 105 and 120 degrees. Appropriate management of the submandibular glands during neck lift can help achieve this ideal and lead to both better outcomes but also higher patient satisfaction. Despite numerous descriptions of the improvement that can be expected from management of the submandibular gland during neck rejuvenation surgery [2,3], there has not been wide acceptance among surgeons due to the unfamiliarity of the anatomy, the complexity of the procedure and the potential for significant complications [4].

Skin excision and platysma manipulation are the main stays in neck rejuvenation. However, ptotic submandibular glands can mar an otherwise excellent result by creating contour deformities in the superior neck. Other described methods to manage ptotic submandibular glands include resuspension or plication of the glands up to the level of the mandible. Our approach involves partial resection of the bulkiness in the underlying tissue deep to the platysma in order to better control the contour of the submental area of the neck. A thorough understanding of the anatomy, utilization of appropriate instrumentation and a systematic approach can allow one to safely and predictably recontour the submandibular gland when necessary.

Anatomy

Careful attention and mastery of the anatomy of the neck is critical. The neck superior to the hyoid is divided into the submental triangle medially and submandibular triangle laterally, with the anterior belly of the digastric dividing the two. The submandibular triangle is bound by the two bellies of the digastric muscle and the mandible. It is bound superficially by skin, superficial fascia, platysma and investing fascia. Deep to the triangle are the mylohyoid, hypoglossus and middle constrictor of the pharynx. The contents of the submandibular triangle are the submandibular salivary gland, facial artery and hypoglossal nerve running deep to the gland and the facial vein and submandibular lymph nodes which are superficial to the gland.

The anatomy pertinent to the submandibular glands consists of its capsule, vascular supply and proximity of nearby nerves. The capsule is derived from the superficial layer of the deep cervical fascia and creates a dense, tight closed space beneath the platysma. Bleeding can become contained within the capsule and expansion will be along the path of least resistance in the direction of the airway. The gland itself is divided into a deep lobe and a superficial lobe. The duct comes off the deep lobe and leads into the mouth. The deep lobe lies deep to the mylohyoid and extends around the mylohyoid muscle laterally. The superficial lobe begins after the gland turns inferomedially and runs superficial to the mylohyoid muscle.

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Figure 1: Equipment.

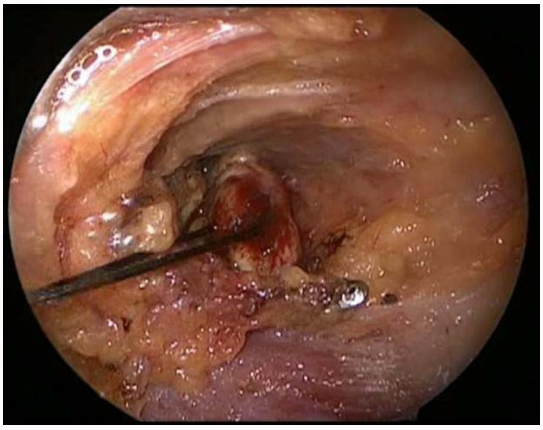

Figure 2: Percutaneous suture retraction.

Figure 3: Superficial vessel.

The vascular supply to the submandibular gland consists of superficial, intermediate and deep supply. The superficial supply consists of one to two vessels that enter the medial aspect of the superficial lobe. The intermediate vessel enters the medial aspect of the capsule to supply both the superficial and the deep lobe. The deep perforator courses through the central aspect of the deep lobe to pierce the posterior aspect of the superficial lobe. The facial vein often runs between the deep and superficial lobes at the lateral extent of the capsule, however its course may vary, where it can run superficially or laterally to the superficial lobe of the submandibular gland.

Nerves surrounding the submandibular gland include the marginal mandibular, lingual, hypoglossal and mylohyoid nerves. The marginal mandibular nerve is often 3 cm to 4 cm superior to the superficial lobe of the gland. The lingual, hypoglossal and mylohyoid nerves are all posterior to the mylohyoid and are essentially protected underneath the mandible border.

Technique

From 2006-2016, the senior surgeon performed 830 neck lift with and without a facelift. Of these, 170 included submandibular resection and reduction as a component of the neck lift. The percentage of patients having the submandibular reduction increased over the course of time, related to the comfort level with the procedure and lower threshold for removal, from an early rate of less than 5% of cases to a current rate of over 60.

Adequate visualization is critical in safe and adequate resection of the submandibular glands. In our practice, the key instruments include a short, narrow, reverse angle lighted retractor with a suction adapter to evacuate smoke and electrocautery with an extended needle tip for precise dissection. A bone hook is used for added retraction by lifting the mandible superiorly. For hemostasis clips are used for larger vessels. Surgicel (Ethicon) is closely available to be utilized for raw surface bleeding, and Tisseel (Baxter) is commonly used to seal capillaries and for prevention of sialocele on the raw gland bed (Figure 1). A submental incision posterior to the mental crease is utilized to access the middle neck. The central neck skin is elevated with at least 5 mm of subcutaneous fat retained on the under surface. The remaining supraplatysmal fat is then removed leaving the superficial cervical fascia intact. The platysma is elevated along its medial border identifying the anterior insertion of the anterior digastric muscle with the dissection continued along the digastric muscle. The medial extension of the subplatysmal fat is identified above the digastric tendon. Resection of the subplatysmal fat can then be performed when necessary prior to accessing the submandibular triangle. The medial capsule overlying the submandibular gland is found just lateral and anterior to the digastric tendon. The capsule is opened with careful electrocautery dissection and the submandibular gland is then identified and completely mobilized from the capsular attachments of the superficial lobe (Figure 2). The superficial vessels (Figure 3) and the intermediate vessels (Figure 4) to the superficial gland are commonly encountered and are ligated with clips or electrocautery (Figure 5). The dissection of the gland is started medially to laterally, with cautery being used along the well-defined septations found within the gland. Because of the significant friability of the gland, care must be taken when handling it as it tends to bleed when grasped with toothed forceps. In instances where bleeding occurs and greater visualization is needed a percutaneous suture is used to retract the gland further into the operative field. The gland is often excised in a piecemeal fashion to always allow for optimal

Figure 4: Intermediate vessel.

Figure 5: Capsule release.

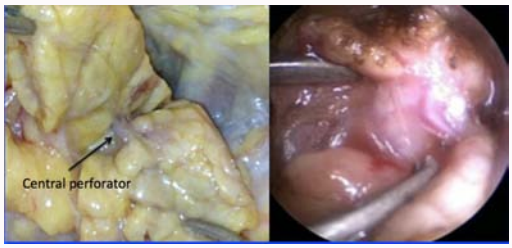

Figure 6: Deep perforating artery.

Figure 7: Sialocele.

visualization of the gland being resected. As the dissection proceeds more laterally, the central perforator (Figure 6) from the deep gland into the superficial gland is often encountered and must be controlled with clips or cautery. The facial vein is often seen superiorly and laterally to the superficial gland, and can be dissected free from the gland without sacrificing it. The marginal mandibular nerve is far from the dissection field and is not commonly visualized. The lingual, hypoglossal, and mylohyoid nerves are posterior to the mylohyoid and are essentially protected underneath the border formed by the mandible and also not commonly visualized. Typically only the superficial gland is excised, leaving the remaining gland flush with the mylohyoid muscle. The remaining exposed gland is then cauterized as needed for hemostasis. Injury to the gland vessels can be difficult to control so preventative hemostasis is critical during this dissection. After irrigation and adequate hemostasis, we spray an aerosolized layer of Tisseel on the raw surfaces of the gland to minimize sialocele formation. The platysma is then managed with platysmaplasty, and the final contour of the submental neck smoothed with suture plication of the superficial cervical fascia. Drains are placed bilaterally in the subcutaneous space, and the incisions are closed in two layers.

Complications

In this review, mean follow up postoperatively was 6 months. There were no cases of hematoma or complaints of xerostomia.

Figure 8: Secondary neck lift.

Figure 9: Left immediately postop, middle 10 year postop, right one year postop necklift with sub-mandibular gland resection.

One sialocele (Figure 7) was encountered that required operative exploration and drainage. This was treated with percutaneous drain placement and intra glandular Botox injections. The drains were left for one week and removed without recurrence. Seven patients experience asymmetrical depressor function of the lower lip, that all resolved spontaneously. Three patients had persistent/recurrent bulging of the lateral neck that was attributed to inadequate resection and progressive glandular ptosis.

Discussion

Submandibular gland prominence can significantly contribute to contour irregularity of the neck and has multiple etiologies. Congenital or developmental size discrepancy can make normal sized glands create a noticeable bulge if the surrounding structures are relatively smaller. Congenital malposition caused by weak intra capsular attachments hold the superficial lobe in a lower and more medial position that increases their visibility. Acquired ptosis, more common with the aging neck, is caused by a laxity of the neck fascial layers that allow the gland to drop. This ptosis is often accompanied by enlargement, hypertrophy, or chronic inflammation of the glands can obviously distort neck contour, and the glands may harden and fixate to the fascial planes. Primary neck lift patients can present with detectable prominence of the glands that contribute to neck fullness. Secondary patients are those that are dissatisfied with the neck contour following a previous face/neck lift (Figure 8). In these cases, submandibular gland enlargement was overlooked or not fully appreciated preoperatively. Correction of the neck skin laxity may also reveal the effect ptotic or hypertrophic glands on neck contour. Postoperatively, they become evident as patients desire additional surgery to correct these deformities [5]. Figure 9 is an example of a patient following facial and neck rejuvenation surgery immediately postoperatively on the left, ten years later in the middle with prominent submandibular gland, and following secondary neck surgery with submandibular gland resection.

There are two general approaches for the management of enlarged submandibular glands: suspension and resection. Suspension is the most common method used and is often considered the safest since there is less trauma to the gland itself. However, in our experience and as confirmed by other authors, time [6], gravity, and tension has significant potential for recurrence. Resection of submandibular glands allows for more direct control of neck contour with a definitive and predictable for correction of prominence, but there is are significant risks that have been described [1]: the potential disruption of local neurovasculature, most notably the marginal mandibular branch of the facial nerve [7]; postoperative hematoma or infection; sialocele [2] or xerostomia [4,8-13].

The details of the resection technique and associated complications presented in this series may alleviate some of the uncertainty associated with submandibular gland resection. Sialocele was the worst complication, needing further surgical intervention, but it was not life threatening and resolved with simply incision and drainage. Issues related to bleeding and therefore the most feared complication, airway compromising hematoma [4] was not seen. In contrast to the observations made by Feldman [2,6] in his series, we felt that he impaired lower lip depressor function was related to direct platysma muscle trauma from the plication of the superficial cervical fascia, muscle retraction or from the accompanying fat injection to the lower mandibular border rather than injury to the marginal mandibular nerve.

Conclusion

Submandibular gland resection is a critical component for acceptable long term results in neck rejuvenation, and full understanding of the involved anatomy can lead to safe and predictable outcomes.

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