Neck Contouring and Treatment of Submental Adiposity

W. Walsh Thomas MD[a] and Jason D. Bloom MD[b]
[a]Hospital of the University of Pennsylvania, Philadelphia, PA
[b]Main Line Center for Laser Surgery, Ardmore, PA

ABSTRACT

There have been many recent and significant innovations to the cosmetic physician's repertoire for addressing excess submental fat and improving patients' neck contour. These new techniques include submental cryolipolysis, injectable chemical lipolysis, percutaneous radiofrequency, laser techniques, and liposuction with or without laser or power assistance. These modalities range from completely non-invasive to surgical procedures. Each technique has its own unique advantages, and limitations and as such, aesthetic practitioners should be familiar with the various indications to use each technique. Additionally, cost to the practice and patient are similarly varied across the different techniques. By increasing familiarity with the new procedures addressed herein, practices can better present a diverse range of treatment options for excess submental fat and neck fullness to the cosmetic patient.

J Drugs Dermatol. 2017;16(1):54-57.

INTRODUCTION

Excess submental fat, known in colloquial terms as a "double chin," is a common cosmetic concern among patients today. There are currently many new non-invasive and minimally invasive techniques for addressing this traditionally difficult to target anatomic area. In a recent 2015 American Society for Dermatologic Surgery (ASDS) survey, excess submental fat was as bothersome to patients as sagging skin and wrinkles around the eyes.[1] The etiology of excess submental fat can be related to the aging process as skin laxity increases and the submental fat pad deep to the platysma can prolapse inferiorly. Also, as patient's gain weight, their submental fat compartments can enlarge and reduce the acuteness of the cervicomental angle. This anatomic site is very difficult to treat through traditional means of diet and exercise. Historically, the sole approach to improving this area of interest was submental liposuction, with or without a surgical neck tightening procedure. However, for medical reasons, including uncontrolled hypertension, significant tobacco use, or anti-coagulant therapy, many patients cannot undergo these surgical procedures.[2] Herein, new non-invasive, minimally invasive, and surgical techniques for fat removal and skin tightening of the submental area will be reviewed. The techniques presented are: (1) cryolipolysis, (2) chemical lipolysis, (3) percutaneous thermal techniques, and (4) surgical liposuction.

Anatomy

The first objective is to define submental fullness, ie, "double chin" and the surrounding anatomic considerations. Patients with submental fullness present with a blunted cervicomental angle, often greater than 120° and a loss of the contour of the jawline and angle of the mandible. These characteristics of submental fullness can be due to other anatomic concerns such as a low hyoid position or enlarged submandibular glands, but the ideal candidate for the procedures reviewed will have hypertrophy of the pre-platysmal fat pad. The pre-platysmal fat pad is superficial to the platysma muscle (Figure 1) and is an easy target for the percutaneous techniques described. While there are no clinically significant vessels or nerves superficial to the platysma, the marginal branch of the facial nerve should be considered when addressing submental fullness. It runs within the fascia of the submandibular gland immediately deep to the platysma muscle and it is usually 1-2 cm inferior to the ramus of the mandible, but it can be found as far as 4 cm inferior to the mandibular ramus.[3] Once anterior to the intersection of the facial artery and inferior margin of the mandible, the marginal mandibular nerve is described as being above the inferior margin of the mandible and out of harm's way when addressing submental fat.[4]

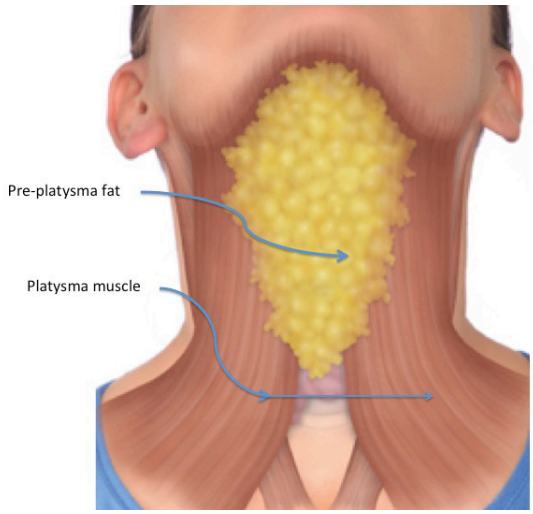
Treatment Options

Coolsculpting™

The first therapeutic intervention that is discussed is cryolipolysis. This technique is available through Zeltiq's Coolsculpting™ using the CoolMini™ applicator handpiece. This non-invasive technique utilizes adipose tissue's increased sensitivity to cold to selectively induce apoptosis by maintaining the target pre-platysmal fat at -10 °C for 45 minutes. Most patients undergo 1-2 treatments and the resulting apoptosis of fat cells has been shown to decrease superficial fat thickness treated by 2 mm with 77% of patients reporting a noticeable improvement in submental appearance.[5] The FDA approved the cryolipolysis technology in 2010 for flank fat; the CoolMini™ applicator was approved in 2015. Patients' initially note a "butter stick" appearance of the submental tissue following treatment (Figure 2), when the applicator is removed, but this resolves within a few minutes and the final results can improve the cervicomental angle over

FIGURE 1. AP and lateral views of the pre-platysmal fat pad.

(A)



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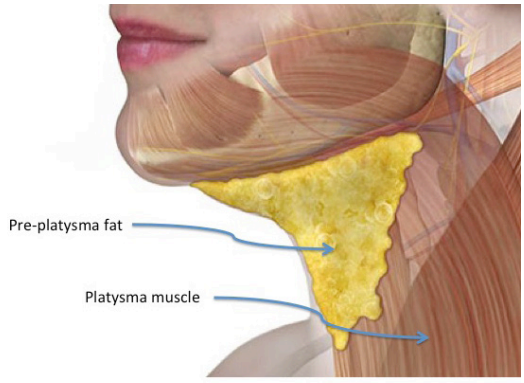


the course of 3-4 months (Figure 3). The advantages of this modality are its non-invasive nature and limited patient "down time," ability to "debulk" significant submental and lateral (submandibular) fullness, and lack of risk for complications. The disadvantages of the CoolMini™ include lack of skin tightening, ability to expose platysmal bands, need for multiple treatment sessions, cost of a disposable applicator, lack of precise control in fat reduction, and the need for the patient's specific submental fat to fit appropriately in the CoolMini™ applicator.

Kybella™

The first and only injectable product for chemical lipolysis is deoxycholic acid, known commercially as Kybella™. Kybella™ was FDA approved for treatment of submental fullness in 2015 and it works by inducing lipolysis through preferential fat cell membrane disruption.[6] Clinically, a patient will typically require 4-6 mL (2-3 vials) of product per treatment and most patients undergo 2-4 treatments. Clinical effects are considered permanent and the most common adverse reactions are edema, swelling, bruising, pain, numbness, erythema, and induration. While encountered by most patients, these side effects typically resolve within 7-14 days. Marginal mandibular nerve paresis is possible and occurred in 4.3% of FDA trial patients; in all cases it was temporary.[7] Kybella™ is considered micro-invasive, as it is delivered through a 30-gauge 0.5 in needle in 0.2 mL aliquots requiring approximately 20-30 injections. The injections are given in a 1 cm grid pattern spread evenly over the area of excess submental fat. The advantages of Kybella™ are its limited invasive nature, high efficacy (Figure 4), ability to control placement and amount of fat reduction, and mild to moderate skin tightening effects. Aside from the expected swelling, the disadvantages of Kybella™ include requiring multiple treatments across numerous weeks, possibility of exposing platysmal bands, and expense relative to cost ratio.

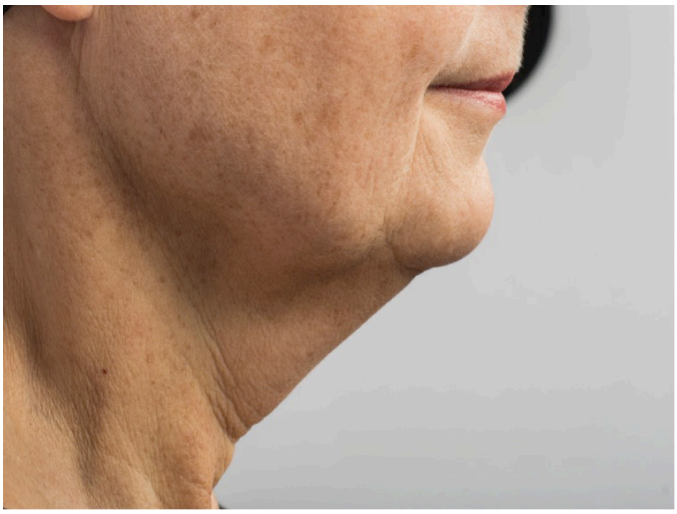
FIGURE 2. The "butter stick" phenomenon occurring immediately following CoolMini™ application.

RF/Laser Devices

The following 3 devices utilize heat to selectively heat and coagulate adipocytes while also stimulating collagen and tightening the fibro-septal connective tissue of the neck. All 3 of these devices are commonly used in conjunction with temperature monitoring sensors or infrared cameras to ensure skin temperatures do not reach damaging temperatures. The first device is the ThermiTight™ by ThermiAesthetics, which is a percutaneous "monopolar" electrode which selectively heats the subdermal fat and stimulates subdermal neo-collagenesis and tightening through radiofrequency (RF) energy to therapeutic temperatures (50-70 °C) while maintaining the epidermis at <45 °C. The applicator cannula can be utilized from the menton inferiorly or infra-auricularly anteriorly, or both, to address the entire pre-platysmal fat area, including the lateral neck.[8] The ThermiTight™ received FDA approval in 2013 and in an initial study of 18 patients no burns or blistering occurred, which is attributed to improved and accurate temperature monitoring of the epidermis.[9] The second device is the NeckTite™ by InMode, which is a "bipolar" RF device with a percutaneous cannula and a superficial electrode to ensure unidirectional spread of energy. This device specifically

FIGURE 3. Patient is 12-weeks following 2 treatments of CoolMini™ to the submental neck. (Treated by Dr. Brian Zelickson).

(A)



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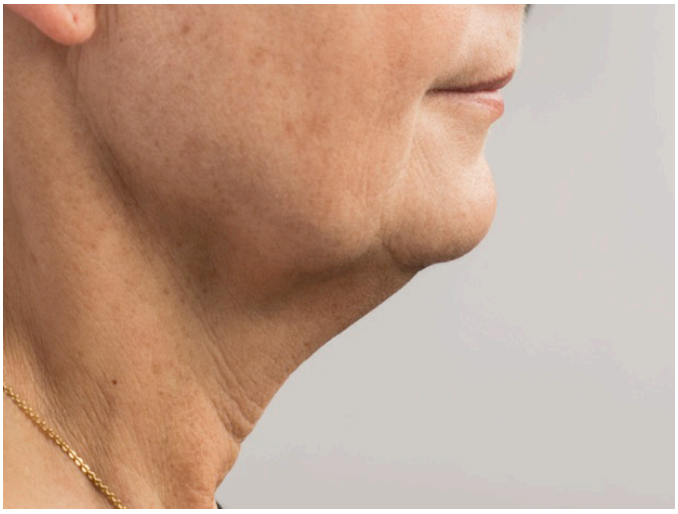

FIGURE 4. Patient underwent 3 treatments with Kybella™ for elimination of submental fullness; the patient has a greatly improved neck contour and cervicomental angle. She had 3 treatments of 3 mL, 3 mL, and 2 mL of Kybella™ over the course of 24 weeks. (Treated by Dr. Jason Bloom).

(A)

(B)

coagulates adipocytes and tightens the subdermal fibro-septal network by inducing subdermal temperatures to 70 °C through radiofrequency energy. The cannula length is 10 cm long enabling an infra-auricular approach to reach the chin and lateral neck, in most patients. The NeckTite™, FDA approved in 2016, is a unique hand-piece that functions with the Radiofrequency Assisted Lipolysis (RFAL) system to improve the contour the neck area. The third thermal device is the PrecisionTx™ by Cynosure. This device utilizes a bi-directional dual-wavelength laser at 1320 nm and 1440 nm to cause both cavitation of the fat and induce collagen deposition for skin tightening. The laser fires forward from the cannula and at a 90° angle enabling the clinician to rotate the wrist and treat superficial and deep tissues. The first version of the PrecisionTx™ was FDA approved in 2012 and it was found to be effective in long-term (>12 months) improvement and control of neck contour and skin tightening.[10] All of the above modalities have built-in safety thermistors to ensure appropriate heating and decrease the risk for burns or skin injury. Thermistors are integrated regulators of electrical current that automatically respond to minute changes in temperature. As a group, the advantages of the percutaneous thermal devices include single treatment modality, the ability to contour and control the location and amount of fat removal and the best skin tightening of all treatments discussed. Additionally, all 3 of these devices can be used to defat and contour the lateral neck and even some "micro-liposuction" can be easily added to these modalities to further improve cervicomental fat removal. The disadvantages of these devices include the small risk for burns, 3-7 days of "downtime" due to swelling and bruising, and the delay in treatment effect in skin tightening for 4-6 months.

Liposuction

The final class of techniques to address submental fullness is liposuction with or without adjuvant powered or laser devices. These techniques can involve a wide range of anesthesia techniques from local to sedation or even general anesthesia. These treatments all entail tumescent anesthesia of the subcutaneous neck and submental fat with subsequent percutaneous tunneling of the liposuction cannulas. Minimally invasive techniques have been developed requiring only a stab incision, which allow direct access for the cannulas to achieve a smooth contour of the neck tissues while keeping overlying skin intact.[2] Additionally, ultrasonic or laser energy can be applied with the liposuction treatment to improve fat reduction and skin tightening. Liposuction is often considered the "gold standard" because it offers the ability to most definitively remove as much fat as necessary to achieve the desired results. Furthermore, with the addition of energy techniques, similar to the thermal devices previously presented, significant skin tightening can be achieved. For example, a European group was able to reduce the mean cervicomental angle from 158° to 124° using a laser assisted liposuction technique. The results were without significant complication and durable at 6-month follow-up and beyond.[11] An additional benefit, when energy-based assistance is not utilized, is the ability to use the fat harvested in with cervicomental liposuction for structural fat grafting in the face, if the patient is undergoing concurrent rejuvenation procedures. Finally, liposuction delivers nearly immediate results; however, the disadvantages involve the time, cost, and risk of operative anesthesia and the surgery itself (low, but real risks of bleeding, infection or deeper structural injury). Generally, 1 week of down time is required for the swelling and bruising to resolve and the need for a post-surgical compression garment is required. Submental liposuction is generally reserved for patients with significant submental fullness who are likely undergoing concurrent rejuvenation procedures which also require a more significant anesthetic.

SUMMARY

In sum, the submental area and pre-platysmal fat hypertrophy are significant cosmetic concerns for many patients. The multiple techniques presented herein enable the clinician to vary treatment based upon skin laxity, amount of fat to be addressed, patient recovery timetable, budget, and discomfort tolerance, as well as the desire for other concurrent procedures. The ability to provide a range of therapeutic options from non-invasive cryolipolysis and injectable treatment to micro-invasive liposuction surgery with or without skin tightening or lateral neck options enables the cosmetic physician to address the concerns of a diverse set of patients and to provide the appropriate level of treatment.

DISCLOSURES

Dr. Bloom is a Consultant for InMode Aesthetic Solutions. Consultant/Speaker's, Bureau/Advisory, and Board/Trainer/Clinical Investigator for Allergan Medical. Speaker's Bureau/Consultant/Clinical Investigator for Zeltiq Aesthetics, Inc., and Speaker's Bureau/Consultant/Clinical Investigator for Thermi-Aesthetics. Dr. Thomas has no conflict of interests to declare.

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AUTHOR CORRESPONDENCE

Jason Bloom MD
E-mail:..... drjbloom@hotmail.com