Noninvasive Treatment of the Neck

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KEYWORDS

• Noninvasive • Neck tightening • Neck lift • Intense focused ultrasound • Ulthera

KEY POINTS

- Intense focused ultrasound is a noninvasive treatment option that can provide clinical results.
- Assessment of patient candidacy is critical but does not guarantee a treatment response.
- Current high-density treatment protocols have not markedly increased reproducibility or objective results in the authors' experience.
- Satisfaction may be related to minimal expectations from a no-downtime treatment modality.
- Patient selection and counseling are paramount, because patients with expectations on par with surgical treatment modalities are disappointed.

A video of Ulthera treatment accompanies this article at http://www.facialplastic.theclinics.com/

INTRODUCTION

With the ever-growing social acceptance of cosmetic interventions to help patients look and feel their best, facial and neck treatments for the effects of aging and obesity are expanding. The desired areas of improvement are submental lipoptosis, skin laxity, platysmal banding, and jowling. Currently, the gold standard for improvement remains a surgical solution. Submental liposuction, corset submentoplasty, an isolated neck lift, or neck lift in concert with a facelift all provide an immediate, substantial improvement. These surgical treatments, tailored to the individual needs of patients, can offer long-term results at a lower final cost to patients. For many reasons, however, not every patient desires a surgical modality. Finding time in a busy schedule, general operative anxiety, and financial limitations are the authors' patients' most common reasons given for seeking treatment alternatives.

The alternative, nonsurgical device options are similar in their goals to achieving an improved neckline. Different from the surgical treatment by direct tissue excision and repositioning, the nonsurgical technologies depend on thermal tissue disruption and the healing response to obtain the desired result. In current clinical use, this disruption can be accomplished through a variety of methods, including intense pulsed light, nonablative lasers, and radiofrequency bulk heating. These modalities attempt to preserve the epidermis while creating enough heat in the target tissues. Although protein denaturation begins at approximately 45°C, the goal is to reach greater than 60°C to break the collagen heat-sensitive bonds and 65°C for denaturation of collagen and contraction.[1] Most of these

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treatment modalities are unable to heat tissue adequately to achieve a collagen response, and ablative laser treatment modalities can only do so with superficial vaporization of the epidermis. Additionally, the ideal depth of surgical treatment of facial skin tightening and rejuvenation is the superficial muscular aponeurotic system (SMAS) or platysma. It is assumed that this depth is also ideal for nonsurgical methods. Each of the noninvasive treatment modalities discussed previously is limited in its ability to accomplishing both these goals.

INTENSE FOCUSED ULTRASOUND

Ultrasound use as a therapeutic modality has grown from its early investigations for neurologic applications in the 1950s.[2,3] In recent decades, high-frequency ultrasound use for the treatment of both benign and malignant solid tumors has expanded. In this form, ultrasound creates thermal injury as well as a cavitation.[4–7] Trials are under way for the use in benign prostate hypertrophy and approval has already been given for an MRI-guided focused ultrasound for uterine fibroid treatment.[8] The use for breast, liver, prostate, and brain cancers is also being studied.[4,5] A nonablative application of ultrasound for targeted drug delivery also shows promise as a future application.[6]

Alternatively, the application for facial rejuvenation utilizes thermal injury alone through intense focused ultrasound. This is accomplished by a shorter pulse duration of 50 to 200 ms, a higher frequency of 4 to 7 MHz, and a decreased energy quantity of 0.5 to 10 J.[7] This technology was commercialized as the Ulthera System (Ulthera, Mesa, Arizona) in 2004 and several preclinical and clinical studies refined the device and supported its ability to create thermal coagulation points (TCPs) at specific tissue depths (**Figs. 1** and **2**).[9–12] Subsequently, a study by Alam and colleagues[13] led to Food and Drug Administration (FDA) approval for a brow lift indication in 2009.[14] Most recently, Kenkel[15] demonstrated improvement in the neck, giving the device an FDA-approved neck lift indication.[16,17]

TREATMENT GOALS AND PLANNED OUTCOMES

The goals of neck rejuvenation with the Ulthera device are to achieve some improvement in the neckline and skin tightness through thoughtful patient selection and increased energy delivery. An ideal patient is usually a younger patient with a robust wound healing response, mild lipoptosis, and good elasticity. An older patient with extensive photoaging, severe skin laxity, marked platysmal banding, and a very heavy neck is not a good candidate. Between these 2 extremes, it becomes even more difficult to predict who will respond; thus, managing expectations becomes paramount. Through a multilayered approach, the authors attempt to see outcomes in good candidates and obtain a response in those who are intermediate candidates through increased TCPs per unit area.

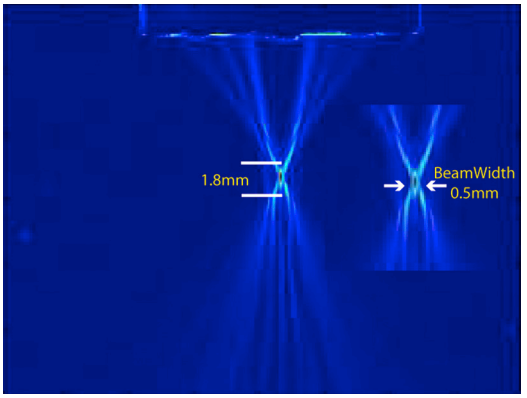

Fig. 1. Schlieren map of intense ultrasound beam profile; 95% of the ultrasound energy is delivered to the targeted, approximately 1.5 mm^3, focal point (*bright blue X*). (*From* White WM, Makin IR, Slayton MH, et al. Selective transcutaneous delivery of energy to porcine soft tissues using intense ultrasound. Lasers Surg Med 2008;40:68; with permission.)

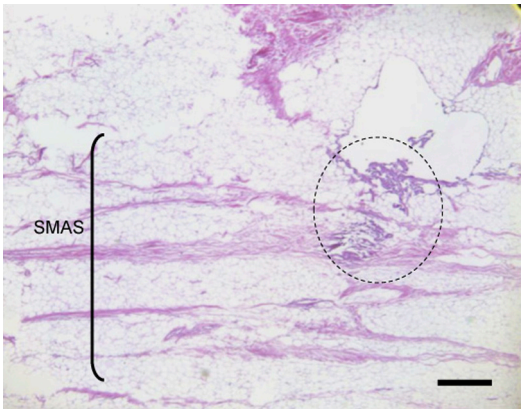

Fig. 2. SMAS treatment targeting. Hematoxylin-eosin staining of preauricular tissue after treatment with intense focused ultrasound. Thermal coagulation point (TCP) identified by the (*dotted circle*). (*From* White WM, Makin IR, Barthe PG, et al. Selective creation of thermal injury zones in the superficial musculoaponeurotic system using intense ultrasound therapy: a new target for noninvasive facial rejuvenation. Arch Facial Plast Surg 2007;9:25; with permission.)