Treatment Density

OVERVIEW AND INTRODUCTION

For those seeking facial rejuvenation, Ultherapy® is an FDA-cleared treatment which is safe and effective for providing significant tightening and lifting of the brow, submental (beneath the chin) and neck tissues following a full face and neck treatment [1]. It is also currently marketed worldwide for these uses, and others. At this time, Ulthera, Inc. offers a choice of six DeepSEE® transducers to target either the dermis (1.5 mm), deep dermis (3.0 mm) or the subdermal tissues (4.5 mm, including the SMAS layer). Ultherapy uses micro-focused ultrasound with visualization (MFU-V) to produce precise thermal coagulation of the dermal and subdermal tissues which initiates the inflammatory cascade and leads to tissue remodeling [2-3].

In 2011, Ulthera supported an advisory board, referred to as the Increased Density Advisory Group, made up of 6 highly experienced Ultherapy providers. This advisory group was convened in order to assess the clinical response of the then current Ultherapy treatment and hear from the experts how, if at all, density should be adjusted for optimal efficacy [4]. The group reported using a range of 750–1000 lines with no significant increase in the number or severity of adverse events. In 2012, a second advisory board, the Optimal Efficacy Consensus Group, was convened to assist in the evaluation of further guideline optimization strategies [5]. Additionally, studies by Sasaki et al., and Werschler reported higher response rates when using a higher density treatments which were shown to be safe when performed as described [7]. The feedback and recommendations obtained from the two advisory groups as well as results from clinical studies, described in more detail below, played an important role in the development of Ulthera's revamped Amplify™ guidelines.

Effect of Treatment Density on Clinical Efficacy

The facial integumentary system is comprised of 1) the superficial epidermal dermal layers, 2) the underlying subcutaneous layer (including adipose tissue with associated fibrous septae), and 3) the deeper fibrous/fibro-muscular connective-tissue layers that line the facial muscles and serves to connect the more superficial tissue layers to the facial musculature. The deeper connective tissues include the muscle fascia as well as the Superficial Muscular Aponeurotic System (SMAS).

During an Ultherapy treatment, micro-focused ultrasound energy may be delivered both to the superficial dermal layer and to the deeper connective tissue layers. The precisely placed energy from the micro-focused ultrasound creates a series of individual, microscopic zones of thermal injury (or thermal coagulation points, TCPs) which trigger the body's natural response to repair damaged cellular and extracellular materials and to replace them with fresh tissue, inherently rich in collagen. This new fresh collagen, which is more viscoelastic, contracts over time; thereby, tightening the surrounding tissues. Additionally, because the tissue is only affected where the energy is focused, Ultherapy can safely firm, tighten and lift the skin unit as a whole without distressing the surface of the skin.

As each TCP will contribute to the overall result of an Ultherapy treatment, a large part of achieving optimal efficacy lies in determining an optimum number, or density, of TCPs created as well as the best anatomical locations for placement of those TCPs. The relationship between of increased treatment density and improved clinical outcomes has been suggested in clinical studies [3,6].

For example, in a study by Kenkel et al., Ultherapy treatment of the lower face using a modest treatment density of 310 lines of TCPs resulted in 67% of the subjects reporting improvement in skin laxity following treatment. These results were confirmed by masked assessment of the subject's photos by three experienced clinicians who identified 62.9% of the subjects as having improvement [3]. Additionally, a quantitative assessment of the same subjects showed appreciable tissue lifting in 73% of subjects (data on file).

So, if a modest treatment density showed improvement in 60-70% of patients, would increasing the density lead to improvement in a larger percentage of patients? This question was addressed in a study by Sasaki et al. [6] where the investigators compared the safety and efficacy between two groups; the first group treated with 360 lines and the second group with 660 lines in the same facial areas.

The results from these study groups were reviewed by two independent evaluators using the Global Aesthetic Improvement Scale (GAIS). In the first group (fewer lines), 51.4% (mild improvement 47%, moderate improvement 52.8%) were classified as responders at 3 months, which then increased to 70.3% (mild 31.1%, moderate 68.9%) at 6 months. The second group (higher density) demonstrated a 71.2% (mild improvement, 34.0%, moderate improvement 47.6%, significant improvement 18.4%) response rate at 3 months and increased to 80.2% (mild 10.4%, moderate 63.4%, significant 26.2%) by 6 months. Subjects in the clinical study did not experience any significant adverse events.

The results of the study by Sasaki and colleagues demonstrated a rate of improvement with a lower density treatment similar to that of the lower density study by Kenkel et al. (~60-70% of patients). However, Sasaki's study suggests that increasing the density of treatment will significantly increase the number of patients that present with clinical efficacy and in a shorter amount of time following treatment.

Additionally, in a single-site study at the University Of Washington School of Medicine, Werschler et. al evaluated the safety and efficacy of higher density treatment with Ultherapy [7]. In this study, 20

subjects were treated with an average of 684 lines (range 609-700) on facial regions. At 90 days, 90% of subjects noted an improvement of "improved" to "very much improved" based on subject GAIS. Physician GAIS noted an improvement in 100% of subjects. The response rate, based on subject GAIS, increased to 94.7% at 180 days and remained at the same rate for the 365 day evaluation. Improvement based on physician GAIS was noted in 100% of subjects at Day 180 and 94.7% at Day 365. Masked qualitative assessments at 90 days noted a change in 46% of evaluated subjects. It should be noted that the photography on which the masked assessment was based was not optimal and may account for the lower rate of improvement. Data collected from Patient Satisfaction Questionnaires showed that 100% of subjects were satisfied with the results at 180 day and 94.7% at 365 days. No serious or treatment related adverse events were reported.

This small-scale study also suggests that a high density Ultherapy treatment of 600-700 lines demonstrates a safe and highly effective treatment in patients with facial/neck laxity with a high rate of patient satisfaction.

Treatment Density in Clinical Practice: A Consensus

Based on their clinical experience as well as review of published and peer reviewed research on the topic [3,6], the Increased Density Advisory Group and Optimal Efficacy Consensus Group both agreed on several critical factors that should be assessed for each individual patient to determine an appropriate treatment density. These factors included:

- General patient/health details; such as gender, age, BMI, and current medications
- Previous cosmetic procedures, including past Ultherapy treatments
- Problem regions to be targeted, and the degree of tissue laxity in those regions
- General health and quality of tissue to be targeted
- Volume of subcutaneous tissues in target areas

As these factors are key components of initial patient evaluation, treatment plans should take each factor into consideration. The group participants provided the following examples (Please note: these examples are based on expert clinical experience, not controlled clinical studies, and should not be interpreted as anything beyond the experts' current clinical understanding of best practices for use of the Ulthera technology):

- A higher degree of laxity can call for more treatment lines on a specific area. If there is moderate to severe skin laxity, a provider may consider increasing the total line count according to the severity of the laxity. This assessment must be customized to each patient.
- On the basis of skin thickness alone, more lines may be added when treating patients with thick skin.
- A large amount of subcutaneous fat on the jowl or submental area may require an increase in the number of treatment lines per transducer, applying higher density to any specific problem areas.
- Prior to treatment, it is critical to establish not only a map of treatment lines, but a map of combinations of depth and the transducers appropriate for the individual patient.

In general, increased laxity equated to the recommendation for increased density of treatment lines/TCPs. Each of the group participants reported high percentages of efficacy when utilizing between 600–800 lines per treatment while not experiencing a significant increase in adverse events with the higher densities. The group participants as a whole have used a range of treatment densities, reaching up to 1,500 lines per treatment. However, all participants agreed that a density as high as 1,200–1,500 lines offered limited therapeutic returns and increases in both the time required to treat a patient as well as the cost of treatment for both the patient and physician [4,5].

Another consensus reached was the importance of physician involvement in the development of patient specific strategies prior to the initiation of treatment. Since patient assessment is critical to determining an appropriate density, it was recommended that the physician be involved at least in reviewing the baseline pictures and choosing a treatment approach prior to the procedure, regardless of who performs the actual treatment. To this end, comprehensive baseline medical history should be documented and quality photography should be collected.

CONCLUSION

The Ulthera® System utilizes micro-focused ultrasound with visualization to deliver thermal coagulation points in order to stimulate neocollagenesis. This restructuring safely lifts skin tissue without disrupting the surface of the skin. The studies by Sasaki et al. and Werschler as well as expert opinions provide support for safe treatment at higher densities.

SOURCES

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