

CURRENT OPTIONS IN NON-INVASIVE BODY CONTOURING FOR FAT REDUCTION

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Summary

In recent years, increasing attention has been paid to non-invasive body contouring procedures, which have many advantages over classical surgical procedures in terms of lower risks, costs and recovery time.

The aim of this paper is to identify current applicable options in non-invasive body contouring.

Body contouring procedures targeting subcutaneous tissue and dermis tissues are: cryolipolysis of small-medium areas, monopolar radiofrequency for deep penetration, multipolar or bipolar radiofrequency for superficial penetration, high-intensity focused ultrasound (HIFU), laser-assisted body contouring, endermology, extracorporeal shockwave therapy (ESWT), lipolytic mesotherapy suitable for small areas.

Understanding aesthetic parameters allows dermatologists to be creative in combining available body contouring procedures so they can provide exceptional results with minimal effort from patients.

Keywords: *body contouring, HIFU, radiofrequency, cryolipolysis, laser, aesthetics.*

Received: 10.10.2017

Accepted: 22.11.2017

Introduction

Body contouring is the use of invasive or non-invasive procedures to alter body appearance. Candidates for such procedures may have adipose tissue located on areas such as the abdomen or thighs and/or loose skin, but non-invasive procedures are suitable for those patients who are not obese or without severe sagging skin [1]. Those patients are suitable for invasive procedures such as liposuction or surgical lifting.

Non-invasive body contouring procedures have many advantages compared to classic surgical procedures in terms of lower risks, costs and recovery time. In body aesthetics, major concerns are loose skin and excess adipose tissue.

Material and method

The article was made after searching on Pubmed keywords "body contouring", "hifu aesthetic", "cryolipolysis", "radiofrequency aesthetic". The search identified 1,189 items. We have reviewed the most relevant and new articles based on the title and the abstract.

Objectives

The aim of this paper is to identify current applicable options for noninvasive body contouring.

Results

Keywords search identified 1,189 items, 935 for "body contouring", 21 for "aesthetic hifu", 98

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for "cryolipolysis", 135 for "radiofrequency aesthetic".

Most commonly used body contouring procedures targeting subcutaneous tissue and dermis are: cryolipolysis, monopolar, bipolar or multipolar radiofrequency (RF), high intensity focused ultrasound (HIFU), laser assisted body contouring, endermology, extracorporeal shock wave therapy (ESWT), lipolytic mesotherapy with deoxycholic acid.

Discussions

In recent years, non-invasive procedures are increasingly used in aesthetic medicine.

To monitor the effectiveness of these procedures, the use of objective scales has been imposed over time. Cellulite is a localized skin change, the skin has "orange peel" aspect, more frequently on the thighs and buttocks, especially in adult women. According to Nurnberger and Muller, cellulite may be quantified in 3 degrees: I – visible changes in the skin while contracting the muscles, II – visible changes without manipulation, III – visible nodules. Subcutaneous fat should be differentiated from cellulite, subcutaneous fat is an indicator of peripheral fat mass, and can be quantified by measuring circumference or skin folds [2].

Cryolipolysis

Cryolipolysis reduces localized fat by freezing at temperatures between -2°C and -7°C for 45-60 minutes. Adipocytes have a higher cold sensitivity compared to other skin cells. The local applicator freezes the tissue and induces panniculitis followed by apoptosis of the adipocytes, which will be digested by macrophages within 15 to 30 days after the procedure [3]. The procedure may be followed by mild transient side effects such as erythema, ecchymosis, edema, pain, dysesthesia. Cryolipolysis is an efficient and safe procedure; in the literature severe side effects have been reported rarely but it should be performed under medical supervision.

Performing multiple cryolipolysis procedures in a single day is safe, it doesn't affect serum lipids or liver function tests [4]. Side effects are often mild and transient, paresthesia,

ecchymosis, local pain, but severe side effects have also been reported such as: a case of thigh necrosis [5], another case of profound wound secondary to a "do-it yourself" cryolipolysis procedure [6], a case of motor neuropathy secondary to a cryolipolysis procedure on the arm's [7]. In recent years, more and more cases of paradoxical hyperplasia of the adipose tissue after cryolipolysis have been reported, which is why patients and physicians should consider this adverse effect before deciding on the procedure [8].

Cryolipolysis is approved by FDA since 2010 for love handles, and it was approved for other areas also in the following years [2].

Submental fat is unsightly, and even if weight loss may reduce submental fat, usually there is no satisfying aesthetic result. There are numerous studies that assert that submental lipolysis can be successfully performed by cryolipolysis [3].

HIFU

There are two types of ultrasounds used in body contouring – low frequency non-thermal ultrasound and high-intensity focused ultrasound HIFU. Ultrasounds produce lipolysis by mechanical or thermal mechanism and also skin tightening. When large amounts of energy are absorbed, heat-generating molecular vibrations are created. At low frequencies, ultrasounds produce cavitation effect creating voids when the ultrasound waves break the adhesion between molecules [9].

HIFU technology was introduced in 1942 and was initially used in oncology, for tumors destruction, after which the indications were extended to the aesthetic field. Using an external transducer, HIFU energy destroys target adipocytes without affecting the surrounding tissues. Due to the large convergence of the ultrasounds at high frequencies, tissue destruction is limited to a small focal point. Ultrasonic energy causes molecular vibrations in the area, it increase the temperature in the target tissue above 56°C and cause the necrosis of fat cells by coagulation [2]. After HIFU induce thermal ablation of the adipose tissue, the circumference of the target area may decrease by

2–4 cm after 3 months, without altering the BMI [10].

Other studies claim that on average, the circumference is reduced by about 2 cm. [2] Most studies state that follow-up sessions were performed at 6, 12, or 24 weeks [2].

Radiofrequency

Radiofrequency procedures are used to induce skin tightening or to reduce circumference and cellulite. RF is better to be used for patients with cellulite rather than fat reduction. In clinical trials, 6-10 RF sessions reduced the circumference of the waist and thighs by 2-3.5 cm. The results should be correctly evaluated, considering that the circumference reduction was reported to be temporary due to skin tightening, and the skin tightening effect may also be initially visible due to post-procedural transient edema. Side effects may include pain, burns, scarring or atrophy. Pain management is based on oral and anxiolytic analgesics with little duration of action since local anesthesia can interfere with the distribution of radiofrequency waves [10].

RF devices, depending on the number of electrodes, can be unipolar, bipolar or multipolar.

Monopolar RF increases local metabolism and produces heat in hypoderm, improves microcirculation, increases lymphatic drainage, collagen remodeling by heat. These mechanisms lead to skin tightening, a smoother appearance of the skin and improvement of the contour [9].

Unipolar RF has an electrode and a grounding pad that allows the deepest penetration and best results comparing to other types of RF, although it also produces the biggest discomfort. The highest concentration of electricity and heat is near the tip of the electrode and decreases distally. Unipolar RF significantly increases skin tightening, reduces wrinkles, it has lifting effect and it may reduce post-acne scars. Bipolar RF devices have two electrodes without a grounding pad that emit a fast alternating current which penetrates half the distance between the two electrodes. Multipolar RF acts as a bipolar RF but with several electrodes [11].

RF is a form of electromagnetic energy which is not absorbed by the melanin in the epidermis, so it can be used in all skin prototypes [9]. RF has

frequencies between 3 kHz and 24 GHz. RF is a safe and relatively effective method for improving the appearance of the skin and lowering the subcutaneous tissue, especially on the abdomen and thighs [2].

Laser

In 1992, Apfelberg initiated the concept of laser-assisted lipolysis, and in 2006, FDA approved the first laser used for lipolysis, Nd: YAG 1064 nm [13].

Low-level laser therapy (LLLT) creates pores in the adipocyte membrane through which lipids are released into the intestinal space. The treatment consists of 6-8 sessions of 20-30 minutes each. Reduction of circumference is modest [1]. There are studies to support the use of LLLT in body contouring, but, however, more studies are needed to support the efficacy and safety of LLLT [2]. Patients using LLLT have burn risk [1].

Mesotherapy

Injecting deoxycholic acid into submental fat may be performed as an alternative to surgical liposuction, less invasive, without requiring recovery time and with less discomfort. Submental injection of deoxycholic acid has undergone efficacy and safety clinical trials, but new studies are underway to extrapolate deoxycholic acid indications to other anatomical areas [14]. 3-15 treatment sessions of subcutaneous injections with phosphatidylcholine and deoxycholate compound can be performed for a good aesthetical result [1]. These cocktail induces adipocyte necrosis and the results are seen after two months [15].

Extracorporeal shock wave therapy

ESWT was originally a treatment for renal lithiasis in 1980, although now it is used in the treatment of wounds, body contouring and cellulite treatments [2].

Conclusions

Body contouring procedures targeting subcutaneous tissue and dermis identified by this paper are: cryolipolysis for fat reduction in small-medium areas, monopolar RF for deep

penetration, bipolar or multipolar RF with superficial penetration, high-intensity focused ultrasound HIFU, laser-assisted body contouring, endermological procedures, extracorporeal shock wave therapy (ESWT), lipolysis mesotherapy suitable for small areas.

Understanding the aesthetic parameters allows dermatologists to be creative in combining available body contouring tools so they can provide exceptional results with minimal effort from patients.

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Conflict of interest
NONE DECLARED

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