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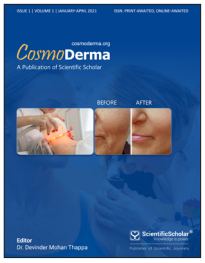

Editorial

Body contouring (sculpting) – Why are non-invasive techniques preferred?

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Received : 13 September 2022
Accepted : 13 September 2022
Published : 24 September 2022

DOI
10.25259/CSDM_99_2022

Quick Response Code:

Nowadays, there is a desire to look slim and trim. The media and the internet dictate it. The suggested methods are losing weight, reducing fat, and rejuvenating skin. Diet and exercise are being promoted. However, to achieve body contouring goals in some individuals, non-invasive devices are preferred over surgical techniques.

Body contouring or body sculpting can shape areas of the body by removing subcutaneous fat and tightening the skin. Lipolysis is a non-surgical option that uses non-ablative techniques such as cryolipolysis (induce cold), radiofrequency (RF) (induce heat), new 1060 nm diode laser, low-level laser therapy (LLLT) (laser), and high-intensity focused ultrasound (HIFU) (induce heat). Surgical methods include liposuction, lifts, and redundant skin excision. Surgery has more risks and takes a long time for recovery, but the results are more noticeable.

Non-invasive body contouring techniques are becoming popular in esthetic medicine and are the fastest growing area of cosmetic dermatology. The surgical body contouring methods have inherent risks and complications, which make non-invasive procedures increasingly popular. The associated risk of invasive body contouring procedures has led to nearly 500% growth of non-invasive techniques in the past two decades.

The demand for safer and less painful procedures for adipose tissue reduction and skin tightening is growing. This has led to the development of new modalities of treatment for non-invasive body contouring. New non-invasive techniques primarily target the physical properties of fat, resulting in extrusion of triglycerides from fat cells, causing either reduced size, necrosis, or apoptosis of adipocytes.

Today, different kinds of non-invasive body contouring modalities, including HIFU, RF, cryolipolysis, new 1060 nm diode laser, and LLLT, are available for reducing the quantum of subcutaneous adipose tissue. In addition to the mentioned techniques, some investigations are underway to analyze the efficacy of other methods, such as whole-body vibration and extracorporeal shockwave therapy (ESWT).

HIFU

HIFU (earlier used for targeting organ tumors, kidney stones, and uterine fibroids) was recently introduced as a new treatment modality for body contouring. It specifically works for skin tightening and rejuvenation. The mechanism of HIFU is similar to that of RF in that it also relies on heat to cause adipocyte apoptosis. HIFU targets the deep dermis, subdermal connective tissue, and fibromuscular layers producing microcoagulation zones without damage to the epidermis.

Molecular vibrations at the targeted zone lead to a temperature above 56°C resulting in coagulative necrosis of fat cells.

HIFU was first approved for eyebrow lifting in cosmetic dermatology. It has been used safely and effectively to treat facial and neck skin aging changes and improve the clinical look of the abdomen and thighs. This technique is best suited for patients with mild-to-moderate skin laxity. The ideal patient is a young one with the good regenerative power of neocollagen synthesis. Older patients with photoaging or skin laxity are not thus preferred candidates for HIFU.

Adverse effects of HIFU are limited to transient pain in most patients and occasional erythema and ecchymosis in some cases, but no scarring. In general, most adverse effects resolve spontaneously within 4 weeks and, in most cases, by 12 weeks after post-treatment. Other reported adverse effects of concern are hard subcutaneous nodules and a burning sensation at the treatment site.

HIFU has been found to be a safe and efficient technology for reducing subcutaneous adipose tissue without any significant effect on blood lipid or inflammatory markers. Patient satisfaction with HIFU is approximately 45–85%.

RF

RF has become an essential and frequently used modality in cosmetic dermatology. RF is an electromagnetic wave that was used for treating periorbital wrinkles, creases, and skin laxity. Today, RF is extensively used for body contouring, skin tightening, cellulite reduction, and for reducing subcutaneous fat. No standard protocol for treatment time with RF exists at present and sessions with various machines may last between 1 and 24 weeks.

This modality differs from cryolipolysis in that it relies on exploiting the difference in water content and impedance between tissues: The skin has low impedance, whereas fat tissue has high impedance. Ultimately, thermal exposure to 43–45°C over several minutes results in a delayed adipocyte death response. In addition to adipocyte death, RF has been shown to cause denaturation of collagen fibers, leading to subsequent remodeling, neocollagenesis, and skin tightening.

Monopolar or bipolar RF devices are available. Bipolar devices generally require more frequent treatments, whereas monopolar devices tend to require fewer treatment sessions with better circumference and fat reduction of the abdomen and thighs. Overall, RF devices have a favorable side effect profile. The most common adverse effects are erythema and edema at the treatment site lasting <24 h after the procedure. Satisfaction for subcutaneous fat reduction with RF is 70–95%.

Overall, RF is a safe and relatively effective method for improving skin appearance and decreasing subcutaneous fat, especially in the abdomen and thighs. In addition, safety and somewhat lesser time for applying the modality are essential advantages.

CRYOLIPOLYSIS

Cryolipolysis is one of the newest procedures for non-invasive fat reduction, which was introduced as a body contouring technique in 2007. The principle of cryolipolysis is based on the higher sensitivity and susceptibility of adipocytes to cold compared with other water-rich cells allowing selective apoptosis while preserving the adjacent structures. Over the years, it has been approved for love handles (2010), abdomen (2012), thighs (2014), submental area (2015), and the arms, back, and buttocks (2016). It reduces adipose tissue, with high patient satisfaction (more than 70%).

Common complications of cryolipolysis include erythema, swelling, and sensitivity at the treatment site, followed by a less common one of pain, tingling, and bruising. Most of these skin changes resolve within a few weeks of treatment. There is an apparent risk of paradoxical adipose hyperplasia.

Cryolipolysis has been found to be safe for all skin types. It should not be performed in patients with cold-induced conditions (e.g., cryoglobulinemia and cold urticaria) or in those with severe varicose veins or atopic dermatitis. Patients benefitting most from this procedure require only small or moderate amounts of adipose tissue removal with separate fat bulges.

The shape of the applicator has recently been changed to a new generation of sharply contoured devices. In general, cup-shaped applicators with two cooling panels are used. A vacuum is created underneath, which pulls the tissue and draws the target zone between cooling panels. The cold-induced constriction of blood vessels accelerates the cooling process. The treatment session usually takes 1 h.

Cryolipolysis for body contouring is effective for patients with separate fat bulges. The efficacy and safety of cryolipolysis in reducing thigh, abdomen, arm, and back fat bulges have been established. However, it seems that the procedure is not efficacious for obese patients with considerable skin flaccidity.

LASER THERAPY

Laser technology is a rapidly growing modality in non-invasive body contouring. LLLT is a non-invasive method for reducing adipose tissue and received FDA clearance in 2010. Before that, LLLT was widely used for treating other problems such as neurologic, ophthalmic, dental, and dermatologic (diffuse hair loss) diseases.

A novel device recently emerged as the first and only FDA-cleared hyperthermic laser for fat reduction and non-invasive body contouring of the abdomen, flanks, back, inner and

outer thighs, and submental area. The device is a 1060 nm diode laser that uses thermal energy to clear adipose tissue, leading to a permanent reduction in stubborn fat through the use of a flat, non-suction applicator that is designed for consistent, natural-looking results. The device includes a contact cooling system that helps to limit thermal discomfort and prevent damage to the surface of the skin during the procedure. Initial improvement can be seen as quickly as 6 weeks after post-treatment, and optimal results usually occur in as few as 12 weeks. There is no downtime. This device has been found to have an excellent safety profile and is well tolerated among patients with only mild pain.

Before the development of this new 1060 nm diode laser, the initial application of lasers for non-invasive body contouring involved LLLT, also known as cold laser therapy. Using LLLT for fat reduction and body contouring is based on experiences, which showed that applying a 635 nm laser leads to the creation of tiny temporary openings within the membrane of adipose cells and releasing of fats into the interstitial space. The result of these changes is the reduction of unwanted fat. Complications of LLLT generally are fewer and milder than with all other body contouring procedures, with several studies reporting no adverse effects. Others reported swelling or erythema at the treatment area, pain or tingling during treatment, and increased urination, all of which were temporary and resolved spontaneously. As a stand-alone procedure, the effects of LLLT are not sufficient, hence, commonly combined with liposuction.

One treatment session with LLLT lasts up to half an hour and 6–8 sessions to obtain optimum results. In addition, manufacturers encourage consumers to use some supplements.

ESWT

ESWT has been a method for treating kidney stones since 1980. In addition, the procedure has been used for curing skin lesions and wounds. Nowadays, the device is being used for body contouring and treating cellulite. Although the full mechanism of ESWT is not clear yet, it seems that it is based on converting electrical energy to mechanical energy. It appears that ESWT could be considered an effective method for body contouring and cellulite treatment, yet further studies are required to determine the effect of this technique on circumference reduction.

VIBRATION EXERCISE AND WEIGHT REDUCTION

The current guidelines for weight reduction suggest moderate-intensity aerobic exercise and moderate caloric restriction, which further improves weight loss. Other exercise modalities, such as resistance training, have received much attention for weight loss.

Vibration exercise sets in repetitive fast eccentric-concentric activity that induces muscular work and increases metabolic rate. This is done by standing on a machine with an oscillating platform or other devices, such as a vibrating slimming belt.

Vibration exercise is becoming popular. Different types of vibration machines in fitness centers and gyms are being used. The results of studies on vibration exercise are contradictory.

COMBINATION THERAPY

For increasing positive results of body contouring methods, combination treatment regimens are used, such as a combination of cryolipolysis and shockwave, RF and suction. Moreover, manual massage is considered in some cases, especially in the cellulite therapeutic approach.

To conclude, the field of non-invasive body contouring is rapidly growing as the efficacy and safety of these treatments is getting established. Dermatologists utilizing body contouring techniques must be familiar with available devices to determine which treatment works for their patients. According to the literature, some non-invasive methods such as cryolipolysis, RF, LLLT, new 1060 nm diode laser, and HIFU have significant effect in body contouring, removing unwanted fat. The clinical effects are mild to moderate, on an average, 2–4 cm circumference reduction as a sign of subcutaneous fat reduction during total treatment sessions. Patient satisfaction, the durability of the results, and time to obtain maximum benefit with less complication and lesser downtime time are considered necessary for non-invasive body contouring.

How to cite this article: Thappa DM. Body contouring (sculpting) – Why are non-invasive techniques preferred? CosmoDerma 2022;2:86.