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Title: Guidelines for Laser-Assisted Liposuction Consistency and Safety

Introduction: Liposuction has been the standard treatment option for removing undesirable adipose tissue for many years. A variety of innovations, including ultrasound-assisted liposuction, have been used in an attempt to make the process of fatty tissue emulsification and removal more effective. Most recently, laser energy has been employed to liquefy the adipose tissue prior to removal by suction. Practitioners of different levels of training are currently performing this procedure at a variety of institutions across the United States and around the world. Currently, however, no standardized technique or patient safety guidelines are available in the literature. The goal of this IRB approved study was to create a reproducible, standardized technique for laser lipoplasty. In addition, this study examined the clinical results of this standardized technique performed on 12 patients. The primary outcomes evaluated were patient safety, treatment effectiveness and degree of skin tightening.

Methods: Twelve patients with excess adipose tissue in the abdominal and thigh regions underwent a single standardized laser-assisted liposuction procedure with a 1064nm Nd:YAG laser (Smartlipo, Cynosure Inc. Westford, MA). Treatment areas were divided into 5x5 cm sectors and two separate applications of laser energy were performed. The laser fiber, inserted through a 1.5 mm cannula, was initially used deep within the adipose tissue in order to disrupt adipocyte cell membranes. The laser was then used more superficially at a level just beneath the dermis in order to heat the skin. The skin surface temperature of the treatment area was carefully monitored throughout the procedure with a thermal camera (Flir Inc. Wilsonville, OR). The thermal camera helped guide the application of laser energy by maintaining the treatment temperature at 42 degrees Celsius. Lipolyzed adipose tissue was subsequently removed with a 3 mm aspiration cannula. Patients were evaluated at 1 day, 1 week, 1 month and 3 months post treatment. Studio 2D photographs and 3D images were taken before and also at 1 and 3 months following treatment. These photographs were independently rated on a scale that ranged from no difference to excellent result. Circumferential measurements of the treated areas were documented before and after the procedure as well. Finally, tissue aspirate lipocrit measurements were recorded in order to quantify blood loss.

Results: A reproducible, standardized technique using laser-assisted liposuction was documented in detail for the first time and performed on 12 patients. The procedure was well tolerated in all patients and there were no significant lasting adverse effects. Independent photographic evaluation demonstrated significant improvement in both body contour and skin laxity. Circumferential measurements of the treated areas revealed good results as well.

Conclusion: Laser-assisted liposuction is a safe and effective method for the removal of undesirable adipose tissue when used in a standardized manner by a plastic surgeon well trained in this specific technique. This is the first study to document the details of a safe and effective laser lipoplasty

protocol. Further studies are needed in order to fine-tune the technique and to accurately document the effect of subcutaneously applied laser energy on skin elasticity.