Procedural discussion...

Patrick McMenamin, MD

Laser Facelifts

Liposuction is one of the most popular cosmetic procedures in the world. The major refinement to effectively perform this operation has occurred with tumescent anesthesia, invented and researched by Dr. Jeffrey Klein. Laser energy in the subcutaneous space (endolaser) can be applied to remove and sculpt fat in addition to the thermal effects of skin tightening.

Endolaser utilization has become more popular since Apfelberg[1] and colleagues first reported their 1996 multicenter trial of this technique. The goal was to decrease bleeding by the coagulation of vessels with the Nd:YAG laser while using this technology to destroy fat cells by light and heat rather than mechanical disruption. They concluded that even with less pain, bruising, swelling and blood loss, there was no clear clinical advantage to using the laser over standard liposuction techniques.

But, we do love our technology. Over several years, the term laser lipolysis came into use. In some circumstances, the fat is just lysed, but in most situations, it is lysed and aspirated.[2] In 2002, Badin and colleagues used a 1064 nm Nd:YAG laser to treat 245 patients with flaccid skin for the express purpose of skin tightening.[3] The smaller cannula (1 mm) was less traumatic, but the major gain was skin retraction and collagen remodeling via the laser's thermal effects.

In 2006, Cynosure (Westford, MA) gained FDA approval of a 1064 nm Nd:YAG laser for the vaporization, excision, ablation and coagulation of soft tissues.[4] Other authors [5, 6] demonstrated cosmetic improvement in laser lipolytic removal of fat. Histologic studies showed ruptured adipocyte membranes and the coagulation of collagen and small blood vessels.

To counter the unproven hype of laser lipolysis superiority over standard liposuction techniques, Prado et al[7] completed a randomized, prospective, double-blinded, controlled trial comparing laser-assisted liposuction (LAL) with suction-assisted liposuction (SAL) alone. They found that LAL offered no major clinical improvement over standard techniques. The difficulty in comparing technologies or procedures lies in the wide variability of techniques for performing cosmetic procedures. There is little chance of uniform comparison based on an extensive array of confounding variables. Fat is no more uniform than aging changes, genetics, skin elasticity, sun damage, volume, body location, distribution and a multitude of other factors.

In spite of these difficult comparisons, the popularity of laser lipolysis and word-of-mouth patient satisfaction spread.[4]

DiBernardo helped us move from marketing towards science with his evaluation of the thermal effects of laser energy on abdominal skin.8 He and his colleagues used the 1064 nm and the 1320 nm SmartLipo at varying depths, power settings and blends of laser energy with careful attention to actual tissue and surface temperatures using the grid technique. Their extensive temperature analysis finally concluded that superficial heating at depths within 5 mm of the skin surface should not exceed 42 degrees. This thinking addresses the uniform induction of tissue trauma by way of laser energy to effect a result. As surgeons, we do not create results in biologic systems. We create wounds with a hopefully astute knowledge of the healing process that will yield a positive clinical result (and hopefully, a happier patient).

This report focuses on the use of laser lipolysis using DiBernardo's grid techniques in face lifting procedures. The initial findings were published in Facial Plastic Surgery, Volume 27 #4 August 2011, pages 299 to 307. This is an update of a retrospective anecdotal exploratory case series. Further work is needed.

Methods: In our initial study, 40 patients were interested in laser face lifting procedures between 2008 and 2010. Follow-up is now extended. These patients requested limited surgical intervention with less downtime, easier recoveries and less expense. Laser energy was applied to the lower 2/3 of the face and anterior cervical triangles. This included the submentum, jowls, neck skin, jaw line, cervicomental angle, oral commissures and nasolabial grooves. All patients were healthy ASA 1 or 2, had detailed informed consent and preoperative counseling, and were operated upon in an Institute for Medical Quality (IMQ) accredited facility. Age was not a factor in selection, but poor skin contractility or elasticity was. Thirty-four of the patients underwent laser facelift 1 (LFL-1) or laser facelift 2 (LFL-2) procedures. Laser facelift 1 procedures consisted of four small incisions, one behind each ear lobule and one at each lateral aspect of the submental crease. Laser facelift 2 procedures consisted of a complete submental incision (for greater access to the platysma) and an incision behind each ear lobule.

Most patients (30 out of 34) were done under oral sedation of Valium 20 mg and Benadryl 50 mg. IV sedation was used (Versed 5 mg/Demerol 100 mg in 500 cc normal saline as a drip) when other

concomitant procedures were done (brow lift, blepharoplasty or both). Phisohex (hexachloraphene) was applied to the target area to avoid alcohol-based blue flame fires during laser surgery. Sharpie markers were used to delineate approximately 15 squares of 5 x 5 cm/patient (Figure 1).

Figure 1. Grid squares (17, approximately 5 cm x 5 cm) drawn on the neck, submentum, and lower face of the 55-year-old woman after infusion of the tumescent anesthetic solution. Each square was treated individually.

Tumescent anesthesia (0.15% lidocaine with 1:250,000 epi) was used via a 22 gauge 3.5" spinal needle. 200-300 cc of tumescence

Figure 2. The neck, submentum, and lower face of a patient in whom the tumescent anesthetic solution has been infused.

was used per patient (Figure 2). Tunneling under the entire area to be treated was accomplished with a 4 and 6 mm spatula cannula

Figure 3. Instruments used in endolaser facelifts. From top to bottom are a syringe adaptor, 4-mm spatula, 6-mm spatula, and 2.75-mm Blugerman rasp.

and a 2.75 mm Blugerman rasp (Figure 3). This is essential to allow uniform application of energy in the entire subcutaneous space, specifically to heat the overlying skin for contraction and tightening. Laser fiber diameter initially used was 300 microns, but advanced to 600 then 1000 micron fibers by the second half of the study.

Each square in the grid was treated with the Joule (Sciton, Palo Alto) 1064/1319 nm or SmartLipo (Cynosure, Westford Mass), 1064/1320 nm ND:YAG laser via optical fibers enclosed in a stainless steel cannula extending 2-3 mm beyond the distal end. All settings were 50/50 blends of two wavelengths (e.g. 6 watts 1064 nm and 6 watts 1319 nm). Each square received an average of 693 Joules with surface end-point temperatures of 38-40° Centigrade (Figure 4).

Figure 4. The cannula and laser fiber inside the neck during treatment of a 53-year-old female patient.

Surface skin temperature was monitored with a handheld infrared thermometer (MiniTempMT6/Raytek Corp, Santa Cruz, CA) usually used to monitor engine block temperatures. Internal temperatures were also monitored (45-47° C to avoid epidermolysis) later in the study with a TempAssure (from Sciton) or ThermaGuide (from Cynosure). The helium neon (He:Ne) diode laser beam allows the surgeon to maintain the depth of the cannula by visualizing the diameter of the light spot transcutaneously. Submental incisions were closed with #5-0 nylon while the postauricular incisions were left open (3 mm). The volume of blood loss averaged 8 mm (range 5-15 ml). Fat loss volume averaged 6 ml (range 0-20 ml), although additional fat was probably lost due to mechanical or thermal trauma. We believe this fat loss to be minimal.

Postoperative: Patients wore a facelift dressing for one day and then an ace wrap support for three to four days. All patients returned to work within seven days and social events within six days (unless they had concomitant procedures). Half of the patients returned to work in three to four days (one patient returned to work on postop day 1). Patients rated their pain, swelling, bruising, nausea, energy level and satisfaction at each post-op visit. Relative to the postoperative course, the patients had easier times than conventional, more invasive facelifts, which was expected. Patients were actually more satisfied with the less invasive procedures, which ultimately reflects on their expectations and our informed consent. Two very small burns occurred, which had no clinical consequence. One was in a

previous scar (oral commissure) and the other was in the preauricular area of a previous facelift without full thickness loss (minor loss of pigmentation).

Of note, facial sensation returns quickly (one to two weeks). The postoperative hyperemic appearance of the patients suggests a different wounding process than seen with flap elevation surgery. Heat and light energy are different than mechanical trauma. Although laser lipolysis can remove and sculpt residual fat, the contraction of the skin envelope may be more valuable. In the face, preservation of fat while tightening skin seems more important in aging patients seeking facial rejuvenation procedures. The evolution of endolaser energy in the subcutaneous areas is towards skin contraction of the envelope more than sculpting and obliterating fat cells (which will be removed by suctioning or macrophage activity). Improving the perioral and midface areas is difficult regardless of a variety of possible techniques. To soften nasolabial grooves, the author has used direct excision, dermal grafting, dermal fat grafting, curettage, suture techniques and fillers. All are suboptimal due to the major mimetic function in the lower midface area. These areas seem to respond better to light and heat than other methods. Patients are more interested in this less invasive, more patient-friendly technique with acceptable results. This may represent a selection phenomenon more than a result outcome based satisfaction. As with all cosmetic procedures, meeting realistic expectations greatly influences satisfaction and perceived results. The expensive laser technology hampers an even more robust presence in the cosmetic surgery armamentarium. Significant literature exists supporting subcutaneous temperature elevation of the skin to 40-42 degrees with very careful observation to prevent over treatment of residual fat or thermal trauma to the skin resulting in burns.8

The author does not believe in a specific wavelength, but rather a heat-dependent response in the tissues. Literature has supported this.9 Laser facelifts are a reasonable alternative to standard facelifting techniques and may offer better results in the perioral and jowl area. Laser facelifts are less invasive with a shorter recovery and potentially lower cost. More scientific work needs to be completed in this area.

Figure 1a & 1b.

Figure 1a & 1b. These images depict the before and 4 ½-month postoperative results of a 43-year-old female who underwent laser facelift 1 and lower eyelid blepharoplasty. 15 grid squares were treated averaging 542 Joules per square with a temperature range of 38-40° C.

Figure 2a & 2b.

Figure 2a & 2b. These images depict the before and one-year postoperative results of a 48-year-old female who underwent laser facelift 1. 15 grid squares were treated averaging 583 Joules per square with a temperature range of 38-41° C.

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