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Evaluation of the KTP 532 Laser in Aesthetic Facial Surgery

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Abstract. This study investigated the ability of the KTP 532 laser to reduce postoperative swelling and bruising in aesthetic facial surgery. Thirty consecutive patients receiving a laser-assist procedure (following skin incision with a scalpel, dissection and hemostasis were accomplished primarily with the laser) were compared to 16 patients who had similar technical operations but relied on scissor/scalpel dissection and electrocautery for hemostasis. Evaluations were performed by comparison of serial photographs after surgery and by patient self-assessment. The clinical observations demonstrated a noticeable reduction in postoperative swelling, bruising, and discomfort in the patients whose procedure was performed with the aid of the laser.

Key words: Laser—Cosmetic surgery—Deep plane rhytidectomy—Blepharoplasty

Most reports assessing the efficacy of laser energy in aesthetic surgery have focused primarily on CO_2 lasers. While some investigators have purported certain advantages using the CO_2 wavelength [2–4,9,10], others indicated no benefit [7]. Recently, Mittleman and Apfelberg reported on a study demonstrating the efficacy of the 1032 wavelength for aesthetic procedures [1]. Possible explanations for the varied conclusions in the mentioned studies include surgical technique, patient selection, delivery system, wavelength of energy, and method of evaluation.

The purpose of this preliminary study was to determine the efficacy of the KTP 532 wavelength when performing aesthetic procedures of the face. The properties of this wavelength, its affinity for hemoglobin, and the fiber delivery system conceptually make it an ideal tool for aesthetic facial procedures.

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Methods

For 30 consecutive patients, aesthetic procedures of the face were performed with the aid of the KTP 532 laser (Laserscope). For patients receiving a laser-assist procedure, the skin was incised with a scalpel and then the remainder of the dissection was performed primarily with the aid of the laser. A 600–100-μm quartz fiber delivery system was used. The laser was set at 4–10 watts of power and a continuous wave. Larger vessels (approximately 1–1.5 mm in diameter) not sealed with the laser were sealed by electrocautery. Eye shields were placed over the patient's eyes, and operative personnel wore protective glasses whenever the laser was in use.

The procedure(s) performed depended on patient need/request. For a given surgical procedure, the actual technique was fairly constant from patient to patient. All but one patient receiving a rhytidectomy had a deep plane dissection following the plane along the superficial surface of the zygomaticus muscle in the malar region to release the nasolabial fold and anterior and caudal to the buccal fat pad in the lower face. The neck dissection was subcutaneous. Redundant neck fat was removed via direct excision. The single patient not receiving a deep plane lift had a subcutaneous and SMAS dissection. Patients undergoing a blepharoplasty procedure had resection of skin, muscle, and fat in the upper lid and fat removal with or without skin and muscle resection in the lower lid. The brow lift was performed in the subgaleal plane with division/excision of the depressor cilli muscle whenever necessary. The method of anesthesia, general versus intravenous sedation, was determined by the patient. Intraoperatively, patients received a local anesthetic, 50:50 mixture of 1.0% xylocaine and 0.25% mar-

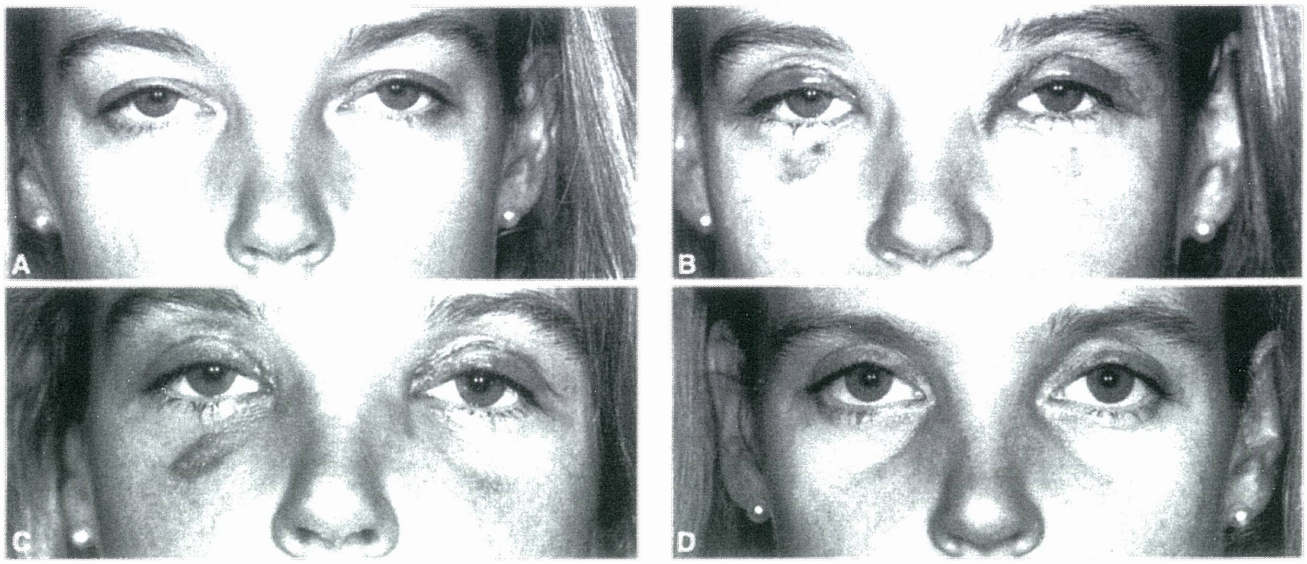

Fig. 1 (**A**) Preoperative view. (**B**) Day 1 postoperative view. (**C**) Day 4 postoperative view. (**D**) Day 7 postoperative view.

Fig. 2 (**A**) Preoperative view. (**B**) Day 1 postoperative view. (**C**) Day 4 postoperative view. (**D**) Day 14 postoperative view.

Fig. 3 (**A**) Preoperative view. (**B**) Day 7 postoperative view. (**C**) Day 21 postoperative view.

caine with epinephrine 1:150,000, intravenous sedation, narcotic analgesia, antihypertensive medication as needed, and antibiotics.

After surgery all patients followed a standard protocol of cold compresses for 24 hours and elevation of the surgical site and were asked to refrain from strenuous activity for 3 weeks. They were asked to return to the office on postoperative days 1, 4, 7, 10, and 14 for photographs and to monitor their recovery. Each morning they were asked to examine their face and call when all the bruising was gone.

The surgical results and recovery of the laser patients were then compared to those of patients undergoing similar technical procedures but with the surgical dissection performed with a scalpel and/or scissors and hemostasis obtained via electrocautery.

Results

In the 30 patients undergoing a laser-assist procedure, 25 blepharoplasties, 9 coronal brow lifts, and 9 rhytidectomies were performed. The average patient age was 46 years. Eleven patients had combined procedures (i.e., rhytidectomy and blepharoplasty, blepharoplasty and browlift, rhytidectomy and browlift, etc.). Two complications occurred in the laser-assist patients, a skin burn in one patient, and a parotid seroma in another. Data from

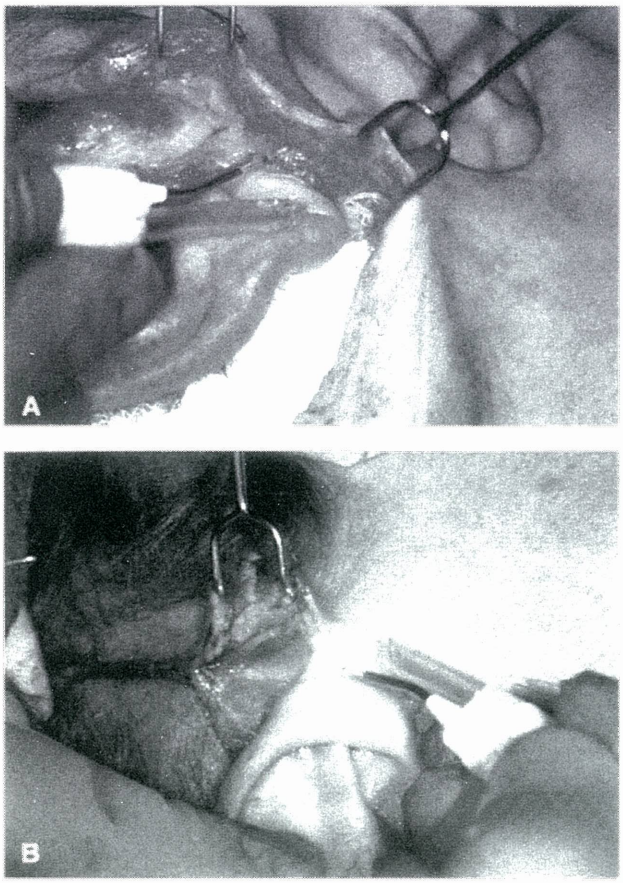

Fig. 4 **(A)** The surgical field during laser activation with a corrective filter on the camera lens. **(B)** A surgical field during laser activation without a filter on the camera lens.

the patient who had the skin burn were eliminated from the final analysis secondary to patient manipulation of her surgical wound resulting in a dehiscence. The seroma occurred in a patient undergoing a deep plane lift during her secondary rhytidectomy and was not directly related to the use of the laser.

Patients receiving a blepharoplasty alone reported complete resolution of ecchymosis in an average of 7 days (range, 5–11 days) in the laser group (14 patients) versus 15 days (range, 10–21 days) in the conventional group (6 patients). Patients receiving combined procedures had complete resolution of ecchymosis in an average of 15 days (range, 10–19 days) in the laser group (11 patients) versus 25 days (range, 21–33 days) in the nonlaser group (10 patients). Postoperative narcotic analgesics were used in all 16 of the nonlaser patients for pain control and in 3 of the laser-assist patients who primarily took acetaminophen.

Inspection of serial photographs revealed a marked reduction in postoperative swelling and ecchymosis in the laser-assist group. Examples of the typical postoperative recovery in patients receiving a laser-assist procedure are demonstrated in Figs. 1–3. Figure 1 illustrates the early recovery period in a 28-year-old patient undergoing a lower transconjunctival and upper lid blepharoplasty. Figure 2 illustrates a 54-year-old woman who underwent a browlift, lower blepharoplasty, and rhytidectomy. The ecchymosis lasted 18 days in the malar region. Figure 3 illustrates a 55-year-old woman who underwent a lower blepharoplasty, chin implant, and rhytidectomy.

Discussion

Because of the possible variables associated in a clinical study (patient age, sex, past medical history, postoperative compliance, etc.), it was not feasible to set up a study with a matched population in both the laser versus nonlaser groups. There is also the inherent difficulty of trying to objectively evaluate the parameters of swelling and bruising in human studies. In addition to the preceding variables, the individual clinical deformities and type and number of simultaneous procedures all directly impact the initial recovery period. Because the local trauma of a hemirhytidectomy produces a response that can effect the contralateral side through systemic eicosanoids, the idea of one side receiving a laser lift and the other side a conventional procedure was aborted. Attempts to try to obtain objective data such as the number of blood-filled sponges were viewed as unreliable objective data because the amount of blood contained in any given sponge during a case is quite variable. Instead, this study was a preliminary investigation to assess the efficacy of the KTP 532 wavelength in reducing postoperative bruising and swelling from a purely clinical observation by the physician through serial photographs and by the patient who is most critical during the postoperative period. Consecutive patients received a laser-assist procedure to eliminate selection bias within the study pool. Initially, the goal was to have equal numbers of laser and nonlaser patients in each surgical group, blepharoplasty alone versus combined procedures. However, it was felt that uniformity in the surgical technique was more important than equal numbers, and as such, it was impossible to obtain a matched population in each group for analysis.

The ability to obtain a similar shortened recovery course does occur with conventional methods. However, the attenuated recovery observed in patients undergoing a laser-assist procedure was consistent. Although this was not a definitive study, patients with a laser-assisted procedure had less postoperative swelling and bruising. Keller et al. also have demonstrated the efficacy of the KTP laser when performing small-incision laser lift for glabellar furrows [7], blepharoplasty [5], and transblepharoplasty brow suspension [6]. Some of the observed benefit may stem from the properties of the KTP wavelength's attraction to hemoglobin. Figure 4A illustrates the surgical field during laser activation with a corrective filter on the camera lens. Figure 4B illustrates a surgical field during laser activation without a filter on the camera lens. The green light is preferentially attracted to the sites of bleeding along the skin edge.

Technically, the laser-assisted procedure provided

greater visibility of the surgical site throughout the operation. The laser light provided additional illumination during deep face dissection. The hemostatic dissection afforded continual identification of the tissue planes. Because of the fiber delivery system, tactile feedback was maintained for the surgeon. The skin incision was not performed with the laser, because doing so would have added an additional step to trim the edge to ensure optimal wound healing. Skin edge bleeding in patients receiving a blepharoplasty was felt to contribute to the ecchymosis noted in some patients. The deep plane was dissected with ease without inadvertent stimulation of the facial nerve. No postoperative zygomaticus muscle dysfunction activity occurred despite the close proximity of the muscle fibers to laser energy. In patients having a blepharoplasty procedure under intravenous sedation, patient discomfort during resection of the mesial fat pocket appeared to be reduced as compared to during electrocautery for hemostasis. Initially, the laser procedure took more time, which was due to the learning curve of the surgeon. By the end of the study, however, the operative time was equivalent in the laser-assist cases. Patients did not complain of any visual problems beyond some early postoperative dryness/tearing similar to that observed following conventional methods.

This study has prompted a laboratory investigation to assess the impact of specific energy settings and wavelengths on the inflammatory response following surgical trauma.

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