

Neutral Plasma Coagulation

Preliminary Experience with Neutral Plasma, a New Coagulation Technology, in Plastic Surgery

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Background & Objectives

A variety of devices are used daily in plastic surgery to achieve hemostasis. These devices can be classified in 2 main families:

1. **Electrosurgery** in which a high voltage electrical current travels through the patient to desiccate or vaporize tissue and stop bleeding.
2. **Lasers** do not present the risks associated with high frequency current but they are expensive and require specific precautions, OR equipment and staff training.

No system to date offers a satisfactory solution to lymphostasis.

A new device, the PlasmaJet™, uses pure plasma energy (ionized argon gas) to deliver a high intensity, electrically neutral energy to tissue. Plasma seals tissue/vessels with a strong, adherent, elastic layer of desiccated tissue. The depth of tissue injury is minimal. The device is easy to use and requires no specific equipment, precautions or extensive training.

Materials and Methods

Between February 2005 and August 2005, 24 plastic surgery patients were treated with the PlasmaJet™.

Applications included bariatric abdominoplasty / tummy tucks (4), breast reduction (2), breast augmentation (7), mini face lifts (7), blepharoplasty (2), skin wart destruction (1) and breast reconstruction (1).

Initially, the PlasmaJet™ was used mainly at the end of the surgery to “seal” planes of dissection and for final hemostasis. As we gained experience, the PlasmaJet™ was used throughout the surgery to seal vessels, fuse perforators before sectioning them, and treat skin edge ooze along the incision site.

During bariatric body contouring, the PlasmaJet™ was able to vaporize fat, skeletonising perforating vessels. Exposed vessels were controlled by either plasma closure or ligature. Plasma closure worked best when flow thru the vessel was occluded.

Patients treated with the PlasmaJet™ set at lower power, and used in a “paint-brush” movement over the entire subcutaneous and fascia dissection surfaces just prior to wound closure, appeared to experience less pain, swelling, and wound drainage.

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The PlasmaJet™ was used to debride open wounds, including decubitus ulcers. Post-debridement cultures showed no bacterial growth.

Histopathology of PlasmaJet™ treated skin showed a 0.4 mm depth of injury, with a maximum injury depth of 0.9mm.

Results

The breast and mini face lift patients experienced less post-op swelling and pain than what we usually witness in our standard practice.

Abdominoplasty patients rarely needed drains post-operatively.

The wart patient was successfully treated with the PlasmaJet™ whereas she had failed all prior attempts at treatment with laser.

One bariatric abdominoplasty patient (6.9kg pannus) experienced a post-op cellulitis unrelated to the use of the PlasmaJet™.

Conclusion

Neutral Plasma Coagulation appears to be a safe and effective alternative to standard electrocautery or laser for intra-operative hemostasis in plastic surgery.

The decreased swelling and pain observed in the abdominal, breast, and mini face lifts patients, and the near absence of fluid collections in abdominoplasty patients suggest that the PlasmaJet™ may seal lymphatics (LymphoSeal™).

The controlled and minimal tissue damage incurred by the system makes it an interesting tool in the daily practice of plastic surgeons.

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