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Case Report

Upper Airway Obstruction Following Radiofrequency-Assisted Liposuction of the Neck and Lower Face: A Case Report

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Abstract

Radiofrequency-assisted liposuction (RFAL) recently gained popularity for non-excisional skin tightening. It involves the delivery of a controlled amount of energy that is converted to heat, resulting in fat liquefaction, hemostasis and skin contraction. It is regarded as safe and effective with general anaesthesia and local tumescent anaesthesia. We report the case of upper airway obstruction associated with diffuse soft tissue hardening and fat necrosis of the neck and lower face following RFAL.

Keywords: Airway; Liposuction; Radiofrequency

Introduction

Radiofrequency-assisted liposuction (RFAL) recently gained popularity for non-excisional skin tightening, thereby broadening the plastic surgeons' armamentarium for specific patients whose skin laxity is not 'severe' enough for surgical excision and not 'mild' enough for traditional non-invasive aesthetic modalities. It is also an option for recurrent skin laxity despite prior surgical excision, and for improving skin laxity in patients who want to avoid surgery and are willing to accept more modest results [1]. RFAL involves the delivery of a controlled amount of energy that is converted to heat, resulting in fat liquefaction, hemostasis and skin contraction by tightening the fibroseptal network, while promoting new collagen and elastin formation and diminishing adipocytes [2]. It is regarded as safe and effective with general anaesthesia [3] and local tumescent anaesthesia in the awake patient1. We report the case of upper airway obstruction associated with diffuse soft tissue hardening and fat necrosis of the neck and lower face following RFAL.

Case Report

A 21 year-old healthy woman (BMI 25kg/m2) with submental fat excess and poorly defined jawline underwent submental and lower face RFAL technology of Neck Tite under local anaesthesia in a private clinic (Figure 1). According to the operative report, local anaesthesia with adrenaline was infiltrated in the cervical and submandibular areas (100cc NaCl 0.9%, 0.2cc of adrenaline 1mg/ml, 10ml of bicarbonate 8.4%, and 20ml lidocaine 20mg/ml). After liposuction (60ml), Neck Tite was performed: 0.4kJ in the anterior neck, 0.2kJ in the right submandibular area and 0.3kJ in the left submandibular area (Power setting of 10W; goal temperature setting for skin heating at 38°C). A lightly compressive bandage was then applied.

On postop day (POD) 1, the patient consults the emergency room for severe cervical and lower face edema associated with dyspnea, orthopnea, dysphonia, and dysphagia. No signs of local anaesthesia toxicity were noted. A CT scan shows diffuse soft tissue edema of the lower face and neck anteriorly and laterally to the level of the sternocleidomastoid muscles and inferiorly to the upper thorax, with no evidence of hematoma or associated vascular injury. A nasofibroscopy shows diffuse supra-glottic edema. High-dose intravenous steroids (methylprednisolone 250mg once, then 200mg daily for 3 days, then 125mg daily), adrenaline aerosols, and prophylactic intravenous antibiotics are administered in addition to non-invasive ventilation, and the patient is admitted to the intensive care unit for respiratory surveillance. On POD4, she develops stridor with progressively worsening edema and is therefore intubated; repeat CT scan remains unchanged. On POD6, surgical exploration reveals diffuse thickening of the subcutaneous tissue, without significant hematoma or abscess formation. Repeat CT scan 24 hours later remains unchanged. On POD10, a cervical puncture does not yield any liquid. Immunologic and investigations do not reveal any underlying allergic or immunologic reaction.

On POD11, the patient is transferred intubated to our hospital university intensive care unit. Repeat CT scan shows diffuse fat

necrosis, with no hematoma, vascular injury, collection, abscess formation, thrombosis or mediastinitis. A repeat cervical puncture yields no liquid. Extensive immunologic investigations are repeated and remain negative. On POD 15, 1g of methylprednisolone is administered for one day, followed by 125mg daily with adrenaline aerosols and topical steroids. She is extubated on POD17.

Nevertheless, on POD21, she develops dysphonia then aphonia with an aggravation of her lower face, neck, and supra-glottic edema, necessitating re-intubation. High-dose intravenous methylprednisolone is resumed. Repeat immunologic investigations remain negative. In order to enhance lymphatic drainage, a manual massage was performed twice daily with an intermittent compressive bandage. In addition, a small pillow was placed under the neck to maintain mild extension and avoid neck flexion, which mechanically impedes lymphatic drainage (Figure 2).

Figure 1: Pre-operative Status.

Figure 2: The Neck is maintained is slight extension with a pillow (POD 31).

Figure 3: Status on the day of extubation (POD 25).

On POD25, edema begins to subside clinically and on CT scan and nasofibroscopy; the patient is therefore extubated (Figure 3). Oral feeding is started on POD30 and steroids are tapered (Figures 4,5). She is discharged on POD42. At the follow up visit 3 months postop, despite daily massage and intermittent compression garments, significant soft tissue hardening and contour deformity persist, associated with bilateral marginal mandibular nerve palsy, submental hypoesthesia and dysphonia due to prolonged intubation (Figure 6).

Figure 4: Status 5 weeks postop.

Figure 5: Status 6 weeks postop.

Figure 6: Status 3 months postop.

Discussion

In Theodorou et al. series of RFAL of the neck and lower face of 247 patients under general or local anaesthesia, complications include prolonged swelling >6 weeks (4.8%), hardened area >12 weeks (3.2%), and marginal mandibular neuropraxia (1.2%), which all resolved without further intervention. There were no repeat treatments or cases requiring operative interventions following RFAL [4].

In Rodopoulo et al. series of RFAL of the neck and lower face of 55 patients, 5 (9.1%) patients developed temporary induration and firmness of the soft tissue of the neck that remained for about 3 months, but fully recovered by persistent, daily massage. They think that the superficial application of high temperature can create this type of hardening, which could become frustrating for the patients and for the doctors to resolve. They recommend smaller energy up to 15W and deeper application of the device in order to prevent the hardening of the tissue, while still allowing energy to be transferred through the fibroseptal network to the subdermal plexus so that tightening can be achieved [5].

In Chia et al. series of RFAL for body contouring in 97 patients with 144 anatomic areas under local anaesthesia, the overall complication rate was 14.6% and was not statistically significantly different among the anatomical areas treated. Major complications (6.25%) included infections, seromas, adverse effects from medications, or clinically significant burns outside of the entry sites requiring intervention. Minor complications (8.3%) included periportal burns or end hits that required no intervention. No deaths or hospitalizations were reported in this series. The authors believe that a slower and gradual heating of soft tissues at a lower power setting results in less tissue hardening and fat necrosis, with better tissue response and patient tolerance. The anatomical area requiring the lowest amount of energy was the neck 2.1kJ. Only one neck case was included in the series, with no complications. Furthermore, the authors believe that RFAL with the Body Tite device does have a learning curve [1].

This case report shows that soft tissue hardening and edema induced by diffuse fat necrosis in the neck and lower face following RFAL may be so extensive as to completely obstruct the airway and become life threatening. In light of the consistently negative immunologic investigations, we hypothesize that the extent of soft tissue hardening, edema and fat necrosis may be related to the amount of thermal energy delivered by the RFAL device, despite the parameters reported to be set within the “safe range” (machine dysfunction vs. erroneous setting of the parameters). Based on the above discussion, we speculate that a slower and more gradual heating of soft tissues at a lower power setting may prove to be a safer approach, especially in the neck and lower face. In view of this life threatening complication, we suggest that the level of safety of RFAL technology of Neck Tite be reassessed.

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