

Aesthetic Abstracts and Citations

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In this Aesthetic Abstract and Citations section, we highlight and briefly discuss recently published manuscripts from other peer-reviewed journals that may be of interest to our readership in oculoplastic surgery. These are just cursory reviews to peak an interest on subjects, which the individual reader may desire to pursue in more detail by reading the manuscript in full.

General review articles have not previously been presented in this forum as to avoid bias and opinions which may be author dependent. When such articles are peer reviewed, the information presented important enough, or the material described not routinely addressed in our journal, exceptions will be made. There will always be a disclaimer that these are review articles. Below are 2 such manuscripts from the plastic surgical literature which merit review to our readership.

DeLorenzi C. Complications of injectable fillers, part I. *Aesthet Surg J* 2013;33:561–75.

Those who inject soft tissue dermal fillers have become keenly aware of some of the potential serious complications of this form of aesthetic enhancement. These concerns have primarily focused on vascular events potentially associated with skin necrosis and visual loss. This review details non-vascular, filler related, adverse events, and elaborates on their etiology and ways to potentially avoid them. Before discussing this clinical information, the author emphasizes some very important points regarding soft tissue filler usage. Firstly, dermal fillers are defined by the Food and Drug Administration (FDA) as devices “not” medications. As such, the same precautions taken with other implantable devices should be taken with dermal fillers. Secondly, dermal fillers can be generally categorized into 2 main classes: reversible and irreversible. This separation is clinically more relevant than temporary and permanent, as reversibility is the important issue when complications occur. The reversible category of fillers is the hyaluronic acid (HA) based products. These products can be removed with the enzyme hyaluronidase (HYAL). HYAL has been reviewed previously in the aesthetic citation section of the journal (*OPRS* 2014;30:201-203). Finally, problems with irreversible fillers are more difficult to manage, especially when what the author describes as “vital” structures (eyelids/periorbital, lips) are involved. Complications from these products often require biopsy and/or product excision to address, which can lead to scars, disfigurement, and functional deficit. It is prudent to use reversible products when possible and only irreversible materials when sufficient experience is attained.

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With this in mind the complications reviewed are separated into: 1. technical errors, and 2. inflammatory issues. Technical errors relate to volume given (too much or too little), depth of treatment (deep or superficial), location placed (incorrect placement), and product choice (incorrect product). Around the eyes our specialty has encountered problems with all 4 factors leading to contour irregularities (prominence, hydrophilic reaction, “Tyndall” reaction). The article describes techniques to avoid such issues which most in our field are aware of. The area of knowledge which may be somewhat lacking to our discipline is the differences in biochemical makeup of these products (concentration, cross-linking process, etc.) which should play a role in defining product selection. Please refer to a previous aesthetic citations section for a review of this very “important” information (*OPRS* 2014;30:84-86).

While the majority of complications related to technical errors can typically be managed with HYAL, the management of the inflammatory complications is not as clear cut. The author divides these problems into: 1. infectious complications (bacterial, fungal, viral, or biofilm mediated), and 2. immune mediated issues (not related to infectious agent). Infectious complications of fillers are rare and can be caused by any of the organisms referenced above. Special mention is given to the herpes simplex virus as this can lead to significant morbidity and patient distress. It is prudent to pretreat all patients with a history of cold sores or fever blisters with appropriate antiviral medications. Also important is to consider *Candida* species with infections not responding to antibiotics and antivirals. Abscesses can occur, often from introduction of bacteria from the skin injection site or from improper mixing or reformulating of products in less-than ideal conditions (not uncommon). Antibiotics alone may not be curative. Incision and drainage is often needed along with HYAL injection as the material (nidus) needs to be removed. HYAL should not be given within the primary phase of treatment as it can cause spread of infection with secondary cellulitis.

Biofilms are another potential infectious complication of filler placement. Bacteria can be protected from immune defenses and administered antibiotics in this “safe room,” and lead to recurrent infection. This complication often requires excision of the implanted material. While not proven or studied with soft tissue filler placement, using guidelines suggested for reduction of health care associated infection (2% chlorhexidine gluconate in 70% alcohol as skin preparation) may reduce the introduction of offending contaminants. Finally the author briefly reviews non-infectious complications of filler injections. These are related to immune mediated responses and can be managed with injectable anti-inflammatory agents (steroid, Fluorouracil), and when localized and in a safe location, direct excision.

Message: This is an excellent review of an underappreciated topic. The complications discussed are becoming more common in the United States as the number of filler injectors and filler injections are increasing. It is incumbent on the physician injector to stay abreast of the current literature and treatment recommendations on managing these potential complications. This reviewer “highly” recommends this article to all who inject soft tissue dermal fillers.

Kpodzo DS, Nahai F, McCord CD. Malar mounds and festoons: review of current management. *Aesthet Surg J* 2014;34:235–48.

Malar mounds, malar edema and festoons are complicated, multilayered lower eyelid/midface aesthetic deficits which are poorly understood and difficult to treat. The authors provide an overview of how the literature has defined these problems, delineates treatment options, including their particular preference of surgical management. It is generally agreed that malar mounds, malar edema and festoons develop from changes in skin, muscle, fat, osseocutaneous support structures, lymphatic drainage, or some combination thereof. The authors elaborate on reports which emphasize the prezygomatic space (PZS), which is the space anterior to the zygoma bounded by the orbicularis ligament (OML) above and the confluence of the zygomatico-cutaneous ligament (ZCL) and malar septum (MS) below, as a critical anatomic area associated with the development of these lower eyelid/cheek deficits. The OML originates from periosteum just below the inferior orbital rim and inserts onto the orbicularis and dermis. The malar septum originates with the OML transverses inferiorly and obliquely, separating preperiosteal fat from the suborbicularis oculi fat to insert with the ZCL onto the orbicularis and dermis. The ZCL, like the OML is an osseocutaneous support structure. It originates from the periosteum of the zygoma (inferior to the OML) and inserts onto the orbicularis and dermis of the midface. The general belief is that prominent malar tissue within the PZS leads to malar mounds. When a fluid component is added malar edema may ensue. When skin and orbicularis muscle thin, sag and attenuate a festoon (a pendulous hammock of skin and muscle which appears as a "secondary" eyelid bag) can develop. The theory is that the OML stretches and elongates vertically, allowing skin, muscle and maybe fat to descend. The ZCL/MS complex is firmer and stretches less. This disparity allows tissue to hang over the ZCL leading to festoons.

The authors proceed to describe a number of treatment options including variations of extended blepharoplasty, orbicularis plication, canthal suspension, midface lifting techniques, and direct excision. All have their inherent limits. The author's primary surgical approach is elaborated on and involves a subciliary incision, creation of a skin/muscle flap to the orbital rim, preperiosteal midface elevation, orbicularis and canthal suspension, and skin excision. They describe high success with few complications, and present various examples of patients who underwent surgery.

Message: A nice review is presented with excellent diagrams demonstrating the deficits discussed. This is a very complex and frustrating problem to address. Currently there is no consistent and reproducible treatment scheme for this spectrum of aesthetic deficiency. The article is worth a review to refresh the thought process behind these issues, assess the author's perspective and to independently judge surgical outcomes.

Jiang X, Liu D, Chen B. Middle temporal vein: a fatal hazard in injection cosmetic surgery for temple augmentation. *JAMA Facial Plast Surg*. Published online February 27, 2014.

As with reviews, I typically do not include "Letters" in this section, but made an exception here as this is a very interesting topic which covers a potentially fatal complication resulting from aesthetic elective surgery. Most attention on vascular complications of facial fat transfer has been directed at ischemic complications related to arterial penetration with secondary embolism (blindness, other cerebral ischemic event). The authors describe three cases of "non-thrombotic" pulmonary embolism (PE) after facial fat grafting to the temple. The

authors implicate the middle temporal vein (MTV – a venous penetration) as the offending vessel predisposing to access to the pulmonary vasculature.

Gross anatomic dissections were performed on 10 formalin-fixed cadavers to evaluate the temporal venous anatomy. The MTV is a large caliber vessel embedded in the superficial temporal fat pad (STFP). The STFP is a dense fibro-fatty layer situated between the superficial and deep layers of the deep temporal fascia, below the temporal line of fusion. In this location the venous walls are well supported by the STFP and tend not to collapse during surgery or injection (author's belief). The superficial temporal vein (Sentinel vein) is a smaller but still relatively large diameter tributary of the MTV. The authors believe these large diameter vessels which may tend toward patency during injection can be violated with subsequent injection pressure leading to PE. Three patients are presented, without significant detail, who developed this complication after temple injections of fat. Two patients had the procedure performed under local anesthesia and complained of sudden shortness of breath, sweating, and tachypnea (there is no mention as to final disposition). The third patient underwent general anesthesia, developed cardiorespiratory arrest and died. The autopsy showed PE.

Message: Facial fat grafting is an invasive procedure with a known potential for ischemic events related to inadvertent arterial penetration and fat embolism (blindness, stroke). This report, while non-detailed, adds PE as a risk with the MTV as the prime venous entry point. PE has previously been described after large volume body fat injections (ie. buttocks), but not in this setting. The letter is open to many questions but that is not the important point. What is important is the awareness of the potential for this life-threatening complication.

Gordin EA, Adam L, Luginbuhl AL, Ortlip T, Heffelfinger RN, Krein H. Subcutaneous vs intramuscular botulinum toxin: split-face randomized study. *JAMA Facial Plast Surg*. Published online April 3, 2014.

The aesthetic applications and techniques of botulinum toxin type A (BTA) injections have evolved significantly since the first studies on forehead rejuvenation in 1992 by Carruthers and Carruthers. Since then the injection of BTA has become the most common cosmetic procedure performed in the United States. In addition, it has also been documented that BTA injections improve patient self-esteem, mitigate against the perceived appearance of age, and improve patients' moods while decreasing feelings of anxiety and depression. For these reasons it is incumbent upon the BTA injector to stay abreast of the current trends in treatment techniques. To this end the authors proceeded with this study in which they prospectively, randomly, and in a double blinded, split-faced fashion, compared BTA injection in the subcutaneous (SC) vs intramuscular (IM) route on opposite sides of patient's foreheads. The purpose was to delineate differences in aesthetic outcome, pain of injection, and general satisfaction with the result. Nineteen patients are included. Each patient received 12 U of BTA (Botox; Allergan Inc, Irvine, CA) to the forehead (6 U each side), with subsequent evaluation at 2 weeks, 2 and 4 months after injection. Injections were given with a 30G needle and with the aid of an EMG (electromyography) device to assess level of injection (SC or IM). Post-injection patients were surveyed on follow-up visits regarding pain and outcome (graded 0-5 scale). Injectors were similarly questioned regarding difficulty in accessing the SC space and on post-injection bleeding. Injection effect was assessed quantitatively with

standardized pre and post-operative digital photographs which compared brow elevation relative to the fixed inter-canthal line and distance. This allowed calculation of a normalized brow elevation ratio (previously published).

The results showed that there was “no statistical difference noted between the 2 techniques of injection by using the magnitude of active brow elevation as an objective metric.” Also, “patients generally found the SC application of BTA to be less painful than the IM technique, rating their discomfort at 1.21 and 1.97, respectively, on the 0-5 scale. This was statistically significant. In regards to bruising and tenderness, “there were more reports of these occurrences with the IM injection; however, most patients experienced neither, and no statistical difference could be ascertained.” Finally, patients noted equal satisfaction with results on the two sides of the face on follow-up visits 1 and 2 (2 weeks and 2 months). Patients did note a slight improvement at the 3rd (4 month) follow-up visit on the IM injection side. However, this was not statistically significant. Of note is that the authors feel experienced injectors can self-determine level of needle placement for BTA injection (SC vs. IM) well. The EMG used in this report was for study purposes only.

Message: The information gathered suggests that SC injections of BTA are equally efficacious as IM injections and lead to less patient discomfort. “SC injections can therefore be used as a technique to mitigate against the pain associated with the IM injection of BTA without compromising the compound’s efficacy.”

Pessa JE, Nguyen H, John GB, Scherer PE. The anatomical basis for wrinkles. *Aesth Surg J* 1014:34;227–34

In the previous issue of the aesthetic citation section of *OPRS* an article on the natural evolution and progression of facial wrinkles in men and woman was presented. As a natural expansion of that topic, this interesting and novel concept on facial rhytids is presented. The authors report on an accidental finding from a separate report on dye injection for evaluation of lymphatics associated with the medial nerve. An inadvertent superficial injection above the carpal ligament led to a delayed

(20 minutes) fill of dye under the palmer creases of the hand. This suggested lymphatic vessel association with creases. This was re-created and showed consistent results, raising the question as to whether this was also true of the superficial lymphatic vessels of the face. The authors proceeded to perform 13 facial cadaver dissections (5 males and 8 females) ranging from 46 to 97 years of age. Tissue sections were cut perpendicular to three consistent facial creases: 1. a forehead crease, 2. a crow’s foot, and 3. the nasojugal crease (NJC). Specific tissue processing was performed (refer to methods section) and immunohistochemical stains were used to identify subcutaneous lymphatic vessels. In every section a discrete lymphatic vessel with adjacent peri-lymphatic fat was identified consistently. The vessel and fat were found just beneath the crease or close to it, with an average distance from each crease of 112 micrometers (μm) (range 0–248 μm). The markers and stains used for study showed an unexpected difference between the crease associated lymphatics of the extremities and the face. The facial lymphatic vessels have a more complex structure than the lymphatic vessels found in the hand and have their own set of unique epitope markers.

What is the clinical significance of this finding? Clearly this requires further study. The authors suggest a possible construct based on data showing that lymphatic damage/obstruction can lead to an up regulation of cytokines and chronic inflammation, edema, fibrosis, and scarring. “These effects may occur with the inadvertent injection (filler or fat) of lymphatic vessels on the face that lie in a superficial position, usually less than 1.5 mm beneath the epidermis.” This can lead to chronic lymphatic dysregulation “which may explain why some reactions to fillers occur months or years after the procedure.” The authors stress that knowledge of this anatomy may help reduce the incidence of these facial filling related complications. They further stress the need to study how UV light, other environmental factors, and aging in general affect facial lymphatics and perilymphatic fat, and how this may alter facial adipose volume and facial aging.

Message: This is a very novel study whose clinical significance is presently unknown but worthy of further evolution. The article is worth reading for those who perform facial fat/filler injections.

Erratum

Prophylactic Postoperative Antibiotics for Enucleation and Evisceration: Erratum

In the article that appeared on page 281 of the July/August 2013 (volume 29, issue 4) issue of *Ophthalmic Plastic and Reconstructive Surgery*, an author’s name was misspelled. Nambi Nallassamy should have appeared as Nambi Nallasamy.

REFERENCE

Fay A, Nallassamy N, Pemberton JD, et al. Prophylactic postoperative antibiotics for enucleation and evisceration. *Ophthalm Plast Reconstr Surg*. 2013;29:281–5.