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Editorial

Dermal fillers: past and present

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It is the human instinct to live a longer life with a youthful face. Loss and redistribution of facial fat and collagen along with static and dynamic rhytides, give rise to facial aging. This concern has paved the way for different invasive and noninvasive cosmetic techniques to address each aspect of facial ageing. In most cases, these techniques work synergistically to deliver the desired results. Soft tissue augmentation by injecting different substances called dermal fillers can be considered as an important segment of modern cosmetic procedures because of its suitability in all skin types (Fitzpatrick type I to VI).[1] Recent advances in materials, techniques, and approaches have greatly increased the therapeutic options available to patients. With proper techniques and skills, these products can restore the facial youthfulness with relative ease and little or no downtime for patient recovery.

Tissue augmentation with dermal filling is not a new treatment. As early as the 1890s, fat from patients' arms was taken and injected into their faces.[2] In the 1940s, the highly refined injectable silicone was used as a dermal implant, with excellent cosmetic results; however, because of problematic adverse effects from contaminants, its use as a cosmetic agent was subsequently banned.

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In the mid 1900s, paraffin was used as filler in the skin until a high incidence of foreign body granuloma formation prevented its wider use.

The last twenty-five years have seen an explosion in technologic advances contributing to a cascade of new dermal implant materials. Injectable bovine collagen was developed in the 1970s, and approved by the FDA in 1981.[1,2,3] It remained the industry criterion standard for many years until the development of human derived collagen fillers. In the 1980s, new techniques using reconstituted human serum product that worked by forming clots, which, in turn, stimulated collagen synthesis were developed. However, in the face of the AIDS epidemic and a concern for blood-borne diseases, they were consequently taken off the market. The same process survives in a slightly different form today, where the patient's own skin provides the basis for the implant material. With the emergence of liposuction in the late 1970s, fat once again became a convenient source for tissue augmentation, and in the late 1980s, autologous collagen processed from harvested fat was first used for dermal augmentation.

The most recent advances in dermal filling technology are in the form of hyaluronic acid (HA) derivatives, harvested and cultured autologous dermal implants, allogeneic products, and synthetically

derived products (**Table 1**). HA fillers, because of their versatility, longer duration and excellent safety profile, have become most common dermal fillers and gold standard against which others are compared.[3]

Dermal fillers are gaining worldwide popularity on an exponential growth rate. In the United States in 2005, dermal filler injections were the third most common cosmetic procedure, behind botulinum toxin injections and laser hair removal. Patients had 1.2 million HA injections as compared to 221,000 collagen injections, 91,000 autologous fat injections, 40,000 hydroxylapatite injections and 35,000 L-poly lactic acid injections.[3]

The fillers are used for perioral and periorbital fine creases, nasolabial folds, thin lips, enhance shallow contours e.g. lipoatrophy in HIV infection, or improve the appearance of recessed scars. The depth of injections i.e. dermal, subdermal, subcutaneous or supraperiosteal varies according to the indication. The results can last from three months to five years, depending on the filler being used. Collagen provides the shortest duration with effects lasting anywhere from three to six months. HA tends to last a bit longer with effects lasting from six months to one year. Hydroxylapatite can provide results that last greater than 3 years. Hence, many of these require ongoing treatment to maintain the classical appearance.

Each type of soft tissue filler or implant has its own advantages and disadvantages. Candidates for treatment must consider certain factors e.g. product availability, treatment complexities – number of required treatment sessions, necessity for local anesthesia, longevity of augmentation, allergy testing, contraindications, cost and technical expertise of the clinician.[1]

Table 1 Different types of dermal fillers being used today [1-4]

A. Biological (organic, natural)
1. Collagen
    a. Bovine
    b. Porcine
    c. Human (autologous and cadaveric)
2. Hyaluronic acid
3. Fat

B. Synthetic
1. Dextran
2. Silicone
3. Expanded polytetraethylene (ePTT)
4. Synthetic calcium hydroxylapatite
5. Poly-L-lactic acid (PLA)
6. Polymethyl metacrylate (PMMA)

General contraindications include any systemic disease that may affect risk or outcome; diseases of collagen tissue; lupus erythematosus; recent treatment with isotretinoin and clotting problems. Each type of treatment may have additional contraindications.[1]

Complications and side effects arising from dermal fillers injections can be attributed to several factors: the patient, the physician, and product characteristics. Patient suitability and appropriate product selection are paramount in obtaining the desired results. However, even if these criteria are satisfied, complications can arise.

The most common early side-effects include bleeding (bruising and hematomas), pain, edema, erythema, hypersensitivity reactions, ulceration, reactivation of herpes infection and bacterial infection.[1-4] To reduce the incidence of bruising any substance that can

impair blood clotting e.g. acetylsalicylic acid, nonsteroidal antiinflammatory drugs, and excessive alcohol consumption should be discontinued for at least three weeks. Appropriate topical, local or regional anesthesia, and cold compresses can be used to relieve mild symptoms. Rare complications, such as skin necrosis and blindness, require rapid diagnosis and immediate intervention. Delayed complications include chronic inflammation, late allergic reactions, nodules, granulomas, discoloration, migration, and hypertrophic scarring. Although some of these adverse reactions cannot be predicted, early detection and initiation of appropriate therapy can help to minimize patient discomfort, severity of side-effects, and prevent the onset of sequelae.

Hypersensitivity reactions to the older collagen-based dermal fillers were frequent and required skin testing ahead of the treatment, but are becoming less common with the use of human collagen instead of cow derived collagen.

The ever-expanding array of dermal fillers is of real benefit for patients and physicians. The hunt for ideal one continues. New products and techniques are being developed at a rapid pace. Clinical trials are in progress. All these enrich the cosmetic arsenal of the esthetic physician.

References

1. Burgess CM. Soft tissue augmentation. Burgess CM, editor. *Cosmetic Dermatology, 1st edn.* Berlin: Springer; 2005. p. 93-110.
2. Sapijaszko MJA. Dermal fillers: ever-expanding options for esthetic use. *Skin Ther Lettr* 2007; **12**: 4-7.
3. Beddingfield F, Kim J. Fillers in ethnic skin. Grimes PE, editor. *Aesthetic and Cosmetic Surgery for Darker Skin Types, 1st edn.* Philadelphia: Lippincott Williams Wilkins; 2006. p. 225-40.
4. Dermal fillers: an overview. [internet]. Chicago: Virtual Beauty Corporation. ©2006. [The date of last modification not mentioned; cited 2008 May 13]. Available from: http//:www.beautymagonline.com/dermal fillers