

Facial Fillers: Fountain of Young in a Syringe?

The growing popularity of soft tissue facial filler in facial rejuvenation and reshaping is evidenced by more than 1.3 million injection procedures of hyaluronic acid performed in 2009. Tissue augmentation is not new; however, our better understanding of wrinkles and volume loss in aging has now dramatically improved the results of procedures available to patients, particularly those results achieved through longer-lasting soft tissue fillers.

As early as 1893, autologous fat grafts were taken from the arms for placement in facial defects, and the first cosmetic injections were accomplished with paraffin in Germany in 1899. Paraffin, which was problematic for a variety of reasons, remained popular in the United States until about 1920. It was not until the 1980s that the era of modern-day injectables for cosmetic and reconstructive purposes began. Today's even wider range of superior injectable materials plus accompanying advances in pain reduction, in addition to their effectiveness in helping patients postpone more invasive procedures, are now making facial-filler rejuvenation increasingly attractive to a growing number of patients.

Soft tissue injectables for facial rejuvenation are commonly classified by the longevity of their effects: temporary, long-lasting, semi-permanent, and permanent. Temporary fillers derived from bovine, porcine, and human products were the first fillers approved by the FDA in 1981. Bovine products require skin testing since approximately 4% of patients will experience an allergic or adverse reaction. Nonetheless, collagen products have an excellent long-term safety profile and work best when injected directly in the skin, which stimulates connective tissue

ingrowth. Because of their short duration, sales dropped when longer-lasting injectables became available, and all have been discontinued.

Long-lasting injectables such as hyaluronic acid (HA) and poly-L-lactic acid (PLLA) last from six months to two years. Hyaluronic acid is a hydrophilic glycosaminoglycan present in all human connective tissue and provides a structural matrix to retain moisture in the skin. A single gram of HA can hold up to 6 liters of water. Another unique property of HA is its isovolemic degradation. As the product degrades, the remaining HA binds more water, keeping the volume the same until the material is totally resorbed. In addition, this product may easily be reversed if the patient is not satisfied with the results. Restylane[®], the first HA filler approved in the United States (2003) for severe facial wrinkles, results from bacterial fermentation and is more viscous than JUVEDERM[®]. JUVEDERM[®], which is especially effective as a lip filler and around the mouth, was approved in 2006. It has a smoother consistency and has been reported to last up to 12 months, dependent on the injection site. Local anesthetics were added to some formulations in 2008 to reduce the procedural pain.

Poly-L-lactic acid, a biodegradable, non-toxic material derived from cornstarch, has been used for decades in biomedical implants such as cardiac stents and suture materials. Sculptra[®], a PLLA which received approval in 2004, is injected into areas of the face which have lost fat where it stimulates fibroblast and collagen formation, then breaks down into carbon, glucose and water. It is most effective in areas requiring volume, such as cheeks and temples. Although it requires a series of injections and has a delayed effect of several months, the results will last up to two years.

Calcium hydroxylapatite (CaHA), a semi-permanent filler, is a naturally occurring mineral in bones which provides a scaffold for collagen ingrowth. Commercially sold as Radiesse[®] (CaHA), it was FDA approved in 2006 to restore fat atrophy and correct wrinkles. Its use requires greater skill than most of the other fillers. Injected below the dermis, it is most appropriately utilized in areas of thicker skin since it is white and may otherwise be visible. A local anesthetic is usually combined with Radiesse[®] without any loss of efficacy. Like Sculptra[®], Radiesse[®] is often used to fill in acne scarring, although most other fillers may also be injected for this purpose.

Among the permanent injectables, autologous fat is historically the oldest injectable. Fully biocompatible and plentiful in a majority of patients, its survival is, however, variable. Fat is harvested from the abdomen or thigh, processed, and then grafted in small, separate dosages into the recipient site. The graft volume generally stabilizes within three to four months, after which a second injection may be needed to attain the desired results. It is most useful in restoring a youthful fullness to the aging face by adding to the midface and to areas surrounding the eyes. Sometimes it is used as part of a facelift procedure to rejuvenate the midface. It has only limited usefulness for fine wrinkles. Polymethylmethacrylate (PMMA) is a permanent filler developed in 1928 which has multiple medical applications in dentistry as well as in the medical field. Artefill[®] is the only PMMA product currently FDA approved (2006) for cosmetic use. It is composed of 20% PMMA plus 3.5% bovine collagen mixed with a local anesthetic. Because it contains bovine collagen, it requires skin testing one month before injection.

All of the above products have an excellent safety profile and rarely produce side effects. The most common problems are transient and due to poor (superficial) placement of injectable

products, but occasionally adverse reactions do occur, prompting patients to return to their physicians. The more serious complications involve red skin nodules known as body granulomas, which are seen in 0.01% of patients. Some granulomas occur more than a year after the initial injections and are felt to be infectious in nature and referred to as biofilms.

Since the patient's choice of fillers and the physician's skill in injection are always major factors in the success of facial rejuvenation, as with all cosmetic and reconstructive procedures, prospective patients are well advised to seek the services of physicians who are both well trained and highly experienced in the use of the safest and most effective filler products for their particular needs.