Fillers: Past, Present, and Future

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Over the last 12 years, a large part of my practice has focused on procedures for volume restoration, mainly augmentation with autologous fat; however, the use of synthetic fillers, both in my practice and nationwide, has trended upward as newer fillers and techniques have been introduced. In fact, in 2012 botulinum toxin type A and hyaluronic acid (HA) were the most common minimally invasive procedures, according to statistics collected by the American Society for Aesthetic Plastic Surgery, with 2,619,739 and 1,206,186 procedures performed, respectively.[1]

It has been interesting to see the use of fillers evolve. Looking back, products have come and gone, and in their wake, they have taught us about volume replacement. The history of these products has been imperative in helping us move the field forward, both in our research and development as well as in our approach to patient care.

When I was a resident, we only had the bovine collagen fillers Zyderm and Zyplast (Inamed Corporation). These products gave way to human-derived collagen fillers—CosmoDerm and CosmoPlast (Inamed Corporation)—which negated the need for intradermal skin tests. We also saw porcine collagen—Evolence (initially ColBar LifeScience Ltd, then Johnson & Johnson)—as well as micronized AlloDerm tissue—Cymetra (LifeCell Corporation). Unfortunately, some of these products came out around the same time as the HA-based fillers Restylane (Medicis Aesthetics), Juvéderm (Allergan, Inc), and Hylaform (Inamed Corporation and Genzyme Corporation). It quickly became evident that the longevity of the collagen-based fillers could not compare with the HA-based fillers. However, because of their small particle size and fluid properties, collagen fillers still have an unparalleled ability to fill the finest perioral rhytides.

The HA market quickly evolved with the introduction of larger particle size fillers and more cross-linked fillers. There also was a move toward bacterial fermentation production and away from animal-derived products that were associated with a higher incidence of inflammation. Refinement in processing also ensured that synthetic HA fillers caused less inflammation.

Paralleling the increased interest in fillers and possibly driving it was an increased interest in autologous fat transfer. A preponderance of lectures and articles have focused on fat transfer procedures over the last 10 years. Fat transfer techniques taught us to evaluate patients from the standpoint of full-face volume depletion, which translated serendipitously to our approach to treatment with fillers. As volume replacement increased in popularity, we began to place emphasis on full-face volume restoration using fillers, moving away from simply filling the nasolabial folds.

The injectable filler trend shifted to injecting HA fillers in areas typically treated with autologous fat, and we began to place fillers deeper than previously had been practiced, thus allowing treatment of malar volume depletion, tear trough deformities, and brow deflation. We began to understand differences in physical properties of the various HA fillers and how these properties could account for the differences in clinical application. We now discuss G' (elastic modulus) for more lift (higher G') or better spread (lower G').[2]

With the deeper placement of HA fillers and the recontouring of facial cosmetic units, 2 older fillers found a resurgence in popularity. Poly-L-lactic acid (Sculptra Aesthetic, Valeant Aesthetics, a division of Valeant Pharmaceuticals North America LLC) and calcium hydroxylapatite (Radiesse, Merz Aesthetics) made a comeback as we learned to use them in ways that avoided the nodules and granulomas we had seen in the past with more superficial placement. We also have gained knowledge of how calcium hydroxylapatite compares to HA fillers with regard to its rheologic properties.[3]

Unfortunately, with adventure also comes misfortune, which we see in the form of complications. Cases of blindness, embolism, and skin necrosis have been reported.[4,5] We must learn from these adverse events and advance the safety of these procedures so that the benefits far outweigh the risks of treatment. To further advance filler safety, we must uphold our standards and only introduce new

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fillers that are backed by research supporting their safety and efficacy.

In essence, we have become sculptors, artists whose medium is the skin and whose tool is a syringe. Now we must focus on this role and truly hone our anatomic approach to treatment with fillers.[6] We will continue to see new fillers emerge, and given the knowledge base we have built so far, we will quickly adapt to these new technologies.

Looking forward, we must dream big and ask for the moon! We know how our current fillers work. Their limitation is their inertness, as they fill and occupy space temporarily. Some do stimulate a bit of neocollagenesis, which also subsides with time. Newer fillers coming through the pipeline appear to be similar to what we have but are geared toward deeper volume replacement. It would be wonderful to have a filler that can actually build bone when placed along periosteum, one that builds adipose tissue in the fat layer, and one that builds dermal thickness (ie, collagen, elastin, glycosaminoglycan). At this point, the filler that comes closest to accomplishing these goals is autologous fat, most likely due to the adipocyte stem cells that can transform into bone, muscle, and fat. However, a filler that functions in a true antiaging manner would take our results to a very different level!

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