

Integrating Injectable Fillers and Fat in Facial Rejuvenation

Samuel M. Lam, MD, FACS¹

¹Willow Bend Wellness Center, Plano, Texas

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Address for correspondence Samuel M. Lam, MD, FACS, Willow Bend Wellness Center, 6101 Chapel Hill Blvd., Suite 101, Plano, TX 75093 (e-mail: drlam@lamfacialplastics.com).

Abstract

This article focuses on the discussion of the risks, benefits, and limitations of the three principal methods for facial volumization: fat grafting, injectable fillers, and alloplastic implants. By understanding these issues, a surgeon can better discuss what would be ideal for a particular patient. Fat grafting offers, the most cost-effective solution to a patient with sufficient volume loss. Injectable fillers provide an easy, predictable, and accurate nonsurgical alternative that is scalable in cost. Alloplastic implants are more ideally used in individuals with skeletal rather than soft-tissue deficiencies or in younger patients where the soft-tissue envelope is sufficient to mask the implant.

Keywords

- ▶ fat grafting
- ▶ injectable filler
- ▶ alloplastic implant
- ▶ cannula
- ▶ risks
- ▶ benefits
- ▶ limitations

Five years ago, my only method of durable, global, and uniform facial volumization was via fat grafting, or fat transfer.^{1–3} However, the advent of the disposable micro-cannula and long-lasting filler options have proven to give an upper hand in certain respects to facial fillers because now large volume injections can be performed rapidly, safely, and with greater precision than with fat transfer. Patients today have been more reluctant to undergo surgery with these advanced in-office options, so my practice has become predominately filler based when only a few years ago it was overwhelmingly fat grafting intensive. Nevertheless, fat grafting offers some undeniable benefits, the greatest one being cost-effectiveness as the physician does not need to count each costly syringe of filler placed into the face as fat is a free commodity. Finally, alloplastic implants that predated fat grafting as the principal method of facial volumization and that today has become less popular still has its role in facial volumization. This article will attempt to outline a practical guide of how to determine the risks, benefits, and limitations of fat grafting, injectable fillers, and alloplastic implants as alternative and complementary methods for facial volumization. By understanding the risks, benefits, and limitations of each method, the surgeon can guide a patient more effectively on which method or combination of methods may be ideally suited for that individual.

Risks, Benefits, and Limitations of Fat Grafting

Fat grafting remains the gold standard for facial volumization but must be well understood to avoid untoward complications or dissatisfied patients. In every aesthetic consultation, I cover the risks, the benefits, and the limitations of fat grafting (and the alternatives) to ensure that a patient makes an educated decision and that I accord them informed consent on their options. I typically begin with the risks, then explore the limitations, and conclude with the benefits. I will follow that structure in this article.

The risks of fat grafting can be understood by exploring the nature of the graft. I liken fat grafting to hair grafting as both use a free graft from another part of the body. That graft does not take 100% and the portion that does is permanent and behaves like the original donor source. In the world of hair transplantation, a hair graft taken from the donor site (back of the head) retains the genetic profile of the occipital region from whence it came and grows despite further hair loss in the recipient area. Similarly, fat harvested from the donor area of the abdominal and thigh area has the best retention after transplantation, but it is more susceptible to weight gain like the body region from whence it derives. Conceptualizing the fat graft like a free graft in this manner allows one to

understand everything that one needs to know about the potential risk of a fat transfer. With good surgical technique, contour irregularities in the periorbital region (a feared complication of the procedure) are extremely rare. The real risk with fat transfer follows from the risk of the graft in the long run. Like a hair transplant in a very young man, it is hard to predict how fat will mature especially if done aggressively in a young person as he or she ages. The risk is twofold: if the person gains weight, the fat may not look as good over time; second, as it is permanent filler and the face ages there may be a need to touch up the face over time with more fat grafting or additional fillers to manage the changes over a decade or beyond.

Fat is also problematic if used for reconstructive purposes, that is, placed to fill in a facial defect in an asymmetric fashion. After I presented a lecture in Cartagena, Colombia, in 2007, a physician came up to me and said that he wished he had heard this information before injecting a unilateral mandibular defect in a 17-year-old girl that over time looked like an expanded tumor. I always like to caution with using fat like bioinert injectable filler as it is simply not one. It is a metabolically bioactive product that can change over time, especially with weight fluctuation. In general, I do not like performing fat grafting in a person who has unstable or fluctuating weight or a history of this problem. If the person is going to lose weight, it is oftentimes preferred to perform the fat transfer before full loss of weight because the fat can look too full with subsequent weight gain that could occur if the person tends to yo-yo in his or her weight profile. In summary, the three categories of individuals that I believe are relatively nonideal for fat grafting are patients who are young, unstable in their weight, or desire fat for isolated reconstructive purposes. I have successfully used fat transfer to improve a patient with Treacher–Collins to cover up some of the bony defects because she fit the right profile: she was over 40 years of age, stable weight, and the fat transfer was used over the entire face in a uniform manner. I still used fillers after that to touch up and finesse the fat grafting result, as will be discussed later.

After discussing the risks of fat transfer, I then explore the limitations of this treatment modality. Because fat is a graft,

there is never 100% take. There is variable take that can range from 50% to 90%. A patient should be fully cognizant of this variable end point. Because fat has variable take, I do not perform multiple fat grafts because I do not want to risk overfilling and also believe that you cannot simply achieve a level of perfection with multiple fat grafting procedures than you can with a single quality session followed up with in-office injectable fillers. Accordingly, when I perform a fat transfer, I perform a single-session procedure followed by filler touch ups at 9 months to 1 year following the procedure. The reason that I wait for this period of time is that I do not like to interfere with the neovascularization of a fat graft that I believe matures and evolves over a period of 1 year and beyond. This process of neovascularization is a slow one that I contend mimics how a hair graft gains blood supply over a similar trajectory of time.

Another limitation of fat grafting is that fat is by nature very soft, unlike many injectable fillers, and it is in my hands placed deeply so that the product remains invisible as a distinct entity. Accordingly, the problem with injecting a soft product deeply is that it does not lift folds and wrinkles very well. I use the analogy of the face like a bed (–Fig. 1) to help a patient understand how I use fat grafts and fillers to achieve the end result. For me, fat grafts are like the mattress of the bed: they constitute the bulk of the foundation for the face and are placed deeply. The duvet (which for the sake of argument here rests below the sheets) is analogous to injectable fillers that rest nearer the surface, so the fillers help to manage remaining facial contour irregularities such as linear folds, grooves, and other facial volumetric deficits. Finally, the surface “sheets” of the bed/face refer to the skin surface that are managed more effectively by neuromodulators and skin-resurfacing therapies such as lasers and/or chemical peeling. I believe that solid patient communication constitutes the prerequisite to successful outcomes as attested by the old adage “an education is given to a patient before a procedure, and an excuse is given after a procedure.” Using these simplified metaphors and similes may be helpful for a physician when discussing these limitations with any prospective patient.



Fig. 1 This figure shows the analogy of “the face like a bed.” Fat grafting is analogous to the mattress, that is, it is the larger, deep volume support to facial volume. It is however inaccurate because it is a graft with variable absorption, soft, and placed deeply. Fillers can be viewed to fill up the duvet portion, that is, the irregularities nearer the skin surface for any area where fat does not have perfect take. Finally, neuromodulators and skin-resurfacing methods help to correct the sheets of the bed, that is, the surface of the face that fillers and fat grafting in my opinion fail to successfully manage.

If fat grafting is variable, then why even perform the procedure? For me, the simplest answer is that it is oftentimes the most cost effective. As long-lasting fillers used to the extent that I do with fat grafting can be very cost prohibitive, I like to say “fat is free,” that is, I can harvest whatever I need to get the job done. I ensure that every patient understands that his or her face will not achieve a perfect result, that is, the tear trough may not be obliterated or the nasolabial groove satisfactorily be effaced. However, fat grafting should change one’s appearance to be more youthful, vibrant, feminine (for women), and aesthetically pleasing all in a single procedure (► **Fig. 2**). In short, one’s “blink” (as discussed in more detail in my article entitled “Volumetric Rejuvenation General Concepts” in this compendium) is materially and substantively improved. This is why I almost never use fat to try to improve just one isolated area of the face like the tear trough because I believe that fat grafting probably will fail in this mission. It is very effective as a foundation for the entire face but does not reliably manage any isolated facial areas with complete precision. If a patient understands this real limitation and also understands that facial fillers will be necessary, then I believe that fat grafting may be a great treatment option for that individual.

Another question often asked is “Is fat grafting permanent?” I answer that query emphatically yes. I have oftentimes heard that a fat graft will last in a range of 2 to 3 years or in other commentaries 4 to 6 years. I believe these random periods of time do not make any sense to me. The reason I contend is that once a fat graft attains its blood supply that it will be retained and not dissipate. Would a skin graft suddenly lose its blood supply 2 years later and die? Of course not. Intuitively, this comment obviously makes no sense. I have removed fat from overaugmented lips (not created by me) 10 years after transplantation and what I remove is distinct lobules of fat. Accordingly, fat is a viable graft that whatever proportion of it survives over a period of 1 or 2 years is durable and permanent.

Then why do people need more fat or fillers after a few years? The same reason holds true for why someone may need another face-lift in a few years after their initial procedure: the scar tissue from the face-lift and removed excess tissue has left a permanent result but the face-lift did not stop the inexorable process of aging. I have observed in some of my patients 5 years later someone who simply looked significantly older and in some cases older than they did 5 years ago before my fat graft. At other times, I have noticed 10 years after a fat transfer that they still look amazingly youthful and significantly so compared with their photographs from 10 years prior. Why is this the case? It all depends on how genetically and environmentally they are programmed for further aging. The analogy I like to use is a glass of water emptying (► **Fig. 3**). We all lose volume linearly from birth to death (► **Fig. 4**) and this is represented by a glass of water that is constantly emptying. If I fill the glass of water to an ideal volume, the need for further volume replacement will depend on how fast that glass of water continues to empty. In many cases that volume is so significantly restored that they do not need much more volume added for years to come. In other cases, there is a constant struggle to ward off ineluctable and progressive volumetric collapse. Again, the glass of water analogy is only used to help communicate this principle to a patient effectively and clearly. If you, the reader, can imagine a better description that facilitates improved physician–patient communication, then use your model rather than my selected one. I still believe that fat grafting provides wonderful facial rejuvenation as a standalone procedure or in conjunction with traditional blepharoplasty, skin resurfacing, and face-lifting. However, undoubtedly I have witnessed the rise of injectable fillers in my practice that has steadily eroded into my fat grafting caseload.

Finally, I have used an analogy of “building a house on sand” to describe why I do not like performing a fat transfer after numerous injectable fillers have been undertaken (► **Fig. 5**). The house, or permanent structure, is analogous to the fat transfer; and the sand, or the temporary structure, is analogous to temporary fillers. As temporary fillers have variable resorption



Fig. 2 This 53-year-old woman is shown before (*left*), 1 year after a fat transfer (*middle*), and after additional four syringes of fillers in the periorbital and perioral regions (*right*) to touch up the fat grafting result. After fat grafting, she looks much more youthful but does not have all of the areas of the face as ideally improved as possible. Filler helped to finesse the fat-transfer result, which I explain to all patients before they undergo a fat-transfer procedure.

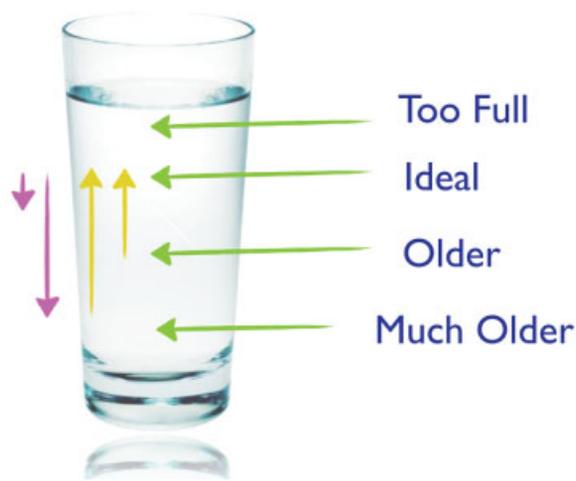


Fig. 3 I like to use the analogy of “the face like a glass of water” in which we are too full in youth, reach an ideal for women in their late 20s to early 30s in terms of volume that many of them prefer, to progressive volume loss over one’s lifetime so long as one maintains consistent weight. The *yellow arrows* indicate fat grafting used to volumize a face to an ideal level depending on the degree of aging present. The *pink arrows* indicate the ongoing emptying of this glass of water over time. Despite ongoing volume loss, typically the volume restored with fat grafting is very durable and overcomes a significant degree of further aging that ensues.

where some of the product may have dissipated over a few months, sometimes the product may take a year or much longer to dissipate. Accordingly, if numerous syringes of temporary product have been used and then fat is added, it is hard to read what is going on, as the temporary products are always undergoing a process of dissolution. This does not matter too much if one to four syringes (which I deem negligible in quantity), for example, have been injected previously or have been done a year or longer before fat grafting is planned. But, if say 10 to 15 syringes have been more recently undertaken, I usually guide a patient to stay on the filler track and forget about fat transfer altogether. If the argument is made to dissolve the product with

hyaluronidase, I do not prefer this option because I believe that hyaluronidase indiscriminately dissolves tissues including native tissue and it is hard to know when native tissues have fully been restored. I only use hyaluronidase for discrete contour problems that arise after a filler or if there is gross overfilling of the face witnessed. Furthermore, as mentioned with the concept of the “face like a bed,” I hate to use “accurate” filler first then follow it with an “inaccurate” fat transfer, which I believe is better used first as a deep foundation for the face.

Risks, Benefits, and Limitations of Facial Fillers

As mentioned at the outset of this monograph, the advent of the disposable microcannula a few years ago, more durable filler solutions in the market, along with the desire for office-based procedures has come to rival fat grafting in my practice and to a large extent eclipsed fat grafting with each successive year of my clinical practice since the year 2010. Whenever I discuss filler options with a patient if that person is an excellent fat grafting candidate, I will spend time to discuss the risks, limitations, and benefits of fat grafting as well. This section will elaborate upon the risks, limitations, and benefits of injectable fillers in my practice, and what types of fillers I like to use and why. I clearly state that I do not receive any remuneration from any of the product manufacturers/distributors and I am not here to endorse their products. In many cases, physicians may have better success based on their particular experience and the way they use other products and may find problems with the ones that I advocate herein. Nevertheless, I believe that theory never helps a reader but a detailed, practical guide of a single surgeon’s experience can be enlightening so long as that sharing of information is taken with the above-stated constraints fully in mind.

The risk of filler is obviously the risk of creating a result that is less than desirable, and this risk is magnified when injecting a permanent filler such as polymethyl methacrylate (PMMA) suspended in collagen, marketed as Artefill (Suneva Medical,



Fig. 4 If weight is maintained, during one’s lifetime volume is lost in the face in a linear manner. What is termed baby fat is nothing more than more fat that is present in the face than perhaps an individual desires but simply represents youth. A baby has more fat than a 10-year-old face, which has more fat than a 20-year-old face, etc.

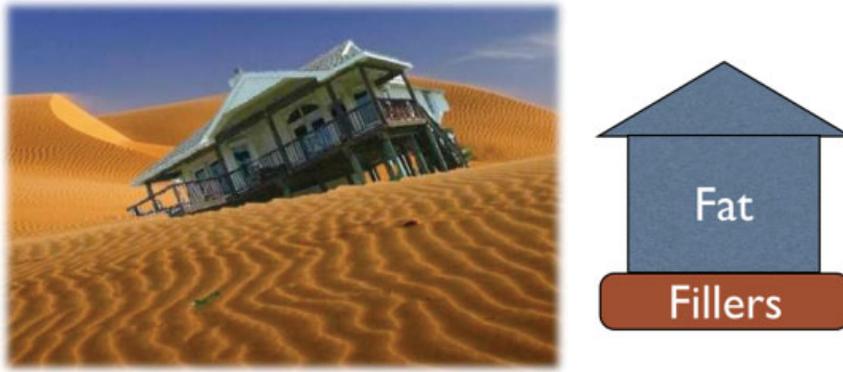


Fig. 5 The analogy of “building a house on sand” refers to placing fat grafting, a permanent structure (the house), on top of temporary fillers, a temporary structure (the shifting sand), which is not an ideal situation. Furthermore, as observed in Fig. 1, I prefer to imagine fat grafting as a deep foundation work that is less accurate than fillers, and I prefer to have fillers placed on top of fat rather than the other way around. Accordingly, if a patient recently has had numerous temporary fillers placed into the face and cannot wait for 1 or 2 years for these fillers to fully dissipate, I encourage them not to undergo fat grafting but to continue to rely on fillers as their preferred method of facial rejuvenation.

Santa Barbara, CA) in the United States. (I have covered the benefits and technique of Artefill/PMMA in another section in this compendium.) Having significant experience with this product, I have yet to encounter a minor problem that I could not easily handle. The greatest risk of a foreign substance is clearly granuloma, which is today understood to be a biofilm infection of the product that would require a long course of antibiotics to manage. Fortunately, I have not encountered this complication in the 3,500 plus syringes that I have injected over the past 6 years although it always remains a known possibility. For a more detailed description of issues with Artefill, please read the sections I wrote on my use of the product in the articles on volumetric rejuvenation of the facial upper, middle, and lower third in this issue. The other risk with any filler if using a needle is tissue necrosis and blindness, which albeit rare, is still possible. For me, I use a 27-gauge cannula for all my injections that I believe virtually eliminate this very rare event. In a recent lecture that I attended by Dr. Patrick Trevidic from Paris, France, undertook a cadaver study that showed that a 27-gauge cannula or larger size cannot pass through a vessel, thereby obviating this risk entirely or as close as one can get to doing so. I can pass all the fillers that I routinely use through a 27-gauge cannula, which I believe if done in a gentle way can minimize patient discomfort attendant with larger-sized cannulas. Like a fat transfer that is permanent, injecting permanent filler carries the same long-term risk that aging may evolve in such a way that would be aesthetically adverse for a patient and that may require additional fillers to manage the situation if possible.

For me, the largest limitation of a filler compared with fat transfer is the potential cost as compared with the latter as each syringe can be quite expensive as I can easily inject 20 to 40 syringes of fillers in a way that looks natural but this can be costly (→ Fig. 6). The greatest benefit of a filler is accuracy. I can perform an injection of a filler with a higher degree of accuracy than I can with fat transfer, which absorbs over time and also must be done in a supine position with the patient under some level of anesthesia. Accordingly, I have incredible accuracy with a filler in which a patient is upright and I can sculpt a filler to near perfection with minimal chance of misreading the

amount and distribution because of edema or patient positioning. The other benefit is that a filler is bioinert and does not increase with patient’s weight gain but obviously may not look good when a patient does gain or lose weight as the filler has been injected to match a person’s current weight status. If someone has a tendency to gain or lose weight, I definitely prefer a hyaluronic acid-based product over PMMA as it could be more easily reversed using hyaluronidase. Similarly, for the much younger patient I may lean toward temporary filler such as a hyaluronic acid for its greater safety profile as that individual ages over his or her lifetime.

I briefly mention my choice of filler products for the face and to reiterate that I have no financial affiliation with any of the companies but only mention the products here to help a reader understand what has worked well for me. I divide the face into upper and lower halves. The upper half includes the temple, brow, and lower-eyelid area. The lower half of the face includes the cheek all the way down to the jawline. For the upper half of the face I prefer Artefill because of the longevity but mainly because I yet have to find a better product including fat that can achieve the level of precision in filling the periorbital and temple area (→ Fig. 7). For the lower half of the face, I prefer to use Juvéderm Voluma (Allergan Inc., Irvine, CA) again both for the longevity and because I yet have to find a product that can sculpt and lift tissues so accurately and with the need for fewer syringes. I do not like Voluma in the periorbital area because it is too thick to be used accurately there. If the patient does not want a permanent product or has a lower budget, I use Belotero Balance (Merz Aesthetics, Frankfurt, Germany) for the upper face. I mix 0.1 cc of 1% lidocaine with 1:100,000 epinephrine into each syringe as it does not contain lidocaine. I like it in the upper face because it is soft enough compared with Restylane (Galderma SA, Lausanne, Switzerland) but does not have the inaccuracy and edema risks of standard Juvéderm in the upper face. For the lower half of the face I prefer Juvéderm Ultra as a second choice because I can blend it in easily without seeing discernible edges, a problem that I encountered with Restylane and Perlane (Galderma SA) in the past. It also lasts longer than Belotero in an area with a higher and faster absorption rate than the upper face.



Fig. 6 This 36-year-old patient is shown before and after approximately 20 syringes of injectable fillers in almost every square centimeter of her face including her temples, upper eyelid/brow, lower eyelid, anterior cheek, outer cheek, below the zygomatic arch, central and lateral buccal area, canine fossa, nasolabial groove, anterior chin, prejowl sulcus, and lips (to correct the previously unnatural lip injection). This panfacial strategy is what I use for every patient that can afford to undergo this procedure and is clearly scalable in that I can achieve excellent results over time if patients prefer to inject a little at a time until a desired outcome is attained or approximated.

Risks, Benefits, and Limitations of Alloplastic Implants

In the past before quality fillers and even before the era of fat grafting, alloplastic implants were the only method for volume augmentation. In many surgeons and physicians' hands, this option has become much less viable because of the alternatives present. I outline my strategy of how and why I use alloplastic implants and when I do not and why not.

As we get older, the soft-tissue envelope recedes faster than the hard-tissue loss underneath (→Fig. 8). Accordingly, if an alloplastic implant is used I believe that the difference between the soft tissue and the hard tissue is worsened, and this

outcome can correlate with actually making an individual look older (→Fig. 9). On the contrary, when fat transfer or fillers, that is, a soft-tissue equivalent, is used to augment the face, the soft-tissue to hard-tissue ratio is restored to a more youthful state (→Fig. 10). In summary, I like the expression "like should replace like." When someone has a "weak chin," that is, microgenia, then a chin implant is the preferred method of correcting this problem. However, if someone is becoming older and loses some soft-tissue envelope in the chin, I believe that a chin implant actually can make that person look older because the chin implant makes the jawline bonier and also makes the region of the mental sulcus that I refer to as the anterior chin even more recessed as a chin implant cannot

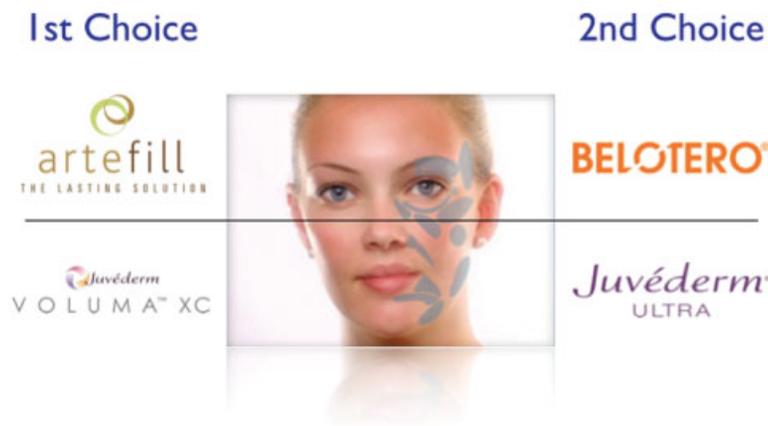


Fig. 7 This schematic diagram divides the face into upper and lower portions. The upper portion of the face is defined to encompass the temple, brow/upper eyelid, and the lower eyelid regions. The lower face includes everything from the cheek down to the jawline area. As my first choice, I prefer Artefill for the upper face and Voluma for the lower face. As my second choice, I prefer Belotero for the upper face and Juvéderm Ultra for the lower face. For detailed reasons for my preferences, please consult the principal text.

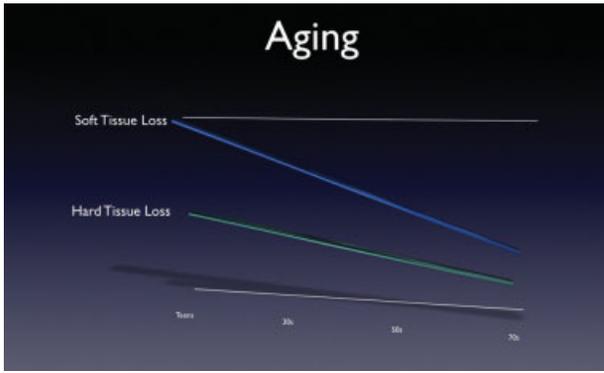


Fig. 8 As we get older, there is a greater proportion of soft-tissue loss (fat, collagen, muscle, etc.) compared with hard-tissue (bone) loss.

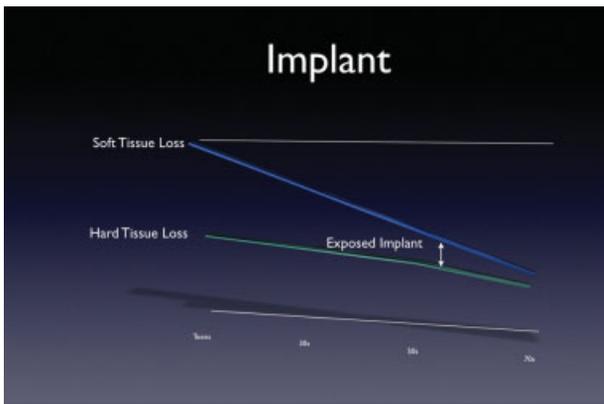


Fig. 9 Because of the greater degree of soft-tissue loss compared with hard-tissue loss as we age, if an alloplastic implant is used I believe that the difference between the soft tissue and the hard tissue is worsened, and this outcome can correlate with actually making an individual look older.

reside over the dental roots and mental nerves. In general, I do not like alloplasts of any kind in the malar region because I believe as one of my colleagues has stated it is a flawed procedure. In my opinion, the problems with malar implants are as follows: they can exacerbate the malar bony appearance

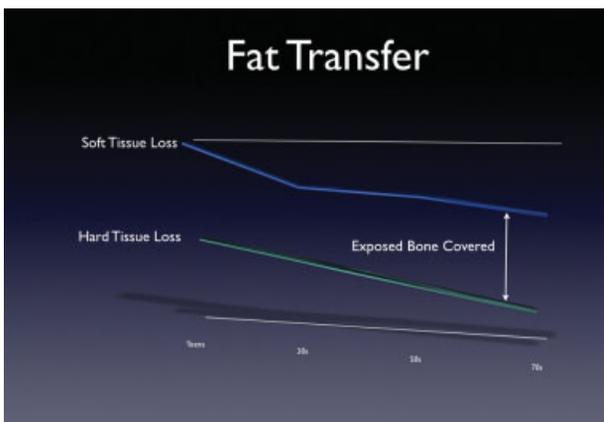


Fig. 10 Unlike alloplastic implants, when fat transfer or fillers, that is, a soft-tissue equivalent, is used to augment the face, the soft-tissue to hard-tissue ratio is restored to a more youthful condition.

Decision	
Fat Transfer	Implant
Older	Younger
Fat Loss	Weak Bone
Stable Weight	Unstable Weight

Fig. 11 This table shows that fat transfer is more ideal in the patient desiring facial rejuvenation to reestablish the lost soft-tissue envelope and in an individual with stable weight. Conversely, a younger patient or one who has a bony deficit may benefit more from an alloplastic implant compared with fat grafting. As with all physical conditions, youth, weight stability, and bony deficiency are relative terms and represent a continuum, so the surgeon should be advised to counsel the patient on the relative risks and benefits of each of these treatment modalities as individually applicable.

of aging, they have a relatively higher chance of infection, and they are hard to create consistently symmetrical results, at least in my hands. I know that many surgeons do achieve excellent results with malar implants and for them I am not here to convince them to stop performing a procedure that works well for them. I am just explaining the problems that I have personally encountered. A great benefit of an alloplast is that it is removable, especially silicone material, which is my preferred implant type in the mentum.

Merging some concepts elaborated upon in the fat grafting section of this article, I prefer fat transfer for older individuals who have stable weight and require volume restoration due to soft-tissue loss. Conversely, solid implants are better for younger patients or for those with more unstable weight but principally for those individuals with weak bone architecture (► Fig. 11). In addition, I believe one of the principal goals in facial rejuvenation is to minimize facial transitions, that is, minimize shadows and improve highlights. I believe that isolated alloplasts (unless multiple alloplasts are used in every region of the face that I believe is not practical or realistic) can actually exacerbate facial transitions (► Fig. 12).

Concluding Thoughts and Summary

As stated throughout this article, what works for me might not work for you and vice versa. These are just recommendations based on my personal experience but everything mentioned has been rooted in practical knowledge rather than purely a theoretical construct. I believe that a few salient ideas should be stressed once more: (1) artistry is of paramount importance to attain excellent outcomes; (2) patient communication throughout every phase of intervention will help maintain excellent rapport and avoid perceived complications when in fact poor

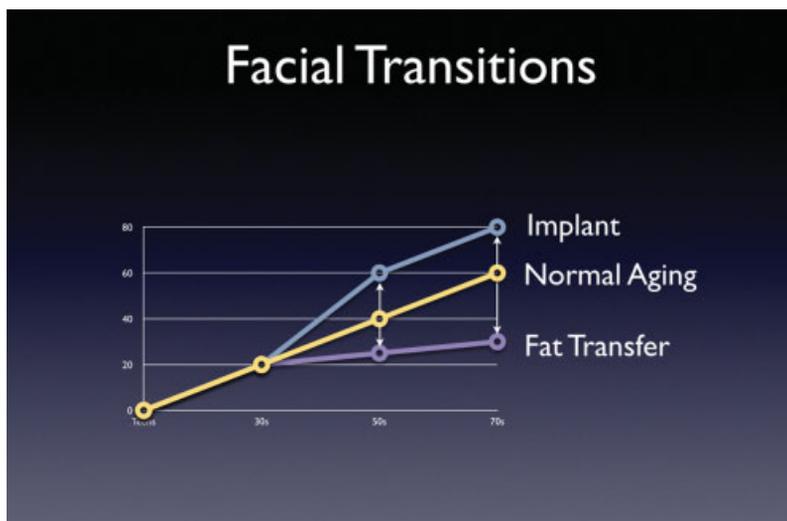


Fig. 12 This schematic shows how isolated alloplastic implants can actually worsen facial transitions as compared with soft-tissue augmentation (with fat grafting and/or injectable fillers). One of the principal goals of facial rejuvenation is to lessen facial transitions or points of shadows rather than to exacerbate them. To achieve a similar lessening of transition zones accomplished with soft-tissue augmentation, multiple alloplastic implants may need to be used to accomplish this task, for example, implants in the tear trough, brow, temple, combined anterior/outer cheek, buccal, jawline, etc. This in my opinion is unrealistic.

explanation was the reason for the “complication”; and (3) fillers, fat grafting, and alloplasts each have their pros and cons and a surgeon should select the right mixture of techniques based on risk, benefit, cost, etc., that is individualized for a particular patient.

Addendum

As of 2015, Artefill has been rebranded as Bellafill.

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