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Perspective

Hyaluronic Acid Fillers after Non-Surgical Touch-Up Facial Reconstructive Surgery

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Abstract

Injectable fillers containing Hyaluronic Acid (HA) are increasingly used for face rejuvenation and recontouring. We share our experiences to highlight the value of HA fillers as instruments for post-surgical facial sequelae that go beyond aesthetic therapies. The use of HA fillers in trauma, reconstructive, and craniofacial surgery is a potential new horizon for this class of medications, which are typically employed for aesthetic rejuvenation. The Maxillofacial Surgical Unit at the University of Campania "Luigi Vanvitelli" in Naples treated patients for lip incompetence, trauma, oncological, reconstructive, and craniosynostosis surgery sequelae. This study was retrospective in nature. Patient satisfaction was evaluated using a Visual Analogue Scale (VAS). There were no serious problems (such as imminent necrosis or loss of vision) recorded. 48 hours after lip injection, there were reports of bruising and swelling. 67% of the patients scored as "very satisfied" and 33% as "satisfied" on the initial VAS rating. At 6 weeks-9 weeks and 3 months-6 months after the VAS test, "very satisfied" replaced "satisfied" in 33% of those cases (contextually to improvement in tissue flexibility, elasticity, and aesthetic appearance). According to the results, this minimally invasive method successfully enhances the patient's appearance to a high degree, which increases patient happiness. The idea of using HA fillers could open up new possibilities in various branches of reconstructive facial plastic surgery.

Keywords Facial reconstruction • Facial trauma • Hyaluronic acid filler

Introduction

Hyaluronic acid (HA) injectable fillers are being used more frequently for facial rejuvenation and recontouring, which has important implications for cosmetic surgery. Even if facial tissue augmentation has become more and more popular recently, the notion is not new. Over a century ago, a fat grafting method was developed. Other materials have been used, but they have severe limits. Examples include silicone, paraffin, Hydroxyapatite Cement (HAC), Polymethylmethacrylate (PMMA), and HAC. Hyaluronic Acid (HA) filler products that are safe, biocompatible, non-allergenic, and injectable have just recently been created and given the thumbs-up by the U.S. Food and Drug Administration. In addition, the range of products available has impressively expanded thanks to new fillers manufacturing processes, and the number of HA injectable fillers for facial recontouring has increased significantly in recent years. Diverse products could have extremely different physicochemical characteristics but the same indications. These characteristics separate items based on functionally significant characteristics, and they have developed into efficient means for surgeons to choose which materials are the most suitable for a specific surgical necessity. They offer facial rejuvenation and aesthetic improvement at a lower cost, with fewer risks, less recovery time, and faster results than surgery. Aside from treating facial deformities brought on by trauma, orbital and periorbital operations, tumor removal, congenital deformities, burns, scars, and facial palsy, HA injections are effective instruments for improving the appearance of the face. HIV-related face lipoatrophy and progressive hemi facial atrophy may potentially be treated using injection methods. Hyaluronic acid is frequently utilized for cosmetic purposes, although there is limited information in the literature about its usage in reconstructive techniques.

One of the most difficult plastic surgery procedures is facial reconstruction; despite the advancement of current techniques, disfiguring anomalies are frequently seen postoperatively in the form of slightly hollow scars, inadequately marked lips, and asymmetries localized in the nose, skull, midface, chin, or mandibular angle. These patients must improve their appearance. We chose to adopt this strategy in these indications because of the viscoelastic characteristics, hydrophilicity, affordability, safety, biocompatibility, efficacy, and non-immunogenicity of HA fillers. The right HA gel should be chosen based on a number of factors, including ease of injection, durability, surgeon choice, and cost-effectiveness. Cohesivity, crosslinking, and HA concentration are important factors that define the behavior of a filler based on hyaluronic acid.

Discussion

Despite the current advancements in craniofacial plastic surgery techniques for congenital malformations, tumors, or trauma sequelae, it frequently happens that aesthetic defects such as asymmetrical facial volume persist at the end of the surgical course. This could be a significant factor in patient unhappiness. In order to restore facial eurhythmy, plastic and craniofacial applications of mini-invasive techniques should be taken into consideration in addition to surgical reconstructive approaches.

For instance, Neuber's work at the end of the 19th century on the use of adipose tissue transfer for the correction of maxillofacial defects following reconstructive surgery has been used for years as great filler for facial enhancement and recontouring because it is highly biocompatible and looks the most natural. Indeed, the use of fat injection techniques has substantially resurrected with the development of lip sculpting surgery. This method improved the capacity to obtain fresh fat for grafting in 1987. Due to improvements in the process of fat cell harvesting and transplantation, autologous fat grafting has become one of the facial cosmetic surgery techniques with the fastest rising popularity over the past 10 years. Fat is a better filler option for patients who have significant volume loss and require global volume replacement, and some authors have shown great reconstructive results with this filler.

An ideal filler substance would be conveniently accessible, long-lasting, affordable, and would not cause unfavorable immunologic reactions. Most of these characteristics are met by autologous fat. It is natural-feeling, soft, biocompatible, non-toxic, and easily harvestable, and it might be employed to enhance a variety of reconstructive scenarios. Moreover, the transplanted fat contains Adipose-Derived Stem Cells (ADSC). In addition to volume restoration, ADSC also contribute to improvements in the surrounding tissue's quality.

In fact, structural fat grafting is being used in reconstructive, craniofacial, and regenerative medicine rather than just for aesthetic purposes. Injected fat is thought to have a regenerative potential that enhances the texture of the surrounding skin in addition to adding volume and a natural filling effect. Due to the abundance of mesenchymal stem cells seen in lipoaspirate, fat tissue has also demonstrated a notable improvement in tissue texture quality and biocellular regeneration capacity. Regenerative surgery is being used in reconstructive procedures because to the widespread availability of

adipose tissue and an easy mechanical protocol for turning the fat tissue into a highly-concentrated solution of ADSC.

Even though this process is straightforward and has minimal donor site morbidity, it still necessitates a harvest procedure and extra operating time during the harvesting and decanting phases. However, sustaining structural fat grafting's viability is the biggest issue because there is disagreement about it in the literature and because lipotransfer's long-term effects are still unpredictable. Additionally, the fat may not resorb uniformly, which could result in asymmetries that may need to be corrected with additional treatments. The capacity of the transplanted fat cells to both resist resorption over time and thrive in the new environment is what is referred to as long-term volume maintenance and is what determines the clinical effectiveness of the treatment. To increase fat graft survival, a number of harvesting, preparing, and injecting strategies have been suggested. Thus, maintaining the survival of fat grafts is their greatest problem, and there is ongoing debate in the literature about the stability and endurance of therapeutic augmentation using adipose transplants. It has been reported that the volume of fat stabilizes around 3 months-4 months after the treatment, and then gradually decreases for up to a year. The literature reports a resorption rate that varies from 25% - 90%. A successful outcome at six months, however, was indicative of a long-lasting repair. Peer noted the significance of a recipient location with adequate blood flow and observed an average loss of 45% of the free fat implant within 1 year.

Many of the fat cells are disturbed, and the ADSC carried by the lipoaspirate repopulate the transplanted areas. This can be the reason for both the volume loss and the improved texture and volume in the same grafted areas. With the goal of maximizing the transplantation of ADSC, current efforts to increase fat graft quantity survival and predictability of engraftment center on harvesting, fat purification, and infiltration procedures. The depth and manner of implantation, sample washing, syringe and cannula size, anaesthetic, level of surgical harvesting expertise, degree of overcorrection, and donor site are all significant factors.

It was determined that among all the steps of the technique, including the harvesting method, the type of fat, the recipient tissue, or internal pressure at the recipient area, which could obstruct successful engraftment, insufficient revascularization of grafted adipose cells is one of the main causes of graft fat resorption. Additionally, a significant amount of individual diversity in adipose survival is reported. The technical aspects of the prolonged graft survival are highlighted by the authors. The medial side of the thigh and knee, as well as the abdomen, hips, pubis, and gluteal area, are the ideal adipose donor locations. The donor location should be highly lipogenic and concealable; fat tissue, which is denser and more granular, produced the best outcomes. Finding autologous donor fat, especially in thin, cachectic, or malnourished people like oncology patients, can be extremely difficult, especially when a big amount of product is needed for vast restorations. When compared to inserting fat into dynamic face areas, transplanted fat tissue appears to persist the longest in regions with the least mobility, such as the cranial vault. However, clinical experience has demonstrated that transplanting fat tissue inside the muscle followed by transplanting inside fatty tissue produced the best results. A low negative pressure approach of aspiration and the use of a rounded cannula reduce damage, limiting breaking of the fat cells, according to histologic studies. Additionally, the dull tip may lessen vascular compromise, discomfort, edoema, and bruising.

Typically, overcorrection is employed to balance postoperative resorption, and Herold claimed that it may also increase the survival rate of transplanted fat. In a survey of 508 plastic surgeons, 87% of the doctors used autologous fat grafts to overcorrect. Platelet-Rich Plasma (PRP) has been shown in studies to have a beneficial effect on fat graft survival. Even though injectable fillers have been heavily advocated for facial restoration, there aren't many published studies that analyze the cost-effectiveness of various injectable agents in facial cosmetic surgery. The cost-effectiveness of fat is characterized as disputed in a cost-effectiveness analysis for the use of HA filler materials and lipofilling due to the variable rate of resorption of fatty tissue and the prolonged recovery period associated with the fat harvesting operation. When compared to the HA derivatives, fat grafting looks to be more expensive per treatment. But when longevity is taken into account, fat is just as cost-effective, if not more so, than HA. This evidence may be explained by the possibility that repeated injections of HA filler may be necessary to maintain the same efficacy as fat grafting after a year. Fat becomes most cost-effective when employed as an auxiliary approach to other facial surgery procedures. When two surgeries are being done simultaneously, the surgeon's time is consumed.

Additionally, using HA filler rather of fat, particularly in younger individuals, may result in higher overall long-term expenses. Postoperative problems are uncommon because to advances in fat grafting techniques, although they could include lumps, bulges, chronic edoema, infection, hematomas, and swelling. Although incidents of embolism and nerve damage have been documented, authors think that utilizing blunt cannulas further reduces the danger. Both the injection of HA and autologous fat have been associated with serious side effects, such as blindness or imminent necrosis, but because there is no antidote for hyaluronidase, vascular consequences are more "thoughtful" for lipofilling than HA injection.

Injections of HA and Autologous Fat (AF) for reconstructive purposes in cases of temporal hollowing following lateral orbital wall decompression were studied and compared in a prospective study. This study demonstrates the safety and efficacy of both HA and AF injections. However, to attain the same soft tissue volume, more AF than HA had to be added in total. Because there was no fat harvesting process involved, HA was said to take less time.

Conclusion

This minimally invasive technique (minimally invasive reconstructive technique employing HA filler injections) offers a high level of aesthetic improvement, enhancing volume and flexibility with improvement in facial morphology and form, and boosting patient satisfaction. In our experience, there were no severe consequences reported, such as imminent necrosis or vision loss. After lip injection, mild, temporary, and transitory adverse effects such bruising and edoema were noted for 48 hours. The most effective injective technique will be determined by the filler's rheology and physicochemical qualities, such as HA content, polymer chain length, crosslinking degree, or crosslinking technology. These factors will have a substantial impact on product selection and indication. Development of facial fillers is a growing field, with the goal of improving treatments to enhance efficacy and reduce side effects. It has become clear that no single filler could be employed for all reconstructive purposes as a result of the ability to change the biochemical compositions of fillers' inherent properties. Instead, given the diverse filler features, the demands of facial plastic surgeons, and the stringent requirements for facial reconstruction, numerous fillers are developing as distinctive goods best suited for the rehabilitation purpose.

Furthermore, there are very few studies that relate in vitro measures to in vivo performances, despite the fact that there is a large body of literature outlining how such data can be utilized to define various HA products. Future research in this area may contribute to the correlation between product properties and clinical reconstructive experiences because there are conceivably numerous diverse properties that affect product characteristics.

In the end, all of the technical surgical abilities developed via real-world practice are not covered by any HA fillers that are now available. In this way, we hope to support our reconstructive experience with certain product qualities and procedures as they apply to our rehabilitation strategy.

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