REVIEW ARTICLE

Lipotransfer in the treatment of facial deformities, an example of scientific progress in plastic surgery

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ABSTRACT

Introduction: facial deformities are a set of residual volumetric alterations of genetic malformations, traumas and postoncologic scars considered as a devastating disease. Their reconstruction is a challenge for the plastic surgery specialist due to the complexity of facial aesthetics in which a set of structures that guarantee the psychosocial integrity of the patient and his validism are harmonized. Lipotransfer is presented as a treatment alternative, which has evolved with the purpose of adjusting to the needs of usefulness and feasibility.
Objective: to analyze the scientific-social impact of lipotransfer in the treatment of facial deformities as an example of scientific progress in Plastic Surgery in Villa Clara Province.
Method: the medical literature published in Spanish and English languages was reviewed, Google Scholar and PubMed search engines were used, SciELO and Oxford digital libraries and Medline database were consulted and appropriate key words were used.
Conclusions: lipotransfer with platelet-rich plasma in the treatment of facial deformities constitutes a viable, safe, economical treatment alternative with satisfactory results that satisfies the patient and restores the anatomical and functional integrity of the damaged structures, which allows its validation and is an example of scientific progress in plastic surgery in the province.
Key words: fat transfer; lipofilling; autologous fat transplant; platelet-rich plasma; facial asymmetry; facial deformities

ABSTRACT

Introducción: las deformidades faciales son un conjunto de alteraciones volumétricas residuales de malformaciones genéticas, traumas y cicatrices postoncológicas consideradas como una enfermedad devastadora. Su reconstrucción constituye un reto para el Especialista en Cirugía plástica debido a la complejidad de la estética facial en la que armonizan un conjunto de estructuras que garantizan la integridad psicosocial del paciente y su validismo. Como alternativa de tratamiento se presenta la lipotransferencia, que ha evolucionado con la finalidad de ajustarse a las necesidades de utilidad y viabilidad.

Objetivo: analizar el impacto científico-social de la lipotransferencia en el tratamiento de las deformidades faciales como ejemplo del avance científico en Cirugía plástica en la Provincia de Villa Clara.
Método: se revisó la literatura médica publicada en idiomas español e inglés, se utilizaron los motores de búsqueda Google Académico y PubMed, se consultaron las bibliotecas digitales SciELO y Oxford y la base de datos Medline y se usaron palabras clave apropiadas.
Conclusiones: la lipotransferencia con plasma rico en plaquetas en el tratamiento de las deformidades faciales constituye una alternativa de tratamiento viable, segura, económica y con resultados satisfactorios que satisface al paciente y restablece la integridad anatómica y funcional de las estructuras dañadas, lo que le permite su validismo y es ejemplo del avance científico en Cirugía plástica en la provincia.
Palabras clave: lipotransferencia; lipofilling; trasplante de grasa autógena; plasma rico en plaquetas; asimetría facial; deformidades faciales

INTRODUCCIÓN

The appearance of human beings before their peers has been one of their priority concerns and perhaps the one that has had the greatest impact on the development of civilizations because it has a great significance within human interactions.[1]
Although there is a popular idea that it is important to know a person's inner self, it must also be recognized that many people may not have the opportunity to show their inner self if they are rejected because of their personal appearance. Nowadays, thanks to the development of plastic surgery, almost all the exterior elements of the individual can be modified at will. In this way, aspects of the physical image affected by the passage of time can be modified and have a positive impact on psychosocial aspects; it can be said that Plastic Surgery has an absolutely defined social function by contributing to the correction of body defects, to rejuvenate patients physically, to modify the appearance of the individual and to allow a better incorporation into society.[2,3]
The face is the window for interpersonal relationships, so it is very important to achieve the best correction of facial defects.[1,3] Over time one of the biggest problems faced in the specialty of plastic surgery is the treatment of patients with facial deformity. Facial deformities are a set of volumetric alterations residual to genetic malformations, traumas and postoncologic scars that affect the individual. Facial defects and asymmetries are a devastating and visible condition in some severe cases of Parry Romberg's disease, scleroderma, hemifacial microsomia, lupus or in the aftermath of trauma.[3]
The reconstruction of facial defects is a challenge for the specialist in plastic surgery because facial aesthetics is complex because it must harmonize a set of anatomical structures that ensure the psychosocial integrity of the patient and his validism. For decades, surgical specialists and researchers of various specialties have been looking for alternatives to meet the needs of reconstruction in order to restore the anatomical and functional integrity of the damaged structures.[1,3]
Among the treatment alternatives for facial deformities, autologous fat grafting or liptransfer in its different variants are presented, which have evolved with the purpose of adjusting to their utility and viability needs.[2,3]

The aim of this work is to analyze the scientific-social impact of lipoblastoplasty in the treatment of facial deformities as an example of scientific progress in plastic surgery in the province.

METHODS

A bibliographic review of the full-text medical literature published in Spanish and English was carried out. The search engines Google Scholar and PubMed were used, the SciELO and Oxford digital libraries and the Medline database were consulted and appropriate keywords were used.

DEVELOPMENT

Nowadays it is evident that Plastic Surgery is not a specialty of minor importance because it plays a central role in the appearance of the individual as a bio-psycho-social being. Men live in society, related to the rest of men and to the world around them, and it is in this interaction that shapes their spiritual sphere, within which their psychological component stands out, which exerts a notable influence on the whole of social relations.[4]
The features of physical appearance can generate a series of psychological disorders due to the individual's failure to adapt to his group of relations or to feel rejected by the rest of the people and cause a decrease in self-esteem. When this sphere is affected, men may suffer an imbalance in their health and resort to medical services in order to make the pertinent anatomical corrections that will lead to a rise in their self-esteem and the reestablishment of harmonious relations with the rest of society. Beauty can play an important role in the legitimately human pursuit of happiness.[5]

Historical and conceptual elements

In the past, plastic surgery was examined from a point of view that blurred the essential sense of the purposes pursued with it. There are those who affirm that it has no curative purpose. Many times it has gone to the extreme of affirming that it leaves the field of medicine and enters the field of vanity and illusion, but it is undeniable that it has an absolutely defined social function.[2]
On many occasions, facial asymmetries produce serious psychological traumas in patients that prevent them from developing a normal and happy life. Someone has said that ugliness can become a disease. Thanks to this specialty many body defects can be corrected and patients can be physically rejuvenated.[6]
Plastic surgery has its origins more than 3,000 years ago (its name, which comes from the Greek *plastikos*, means to model or give shape), is the medical specialty dedicated to restore or modify the shape of the human body and includes both reconstructive surgery and aesthetic surgery. Reconstructive surgery is performed on abnormal structures of the body caused by congenital defects, developmental abnormalities, trauma, infection, tumors or disease, and aesthetic surgery to restore shape or reshape structures of the body to improve its appearance.[6]

History shows that the practice of plastic surgery has ancient roots: in 500 B.C. nose reconstructions were performed using a frontal flap (Indian flap) and in the sixteenth century Tagliacozzi performed the transfer of skin from the arm to perform nasal reconstruction. Von Graefe was the first to use the term plastic in his book Rinoplastik, published in 1818, in Berlin. Plastic surgery achieved great recognition in the First World War as a necessity for the treatment of soldiers who were victims of disfiguring injuries of the face and body and reached its maximum development as a specialty from the Second World War onwards.[6]

In the reconstruction of different body areas it is often necessary to bring in tissue from other parts of the body. In 1893 the German surgeon Gustav Neuber reported the first graft of adipose tissue from the arm to the periorbital region to correct a sequela of osteomyelitis. In 1895 another German, Viktor Czerny, transferred a lipoma to the breast to restore symmetry following a partial mastectomy. Since the late 1970s, with the greater knowledge of the vascularity of soft tissues and the development of microsurgery, it was possible to transfer various tissues from distant anatomical sites in a single surgical time and preserve their vascularization, which became a plus in the reconstructive armamentarium of the Plastic Surgery Specialist.[7]

Lipotransfer, lipofilling, lipografting or autogenous fat transplantation

Fat grafting, lipotransfer, lipofilling, lipografting or autogenous fat transplantation, as it is called by several authors, is a technique used internationally for facial and body sculpting in reconstructive, regenerative, rejuvenation and cosmetic treatments.[3,8]

In the case of volumetric defects, as in the case of Parry-Romberg disease (progressive facial hemiatrophy), or in the case of breast amputation as a treatment for breast cancer, the consideration of reconstruction with soft tissue transfer using microsurgical techniques is always an excellent option; however, it is not free of major risks and disadvantages, since it requires the participation of surgical specialists with microsurgical training, specialized equipment and material that is not always available in all hospitals. It was these difficulties in the implementation of reconstructive microsurgical methods that motivated some Plastic Surgery Specialists to re-explore the possibility of performing autologous fat tissue transfer for the reconstruction of contour tissue defects in a simpler way and with lower risks.[7,8]

The transfer of autologous adipose tissue (AT) or lipotransfer in the free graft modality is not a new procedure, it was tried by Neuber in 1893 and Peer in the 1950's, but the unpredictability in the results and in the behavior of the transplanted fat was responsible for the fact that this technique did not progress and fell into oblivion.[8,9]

Two Latin American plastic surgery specialists, Dr. Abel Chajchir, from Argentina, and Dr. José Guerrero Santos, from Mexico, contributed, at the beginning of the eighties, to establish the current surgical techniques of autologous fat tissue transfer in its modality of free grafts through lipoinjection to successfully solve different problems of facial and body contour defects. Coleman contributed to the standardization of the technique of procurement, fat preparation and its application by means of serial injections.[8]

The first reference to autologous AT grafting applied in the form of subcutaneous injection is from 1911: Bruning used small portions of fat obtained surgically and implanted it by means of a needle and syringe to correct depressions following rhinoplasty. In 1912 Eugene Hollander presented two cases of TA lipoinjection in facial lipoatrophy and in 1950 Peer demonstrated that TA should be transplanted in the form of small portions to obtain a 50% permanence at one year of control. During the 1960s and 1970s there was a relative disinterest in fat autografting, probably because of the uncertainty of graft viability, the variability in clinical results and the growing interest in synthetic materials.[10]

Autologous AT autografting again aroused great interest two decades ago, especially with the introduction, by Illouz, of the liposuction technique and the concept of AT implantation by injection. In 1987 Klein introduced tumescent anesthetic infiltration in liposuction, an achievement that minimized bleeding and anesthetic risk; a breakthrough in liposuction for harvesting autologous AT grafts.[11]

In the mid-1990s Coleman systematized the harvesting and injection of AT grafts, presented very good results and took into account a number of aspects:

- The procurement should be of small caliber fat cylinders by atraumatic manual aspiration, with two-hole blunt cannula and 20cc syringe, at low negative pressure.
- The material obtained must be processed to obtain an AT graft free of impurities.
- The implantation method must respect the AT graft structure without damaging the recipient tissue, for which a retrotracer injection is performed, avoiding localized accumulations, which increases the area of exposure to the surrounding tissue and facilitates graft nutrition by imbibition and subsequent revascularization, while avoiding potential displacements of the material.[8]

Currently, fat injection has been established as a widely used technique both in reconstructive and aesthetic surgery; determining factors have been the great availability of fat tissue in most patients, the low morbidity and the ease of performing the procedure with material and equipment of routine use.[12]

Even with the disadvantages of sometimes requiring several sessions of lipoinjection for the correction of a tissue contour defect, autologous fat tissue transfer is an excellent option for the reconstruction of congenital and traumatic facial and body contour defects.[13] Its application is already routine for the treatment of facial hemiatrophy, lipodystrophy in patients with human immunodeficiency virus (HIV), post-traumatic facial and body contour alterations and, especially, it represents a valuable adjuvant in post-mastectomy breast reconstruction due to cancer. Its use has been extended to the field of aesthetic surgery by combining liposuction of specific body areas with liposuction in order to achieve augmentation in other areas, which has favored the substantial development of body liposculpture.[12,13]

As any procedure in medicine, the mastery of a technique requires a learning curve and a long period of evaluation of the possible implications and repercussions that it may have in the different facets of its clinical application. The lipograft is not exempt from complications that are directly attributed to

deficiencies in the surgical technique, or to other fortuitous conditions not necessarily related to it, such as fat resorption or fat necrosis, aspects that after decades of use have discouraged the use of this reconstructive technique.
Although there are still many questions surrounding the transfer of adipose tissue (AT) by lipoinjection due to the changes that occur at facial level due to the physiological processes of aging or facial thinning, Meruane and collaborators, to overcome the disadvantages of autologous lipoinjection, have popularized in recent years a novel strategy called lipotransfer enriched with platelet-rich plasma (PRP) that allows a better integration of fat when elements such as the individual's own plasma are added.[14,15]
PRP is defined as a portion of the patient's own plasma with a higher than baseline platelet concentration obtained by centrifugation. This plasma fraction contains not only a greater volume of platelets, but also the factors responsible for coagulation.[16] PRP contains approximately eight times the concentration of platelet-derived growth factors than basal plasma, all of which has clinical effects that can be generally established as an increase in tissue repair processes of soft tissue and bone, as well as a decrease in postoperative infection rates, pain and blood loss.[15,16]
Multiple authors assure encouraging results with this association, which is effective, safe and potentially superior to conventional lipoinjection for facial remodeling.[15,16,17]

Current status and implementation of the technique

Nowadays, the use of lipotransfer for the treatment of facial deformities has become a valuable resource in Plastic Surgery. It was introduced in the Burn Service of the "Arnaldo Milián Castro" University Clinical Surgical Hospita of Santa Clara City, Villa Clara Province, starting in 2015, after the implementation of new liposuction techniques with small diameter non-traumatic cannulas and the use of tumescent anesthetic infiltration methods in liposuction that minimize bleeding and anesthetic risk to obtain autologous fat tissue grafts that are enriched with PRP and transferred with serial lipoinjection techniques that correct the facial defect quickly, without large incisions and with ambulatory follow-up; has gone from being tedious and boring to being a fascinating object of study.
For this reason, the transfer of autologous fat tissue by lipoinjection has transcended in a few years from being a procedure for filling contour defects to a reconstructive procedure with tissue regenerative implications[18] because human adipose tissue contains a population of mesenchymal cells capable of proliferating and differentiating into multiple cell types, as well as containing growth factors and favoring neoangiogenesis.[19]
The AT is not only a reservoir of energy, it is a vital organ, with its vascular stromal fraction containing a population of mesenchymal stem cells capable of renewing and differentiating into multiple cell lineages.[20,21]
The regeneration process occurs after four weeks and is complete after three months. Stabilization persists for several months and volume reduction can be seen up to one year and resorption is significantly reduced with the association of PRP[15,22]

Autologous adipose tissue grafts as filler present many advantages that include it within the characteristics of an ideal filling material: biocompatible, versatile, stable, non-immunogenic, durable, non-migratory, non-carcinogenic, non-teratogenic and replaces the lost tissue on an equal basis with very natural results. It has a low cost and little morbidity for the patient.[23]

Several studies have been published in which the use of autologous AT transfer by lipoinjection has been endorsed, as it improves fat integration when elements such as platelet-rich plasma (PRP) are added.[15,22,23]

In facial aesthetic surgery the work focuses on the evaluation of the degree of ecchymosis and postoperative edema, that is, on the anti-inflammatory and hemostatic properties of PRP.[15] Autologous lipoinjection associated with PRP is a promising treatment for soft tissue augmentation in facial deformities because it does not carry associated incision scars or complications associated with the use of foreign materials and can be a primary or complementary procedure to treat tissue atrophy. Fat grafting provides volumetric rejuvenation with a material that integrates with the facial tissue and provides a natural appearance that is maintained over time.[23]

This technique is a successful and hopeful therapeutic alternative supported by numerous scientific studies. More and more indications are presented, allowing patients with facial deformities to be rehabilitated with success and satisfaction, taking into account that the development of science and technique should cause satisfaction not only for the patient but for all the technical and professional staff linked to each technological advance. From the point of view of the professional, the lipograft, with the incorporation of platelet-rich plasma obtained from the patient himself, increases the therapeutic arsenal of the specialty and is a simple, inexpensive, virtually risk-free treatment that can be performed, in most cases, on an outpatient basis. For the patient it is the treatment of choice because although the surgical component of the procedure becomes an important psychological factor, the aesthetic and functional results and durability provide the patient with satisfaction from the emotional point of view. This fact, together with the technological scientific progress, makes the choice of this therapeutic alternative more and more frequent and routine.

As with any reconstructive treatment, it requires a precise etiological diagnosis of the facial deformity and meticulous planning from a surgical point of view, without undermining the importance of timely follow-up of the patient once the PRP lipotransfer has been performed.

Another very important aspect is the degree of satisfaction shown by the patient with the treatment, a fundamental factor in evaluating whether the treatment has fulfilled its objectives. Some authors consider that the greatest risk of failure of lipotransfer in the treatment of facial deformities is an undercorrection of the defect, which corroborates the importance of timely evaluation and planning prior to lipofilling (clinical history and detailed examination of the patient), an adequate surgical technique and timely post-surgical follow-up.[19] Other complications are reported in the literature: infection, edema, hypercorrection, appearance of nodules, nerve damage and asymmetries, totally avoidable if an adequate evaluation of the patient and an adequate selection of the technique to be implemented are carried out.[23,24]

Each patient is made aware of all the risks and benefits before treatment by means of informed consent, an essential method that highlights the patient's autonomy, which is a fundamental right and also an ethical and legal requirement for the physician.
Although consensus could not be reached in the early stages, there are now sufficiently clear and updated concepts that allow this technique to be indicated in a precise manner when associated with the use of PRP, which is highly effective. The efficacy of the treatments lies for the patients not only in the function, but also in the achievement of the most perfect aesthetics possible. For this, the development of minimally invasive surgical techniques can be fundamental to achieve the functional and aesthetic objectives demanded by modern science. This procedure achieves an optimal esthetic result and adequate function.

Final considerations

At present, several health institutions in Cuba provide reconstructive services with the use of lipotransfer techniques with PRP for the treatment of facial deformities. In Villa Clara Province it began in 2015 thanks to the scientific preparation achieved by the professionals for the realization of this project; it is demonstrated that the Cuban socialist health system has as its main objective to benefit the people with all the technological and scientific advances. The advance of science and technique in this branch of Plastic Surgery in Cuba contributes to introduce in this service, in Villa Clara, a state-of-the-art technology that in other countries is elitist and mercantilist and that in the country is within the reach of all the citizens who require it. These treatments have been widely used and have attracted the attention of professionals dedicated to these procedures due to their possibilities of success.

CONCLUSIONS

The treatment of facial deformity with the use of lipotransfer with PRP is a viable, safe, economical treatment alternative, with satisfactory results due to its permanence and stability over time, with good acceptance by the patient who fulfills his aesthetic requirements, satisfies his expectations and restores the anatomical and functional integrity of the damaged structures, which allows its validation and full incorporation into society; it is an example of scientific progress in plastic surgery in the province.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.