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COMPLICATIONS OF FACIAL HARMONIZATION: INSIGHTS INTO ADVERSE REACTIONS AND MANAGEMENT STRATEGIES

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Abstract: INTRODUCTION The introduction discusses the rapid evolution and growing popularity of facial harmonization techniques such as dermal fillers, botulinum toxin injections, and thread lifts. It outlines the societal and aesthetic factors driving this trend, while highlighting the increased demand for minimally invasive procedures. It also introduces the various materials and techniques used in facial harmonization, emphasizing the importance of managing patient expectations and screening for risk factors to minimize complications. The introduction sets the stage for a detailed exploration of the most common and severe complications arising from facial harmonization procedures. **OBJETIVE** The main objective of this narrative review is to comprehensively analyze and provide insights into the complications associated with facial harmonization, including dermal fillers, botulinum toxin, and threads, while highlighting the therapeutic management of these adverse reactions. The review focuses on providing up-to-date knowledge on the prevalence, causes, and best practices in managing complications, with an emphasis on improving patient safety and outcomes. **METHODS** This is a narrative review which included studies in the MEDLINE – PubMed (National Library of Medicine, National Institutes of Health), COCHRANE, EMBASE and Google Scholar databases, using as descriptors: “Facial Aesthetics” AND “Dermal Fillers” OR “Adverse Effects” OR “Vascular Complications” OR “Cosmetic Medicine” in the last 5 years. **RESULTS AND DISCUSSION** The results and discussion sections focus on analyzing the different types of complications that can occur with facial harmonization. These include immediate reactions such as bruising, swelling, and pain, as well as more serious complications like vascular occlusion, blindness, and infection. The review delves into the pathophysiology of these complications, with a par-

ticular emphasis on vascular complications and their management using hyaluronidase. It also explores the long-term effects of complications such as granulomas, filler migration, and psychological impacts on patients. The discussion addresses various therapeutic management strategies, including pharmacological and surgical approaches, and highlights the importance of early intervention and prevention in improving patient outcomes. **CONCLUSION** The conclusion emphasizes that while facial harmonization procedures offer significant aesthetic benefits, they carry risks that require careful consideration by both practitioners and patients. It underscores the need for awareness of these risks, better preventive strategies, and the continuous development of safer techniques and materials. Additionally, patient education and setting realistic expectations are critical in reducing dissatisfaction and adverse outcomes. The article calls for ongoing research and improved training for practitioners to minimize complications and enhance patient safety in facial harmonization procedures.

Keywords: Facial harmonization; Dermal fillers complications; Vascular occlusion; Hyaluronidase; Aesthetic procedure safety

INTRODUCTION

Facial harmonization has become a pivotal area in cosmetic medicine, driven by advancements in non-invasive aesthetic procedures¹. Over the past two decades, facial harmonization has evolved significantly, propelled by the demand for minimally invasive techniques that yield substantial aesthetic improvements¹. This evolution mirrors broader shifts in aesthetic medicine, where procedures such as fillers, botulinum toxin injections, and thread lifts have gained prominence¹. Initially utilized for facial rejuvenation and volume restoration, these techniques are now widely used for contouring and reshaping the face².

The continuous innovation in facial harmonization technologies, alongside the increasing accessibility of these procedures, has sparked global interest among patients seeking enhanced aesthetics with minimal downtime². Medical specialists and aesthetic practitioners have had to adapt to this growing demand, incorporating novel materials and techniques into their practice².

The surge in demand for facial harmonization is closely linked to changing societal ideals of beauty³. Influenced by global media and social platforms, patients are increasingly seeking aesthetic enhancements that align with the idealized facial features portrayed by public figures³. This growing trend has diversified the demographic seeking cosmetic procedures, with both younger and older populations opting for facial harmonization³. The younger demographic often seeks preventative aging solutions or minor aesthetic adjustments, while older patients focus on rejuvenation and correcting age-related changes such as loss of facial volume and skin laxity⁴. With this rising demand, however, comes the challenge of managing patient expectations, as desired results can sometimes differ significantly from achievable outcomes⁴.

At the core of facial harmonization procedures are various materials, most notably hyaluronic acid-based fillers, botulinum toxin, and polydioxanone (PDO) threads⁵. These materials have been developed and refined to provide more natural results while minimizing the risk of adverse reactions⁵. However, even with advancements in product safety and procedural techniques, complications remain an inherent risk⁵. The most common complications include immediate reactions such as bruising, swelling, and pain at the injection site⁶. These reactions are generally self-limiting, but in some cases, patients may experience more serious outcomes such as vascular occlusion, leading to tissue ischemia⁶. The

latter is of particular concern in areas of the face with a rich vascular network, such as the nasolabial folds and glabella⁶.

Delayed complications, though less frequent, can be more challenging to manage⁷. These include the formation of granulomas, nodules, and the development of biofilms⁷. Granulomas typically form as a result of a foreign body reaction to the filler material, while biofilms, composed of bacterial colonies, can develop around the injected filler, leading to chronic inflammation and infection⁷. These delayed complications often require a multidisciplinary approach for diagnosis and management, involving both dermatologists and plastic surgeons⁸. The management of these complications may include the use of corticosteroids, antibiotics, or, in severe cases, surgical intervention to remove the affected filler material⁸. Preventing such outcomes is a major focus in the field, with ongoing research dedicated to improving product formulations and refining injection techniques⁸.

OBJETIVES

The main objective of this narrative review is to comprehensively analyze and provide insights into the complications associated with facial harmonization, including dermal fillers, botulinum toxin, and threads, while highlighting the therapeutic management of these adverse reactions. The review focuses on providing up-to-date knowledge on the prevalence, causes, and best practices in managing complications, with an emphasis on improving patient safety and outcomes.

SECONDARY OBJETIVES

1. To identify the most common and severe complications associated with facial harmonization procedures, including immediate and delayed adverse reactions.

2. To explore the underlying pathophysiology of vascular occlusion and blindness, two of the most feared complications in facial fillers.
3. To review therapeutic options, including enzymatic degradation, corticosteroids, and surgical interventions, for managing complications effectively.
4. To discuss the psychological impact of complications on patients and the importance of mental health support.
5. To highlight preventive strategies for reducing the occurrence of complications in facial harmonization.

METHODS

This is a narrative review, in which the main aspects of the complications associated with facial harmonization, including dermal fillers, botulinum toxin, and threads, while highlighting the therapeutic management of these adverse reactions. The review focuses on providing up-to-date knowledge on the prevalence, causes, and best practices in managing complications, with an emphasis on improving patient safety and outcomes in recent years were analyzed. The beginning of the study was carried out with theoretical training using the following databases: PubMed, sciELO and Medline, using as descriptors: “Facial Aesthetics” AND “Dermal Fillers” OR “Adverse Effects” OR “Vascular Complications” OR “Cosmetic Medicine” in the last years. As it is a narrative review, this study does not have any risks.

Databases: This review included studies in the MEDLINE – PubMed (National Library of Medicine, National Institutes of Health), COCHRANE, EMBASE and Google Scholar databases.

The inclusion criteria applied in the analytical review were human intervention studies, experimental studies, cohort studies, case-control studies, cross-sectional studies

and literature reviews, editorials, case reports, and poster presentations. Also, only studies writing in English and Portuguese were included.

RESULTS AND DISCUSSION

One of the most feared complications in facial harmonization, particularly with dermal fillers, is vascular occlusion⁹. This occurs when filler material inadvertently enters an artery, obstructing blood flow and leading to ischemia in the surrounding tissues⁹. The areas most at risk are those with limited collateral circulation, such as the nose and glabella⁹. If not promptly recognized and treated, vascular occlusion can lead to tissue necrosis and, in severe cases, blindness if the occlusion occurs in vessels supplying the eye¹⁰. Early recognition of vascular compromise is crucial, and the treatment protocol typically involves the administration of hyaluronidase, an enzyme that breaks down hyaluronic acid fillers¹⁰. In addition to enzymatic degradation, warm compresses and massage may be used to enhance blood flow and mitigate the effects of ischemia¹⁰.

Blindness is one of the most devastating complications associated with facial fillers¹¹. Although rare, it is a well-documented risk, particularly when fillers are injected into areas near the eye¹¹. The mechanism involves retrograde embolization, where the filler material is forced into the arterial system and travels upstream to the ophthalmic artery¹¹. This leads to an interruption in blood supply to the retina, resulting in sudden, irreversible vision loss¹². Treatment options for blindness are extremely limited, making prevention the most critical aspect of patient safety¹². Practitioners are encouraged to use aspiration techniques before injecting fillers and to avoid high-risk areas whenever possible¹².

Another significant area of concern in facial harmonization is allergic reactions to the materials used¹³. Although hyaluronic acid is generally well tolerated due to its biocompatibility, some patients may develop hypersensitivity reactions¹³. These reactions can range from mild swelling and erythema to more severe anaphylactic responses, although the latter is exceedingly rare¹³. Botulinum toxin, used primarily for the treatment of dynamic wrinkles, carries a different set of risks, including the potential for allergic reactions or the development of neutralizing antibodies that render the treatment ineffective¹⁴. Practitioners must be vigilant in screening patients for any history of allergies or autoimmune conditions that could predispose them to adverse reactions¹⁴.

Infections are another possible complication following facial harmonization procedures¹⁵. Although aseptic techniques are employed during injection, the introduction of any foreign material into the skin carries a risk of infection¹⁵. The most common pathogens involved are skin flora such as *Staphylococcus aureus* and *Streptococcus* species¹⁵. Early signs of infection include redness, warmth, and tenderness at the injection site, often accompanied by systemic symptoms such as fever¹⁶. Prompt diagnosis and treatment with antibiotics are essential to prevent the progression of the infection, which, in rare cases, may lead to abscess formation or cellulitis¹⁶. In some instances, the infection may be related to the formation of biofilms around the injected filler, making the infection more resistant to treatment¹⁶.

Filler migration and displacement represent additional challenges in facial harmonization procedures¹⁷. These complications occur when the filler material moves from its intended location, often resulting in an unnatural appearance or asymmetry¹⁷. Migration can happen due to improper injection tech-

nique, overfilling, or the use of inappropriate filler materials¹⁷. While hyaluronic acid fillers are temporary and can be dissolved with hyaluronidase, other types of fillers, such as calcium hydroxylapatite or poly-L-lactic acid, are more difficult to reverse¹⁸. Correcting filler migration may require further injections to balance the appearance or, in more severe cases, surgical intervention to remove the misplaced material¹⁸.

Nerve damage is another complication that can occur during facial harmonization procedures, particularly when large volumes of filler are injected into areas close to major nerve branches¹⁹. This can result in temporary or, in rare cases, permanent sensory or motor deficits in the affected region¹⁹. Facial asymmetry, either due to nerve injury or uneven filler placement, is a frequent concern for patients and can significantly impact their satisfaction with the procedure¹⁹. In cases of nerve damage, conservative management with observation is usually recommended, as most cases resolve spontaneously within a few weeks or months²⁰. However, persistent cases may require further medical or surgical intervention to restore normal function²⁰.

Psychological impacts of adverse reactions in facial harmonization are often overlooked but can be profound²¹. Patients who experience complications may develop anxiety, depression, or body dysmorphic disorder, particularly if the aesthetic outcome falls short of their expectations²¹. The psychological burden is exacerbated by the societal pressures associated with physical appearance, especially in an era where social media plays a central role in shaping beauty standards²¹. Managing these psychological impacts requires a holistic approach, with support from mental health professionals in addition to addressing the physical complications²². Practitioners must also be sensitive to the emotional needs of their patients, ensuring that realistic

expectations are set from the outset and that any complications are handled with empathy and transparency²².

Therapeutic management of complications in facial harmonization is multifaceted and depends on the nature and severity of the adverse reaction²³. For immediate complications such as bruising, swelling, and mild pain, conservative measures including cold compresses, anti-inflammatory medications, and reassurance are often sufficient²³. For more serious complications such as vascular occlusion or granuloma formation, more aggressive interventions are required²³. The use of hyaluronidase for hyaluronic acid fillers has become the cornerstone of treatment for vascular complications, with early administration showing the best outcomes²⁴. Other treatment options include corticosteroids for inflammatory reactions and antibiotics for infectious complications²⁴. In cases where non-surgical management is insufficient, surgical removal of the filler material may be necessary²⁴.

CONCLUSION

In conclusion, facial harmonization procedures, while offering significant aesthetic benefits, carry inherent risks of complications. These complications range from mild, self-limiting reactions to severe outcomes such as vascular occlusion, blindness, and infections. The increasing demand for facial harmonization has highlighted the need for greater awareness and management of these risks among practitioners. Adopting preventive strategies, such as proper patient selection, thorough screening for risk factors, and adherence to best practice guidelines, is crucial for minimizing the occurrence of adverse reactions. As the field of aesthetic medicine continues to evolve, ongoing research into safer materials and techniques will play a critical role in reducing the incidence of complications. Moreover, patient education and the establishment of realistic expectations are essential components of a successful facial harmonization practice, ensuring that both aesthetic outcomes and patient safety are prioritized.

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