J Young Pharm, 2021; 13(1) : 14-18.
A multifaceted peer reviewed journal in the field of Pharmacy
www.jyoungpharm.org | www.phcog.net

Review Article

Oral and Maxillofacial Complications due to the use of Hyaluronic Acid as an Alternative for Facial Implants

José Laurentino Ferreira Filho[1], Edilson Martins Rodrigues Neto[2,*], Fernanda Maria Teófilo Campos[3], Sormani Bento Ferrnandes de Queiroz[4]
[1]Laurentino Institute, Quixadá, CE, BRAZIL.
[2]Department of Pharmacy, Dentistry and Nursing College, Federal University of Ceara, Fortaleza, CE, BRAZIL.
[3]Health Multidisciplinary Residence Program, Public Health School from Ceara State, Fortaleza, CE, BRAZIL.
[4]Doctor Sormani Queiroz Institute, Fortaleza, CE, BRAZIL.

ABSTRACT
This work aimed to review in the scientific literature the reported complications associated with the use of Hyaluronic Acid (HA) as an option for dermal implants in the maxillofacial region and how the health professional should intervene. The pathological and aesthetic defect restorative treatments for the human body are increasingly gaining space in several areas of health. Dentistry is one of these areas that has stood out in diseases and complications diagnosis of functional and aesthetic treatments of the maxillofacial complex. Hyaluronic acid fillers are predominantly used in aesthetic and functional procedures in the maxillofacial region. HA is a hydrogel of natural occurrence in human skin, belonging to the family of glycosaminoglycan's (GAGs), present in abundance in the extracellular connective tissue matrix, It is a polymer used in the manufacture of artificial frameworks for tissue engineering due its nature biocompatible, biodegradable, non-immunogenic and non-thrombogenic, presenting benefits in the aesthetic and functional treatment of the skin and mucous membranes of the maxillofacial region. Nevertheless some complications are expected from its application to the living organism. These complications can be divided into early and late complications according to the patient's symptoms. HA application liable to success shall respect important items/steps, thus its use must be correctly indicated and well applied by trained professionals who are familiar with facial anatomy, appropriate injection techniques and the preparation of the integumentary system. Early identification of complications and immediate intervention with medications and invasive procedures can significantly decrease the risk of long-term consequences.
Key words: Facial implants, Dermic implants, Hyaluronic acid, Side effects, Maxillofacial complications.

Correspondence

Dr. Edilson Martins Rodrigues Neto

Department of Pharmacy, Dentistry and Nursing College, Federal University of Ceara, Fortaleza, CE, BRAZIL.

Phone: +55-86-33660000

Email: edilsonmrneto@hotmail.com

DOI: 10.5530/jyp.2021.13.3

INTRODUCTION

With the scientific research advances over the years, the pathological and aesthetic defect restorative treatments for the human body are increasingly gaining space in several areas of health. Dentistry is one of these areas that has stood out in diseases and complications diagnosis of functional and aesthetic treatments of the maxillofacial complex, since the education of dentists includes technical and scientific knowledge about the structures that form the head and neck region.[1] Some aesthetic and functional methods of treatment for head and neck regions use tissue engineering to develop techniques for replacing lost tissues, physiologically due aging or pathologically, with the involvement of diseases that affect the maxylofacial function. Tissue engineering is a technological field that applies scientific concepts from different areas in order to use biocompatible materials for biological replacement of structures that cannot naturally be repaired, thus restoring cellular functions lost by some etiological factor or by the physiological process itself.[2,3] To restore tissue functions, tissue engineering uses an approach that consists of recruiting the patient's own cells, cultivating in biological or synthetic frameworks, known as scaffolds (frameworks / supports) to then be reinserted into the patient.[4]

HYALURONIC ACID

A variety of frameworks such as hydrogels, synthetic or natural polymers, have been used as an alternative for the cellular functions repair. Hyaluronic acid (HA) is a hydrogel of natural origin, belonging to glycosaminoglycan's (GAGs) family, occurring abundantly in the extracellular matrix of connective tissue, being produced by cells of mesenchymal origin, organizing the elements of the extracellular matrix (MEC) as function.[5] Synthetic HA is manufactured from structures of animal origin and / or bacteria, through direct isolation or fermentation.[6]

HA plays important roles in a variety of cellular processes. It is a polymer used in the manufacture of artificial frameworks for tissue engineering due its characteristics of biocompatibility, biodegradability, non-immunogenicity, non-thrombogenic and has benefits in the aesthetic and functional treatment of the skin and mucous membranes of the maxillofacial region.[1-3]

HA is also a hydrogel that regulates inter-cellular behavior in the tissue repair process, mainly in its phases of inflammation and proliferation including the activation and modulation of immune response, angiogenic promotion, as well as cell differentiation and migration.[7]

Currently, HA is used as an immunohistochemical biomarker for pathologies such as some types of cancers, arthritis and hepatopathologies, as well as into certain ophthalmologic and soft tissue surgeries. In addition, HA is used as a dermal filler due to its high water-holding capacity and biocompatible properties.[6,8]

Whereas the HA use as dermal fillers is expanding, some complications are expected caused by application in the living organism. These

complications can be divided into early and late complications according to the patient's symptoms. Most complications that can occur are generally mild, transient and reversible. Adverse effects related to the injection technique are the most commonly observed. The improvement of HA injection technique and the understanding of possible complications diagnosis and its therapeutic management, can help to prevent, diagnose and treat these complications.[9]

In addition to the undesirable effects related to the application technique, there are effects related to hypersensitivity reactions, foreign body granuloma, vascular occlusion, bacterial, fungal and viral infections, such as abscess, cellulite and reactivation of herpes simplex.[1,10-12]

Dermal filling

Funt and Pavicic (2015) developed a literature review about complications of dermal filling. They had as final considerations that the different dermal fillers have varied properties, risks associated with injection techniques. Like any other pharmaceutical product, dermal fillers can cause complications. These can be related to volume and technique, however they can also be related to material. Bruising and trauma-related edema are the most common reactions. The planning and application of the correct technique avoids serious adverse events.[13]

For best results, professionals should have a detailed understanding of facial anatomy; the individual characteristics of the available fills; its indications, contraindications, benefits and disadvantages; ways to prevent and avoid possible complications as well.[13]

Kopera *et al.* (2015) conducted a multicenter study to evaluate the effectiveness and safety of Princess VOLUME® in nasolabial wrinkles treatment. The study was open-label, uncontrolled and controlled. Forty-eight individuals were recruited with moderate to deep wrinkles, according to the Modified Fitzpatrick Wrinkle Scale (MFWS). The persons received Princess VOLUME® in both nasolabial folds on day 0. The severity of nasolabial folds was assessed 30, 90, 180 and 270 days after treatment, using the MFWS and the Global Aesthetic Improvement Scale (GAIS).[14]

The study population was 48 individuals, in which 93.8% were female, with a median age of 52 years old. There were significant improvements (P <0.0001) in MFWS scores at 30, 180 and 270 days after treatment compared to those at baseline, with an average reduction of 1.444 (± 0.408), 1.309 (± 0.373) and 1,222 (± 0.401), respectively; therefore, the primary endpoint has been reached and clinical efficacy has been demonstrated. Princess VOLUME® was well tolerated and most adverse events were reactions at the injection site of mild to moderate severity. The individual's satisfaction (97.9%), the person's recommendation of treatment (93.6%) and the researchers' GAIS scores (97.9% improvement) were high.[14]

Polydensified hyaluronic acid

Moradi *et al.* (2015) explored the severity of bruises and pain in patients treated with the polydensified hyaluronic acid (CPMHA) co-sensitive matrix in three different preparations: CPMHA (Belotero Balance [BEL]), CPMHA with lidocaine (BEL-L) and CPMHA with lidocaine and epinephrine (BEL-LE). They conducted a 14-day, blind, split-face study, where 30 patients were divided into groups of 10. One group received 1.0 mL of BEL on the perioral lines on one side and 1.0 mL of BEL-LE on the other. Side. A second group received 1.0 mL of BEL on one side and 1.0 mL of BEL-L on the other side. The third group received 1.0 mL of BEL-L on one side and 1.0 mL of BEL-LE on the other side. Over three visits, the investigator responsible for treatment, patients and a "blind" investigator classified the bruises. Bruising occurred in each treatment group on day 1, but resolved for half of the patients on day 7 and for all patients on day 14. Comparison with the split face did not reveal a significant difference in pain and bruise scores in the three preparations. No significant difference was found in bruising or pain among patients treated with BEL, BEL-L and BEL-LE.[15]

Reactions to hyaluronic acid

Artzi *et al.* (2016), outlined the features of hyaluronic acid reactions. The medical records of 400 patients (360 women and 40 men; mean age = 49.6 years of age) were examined in this retrospective study. Filling with Juvéderm Volbella® was injected only in the lacrimal area or in the lips. Other hyaluronic acid-based products have been used on other areas of the face. Seventeen patients (4.25%) developed prolonged (up to 11 months) and recurrent (mean: 3.17 episodes) late inflammatory skin reactions (mean onset: 8.41 weeks after injection). The incidence of late reactions to loads based on hyaluronic acid varies between products. A high reaction rate has been described for the newly qualified material. The use of antimicrobial agents combined with intralesional hyaluronidase was effective in the treatment.[16]

Or *et al.* (2016) described a new complication xanthelasma-like reaction that occurred after dermal injection in the lower eyelid region. A retrospective analysis of the case was performed in 7 patients who presented a reaction similar to xanthelasma after filling the lower eyelids. Seven female individuals with no history of xanthelasma had a xanthelasma-like reaction in the lower eyelids after the filling injection. The loads included hyaluronic acid (2 patients), synthetic calcium hydroxyapatite (4 patients) and polycaprolactone microspheres (1 patient).The xanthelasma-like reaction was verified in an average time of 12 months, with a range of 6-18 months. Injectable steroids, fluorouracil (5FU), ablative or fractional CO_2 laser and direct excision were used as treatment. One patient had xanthelasma confirmed by biopsy. The laser treatment generated partial resolution. The excision was resolutive for xanthelasma-like lesion. These data become relevant due to the fact that the lesion appears after the use of three different fillers. There was no report of pre-cocclusion injury. It is still unclear the mechanism by which the filler can generate an xanthelasma-like lesion. There is a hypothesis related to the binding of low density lipoprotein and phagocytosis by macrophages. This is a complication that the professional must be aware of and know its clinical management.[17]

A study evaluated lip filling with hyaluronic acid associated with lidocaine, CPM-HAL1 (Belotero Balance Lidocaína, Merz Aesthetics, Raleigh, NC) and CPM-HAL2 (BeloteroIntensaLidocaína, Merz Aesthetics, Raleigh, NC). These patients received aesthetic treatment or rejuvenation. These study was conducted for 4 months. The only documented adverse effect was pain. 95% of the patients were classified as having good and very good results in relation to natural uniformity and the final result. Over 91% good and very good in relation to Distribution, fluidity, handling and malleability. Regarding satisfaction, 93% were satisfied or very satisfied with the result. Of the 146 patients in the study 125 (85.6%) had transient adverse effects in relation to the injection of the product. The reported pain was of mild intensity 2.72 ± 1.72 on a scale of 10 and there was a decrease of 0.42 ± 0.57 after 30 min. Lip volumization with hyaluronic acid had a long-term effect. Due to the lidocaine content, the pain in the procedure was low and transient. There were no problems during the application nor lasting side effects.[18]

Combined technique

Anand (2016) performed a series of cases in women with the objective of obtaining a thinner oval shape with smooth contours. A combined technique was applied, in which the narrowing of the face was achieved with the use of botulinum toxin, bypassing with clusters of soft tissues and thinning the face with the injection of lipolysis. 15 women aged between 25 and 40 years were treated and followed for 12 weeks. Dermal fillers

based on hyaluronic acid (Perlane®, Voluma® and Juvederm®), botulinum toxin type A (Botox®) and a lipolytic solution of phosphatidylcholine with deoxycholate (Dermastabilion®, Aesthetic Dermal®, Spain®) were used to perform the facial harmonization. All patients had edema for up to 2 weeks after lipolysis, but in 2 patients the edema persisted until the third week. No adverse event was observed after the use of botulinum toxin type A; however, after using hyaluronic acid-based padding, it was observed that one patient had bruises on the mental region.[19]

Complications

Prado and Rodríguez (2016) reported the case of a 64-year-old woman who suffered from blindness and hemiparesis after facial cosmetic injections performed by a family doctor. They shared their experiences with the incorporation of a "blindness safety kit" to immediately start treatment on someone with embolization and impending blindness. The kit contains a step-by-step protocol to be followed in the case of arterial embolization of the filling material associated with eye pain and imminent vision loss. This kit must be in the offices, to promptly start the treatment of someone with embolization and imminent blindness. The goal is to quickly reduce intraocular pressure to allow the plunger to move to improve retinal perfusion. Treatment should begin within 90 min. The sooner treatment begins, the better the prognosis.[20]

Intercurrence management

The professional must call the emergency service, prepare to transfer the patient to the hospital as soon as possible, start the six-step therapy protocol at the clinic and continue at the hospital. It includes 0.5% Timolol 1-2 drops administration into the affected eye allied to a beta-adrenergic antagonista that will reduce aqueous production of humor in the eyes and reduce intraocular pressure and administration of a 325 mg aspirin tablet, plus the massaging the eyeball for 10 to 15 seconds, followed by sudden movements in and out using a three mirror and repeat this procedure for 3 to 5 min. If hyaluronic acid has been injected, hyaluronidase must be injected into the retrobulbar space. This procedure should be performed only by a trained professional, preferably an ophthalmologist or eye surgeon.[20]

To perform the retro bulbar injection of hyaluronidase, an injection of local anesthetic into the lateral lower eyelid is initially performed. Then a 27G cannula is inserted at least 1 inch in the direction of the posterior aspect of the orbital cone. Finally, hyaluronidase of 2 to 4 ml (150 to 200 units / ml) is injected. After the patient is transferred to the hospital, he or she must inject intravenous acetazolamide 500 mg, thereby increasing blood flow to the retina and reducing intraocular pressure. It is considered the administration of Lovenox® (enoxaparin) subcutaneously or intravascular heparin for anticoagulation If the patient is having signs or symptoms of a stroke, postpone this step until a neurologist evaluates the patient.[20]

Efficacy and safety

Sattler *et al*. (2017) evaluated the efficacy and safety of 12 months of VYC-17.5L (Juvéderm Volift with lidocaine; Allergan plc, Irvine, CA) in the treatment of moderate / severe nasolabial folds (SNLs). Individuals aged 18 years or older with moderate / severe SNL were recruited (n = 70). The volume injected aimed to achieve the ideal correction, so the replacement treatment was administered in 2 weeks. The primary endpoint was the change assessed by the investigator in SNL severity over 12 months using the validated photo numeric SNL Severity Scale. Secondary objectives included satisfaction and safety assessed by the investigator and the subject. The average volume injected was 3.0 ± 1.0 mL for the two combined SNLs. The significant improvement was maintained in the severity of the SNL assessed by the investigator at 12 months and researchers and individuals reported high satisfaction with VYC-17.5L throughout the study. Two unexpected adverse events have been reported: redness, decreased sensitivity (resolved after 4 days) and edema (resolved after 48 hr); none of the events were serious or life-threatening.[21]

Ascher *et al*. (2017) compared the efficacy and safety of two HA fillings: AH Emervel Deep (AHed) and AH Restylane Perlane (AHper) for the treatment of severe nasolabial folds. This was a split-face study and a "blind" reviewer. At first, AHed or AHper were randomly assigned to the left or right nasolabial folds. The follow-up period was 12 months. Effectiveness was assessed using the wrinkle severity rating scale (WSRS) and the subjects' preference. Safety was assessed by adverse events and symptoms of local tolerability recorded by individuals for 3 weeks after treatment. At 6 months, AHed was not inferior to AHper (assessed by the mean change from baseline in the WSRS score). There was a significant difference in the average change of the WSRS score from the baseline in favor of AHed from 3 to 12 months and most individuals preferred AHed to AHper at 12 months. However, the overall response rate was similar across products and remained high throughout the study. At 12 months, approximately 80% of individuals still responded. Both products were well tolerated and associated with some treatment-related adverse events.[22]

Lee *et al*. (2017) compared the pain relief, efficacy and safety of IDF® hyaluronic acid containing lidocaine and IDF® hyaluronic acid without lidocaine to correct nasolabial folds. Sixty-two individuals were included in a randomized, multicenter, double-blind, split-face study of AH IDF® with lidocaine and AH IDF® without lidocaine. For the split face study, AH IDF® with lidocaine was injected on one side of the nasogenian groove and AH IDF® without lidocaine was injected on the other side. The first assessment variable was pain at the injection site, measured on a visual analog scale of 100 mm (VAS). The second evaluation variables included the global aesthetic improvement scale, the wrinkle severity rating scale and adverse events. Immediately after injection, 91.94% of subjects showed a reduction of at least 10 mm in EVA scores on the side injected with AH IDF® with lidocaine compared to AH IDF® without lidocaine and the rate of subjects was statistically significant. The two fills were not significantly different in the safety profile or correction of wrinkles during the follow-up visit. AH IDF® with lidocaine significantly reduced injection-related pain during correction of nasogenian grooves compared to AH IDF® without lidocaine with no changing clinical results or safety. Most adverse reactions were mild and transient.[23]

Chopra *et al*. (2018) evaluated the safety and efficacy associated with the use of a blind tip microcannula for lip enlargement and correction of perioral rhytids using a small particle hyaluronic acid gel with lidocaine (SPHAL). A prospective multicenter study was carried out with 60 patients. The subjects reported events related to the injection for 2 weeks after treatment. Adverse events were assessed throughout the study. The 60 patients were treated with a medium volume hyaluronic acid of 2.2 mL. Adverse events due treatment were reported and assessed as related to the product and/or injection procedure included injection site swelling (13.3%), injection site bruising (6.7%) and injection site pain (1.7%). These were typically mild and transient in nature. No serious adverse events were reported after treatment.[24]

Guduk (2018) described three case reports that presented an unusual type of late reaction, consisting of temporary lower eyelid edema (1-3 days) several months after the periorbital injection of HA without recurrence. All patients were treated by the author using the same product. The patients had no history of autoimmune disease or allergic reaction. EMLA® cream (lidocaine) was applied for 30 min to anesthetize and 70% alcohol was used to prepare the skin before injection. Patients were instructed not to apply makeup on the day of treatment.[25]

All injections were made supra-periosteum using 25G cannulas. This late reaction was similar in all cases. The main characteristic was only sudden diffuse edema, without palpable nodules, pain, induration or tenderness. It was also observed temporary purple discoloration developed in two cases. No systemic signs and symptoms were observed. The first side effects associated with the filler injection, including bruising, redness and edema, were not seen in any of the patients after treatment. No patient had nodules. The cosmetic result was satisfactory immediately after treatment until the reaction.[25]

Robati, Moeineddin and Nasrabadi (2018) highlighted the importance of the patient's history in previous cosmetic procedures including rhinoplasty in the appearance of vascular complications. They reviewed medical records over a two-year period to identify all patients who were treated for vascular complications associated with hyaluronic acid filler injections. In each case, the subject's demographic data, habits, medical and surgical history, symptoms and clinical presentation. Seven patients had cutaneous necrosis after applying the filler, all of whom had undergone aesthetic rhinoplasty more than three years ago. These data corroborate the evidence in the literature, suggesting that nasal vascularization and surrounding areas may suffer vascular complications induced by filling in patients who have already suffered previous surgical injury.[26]

Funt and Pavicic (2015), Kopera *et al.* (2015) and Ascher *et al.* (2017) agree that the adverse effects of hyaluronic acid are preventable, once the professional has enough knowledge about the maxillofacial anatomy, the product characteristics and nature, its presentations on the market and the appropriate application techniques. These authors generally described that the reactions are mild to moderate and are well tolerated by patients, without specifying the locations and presentations, as well as they did not defined the therapy for possible complications.[13,15,22]

Moradi *et al.* (2015), Fischer *et al.* (2016), Anand (2016) and Lee *et al.* (2017) corroborate in their studies that the most prevalent findings of adverse reactions due hyaluronic acid injection were hematoma and pain. Anand (2016) reported only that there was a hematoma in the mental region of a patient. Moradi *et al.* (2015) did not observe significant differences regarding pain by patients who used hyaluronic acid with and without lidocaine in its composition. However Ficher *et al.* (2016) and Lee *et al.* (2017) agree that the use of hyaluronic acid with lidocaine in its composition shows a lower painful response reported by patients. None of the authors stipulated a treatment protocol for these effects.[15,18,19,23]

Sattler *et al.* (2016) and Chopra *et al.* (2018) found in their studies that the most prevalent effects were edema and redness at the site of filling with the gel. However, Artzi *et al.* (2016) evidenced in their findings that there were prolonged, recurrent and late inflammatory skin allergic reactions at the injection site of hyaluronic acid, pointing out that these reactions vary according to the product used. Only Artzi *et al.* (2016) presented a therapeutic approach using hyaluronidase and broad-spectrum antibiotics. The other authors did not express their considerations regarding to alternatives of treatment.[16,21,24]

Or *et al.* (2016) and Guduk (2018) state in their results that the region which presented the most complication due to the inection of hyaluronic acid, was the eyelid region. Guduk (2018) observed eyelid edema as an unusual late reaction several months after using the product, however, hematomas, redness and edema were not observed in any of the patients after applying the gel. Or *et al.* (2016) also observed in this region of application a complication hitherto not reported in the literature, a xanthelasma that refers to xanthomas that occur on the eyelids. They are generally seen clinically as a yellow plaque-shaped lesion that most commonly occurs near the inner portion of the eye socket. The findings of these two authors are extremely important for professionals working in the area of dermal fillers.[17,25]

Prado and Rodríguez (2016) and Robati, Moeineddin and Nasrabadi (2018) demonstrated more discrepant results that require attention from this literature review. Prado and Rodríguez (2016) reported a case of blindness and hemiparesis after filling hyaluronic acid in an eye-socket region. They developed a care protocol for such situations with the use of medications and hospital procedures to be followed by the professional responsible for applying the gel.[20,26]

Such findings corroborate the reports of Robati, Moeineddin and Nasrabadi (2018) who identified seven patients with also vascular changes and development of skin necrosis after injection of the hyaluronic acid filler. Unlike Prado and Rodríguez (2016), Robati, Moeineddin and Nasrabadi (2018) did not highlight therapeutic alternatives for such complications findings.[20,26]

CONCLUSION

Hyaluronic acid fillers are predominantly used in aesthetic and functional procedures in the maxillofacial region and it has been a crescent usage into noble and very sensitive face areas such as the eyes areas. Thus, an HA application liable to success shall respect important items/steps such as the patient's health history thoroughly studied, its injection must be correctly indicated and well applied by trained professionals who are very familiar with facial anatomy, appropriate injection techniques and the preparation of the integumentary system. Early identification of complications and immediate intervention with medications and invasive procedures can significantly decrease the risk of long-term consequences.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Carle MV, Roe RH, Novack RL. Occlusion Caused by Cosmetic Facial Filler Injection-Reply. JAMA Ophthalmol. 2015;133(2):225.
2. Barbanti SH, Zavaglia CAC, Duek EAR. Polímeros bioreabsorvíveis na engenharia de tecidos. Polímeros. 2005;15(1):13-21.
3. Fisher JP, Mikos AG, Bronzino JD. Tissue engineering. Tissue Engineering. 2007.
4. Huang S, Fu X. Naturally derived materials-based cell and drug delivery systems in skin regeneration. J Control Release. 2010;142(2):149-59.
5. Laurent TC, Fraser JRE. Hyaluronan. The FASEB Journal. 1992;6(7):2397-404 .
6. Kogan G, Soltés L, Stern R, Gemeiner P. Hyaluronic acid: A natural biopolymer with a broad range of biomedical and industrial applications. Biotechnol Lett. 2007;29(1):17-25.
7. Reitinger S, *et al.* A ready choice to fuel regeneration: A mini-review. Gerontology, Innsbruck. 2013;59(1):71-6.
8. Mori M, Yamaguchi M, Sumitomo S, Takai Y. Hyaluran-based biomaterials in tissue engineering. Acta Histochemica et Cytochemica. 2004;37(1):1-5.
9. Abduljabbar MH, Basendwh MA. Complications of hyaluronic acid fillers and their managements. J Dermatol Dermatol Surg. 2016;20(2):100-6.
10. Dyke SHGV, Caglia AEM. Reações locais agudas graves a um preenchimento dérmico derivado do ácido hialurônico. J Clin Dermatol Estético. 2010;3(5):32-5.
11. Bailey SH, Cohen JL, Kenkel JM. Etiologia, prevenção e tratamento de complicações de preenchimento dérmico Aesthet. Surg J. 2011; 31(1):110-21.
12. Ozturk CN, Li Y, Tung R, Parker L, Piliang MP, Zins ZE. Complicações depois da injeção de enchimentos de tecido mole Aesthet. Surg J. 2013;33(6):862-77.
13. Funt D, Pavicic T. Dermal fillers in aesthetics: An overview of adverse events and treatment approaches. Clin Cosmet Invest Dermatol. 2013;6:295-316.
14. Kopera D, Palatin M, Bartsch R, Bartsch K, O'Rourke M, Höller S, *et al.* An open-label uncontrolled, multicenter study for the evaluation of the efficacy and safety of the dermal filler Princess VOLUME in the treatment of nasolabial folds. Biomed Res Int. 2015. doi: 10.1155/2015/195328.
15. Moradi A, Shirazi A, Moradi-Poehler J, Turner J, Howell DJ. A blinded, randomized, split-face pilot study of bruising and pain with hyaluronic acid for correction of perioral lines using no lidocaine, lidocaine alone and lidocaine and epinephrine. Aesthet Surg J. 2015;35(4):443-55. doi:10.1093/asj/sjv043
16. Artzi O, Loizides C, Verner I, Landau M. Resistant and Recurrent Late Reaction

to Hyaluronic Acid-Based Gel. Dermatol Surg. 2016;42(1):31-7. doi:10.1097/DSS.0000000000000562

17. Or L, Eviatar JA, Massry GG, Bernardini FP, Hartstein ME. Xanthelasma-Like Reaction to Filler Injection. Ophthalmic Plast Reconstr Surg. 2017;33(4):244-7. doi:10.1097/IOP.0000000000000722
18. Fischer T, Sattler G, Gauglitz G. Lidocain haltiger Hyaluronfiller auf CPM®-Basis zur Lippenaugmentation: Erfahrungsberichteaus der Praxis [Lidocaine-containing hyaluronic acid filler on a CPM® basis for lip augmentation: Experience from clinical practice]. Hautarzt. 2016;67(6):472-8. doi:10.1007/s00105-016-3779-1
19. Anand C. Facial Contouring with Fillers, Neuromodulators and Lipolysis to Achieve a Natural Look in Patients With Facial Fullness. J Drugs Dermatol. 2016;15(12):1536-42.
20. Prado G, Rodríguez-Feliz J. Ocular Pain and Impending Blindness During Facial Cosmetic Injections: Is Your Office Prepared?. Aesth Plast Surg. 2017;41(1):199-203. https://doi.org/10.1007/s00266-016-0728-4
21. Sattler G, Philipp-Dormston WG, DenElzen HV, DerWalt CV, Nathan M, Kolodziejczyk J, *et al.* A prospective, open-label, observational, post market study evaluating VYC-17.5 L for the correction of moderate to severe nasolabial folds over 12 months. Dermatol Surg. 2017;43(2):238.
22. Ascher B, Bayerl C, Kestemont P, Rzany B, Edwartz C, Podda M. A 12-Month Follow-up, Randomized Comparison of Effectiveness and Safety of Two Hyaluronic Acid Fillers for Treatment of Severe Nasolabial Folds. Dermatol Surg. 2017;43(3):389-95. doi:10.1097/DSS.0000000000001031
23. Lee JM, Kim YJ. Granulomas de corpo estranho após o uso de preenchedores dérmicos: Fisiopatologia, aparência clínica, características histológicas e tratamento Arco. Plast Surg. 2015;42(2):232-9.
24. Chopra R, Graivier M, Fabi S, Nestor M, Meuse P, Mashburn J. A Multi-Center, Open-Label, Prospective Study of Cannula Injection of Small-Particle Hyaluronic Acid Plus Lidocaine (SPHAL) for Lip Augmentation. J Drugs Dermatol. 2018;17(1):10-6.
25. Guduk SS. An Unusual Delayed Type Reaction Following Periorbital Filler Injection With Hyaluronic Acid. Aesthet Surg J. 2018;38(8):109-13. https://doi.org/10.1093/asj/sjy035
26. Robati RM, Fatemeh M, Almasi-Nasrabadi M. The Risk of Skin Necrosis Following Hyaluronic Acid Filler Injection in Patients with a History of Cosmetic Rhinoplasty. Aesthet Surg J. 2018;38(8):883-8. https://doi.org/10.1093/asj/sjy005

Article History: Submission Date : 27-10-2020; Revised Date : 25-12-2020; Acceptance Date : 05-02-2021
Cite this article: Filho JLF, Neto EMR, Campos FMT, Queiroz SBF. Oral and Maxillofacial Complications Due the use of Hyaluronic Acid as an Alternative for Facial Implants. J Young Pharm. 2021;13(1):14-8.