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Beyond the Aesthetics: Understanding Risks in Nonsurgical Rhinoplasty.

Magdalena Czach^{1*}, Monika Anna Kamińska², Monika Kienanh Do³, Marta Justyna Gonciarz⁴, Natalia Paduszyńska⁴, Anna Dąbrowska⁴, Dominika Karolina Adamiec⁴, Agnieszka Aleksandra Strojny⁵, Dominika Zaliwska⁶, Adrianna Kraszkievicz⁶, Zuzanna Czach⁷

1. LUX MED Sp. z.o.o., Postępu 21C, 02-676 Warsaw, Poland
2. Independent Public Clinical Hospital Witolda Orłowskiego, Czerniakowska 231, 00-416 Warsaw, Poland
3. Independent Public Complex of Health Care Facilities, Marshal Józef Piłsudski in Płońsk, Henryka Sienkiewicz 7, 09-100 Płońsk
4. Dr Anna Gostynska Wolski Hospital, Independent Public Health Care Institution, Marcina Kasprzaka 17, 01-211 Warsaw, Poland
5. St. Zofia Hospital, Żelazna 90, 01-004 Warsaw, Poland
6. University Clinical Hospital in Poznań, Przybyszewskiego 49, 60-355 Poznań, Poland
7. Faculty of Medicine, Medical University of Warsaw, Żwirki i Wigury 61, 02-091 Warsaw, Poland

Magdalena Czach [MC]: magdalena.czach@op.pl; ORCID: <https://orcid.org/0009-0009-3786-5706>

Monika Anna Kamińska [MAK]: monika.anna.kaminska1@gmail.com; ORCID: <https://orcid.org/0009-0004-3955-4710>

Monika Kienanh Do [MKD]: mkienanh@gmail.com; ORCID: <https://orcid.org/0009-0000-3155-0513>

Marta Justyna Gonciarz [MJG]: marta.gonciarz1@gmail.com; ORCID: <https://orcid.org/0009-0006-7746-1237>

Natalia Paduszyńska [NP]: natalia_paduszynska@onet.eu; ORCID: <https://orcid.org/0000-0001-9953-662X>

Anna Dąbrowska [AD]: annaalicjadabrowska06@gmail.com; ORCID: <https://orcid.org/0009-0003-2289-5909>

Dominika Karolina Adamiec [DKA]: dominikaa.adamiec@gmail.com; ORCID: <https://orcid.org/0009-0008-5975-3927>

Agnieszka Aleksandra Strojny [AAS]: agnieszkastrojny@icloud.com; ORCID: <https://orcid.org/0000-0003-0893-1881>

Dominika Zaliwska [DZ]: dzaliwska@gmail.com; ORCID: <https://orcid.org/0009-0009-1423-7918>

Adrianna Kraszkiewicz [AK]: ada.kraszkiewicz@gmail.com; ORCID: <https://orcid.org/0009-0008-4746-903X>

Zuzanna Czach [ZC]: zuzannamariaczach@gmail.com; ORCID: <https://orcid.org/0009-0009-6154-8022>

*Correspondence: magdalena.czach@op.pl

Abstract

Nonsurgical rhinoplasty (NSR), colloquially referred to as a "liquid nose job," is a procedure that employs injectable fillers to modify the shape and contour of the nose. This procedure is particularly suited to patients presenting with minor imperfections and nasal defects. The procedure typically entails the injection of hyaluronic acid-based fillers, which are preferred due to their reversibility and safety profile.

Although rare, dangerous complications are possible, therefore it is important to be aware of the risks associated with performing NSR and how to recognise and manage them. This article examines a number of potential complications associated with the procedure, including minor side effects such as bruising and swelling, as well as more serious risks such as vascular obstruction, skin necrosis and blindness. It is evident that the practitioner's experience and anatomical knowledge are of paramount importance in order to minimise the aforementioned risks.

The aim of this review is to delineate the potential hazards associated with NSR. It is imperative that both clinicians and patients are cognizant that NSR is not a risk-free procedure. Dissemination of information may facilitate the implementation of safer practices and superior outcomes in facial aesthetic procedures.

Keywords: Rhinoplasty / adverse effects; Rhinoplasty / methods; Dermal Fillers; Hyaluronic Acid; Injections

Introduction

Aesthetic medicine is garnering attention due to the plethora of procedures it offers for enhancing the appearance and perceived quality of life of patients. Dissatisfaction with the appearance of the nose is a prevalent phenomenon and a significant factor in the well-being of many individuals. The nose plays a key role in facial aesthetics and, due to its central position, any disproportionality is highly visible. Imbalances in length, width, tip position or deformities

such as a dorsal hump or deviation can disrupt facial harmony and cause serious problems for patients ^{1,2}. Although some patients recognise the necessity for rhinoplasty, they are hesitant to undergo surgical procedures to improve their nose due to the invasive nature of the procedure and the potential risk of complications.

In recent years, there has been a notable increase in the popularity of injectable techniques. Injections of fillers into the nasal pyramid for aesthetic or functional purposes are known as rhinofiller, nasal augmentation, liquid rhinoplasty, medical rhinoplasty, nonsurgical rhinoplasty or injection rhinoplasty ³.

Nonsurgical rhinoplasty (NSR) is becoming an increasingly attractive alternative for those seeking less invasive ways to improve the appearance of the nose. The procedure is particularly suited to patients with minor imperfections and defects in the nasal area that do not require full surgical intervention ^{2,4}.

Nonsurgical rhinoplasty is often promoted on social media through visually appealing videos and images. This portrayal can mislead patients into believing that these procedures are simple, risk-free and suitable for any practitioner, regardless of their qualifications ⁵.

It is therefore crucial to be aware of potential complications and how to manage them, as well as strategies to prevent their occurrence.

Aim

This narrative review aims to discuss the potential complications associated with nonsurgical rhinoplasty, outline effective methods of managing these complication and identify ways to minimise associated risk.

Material and methods

Databases such as Pubmed, Medline, Google Scholar, and Europe PMC were used for the literature review with the keywords: nonsurgical rhinoplasty, liquid rhinoplasty. Thirty-two articles were considered for inclusion, with publication dates between 1996 and 2024 to ensure relevance to contemporary understanding and practice.

Anatomy - Highlights

The minimisation of potential complications necessitates a comprehensive grasp of the nasal anatomy, with a particular focus on its vascularisation.

The thickness of the soft tissues varies along the bridge of the nose, being thickest at the nasion and thinnest at the rhinion. Beneath the skin there are the following layers: superficial fatty layer, fibromuscular layer, deep fatty layer, periosteum or perichondrium and the bony-cartilaginous framework ⁶.

Changes in the shape of the nose can occur as a result of ageing, such as a drooping tip, an increase in the visibility of the dorsal hump and a reduction in the width of the body and cartilaginous ridge ⁷.

In most cases, the subcutaneous nasal venous system is located above the muscul layer along the lateral wall, dorsum and supratip regions of the nose. The arterial system is located in the superficial musculoaponeurotic layer (SMAS) in the subcutaneous plane ⁸. In order to prevent damage to these vessels, the majority of clinicians attempt to place the filler in the deep fatty layer between the fibromuscular layer and the periosteum or periosteum ⁹.

The arterial supply to the nose comes from the internal and external carotid arteries. The internal carotid artery gives rise to the ophthalmic artery, the main terminal branch of which is the dorsal nasal artery. The dorsal nasal artery, involving the external nasal branch of the anterior situs artery, supplies the skin and soft tissues of the nose. The main branch of the external carotid artery supplying the nose is the facial artery, involving the maxillary artery. The facial artery, which runs upwards, gives rise to the superior labial artery, the anterior lateral nasal artery and the angular arteries. The anterior nasal artery supplies the tip of the nose. They anastomose with the columellar artery, the infraorbital artery (a branch of the maxillary artery) and the dorsal nasal artery to supply the remainder of the skin and soft tissues of the external nose.

There is considerable variation in the vascular anatomy with different patterns of anastomosis. The paired lateral nasal artery and dorsal nasal artery run mostly lateral to the midline. Arterial vessels may also form complex subcutaneous plexuses or appear as a single larger artery crossing the middle part of the nose ¹⁰. Avoiding these vessels is crucial to minimising the major complications associated with NSR. Due to anatomical differences, it is not possible to predict whether a patient is at increased risk if the dorsal nasal artery is small or if there is a single large dorsal artery ¹¹. Particular attention should be paid to patients with a history of trauma or surgical rhinoplasty, as tissue and blood vessels may have been distorted ¹².

Indications

The published literature identifies various nasal deformities that can be addressed with injectable reshaping materials. These include issues such as narrow naso-frontal angles, dorsal humps, dorsal concavity or flat dorsum, contour irregularities or asymmetries, polly-beak deformities, decreased tip projection or rotation, alar base deficiencies, alar rim irregularities, narrow naso-labial angles, and minor asymmetries or irregularities following primary rhinoplasty. Non-surgical rhinoplasty with fillers can effectively address these concerns and improve nasal aesthetics without the need for surgery ^{2,13}.

Patients who have previously undergone rhinoplasty may be eligible for non-surgical correction. However, it is important to note that the degree of correction achievable will depend on the extent of scarring and the elasticity of the skin covering. The most common indications for correction following rhinoplasty are: asymmetry of the nasal dorsum, overreduction or collapse of the nasal dorsum, a boxy or asymmetric tip ¹⁴.

Contraindications

The use of fillers is contraindicated in several circumstances, which can be categorised as absolute or relative.

Absolute contraindications include pregnancy, lactation, fever, active phase of autoimmune diseases, skin infections, hypersensitivity reactions to fillers, previous placement of implants in the area to be treated, and excessive and unrealistic expectations of the treatment.

Relative contraindications include a history of allergic reactions to numerous antigens, the use of anticoagulants, and a tendency to form hypertrophic scars and keloids ¹⁵.

Complications

The nose is one of the most susceptible areas for complications following filler injections. As such, it requires special attention and precision. Therefore, only the most experienced and qualified practitioners should perform procedures in this sensitive area to minimise risk and ensure the best possible results ¹⁶.

Complications can be categorised according to their severity (mild, moderate, severe), their nature (ischaemic or non-ischaemic) or the time of their onset (immediate onset - within 24 hours after procedure, early onset - from 24 hours to 4 weeks after procedure, delayed onset - more than 4 weeks after procedure) ¹⁷.

Mild or moderate complications may include bruising, ecchymosis, edema, hyperpigmentation, and nodules. Serious complications that can occur after NSR include vascular damage, ischemia, and necrosis of the skin, loss of vision, and even stroke ^{10,18}. Additionally, herpetic outbreak or infection may occur ¹⁸.

Nasal septal necrosis is another rare complication following NSR. It can present as intranasal pain, odontalgia and rhinorrhea ¹⁹. A case has been documented in which injection of hyaluronic acid into the dorsal nasal region caused local ischaemia, resulting in ulceration of the nasal septum without visible skin lesions ²⁰. The lack of clear signs of vessel occlusion may result in a delay in diagnosis and treatment ^{19,20}.

Specific complications:

- ***Asymmetry***

The NSR should be carried out with the utmost precision. In order to prevent asymmetry, the filler should be injected at a slow and steady pace, in small, incremental amounts. It is crucial to observe the shape of the nose during the injection process to avoid any potential for asymmetry and to ensure that the filler is deposited in the correct location ⁶.

- ***Bruising, edema, ecchymosis***

These are the most common complications associated with NSR ^{6,18,21}. These complications are typically associated with direct damage to the vessel by the needle and manifest immediately following injection ⁶. They typically resolve spontaneously within a week ¹⁷. To mitigate this risk, it is advisable to utilise blunt-tip cannulas or apply a cold compress prior to injection. In the event of bruising, the use of cold compresses, Arnica, Aloe Vera, and vitamin K cream is recommended ¹⁸.

- ***Nodules***

Nodules that occur subsequent to NSR can be inflammatory or non-inflammatory in nature. Inflammatory nodules may manifest from a few days to several years following treatment. Conversely, non-inflammatory nodules are most often associated with inadequate administration, for instance, when the filler is applied too superficially. The nodules typically manifest within four weeks of NSR. The nodules can be effectively dissolved with hyaluronidase. ^{6,16}.

- ***Infections***

Infections, although relatively rare, are the second most common complication following NSR¹⁸.

A number of infections of various aetiologies have been observed, with the most common cause being a failure to maintain asepsis during the procedure. Maintaining adequate asepsis and hygiene during NSR is of paramount importance. Injections in areas of skin affected by infection should also be avoided^{18,22}.

Infection can result in cerebral abscess or other serious complications such as meningitis or encephalitis. Consequently, it is of paramount importance to take measures to prevent the occurrence of infection²³.

- ***Herpetic outbreak***

Local injection trauma can reactivate herpes virus infection, resulting in the development of herpetic skin lesions in the nasal mucosa and skin of the nose, as well as the cheeks¹⁸.

In patients with a history of herpes (more than three episodes), it is recommended that they take Valaciclovir. The medication should be taken at a dose of 1 g per day for a period of four days (one day before the planned procedure and three days after)¹⁷.

- ***Skin ischemia and necrosis***

Skin necrosis is a rare but potentially devastating complication that can result from direct injection of the filler into a blood vessel or from external compression caused by the filler. It is important to be aware of the symptoms that may indicate vascular occlusion and skin ischaemia^{12,16,24,25}.

Signs and symptoms of vascular occlusion that may occur include:

- blanching or pallor of the skin, which may result in a reticulated pattern (livedo pattern),
- pain,
- asymmetric swelling,
- slow capillary refill^{10,12,16,24,25}.

If vascular occlusion is suspected, the injection should be stopped immediately.

Damage to blood vessels can lead sequentially to local tissue ischaemia, necrosis, gangrene, tissue sloughing and permanent scarring¹⁶. Clinical signs of progression of vascular

complications include blue-black discolouration, blistering, ulceration, dermabrasion and sloughing ²⁵.

The key to preventing progression of skin ischaemia to necrosis is to identify and treat ischaemia as early as possible. Hyaluronidase should be injected immediately into the skin at the site of obstruction and into any areas of ischaemia in the immediate periphery ^{16,24}. Warm compresses and nitroglycerine paste may also be applied. In cases of necrosis and poor wound healing, surgical debridement and daily care may be required to minimise the risk of scarring ⁶.

- ***Vision loss***

One of the most serious complications that can occur is loss of vision. The occurrence of blindness subsequent to the administration of fillers is exceedingly uncommon. However, it is imperative to be cognizant of the potential risks associated with the NSR.

This complication arises from the inadvertent injection of filler directly into a vessel, even a small quantity of which is dangerous. The mechanism by which filler-related visual loss occurs is through the retrograde flow of the filler into the ocular arterial system via the dorsal nasal artery and its multiple anastomoses with the external carotid artery system ^{6,10}. Visual disturbances typically manifest immediately following injection and are unilateral. It is possible that a sudden and severe pain in the eye or headache may occur. Furthermore, some patients may experience vomiting and nausea ^{26,27}.

Symptoms affecting the periocular region, such as ptosis (eyelid drooping) or ophthalmoplegia (paralysis of the eye muscles), may result from ischaemia of the extraocular muscles or the nerves innervating them ^{23,26-28}.

Should visual compromise or other additional symptoms occur, the injection should be stopped immediately. It is imperative that an oculoplastic surgeon/ophthalmologist be consulted. It is of the utmost importance to carry out a test of visual acuity in each eye separately, a test of pupillary response to light and of extraocular muscle function. It is recommended that topical Timolol, oral 500 mg Acetazolamide be used to reduce intraocular pressure. It is also recommended ocular massage by compressing the eyeball for 5-15 seconds and releasing the pressure quickly. These actions may dislodge embolus, resulting in improved retinal and optic nerve perfusion. Hyaluronidase injections should be considered immediately. It is recommended that hyaluronidase be injected into the area where the injection was performed,

areas of skin ischaemia and along the arteries leading to the eye. Hyaluronidase can also be injected into the supratrochlear and supraorbital foramina ^{16,23}.

Retrobulbar and peribulbar injections of hyaluronidase may be beneficial for the treatment of vision loss resulting from hyaluronic acid injections, although this remains controversial and further research is required to confirm their efficacy ^{16,23,29,30}.

Following the administration of HA filler injections, patients with partial vision loss exhibited a more favourable prognosis than those with complete vision loss. Among the various patterns of vision loss, branch retinal artery occlusion was associated with the most favourable prognosis, while central retinal artery occlusion and ophthalmic artery occlusion were associated with the least favourable prognosis ²⁶.

Use of ultrasound

The use of ultrasound in aesthetic medicine offers significant benefits. It allows precise mapping of vascularisation, assessment of complications associated with filler use and guidance for both injection placement and hyaluronidase treatments ^{19,31,32}.

In relatively high-risk areas like the nose or nasolabial folds, it is recommended to use Doppler ultrasound to map the vascularization of these regions before injecting HA filler ³³.

Conclusion

Nonsurgical rhinoplasty, or liquid rhinoplasty, presents an appealing option for individuals seeking to correct minor nasal imperfections without undergoing invasive surgery. The use of hyaluronic acid-based fillers, valued for their reversibility and safety, has made this procedure increasingly popular. However, despite the minimally invasive nature of nonsurgical rhinoplasty, it is not without risks. This literature review has detailed a spectrum of potential complications, ranging from common, mild side effects such as bruising and swelling to rare but severe consequences including vascular obstruction, skin necrosis, and blindness.

The findings underscore the critical importance of practitioner expertise and a thorough understanding of nasal anatomy to mitigate these risks. Key strategies for minimizing complications include employing proper injection techniques, utilizing tools such as blunt-tip cannulas and Doppler ultrasound for vascular mapping, and adhering to strict aseptic protocols. In instances where complications do occur, prompt recognition and appropriate management are of the utmost importance to prevent long-term adverse outcomes.

For clinicians, the review provides a comprehensive overview of potential complications and their management, emphasising the necessity for continuous education and training in the latest techniques and safety protocols. For patients, it underscores the importance of selecting qualified, experienced practitioners for their procedures. By fostering an informed approach to nonsurgical rhinoplasty, the objective is to enhance the safety and effectiveness of this procedure, thereby contributing to better aesthetic outcomes and patient satisfaction.

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All authors contributed to the article. Conceptualization, MC.; methodology, MC, MAK, MKD; software, MJG, NP, AD, DKA, AAS; check, DZ, AK, ZC; formal analysis, MKD, MJG; investigation, NP, AD, DKA; resources, AAS, DZ, AK; data curation, MKD, NP; writing - rough preparation, MC, MAK, MJG; writing - review and editing, MC, AD, DKA, AAS, DZ; visualization, AK, ZC.; supervision, MAK; project administration, MC

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