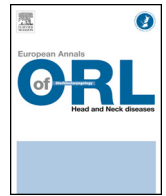




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Review

Nose burns: 4-dimensional analysis

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ABSTRACT

The nose is the central organ of the face. It has two essential roles, aesthetic and breathing. It is often seriously damaged in the context of facial burns, causing grotesque facial disfigurement. As this disfigurement is visible on frontal and profile views, the patient suffers both socially and psychologically. The nose is a three-dimensional organ. Reconstruction is therefore more difficult and needs to be more precise than in other parts of the face. Maintaining symmetry, contour and function are essential for successful nasal reconstruction. Multiple factors determine the optimal method of reconstruction, including the size of the defect, its depth and its site. Satisfactory social life is recovered only after multiple surgical procedures and long-term rehabilitation and physiotherapy.

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1. Introduction

Due to its central position in the face and its complex and delicate structure, the nose is certainly the most difficult anatomical unit of the face to reconstruct. In addition to its aesthetic function, it also plays an essential functional role: nose breathing [1–3]. Sequelae of nose burns have a major psychological and social impact for the patient.

Reconstruction of the burnt nose is therefore challenging, both in terms of the choice of the most appropriate surgical technique and integration of this nose repair in the broader reconstruction programme of the sequelae of panfacial burns [3].

2. Challenges in nose burns reconstruction

Due to its central and projected position, the nose, particularly the tip, is often involved in facial burns. The nose tip has a complex and delicate structure with a precarious blood supply, explaining the high incidence of tip destruction.

The shape and appearance of the nose are key elements of interpersonal relationships, and nose deformities induce major functional and social consequences [4].

The objectives of reconstruction of nose burns are restoration of its aesthetic (quantitative and qualitative) and functional characteristics. The skin constitutes the most visible part of the surgical

result. The characteristics of skin cover vary with age, sex, ethnic origin and site and the skin used for nose reconstruction must take these criteria into account. Nose reconstruction must also take into account the nasal aesthetic subunits (dorsum, lateral surfaces, alae and the tip-columella complex). These subunits determine the anatomical characteristics of the nose and must be considered to be independent aesthetic entities.

The functional dimension of the nose must be kept in mind throughout the steps of reconstruction, especially when considering the use of an osteocartilaginous strut designed to maintain patency of the nasal cavities, prevent the inexorable effects of gravity and limit distortion phenomena related to scarring [5].

3. Assessment and classification of the lesions

Assessment of sequelae of deep nose burns results in the following classification.

3.1. Sequelae confined to the skin

When the cartilages of the nose and nose tip are preserved and when the deformity is exclusively related to skin scars, only the skin needs to be replaced (Fig. 1A).

3.2. Intermediate sequelae

They are characterized by intact cartilages and correspond to one of the following sequelae (Fig. 1B):

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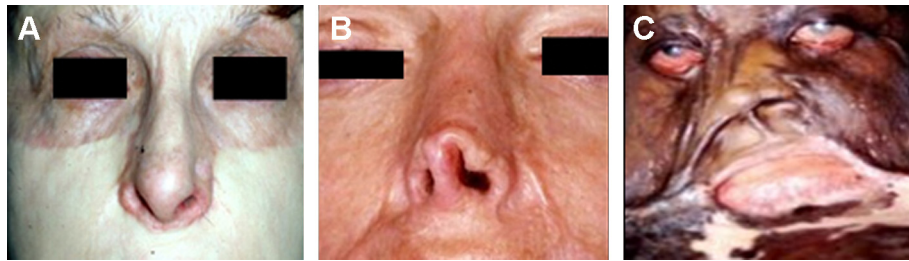


Fig. 1. Classification of sequelae of deep burns of the nose. A. Sequelae confined to the skin. B. Intermediate sequelae. C. Serious sequelae.

- tip retraction;
- elevation of the nostril margin;
- shortening of the columella;
- widening of the nasal vestibules.

3.3. Serious sequelae: tip amputation

Tip amputation is the result of deep burns that have destroyed the skin, muscle, cartilage and mucosa (Fig. 1C). According to Rose et al., the nasal mucosa is particularly resistant to burns and mucosal sequelae are exceptional [6].

4. Indications and timing of repair

Peri-orifical zones of the face (eyelids and lips) must be considered to be functional priorities and will be repaired before the nose [4,7].

Rhinopoesis is one of the first steps in the chronology of nose repair, as this step certainly has the greatest impact in improving the appearance of a severely burnt face [8].

4.1. Sequelae confined to the skin

In this case, only the skin needs to be replaced by full-thickness skin grafts shaped to the exact dimensions of the various anatomical subunits (Fig. 2). These grafts are applied after having excised all underlying fibrosis and after having restored the anterior anatomical relations.

4.2. Intermediate sequelae

4.2.1. Alar deformity

Alar rim notching can be treated by auricular chondrocutaneous composite grafts or non-specific local plasties (Z-plasties, rotation-local advancement flaps) (Fig. 3).

Marked alar retraction requires complex lowering of the alar rim. The deep plane is initially reconstructed by an inferior-based inversion flap of the skin of the alar rim: a non-transfixing incision is performed several millimetres above the alar rim, the most distal skin is cautiously detached and then inverted to constitute the internal surface of the newly reconstructed nostril [9]. Alar cartilages, when still present, can be dissected and lowered to their normal position.

The superficial plane is then reconstructed by full-thickness skin grafts or local flaps (nasolabial island flap, Rybka nasalis flap, which are rarely available in practice). Similarly, the flaps commonly used for full-thickness reconstruction of the alae (Préaux upper nasolabial flap, plicated nasolabial flap) are also generally not available [10].

4.2.2. Columella deformity

This type of burn causes retraction and shortening of the columella and can be simply repaired by a V-Y plasty harvested from the philtrum, or a superior pedicle philtral flap. A triangular chondrocutaneous composite graft can also be inserted to effectively replace the columella. It is often harvested from the root of the helix.

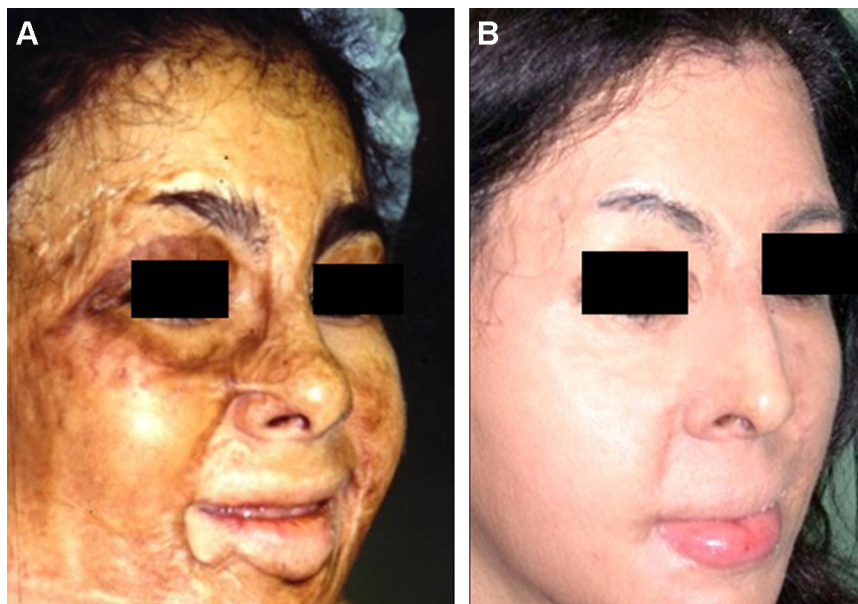


Fig. 2. Sequelae confined to the skin: only the skin must be replaced by full-thickness skin graft preserving the anatomical subunits. A. Preoperative appearance. B. Appearance 10 years later.

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