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Review

Full-thickness nasal defect: Place of prosthetic reconstruction

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ABSTRACT

Extensive rhinectomy or full-thickness defects are not uncommon, in particular in the treatment of skin cancer. The present study lays out the principles of choice and creation of prostheses for nasal reconstruction. Prosthetic nasal reconstruction in France depends on a specialist prescription drawn up under the "Ocular and Facial Prostheses" rubric of the official List of Products and Procedures. National health insurance cover is 100% on condition that the prosthesis is produced by an approved prosthetist. The present study describes production stages, forms and means of fixation, and the timeline of implantation. Nasal prosthetic repair is simple, fast and functional, allowing social rehabilitation despite full respect of carcinologic margins, and without ruling out subsequent multilayer reconstruction. Benefits and drawbacks, and the factors determining repair options according to pathologic context are discussed. Nasal prostheses are an integral option in the repair of full-thickness nasal defects and total rhinectomies. The head and neck surgeon needs expertise in indications and techniques of reconstruction, so as to prescribe nasal prostheses as the context demands.

1. Introduction

Nasal full-thickness defect repair is among the most difficult challenges in head and neck repair surgery. Presenting contexts may be traumatic or infectious (leprosy), but especially concern deep invasion by cutaneous tumor. The tip, wing and columella may require full-thickness repair [1–3].

The challenge is obviously primarily esthetic, as the nasal pyramid is essential to facial visual symmetry and deformity easily entails severe esthetic blemish [2,4]. Secondarily, it is desirable to restore good respiratory permeability [5,6].

Optimal esthetic results usually require reconstruction of the three anatomic layers defined in Burget's princeps description: the deep mucosal lining, intermediate cartilage and superficial skin [7,8]. Nasal reconstruction should be clearly explained to the patient [9,10].

In extensive full-thickness defects, especially in elderly subjects or patients with poor general health status, the use of a facial prosthesis should be discussed and explained. This represents a real alternative to 3D surgical reconstruction of the pyramid. The results are usually socially acceptable from the esthetic point of view, especially when the entire nasal pyramid is to be reconstructed [11,12]. The present study lays out the principles for prescription and implantation of such facial prostheses along with their role, interest and limitations.

2. Principles and procedures

2.1. Regulatory considerations

In France, national health insurance cover for facial prostheses requires a specialist prescription by an ENT surgeon, ophthalmologist, dermatologist, radiotherapist, etc. On condition that the prosthesis is produced by Health-Ministry-approved prosthetist, cover is 100% under rubric II, Section 5 ("Ocular and Facial Prostheses") of the List of Products and Procedures (*Liste des produits et prestations*: LPP) covered by the national health insurance system.

On reception of the medical prescription, the prosthetist must begin by drawing up an estimate detailing the various stages of production, specifying the materials and equipment required to fulfill the prescription with respect to the individual patient. This involves filling out a preliminary approval form called CERFA S3604c [13] to be enclosed with the prescription and the estimate and sent to the patient's local national health insurance office (*Caisse d'assurance maladie*: CAM).

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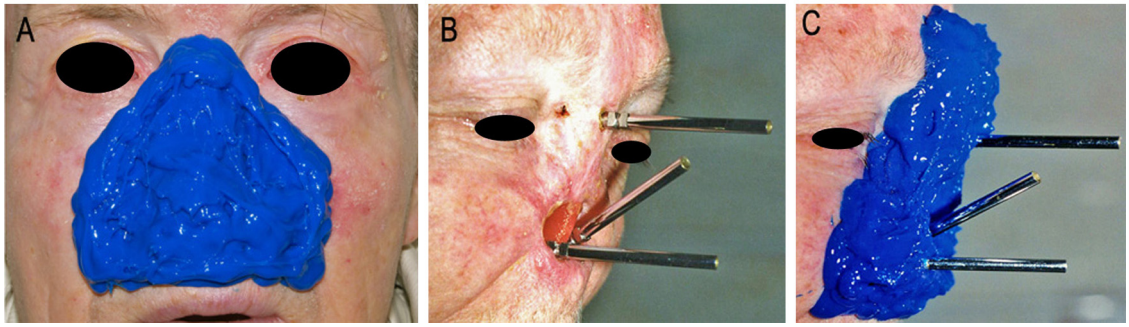

Fig. 1. (A) Taking primary defect imprints. (B) Tissue defect status with implants positioned for insertion of magnets into final prosthesis. (C) Taking imprints with bone-implant landmarks.

Like with any other prescription requiring preliminary approval, a written insurance coverage agreement must be provided by the CAM; according to the regulations, the request is deemed to have been accepted by default if no reply is received from the CAM within two weeks. Once the prosthesis has been manufactured, the prosthetist draws up an invoice based on the agreed items of the estimate sent to the CAM, and the CAM settles the invoice directly as third-party payer, without any up-front payment by the patient. The prosthesis may be renewed, again receiving full coverage, at a 2-year interval (or before, in case of biometric change to the implanted body region specified by the prescribing physician in a new prescription).

2.2. Manufacture

The first stage of manufacture consists in taking an imprint of the affected area, using high-fluidity condensation-cured silicone, so as to model the relevant body area with a high degree of precision (Fig. 1).

A cast is produced from the imprint, using a material such as dental plaster, onto which the form of the prosthesis is molded in hot modeling wax; this preliminary model is then directly tried out on the patient and refined by adapting the edges and finishing the surfaces, so as to render skin texture and any wrinkles or irregularities of the tegument. A second plaster mold (or counter-mold) is then taken, and the wax is melted off. The final prosthesis is then cast in the counter-mold using colored heat-cured medical silicone (Fig. 2).

The final step is performed with the patient: using natural pigments mixed in fluid silicone, the prosthetist paints the final coloring onto the prosthesis, by hand, in minute detail, with micro-brushes, millimeter by millimeter, so that it blends with neighboring tissue, vessels, telangiectasias, and skin markings, etc.

A final heat treatment fixes this definitive skin coloring on the prosthesis.

2.3. Types of nasal prosthesis

2.3.1. According to location

Facial prostheses may be applied in various areas of the face and be of varying size according to the loss of substance to be reconstructed. A nasal pyramid prosthesis, for example, is used to replace all or part of the nose, and, on the same principle, a pinna prosthesis may be used following total or partial ablation of the pinna,

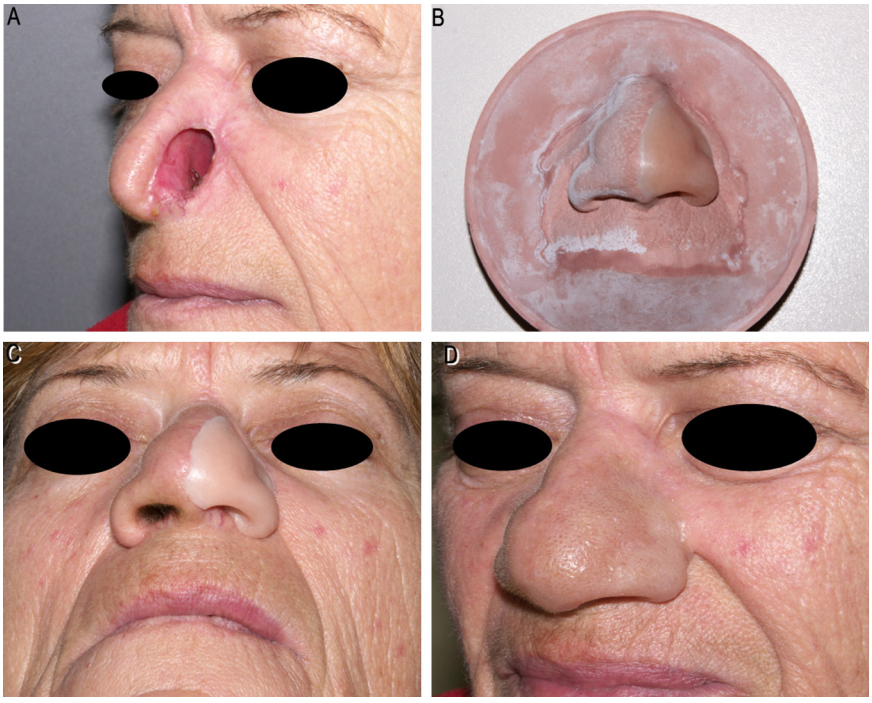

Fig. 2. (A) Left hemi-nasal defect. (B) Production of positive cast and wax mold (C) tried out and adjusted on the patient. (D) Final aspect.