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ORIGINAL STUDY

Reconstructive surgery of the nasal pyramid

Elena Latcan, "PRAIN" Medical Center, Bucharest, Romania

ABSTRACT

The author presents her personal experience in reconstruction of the nasal pyramid on 150 cases, children and adults, between 2000-2010.

Reconstruction of the nasal pyramid, regardless of age, was performed in cases of dysmorphias due to congenital malformations, accidents or surgical treatments with great loss of substance (benign or malignant tumors).

The author used the classical methods of reconstruction - rhinocorrection, rhinoplasty; however, she mainly focused on the use of heterografts - implantable silicone implants (endoprostheses), or reconstruction of the nasal pyramid entirely with elastomeric silicone (epitheses), fixed by adhesive, implants, titanium magnets. Silicone, as a synthetic material, is very well tolerated by the body, having been demonstrated that it is a good oxygen carrier. Both nasal silicon and titanium implants are well tolerated, with good aesthetic, functional and psychological results. Patients regain an almost normal appearance, having a good family and social integration an improved quality of life.

KEYWORDS: reconstruction, rhinocorrection, rhinoplasty, heterografts, silicone, titanium implants, magnets, endoprostheses, epitheses.

INTRODUCTION

The nose - the nasal pyramid is an essential anatomical element of the central region of the face, with a mainly aesthetic role, brain protection in case of accidents (traumatic shock attenuation) and functional by its positioning at the beginning of the upper respiratory trac. It has an important role in breathing, smell, taste and protection of the lower respiratory tract (cleans, moistens and warms inspired air)[1].

Generally, an individual, according to sex and age, is more concerned with aesthetic appearance than with the functional aspect. Hence the multitude of surgical techniques that emerged and developed many years ago, depending on the techniques that have appeared and improved, instruments, equipment, doctor's training. There is no special technique to achieve reconstruction of the nasal pyramid; it mainly differs depending on the anatomic appearance of each patient's nose[2].

The doctor, as an objective person and according to his training, must choose the most suitable method for the respective patient, regardless of his subjective wishes. He must also explain by all methods (photographs, measurements, endoscopic examination) what is best to apply in order to obtain the maximum aesthetic and functional result. Patient's appearance and psychological implications are very important and must be perceived and fought with methods specific to the surgical speciality, since satisfaction of final results, as well as avoidance of medicolegal implications depend on them, both for the doctor and for the patient. The patient needs to be correctly informed and he must justify by signature that he understood everything and agrees with the method applied by the doctor, that it is not always possible to achieve the aesthetic aspect imagined or desired by the patient, that evolution and surgery results can be seen after about 6 months to 1 year, that complications may occur, especially due to lack of doctor-patient collaboration or by failure to follow the post-surgery guidelines for care and check-up[3].

NASAL PYRAMID RECONSTRUCTION METHODS

Indications:

- congenital malformations;
- accidents;
- after major surgical interventions: benign or malignant tumors.

Nasal pyramid dysmorphia may exist either by lack or surplus of substance: soft parts, cartilages, bones[4].

Corresponding author: Latcan Elena,
e-mail: elenalatcan@yahoo.com

Types of nasal pyramid reconstruction:

I) By loss of substance, depending on materials used:

1. Reconstruction with biological materials: bone or cartilage auto- and homografts;

2. Reconstruction with inert materials: heterografts, acrylic, polyethylene or silicone external (epitheses) or internal prostheses (endoprostheses - implant)[3].

II) By surplus of substance:

A) Rhinocorrection:

- nasal dysmorphias due to acute or chronic trauma or congenital malformations;
- luxations and fractures (recent or old);
- mutilations.

B) Rhinoplasty - nasal hyperplasias - aesthetics.

Objectives:

- pyramid height reduction;
- shortening of the pyramid with possible lobe lifting;
- narrowing of the pyramid[5].

MATERIAL AND METHOD

Silicone, invented in 1970, together with titanium implants, are synthetic materials well tolerated by the body (silicone is even used as a cardiac valve - because it has been demonstrated that it is a good oxygen carrier). Silicone is used for replacement, through methods of prosthetic reconstruction, of various parts of the human body, in cases of great loss of substance, which cannot be replaced by common surgical techniques[6].

Titanium implant - invented in 1950 by Prof. Branemark (Sweden), with a very high purity (about 99,75 %), was initially used until 1977 in orthopaedics and dentistry, while beginning with 1977 it has been used in prosthetic cranio-facial and body reconstruction, for fixing prostheses with the Branemark ossteointegration method[7].

Titanium implant is very well tolerated (even a lifetime), without being toxic or allergic. The process of ossteointegration is a process of oxidoreduction that leads to bone growth around the implant, after a period of about 3 to 6 months from the surgical fixation[8].

There are many methods and techniques, depending on the defect, doctor's training and patient's wishes. Nasal pyramid reconstruction can be performed under local or general anaesthesia. There are traditional and new prosthetic surgical techniques that use silicone and fixation through ossteointegration with titanium implants or magnets[9].

Traditional surgical techniques:

- incision, lifting;
- reduction of the ossteocartilaginous height;
- paramedian osteotomy;
- smoothing of the osseous nasal crest;
- lateral osteotomy;
- shortening of the pyramid;
- reduction of the triangular cartilages height;
- suture of the interseptocolumellar incision;
- internal contention (anterior nasal packing);
- external contention - with splint + adhesive bandages[3].

Prosthetic reconstructive surgery using silicone and titanium osseointegrated implants:

I) Silicone epitheses:

They are indicated in great losses of substance, when it is not possible anymore to intervene by conventional surgical methods: in congenital malformations, accidents, after major surgery (benign or malignant tumors)[7]. A specific technique similar to the dental one is used, obtaining prostheses with the shape, size, colour and elasticity of normal tissues, and with a good anatomical integration in the respective region. These prostheses are light, aesthetic and well tolerated by the organism. They restore human face as close to normal as possible, improving the patient's quality of life and increasing his self confidence[9].

Their fixation can be made either with adhesive or titanium implants, or surgically, with general or local anaesthesia. They ensure greater stability, are easier to care and more aesthetic.

II) Silicone endoprostheses:

Indications - alar insufficiency or nasal dysmorphias with loss of substance, in congenital malformations, accidents, operations.

The technique used is also similar to the dental one, but it uses a special type of implantable silicone after 29 days, well tolerated by the organism and which can remain in the body for the whole life. In the defective area, a cavity is surgically created, where the silicone endoprostheses is introduced[10].

Postoperative EVOLUTION and prognostic are generally favorable with aesthetic, functional and psychic RESULTS for the patient.

COMPLICATIONS - multiple and different, both for the surgeon and for the patient, both in the case of classical methods of prosthetic rehabilitation using silicone and titanium implants[11]. Complications can be - early postoperative, in the first 7 to10 days, or late postoperative - after several months or years.

IMMEDIATE POSTOPERATIVE COMPLICATIONS (EARLY)

1. General complications:

- shock - rare in prolonged and very traumatic surgery with major blood loss - quick resolution in the Department of Anaesthesia and Intensive Care;

- postoperative resorption fever - insignificant in the first 3 days, but indicating an infection in the following 5-6 days - antibiotic treatment;
- nausea, vomiting dark blood, digested and swallowed during surgery, or intolerance to postoperative anesthetics and antibiotics[12];
- urine retention - it is reflex.

2. Local complications:
- bleeding, hematoma;
- eyelid, face and forehead edema;
- skin redness;
- skin incision.

3. Septic complications - rare because of the intra- and postoperative antibiotics use:
- abscess;
- inflammation of the lacrimal sac;
- acute infection of the upper airway tract;
- periostitis[3];
- necrosis around the titanium implants with their rejection[7].

LATE POSTOPERATIVE COMPLICATIONS can be aesthetic or functional:
- Vicious scars - physiologic, hypertrophic (keloid), atrophic (retractile), or pigmentation;
- Septoturbinate synechiae - breathing disorders;
- Immune response - prostheses or homografts allergies;
- Lowering of the raised tip;
- Nose widening;
- Movement or curving of the cartilage graft;
- Bone or cartilage resorption in homografts;
- Perichondritis;
- Nasal algiae;
- Nasal pyramid dephormities;
- Pharyngeal mycosis;
- Hypoesthesia, paresthesia in the operated region;
- Neuralgia;
- Psychiatric disorders;
- Anosmia[2].

CASE PRESENTATION

A) Epitheses - accidents :

CASE 1: animal bite mutilation (rat)

Figure 1 B.C., one and a half years old, Bucharest. At nursery, while sleeping, the child was mutilated by a rat which ate his nose. The nasal pyramid reconstruction has been made with adhesive fixed silicone. After the age of 6, titanium implants and magnets will be used. Aestethic, functional and social results are very good.

Case 2 - animal bite mutilation (horse)

Figure 2 C.S., 42 years old, Teleorman. Domestic accident with right nasal wing destruction due to horse bite. A silicone epithesis has been used, with favorable results.

Case 3 - malignant tumors surgery

Figure 3 B.T., 63 years old, Galati. Skin neoplasm of the nasal pyramid. Total rhinectomy was performed, and nasal pyramid reconstruction consisted of adhesive fixed silicone prosthesis. The patient regained his human appearance with the improvement of breathing, sleep and quality of life.

Case 4

Figure 4 D.V., 55 years old, Sibiu. Destruction of the nasal pyramid due to squamous cell carcinoma, appeared after prolonged exposure to high temperature while working on a construction site in the Middle East. After a failed attempt of flap reconstruction in the Department of Plastic Surgery in Bucharest, a silicone nasal epithesis was fixed over the existing flap with adhesive. But the disease had a fulminant evolution with the invasion of sinuses, orbits, eyes, with brain metastases followed by the patient's death after categorical refusal of surgical reintervention or of any other treatment.

Case 5

Figure 5 B.I., 68 years old, Bucharest - right maxillary sinus cancer diagnosed 10 years ago, with invasion of the right orbit and eye, of the nasal pyramid, with numerous surgeries in the Buco-Maxillofacial Surgery Department, Plastic Surgery in Bucharest. In 1999, the doctor suggested prosthetic reconstruction of the affected area (the half upper right hemiface and eye orbit). In 2009, after unfavourable postoperative results, the patient required silicone reconstruction of almost 2/3 of the face.

Case 6

Figure 6 P.V., 65 years old, Bucharest - with total rhinotomy and resection of the first half of the hard palate for squamous cell carcinoma. The nasal pyramid and the upper lip were reconstructed with silicone, while the hard palate with insertion of an acrylic obturator prosthesis. Aesthetic and functional results were favorable, the prosthesis becoming almost unnoticed by using glasses and a mustache.

Case 7

Figure 7 D.F., 64 years old, Bucharest - Total rhinotomy and left hemimaxillectomy with resection of the first half of the hard palate, surgery performed for squamous cell carcinoma with left narinary starting point. The central part of the face was reconstructed with 2 extraoral prostheses (nose and upper lip silicone epithesis) and one intraoral (acrylic obturator with teeth). The prostheses were fixed together with titanium magnets. The consolidation of the prosthetic assembly was made with progressive glasses which provided to the patient a safer travel environment. There were good aesthetic and functional results (breathing, chewing, eating, speaking) with a good psychological support.

B) Endoprostheses - congenital malformation

1. Nasal valve insufficiency, lack of development of the bilateral alar cartilage during intrauterine life or acquired atrophy.

Case 1

Figure 8 C.V., 38 years old, Bucharest - chronic nasal obstruction with many treatments and surgery interventions. Implantable silicone splints are endonasally inserted with the remedy of all functional deficiencies (breathing, sleep, mood, taste, smell). The patient presented a good tolerance of the endoprosthesis without rejecting it so far (6 years).

2. Congenital facial asymmetry with nasal dysmorphia - saddle nose

Case 2

D.R., 19 years old, Bacau - facial asymmetry due to lack of development of the right hemiface and nasal dysmorphia with loss of substance (saddle nose). A complex reconstruction of the genian region, right cheek and dorsal region of the nose is performed using implantable silicone endoprosthesis, with good aesthetic results.

3. Accidents
a. Sledding

Case 1

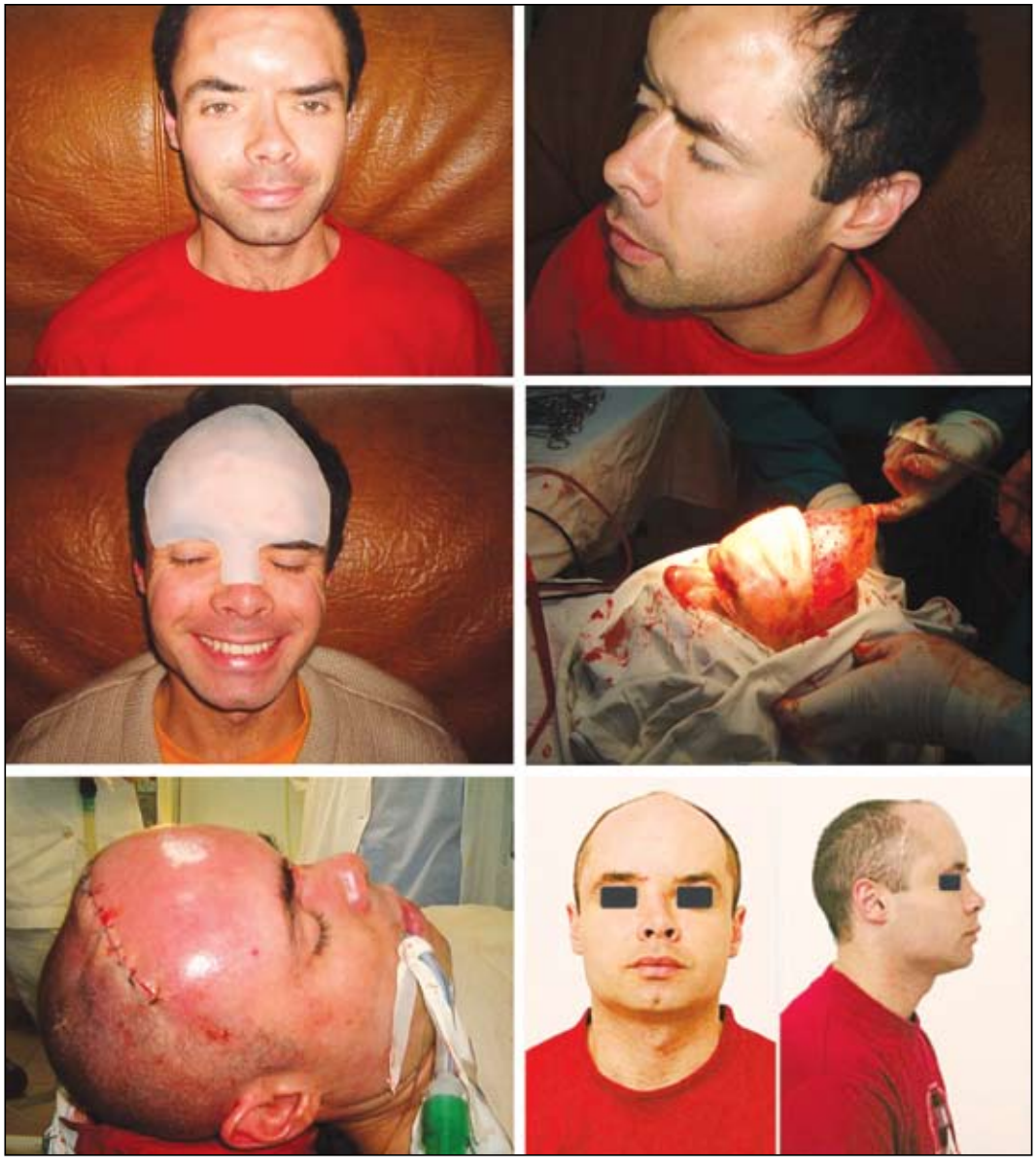

Figure 9 T.L., 34 years old, Brasov. - sledding accident (impact of the skull with a tree trunk) with clogging of the frontal region and the nose base, hypertelorism. The patient underwent repeated unsuccessful attempts of aesthetic reconstruction of the frontal region with acrylate, by the neurosurgeon, and of the nasal pyramid with an iliac crest bone graft, by the ENT specialist. After almost 10 years, a subcutaneous implantable silicone endoprosthesis was used for the frontal region and nasal pyramid. Aesthetic and functional results were very good, the prosthesis fitting perfectly in the area by tissue growth around it. The patient is married now and has two children.

b. Perinatal accident

Case 2

Figure 10 M.L., 26 years old, Teleorman - deformation of the nasal pyramid at birth, through obstetrical maneuvres. After numerous failed attempts, a surgical reconstruction with silicone was performed.

CONCLUSIONS

• Surgical reconstruction of the nasal pyramid with the multitude of surgery techniques, despite accidents or postoperative complications, is a useful technique in the aesthetic and functional reconstruction of the central region of the face.

• It is worth mentioning the modern technique of surgical prosthetic reconstruction in cases of large loss of substance, when the common surgical procedures are inefficient.

• Silicone and titanium implants are well tolerated by the body, without being toxic or allergic.

• Aesthetic role - the patient regains a normal appearance by restoring the normal anatomy of the respective area.

• Functional role - in breathing, mastication, phonation, hearing.

• Psychological implications in socialization and improvement of the quality of life.

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