

A dynamic nostril splint in the surgery of the nasal tip: technical innovation

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SUMMARY. Some types of surgery performed on the tip of the nose, such as secondary rhinoplasty on cleft lip and palate (CLP) patients, may have an uncertain end-result due to the difficulty in maintaining the surgically created status constant over time. This is precisely the reason behind the multiple proposals and surgical techniques presented by various authors through the years, in order to produce a long lasting, valid, surgical result. The problem has been approached by implementing varied and creative methods and still remains partially unsolved. Experience has shown that the application of a dynamic nasal splint has contributed efficiently to maintaining the surgical results by opposing healing contraction.

INTRODUCTION

Very often the postsurgical results of the correction of the nostril, or more generically, of the tip of the nose, do not come up to the expectations of either the surgeon or the patient. It frequently happens that a brilliant postsurgical result will deteriorate, sometimes very visibly, in the following months.

Particular reference is made to the following case applications: the secondary correction of nasal deformities in patients with facial or craniofacial malformations (cleft lip and palate in primis); traumas with multiple wounds or loss of nostril tissue; the reconstruction of the tip of the nose by means of loco-regional flaps or adjacent tissues, after its resection.

In several cases, in which it becomes necessary to reconstruct the tip of the nose or simply to recorrect some of the anatomical components, in order to achieve the correct architecture, the healing process could cause some alteration and create aesthetic and respiratory problems.

Some surgeons saw the need for a device which would result in an often delicate and difficult surgical procedure lasting over time (Matsuo et al., 1989; Nakjima et al., 1990). With this in mind, about 7 years ago, a nostril splint with some distinctive features was developed.

MATERIALS AND METHODS

The healing of scar tissue is a dynamic process which takes several months; therefore a splint has been developed that can exert an opposing force on the healing contraction, which lasts for an extended period of time. It is usually necessary to prevent the collapse of the nostril which has been reconstructed

either vertically, transversely or concentrically; the deformity to be corrected can be uni- or bilateral.

The basic idea was to create a device which could act, not statically, but with a gradual 'orthopaedic' action, even to the extent of overemphasizing the surgical correction.

The fabrication of the nasal splint was effected as follows. An impression of the nostrils is taken at the end of the surgery: after having protected and lubricated the nasal fossae with an antibiotic cream; the impression is taken using any silicone dental impression material, which has to be pressed inside the nose while still soft. The material is then left to harden so that it adheres to the columella and to the rim of the nostrils (Fig. 1A). The impression obtained (Fig. 1B) is then sent to the laboratory where the nostril splint is fabricated. The number (1 or 2) and the position of the expansion screws which need to be incorporated must be indicated on the mould.

Once the cast has been removed from the resin (methyl-methacrylate) copy, a device is fabricated (Fig. 2A, B) by inserting the expansion screws into one or both sides of the splint.

Some space is left at the side of the screw to enable the free flow of air. By expanding the screws the splint also expands, facilitating air intake. Before insertion, which usually takes place 10–15 days after surgery, the splint is hand finished by utilizing a laboratory cutter and an abrasive polisher. The length of the splint is trimmed in such a way that the endonasal extension (which usually measures between 10 and 20 mm) will ensure retention without bothering or traumatizing the patient.

Some instructions on the activation of the screws are given to the patient. Usually, during the first couple of weeks, a quarter of a turn is made every 2–3 days, thereafter the frequency is reduced to a quarter of a turn, once or twice a week, for a total period of 40–60 days (a quarter of a turn = 0.25 mm).

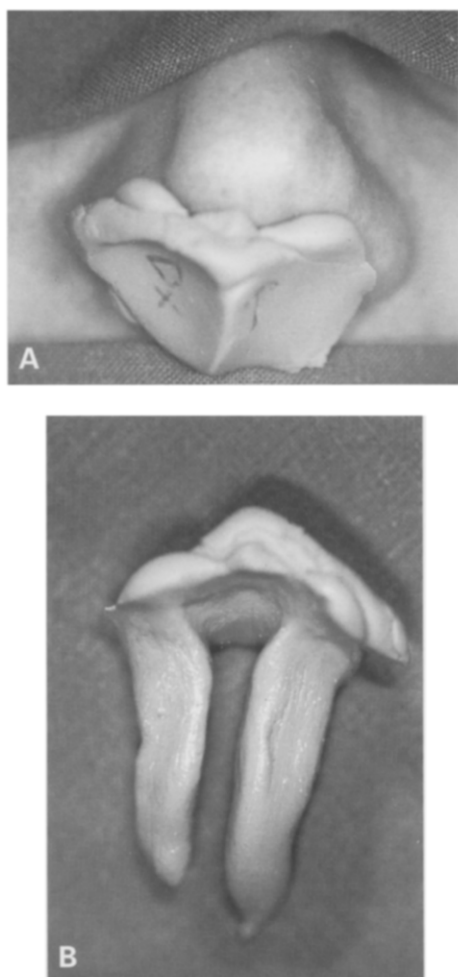


Fig. 1 – (A) and (B) The impression of the nostril is taken with a silicone dental impression material.

Once the entire length of the screw has been used up, if additional expansion is required, it is sufficient to return the screw back to its original position, add some additional resin to the external surface of the splint and restart the expansion process. The resin can be added to a specific point of the splint if the expansion is needed at a particular site.

During the active application period of the splint, the patient is required to wear the splint for at least

15–18 h per day. Afterwards the splint is kept in position, but inactive, for an additional period of 3–4 months. At the beginning of the inactive period (by inactive we mean a consolidating period in which no further splint expansion takes place) the splint is still worn for a period of 12 h; its application is progressively reduced, so that eventually it is only used at night.

CASE REPORTS

Case No. 1

A 23 year-old woman who had an abnormal uni-CLP, exhibited unsatisfactory results after treatment at another institute. All the components of the nasal pyramid were deformed and her air intake was compromised. The patient also had a palatal fistula and deformity of the upper jaw with dental malocclusion. A septorhinoplasty was performed to straighten the septum, the nasal bone and reshape the tip of the nose (Fig. 3A, B).

The morphology and the nasal breathing were maintained by a nostril splint fitted with a monolateral expansion screw. The patient refused to undergo any type of surgery that we suggested, i.e. the correction of the residual deformity of the nostrils, palate and upper jaw.

Case No. 2

A female, who at birth presented serious bilateral CLP with severe protrusion of the premaxilla, an almost absent columella and asymmetry of the nostrils which were extremely hypoplastic. At the age of 6 months she underwent a cheiloplasty; after a further 6 months, a marked deformity of the tip of the nose was present and the right nostril had almost collapsed. At the age of 2 years a columella lengthening was performed, the reconstruction of which could not be done in only one stage. At the age of 4, a noticeable deformity of the tip of the nose and of the nasal

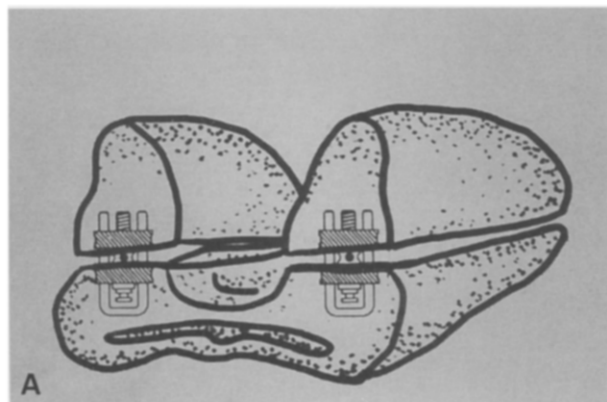


Fig. 2 – (A) The scheme of the nostril splint. **(B)** The retainer (nostril splint) in place.

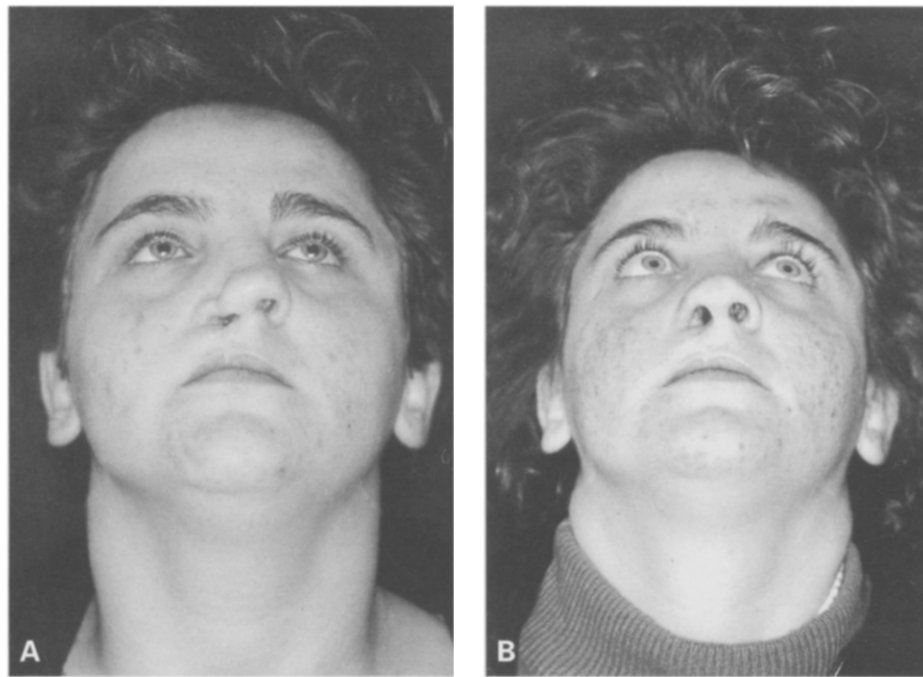


Fig. 3 – (A) and (B) The patient pre-operatively and 12 months after surgery.

pyramid still persisted, along with a deficiency of the inflow and outflow of air (Fig. 4A).

One year later a septorhinoplasty was performed using the *Ortiz-Monasterio* and *Olmedo* (1981) pro-

cedure; repositioning of the cartilaginous septum without resection; medial and lateral osteotomy of the nasal bones; nostril reconstruction using chondro-cutaneous auricular grafts. A nasal splint with a

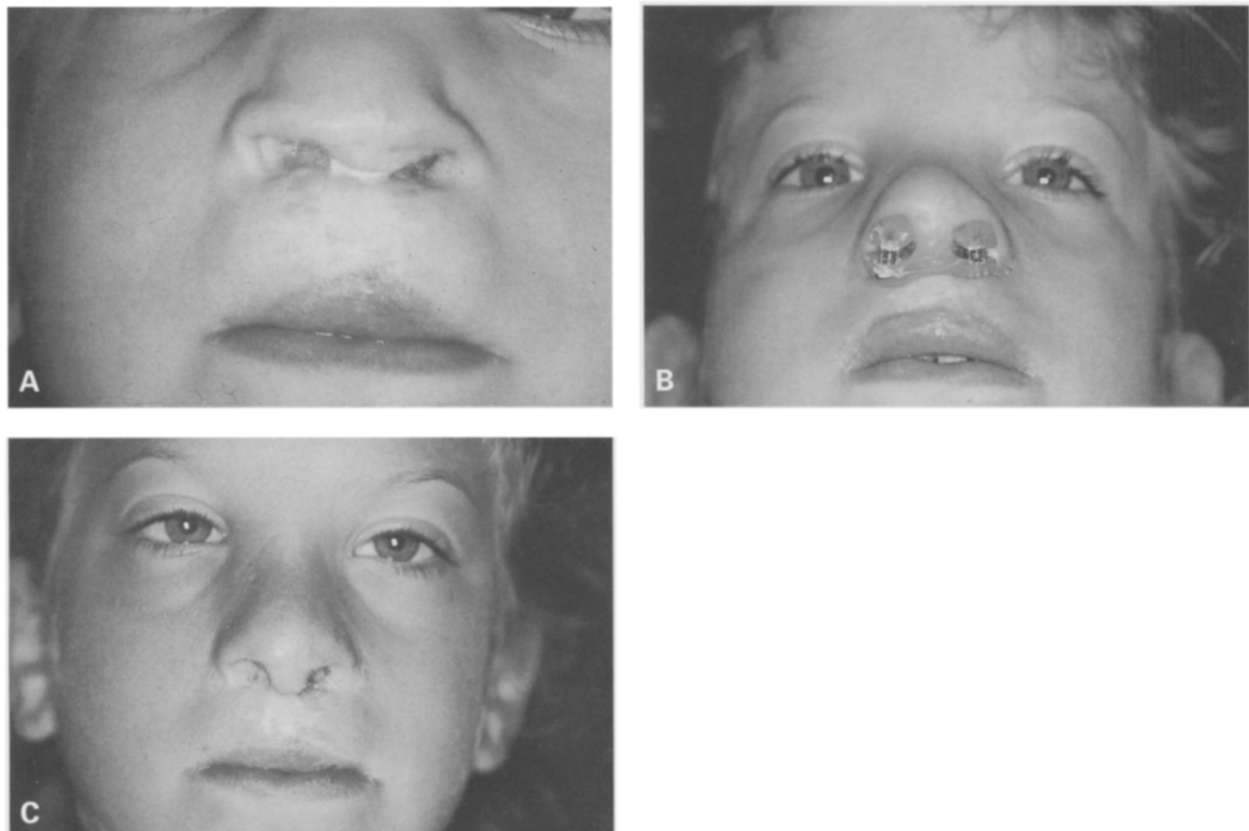


Fig. 4 – (A) The 4-year-old patient with a marked deformity of the pyramid and tip of the nose. (B) Application of the nasal splint after septorhinoplasty and chondro-cutaneous grafts. (C) The stable situation still persists 3 years after surgery.

bilateral expansion screw was inserted after surgery (Fig. 4B). In the following year, a marked aesthetic improvement in the nasal appearance as well as breathing efficacy was evident (Fig. 4C).

DISCUSSION

Sixty patients, over a period of 7 years, were treated utilizing the 'dynamic nostril splint'; the majority of these cases (46) were affected by uni- or bilateral CLP.

The application of the nasal splint was also tried immediately after primary rhinocheiloplasty but in these cases the screw was too big and the expansion was obtained by utilizing a periodically activated omega shaped spring. Young patients, however, were unable to tolerate the device; they continuously tried to remove it, even if an adhesive plaster had been put on, they kept on crying, were irritable and there was a high risk that they would swallow the device. Therefore, it was decided to limit the use of the nasal splint to a later age period, after secondary surgery had taken place, such as, for example, the lengthening of the columella, starting at the age of 4 or 5 years, when patient co-operation was more feasible.

The aim of the treatment in the secondary correction of the tip of the nose, in patients affected by unilateral CLP, was to produce symmetry of the two nostrils, with a regular contour and to avoid the collapse of the nasal valve. The use of the nasal splint had a further application in bilateral CLP secondary surgery in that it maintained the projection of the tip of the nose once the columella has been lengthened.

Nasal splints have been successfully utilized in preventing secondary deformity due to the healing contraction, which tends to collapse the reconstructed cartilaginous frame before it has consolidated. This condition frequently happens in many craniofacial deformities (secondary CLP, Binder syndrome, etc.), in the reconstruction of the tip of the nose due to

resection or trauma, and in all cases which require the utilization of cartilaginous, bone or heterologous grafts on the tip or on the dorsum of the nose.

The dynamic nasal splint was also useful when the nostril had been reconstructed with auricular chondro-cutaneous grafts, keeping the surgically acquired morphology and inhibiting the healing contraction. The dynamic nasal splint is certainly not able to turn a poor surgical result into a successful one; its goal was to maintain the good surgical results, and from this point of view, slight overcorrection may be useful.

The nasal splint is a device that can be easily made by any dental laboratory, it costs very little and it can be easily modified during the treatment.

The dynamic nasal splint has been used for the past 7 years, without producing any complication and more particularly its action on the tissues of the tip of the nose has never caused pressure sores or ulceration of the skin or mucosa.

Even if it is difficult to evaluate and, more specifically, to quantify the results obtained by using this device, experience has shown that it is very useful.

This splint has created an aesthetic as well as functional improvement in the reconstruction or correction of the tip of the nose, in some patients the use of this retainer has been essential in order to maintain the previously produced results.

References

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