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Aesthetic Plastic Surgery



# Secondary Rhinoplasty

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**Abstract.** Revision rhinoplasty is a complex aesthetic and reconstructive procedure in which both functional and cosmetic principles must be considered in the planning of an appropriate operation. Different techniques must be modified according to the specific defects. The modifications may vary from simple integration of a previous poorly performed surgery to complex grafting of homologous or heterologous material. The authors report their experience with 311 cases of revision rhinoplasty.

**Key words:** Nose—Rhinoplasty—Secondary rhinoplasty

Rhinoplasty is one of the most challenging plastic surgery procedures. The nose is composed of an osteocartilagineous skeleton and a skin/soft tissue envelope.

In dealing with the underlying structure, surgeons very often have subjected patients requiring secondary or tertiary rhinoplasty to aggressive resection of bone and cartilage. The quality and quantity of residual structures influence the aesthetic and functional sequelae and the corrective procedure.

The skin and soft tissues are critical components of postrhinoplasty deformity. Very thin and pliable skin shows every little irregularity in bone and cartilage, and a thick sebaceous skin does not conform well to the underlying structures, particularly on the inferior third of the cartilages. Most aesthetic and functional complications that require revision are caused by a misunderstanding of basic principles such as preservation of nasal integrity, "functional reshaping" of the nose, and good skin and soft tissue adaptation to the osteocartilagineous skeleton. At other times, unexpected healing of tissues causes distortion of an otherwise well-performed operation. This underscores the importance of atraumatic techniques and precision of dissection.

Finally, some noses are particularly difficult to manage, presenting some anatomic variants that predispose them to unfavorable rhinoplasty results, particularly if managed by unskilled surgeons [7]. Even expert surgeons report an average revision rate of 8% to 15% in the literature [11].

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## Materials and Methods

A review involving 276 secondary and 35 tertiary rhinoplasty patients was performed. These patients have undergone secondary surgery by the senior author from 1980 to 2000, and had been followed up for more than 1 year. The ages of these 109 men and 202 women ranged from 20 to 61 years. We used a closed approach for 288 patients, reserving the open technique for cases for which very complex grafting was indicated. Complete preoperative and postoperative photographic documentation was examined. Preoperative and postoperative evaluation was performed by speculum examination, nasal endoscopy, and rhinomanometric measurements. During the follow-up period, which ranged from 2 to 22 years, both aesthetic and functional results were evaluated.

## Results

The most frequent aesthetic deformities observed in these patients requiring secondary rhinoplasty were excessive dorsal resection (70.09%), open roof (39.8%), supratip deformity (49.8%), alar collapse (29.9%), asymmetry of the nose (80.06%), and

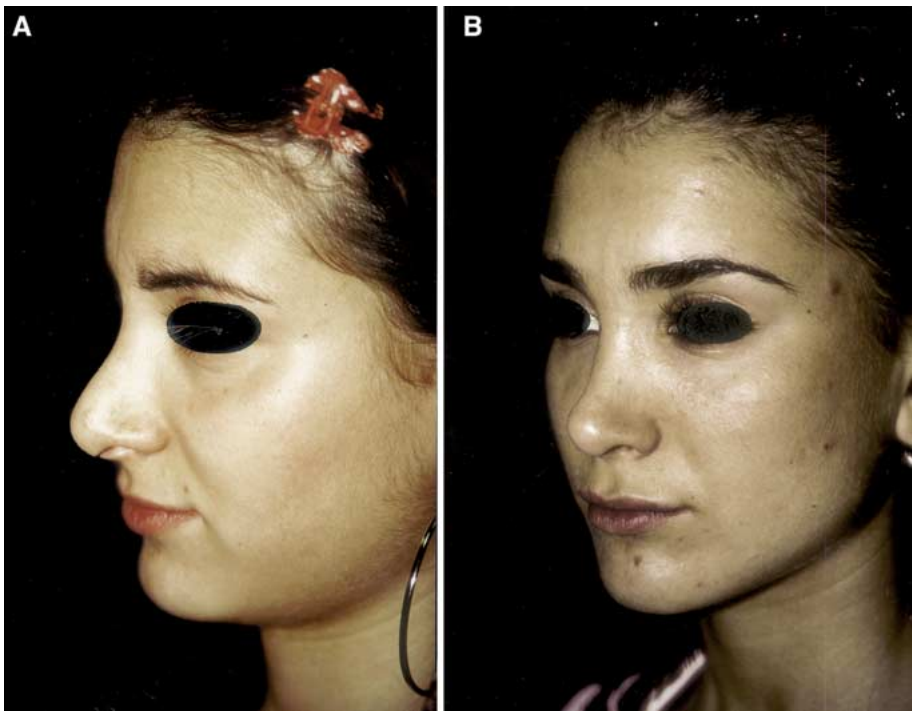


**Fig. 1.** (**A**) Supratip deformity resulting from unsatisfactory surgery to the septal cartilage, residual domes hypertrophy, and thick sebaceous skin. (**B**) Results 5 years after surgery involving reduction of quadrangular and alar cartilages, debulking of soft tissue overlying the tip, and regularization of the dorsum.

hanging columella (19.9%) associated with (9.96%) or without alar retraction. Less frequent complications (2 cases) were mucous cysts [3] and malposition or deformity of the previously inserted autologous (2 bony, 20 cartilagineous) or eterologous (3 polytetrafluoroethylene [PTFE] and 3 silicone) grafts.

Nasal obstruction was referred in 77.17% of the cases involving secondary rhinoplasty patients, and in 88.57% of the cases involving tertiary patients. The underlying causes were uncorrected septal deviations (80,06%), inferior turbinate hypertrophy (39.87%), alar collapse (29.9%), internal valve stenosis (39.87%), and synechiae (5.1%).

## Discussion

In some cases, it is possible to perform a revision rhinoplasty without using grafts (45% of the cases in our experience). In these cases, the most frequent aesthetic deformities observed have been dorsal irregularities, asymmetry of the nose [2], and supratip deformity (Fig. 1).

In other cases, residual structures have been excessively resected, and grafting is necessary. Whatever its source, the essential qualities of a structural graft are strength, integration, and stability over time. Among autologous materials, cartilage and bone have been the most useful in our experience [4,5,8,9]. We performed 147 cartilage grafts (25% of the patients): 129 in the alar region to correct alar collapse or retraction and 18 in the dorsum to correct overresection.

The nasal septum is the optimal source of cartilage, but often (for 60% of the cases in our experience) it has been widely removed by previous surgery. When available, it is very versatile, and we have used it for dorsal grafts, alar grafts, spreader grafts, and Sheen's graft for the tip.

Our second choice for cartilage harvesting is the auricular choncha. It is very useful for alar replacement because it conforms well to the natural curvature of the lateral crura and can be used as a composite graft when alar retraction must be corrected. We have never used costal cartilage because we find the donor-site morbidity unacceptable (chest scar and depression), and because it tends to regain its curved shape when used for dorsal grafting, even when incised at full thickness to release the curvature. We have operated on nine patients (tertiary cases) who had received costal grafts in the nasal dorsum and presented with "C" deformities. For these patients, we performed bone grafting after removing the costal cartilage (Fig. 2). Cartilage grafts can be indicated for many different defects.

The patient in Fig. 3 presented a very unnatural and "surgical" nose, with columella show, pinched nose, Pinocchio nose, and thin dorsum. She reported severe nasal obstruction. To correct the alar retraction and the pinched nose, we performed a composite condrocutaneous graft, elevated from the auricular choncha, in the alar region. Spreader grafts [12], taken from the nasal septum, were used to improve the internal valve stenosis, and to widen the excessive narrowing of the lower third of the dorsum. An onlay cartilage graft [13], taken from nasal septum, was used to improve the nasal tip contour.

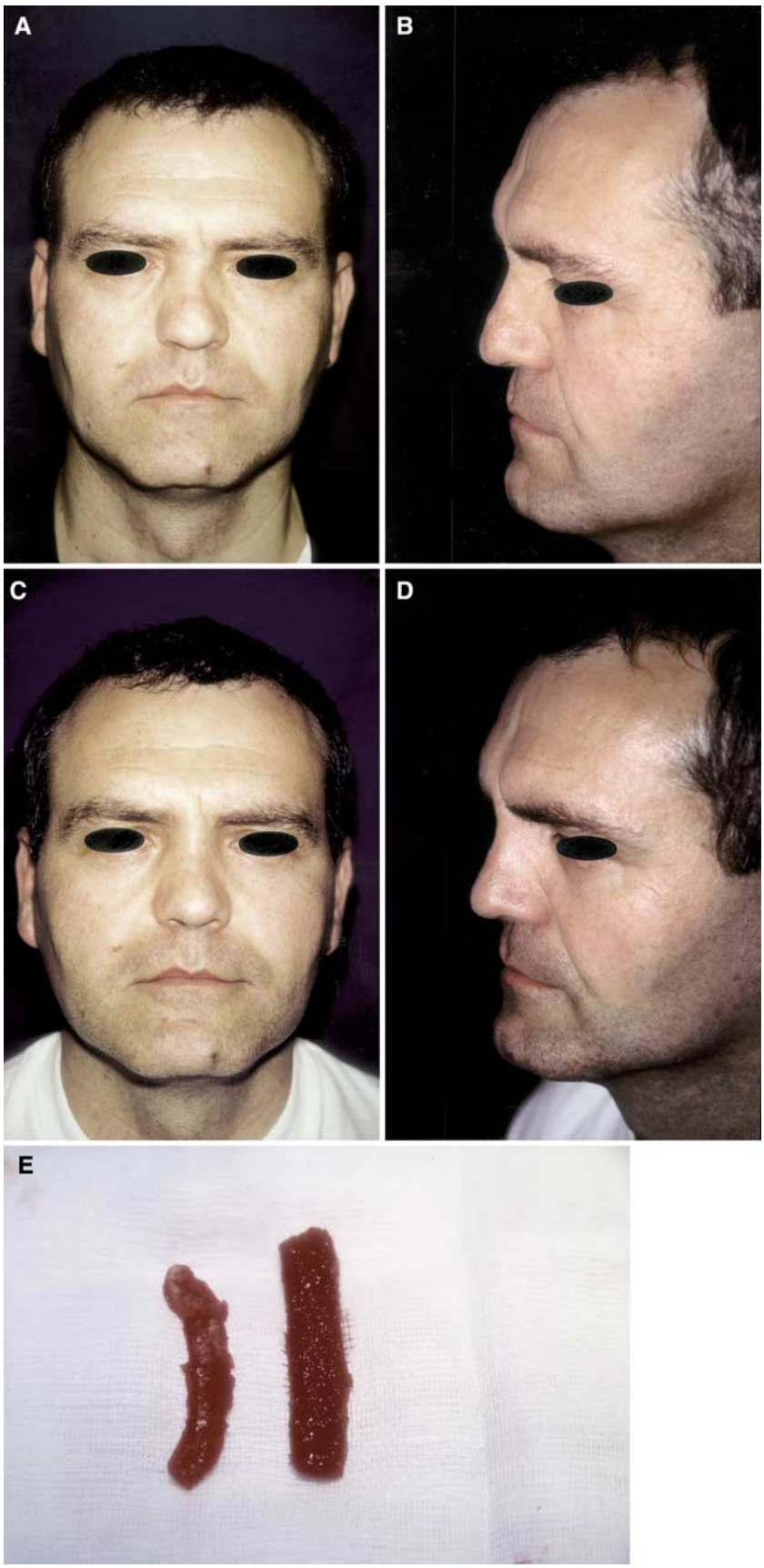


**Fig. 2.** (**A,B**) Preoperative view of a patient who had undergone costal cartilage grafting to the nasal dorsum. A "C" deformity is evident because of cartilage curvature. (**C,D**) Postoperative results 4 years after replacement of costal cartilage graft with bone graft elevated from the iliac crest. (**E**) The costal cartilage graft that was removed and the bone graft, elevated from the iliac crest, which replaced the cartilage. Notwithstanding the full-thickness incision, the cartilage had recovered its curved shape over the years.


**Fig. 3.** (**A,B**) Preoperative view of a patient showing columella show, pinched nose, Pinocchio nose, and thin dorsum. (**C,D**) Five-year postoperative view after composite condrocutaneous graft, elevated from the auricular choncha, in the alar region; spreader grafts; and onlay cartilage graft on the tip.

In the patient shown in Fig. 4 the lateral crura had been almost completely resected and the upper lateral cartilages excessively reduced. The septal cartilage was sufficient to provide alar triangular grafts, restoring the nasal outline and valve competence.

For 89 patients, the cartilage was judged insufficient for dorsal grafting because wide resection of the osteocartilagineous structures had been performed and structural strength was required. Bone grafting then was our first choice. We always elevated bone grafts from the iliac crest [1]. This donor site presents, in our opinion, many advantages over cranial bone, widely used by many authors [6,10]. In fact, the iliac crest offers a large amount of bone tissue with both cortical and spongy layers. Thus, even a thick graft can be harvested to fill wide defects of the nasal dorsum, whereas cranial bone thicker than 3 mm cannot be elevated without exposing the donor site to a full-thickness defect and potential intracranial injuries.


**Fig. 4.** (**A,B**) Preoperative view of a patient with significant alar collapse. (**C,D**) Postoperative view 10 years after surgery, in which cartilage triangular grafts harvested from the residual nasal septum cartilage were used in the alar region.

After preparing the recipient bed, by removing any osteocartilagineous irregularity, we shape the spongy layer of the graft in a tile fashion. Then we insert the graft with its cephalic end in a subperiosteal pocket, with the cortical layer in contact with the osteocartilagineous frame of the nose. The shaped spongy part of the graft follows the contour of the nose, harmoniously blending the edge of the graft with the rest of the nose. No steps were palpable in the postoperative course. We have always shaped the graft in pyramid fashion: thicker at the cephalic part and thinner at the distal end. Just before the tip, we created a little hollow on the dorsal line of the graft to prevent supratip deformities. We keep the graft fixed just, performing limited lateral undermining at the nasal radix, which prevents displacement and keeps

**Fig. 5.** Good proximal osteointegration of the bone graft, elevated from the iliac crest, with the nasal bones (inside the spot) 10 years after surgery.

**Fig. 6.** In this patient, iliac crest bone grafting had been performed 10 years earlier because of significant dorsal osteocartilagineous overresection resulting in a severe saddle nose deformity of the whole nasal dorsum. Complete resorption of the graft at its distal end can be seen, but correction is maintained, and no saddle nose deformity is evident, as shown by the external nose outline.

the graft and bone in tight contact. The bone graft executed with this technique becomes integrated with the nasal bones, as shown in Fig. 5.

It is very important to put the graft in tight contact with the recipient nasal bones under the periosteum at the nasal radix level. We put the spongy layer in contact with the soft tissues and the cortical layer in contact with the osteocartilagineous nasal structure. We performed 89 bone grafts (35%), and the clinical results were stable during more than 10 years of follow-up evaluation. Even when partial resorption of the mineral component of the bone graft can be demonstrated by x-ray examination (Fig. 6), the external correction is maintained, probably thanks to hard fibrous tissue that in part replaces the graft. No bone graft was exposed or extruded.

The patient in Fig. 7 presented with dorsal overresection, open roof, right alar retraction, and a pinched nose. Correction was achieved by dorsal bone grafting and a cartilage graft on the right ala. All the grafts had maintained a stable correction at the 7-year follow-up visit.

For 47 patients, we used expanded PTFE (e-PTFE) for dorsal grafting. This highly biocompatible material avoids capsular formation and provides for tissue ingrowth. We have found it indicated for minor defects of the nasal dorsum because, differing from bone, it cannot provide architectural support (Fig. 8).

In our experience, the disadvantage of e-PTFE grafting is the high incidence of infection (5 patients), even when it is implanted extramucousally, which is always indicated with this material. Infection results in a high potential for fistula formation and extrusion (Fig. 9). When forced to remove the implant, we treated these patients with homologous cartilage or bone grafting.

In 10 patients requiring dorsal grafting, the skin was particularly thin and scarred. In these cases, we used a derma or temporal fascia graft, according to patient preference, rolled up on the structural graft (bone or cartilage) to restore soft tissue bulk. This approach achieved a natural-looking result (Fig. 10).

## Conclusion

Revision rhinoplasty can range from minor corrections to complex reconstructive procedures requiring extensive knowledge of both aesthetic and functional


**Fig. 7.** (**A,B,C**) This patient had undergone surgery 3 years earlier and presented with dorsal overresection, open roof, right alar retraction, and a pinched nose. (**D,E,F**) This postoperative view 7 years after surgery shows correction achieved by dorsal bone grafting and a cartilage graft on the right ala. All the grafts maintained a stable correction.

principles and the skilled use of different surgical weapons. During the operation, difficulties and surprising situations not detectable at physical examination can emerge and change the surgical strategy. When grafting is necessary, in our experience, septal or auricular cartilage and iliac crest bone are the most useful grafts for nasal aesthetic and functional reconstruction.

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**Fig. 7.** Continued.

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**Fig. 8.** (**A**) Preoperative view of a patient who had undergone previous septorhinoplasty that resulted in a minor defect of the nasal dorsum, which was correctable without the need for structural strength. (**B**) Postoperative view 10 years after bone graft.

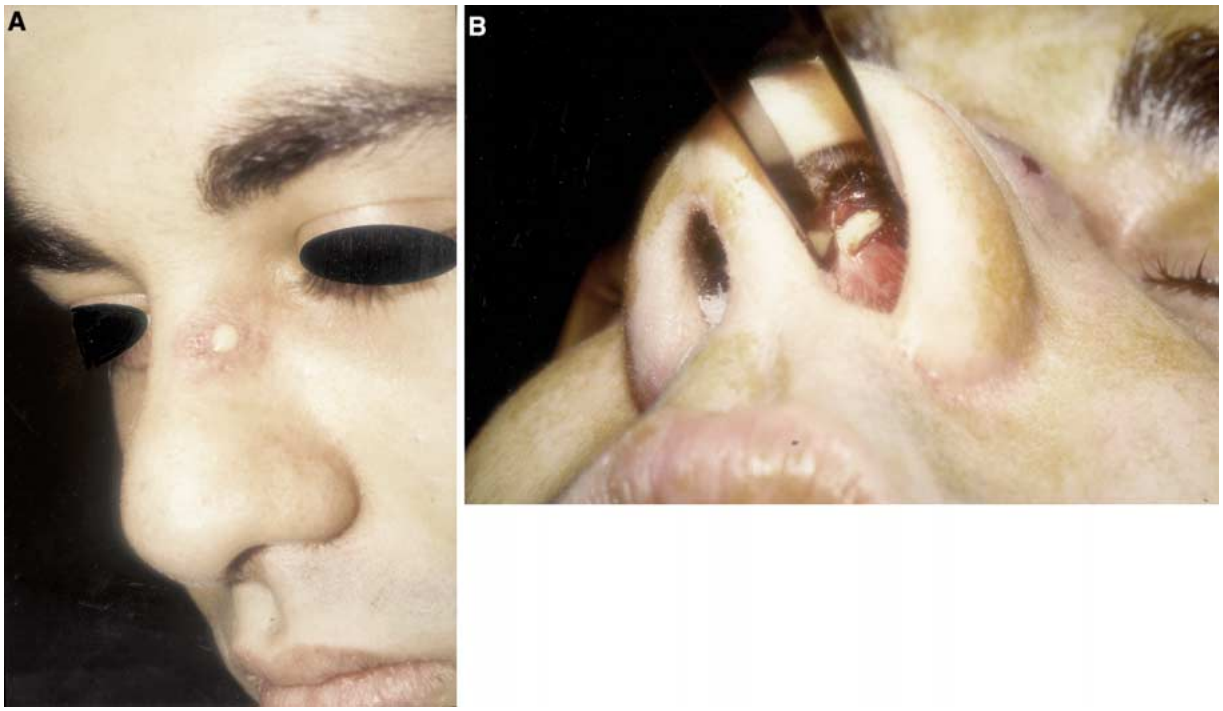


**Fig. 9.** (**A**) A case of infection of an expanded polytetrafluoroethylene (e-PTFE) implant 3 months after surgery with cutaneous fistula. (**B**) Extrusion of another implant, which had manifested signs of infection about 2 months after surgery, and which we tried to treat with antibiotics. The infection did not improve and resulted in intranasal exposure of the implant, which had to be removed.

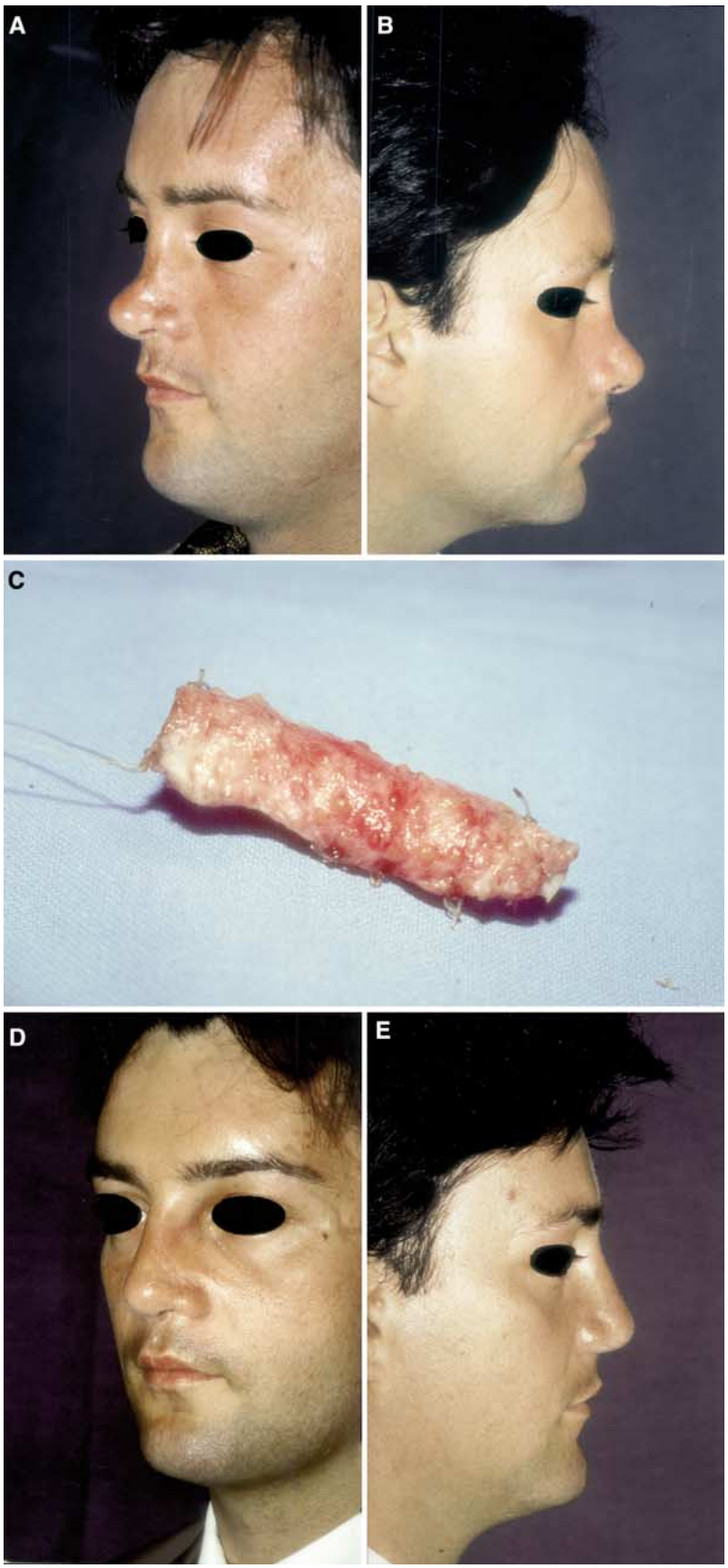


**Fig. 10.** (**A,B**) Preoperative view of a patient who had undergone a rhinoplasty 3 years earlier showing saddle nose deformity with thin and scarred nasal dorsum skin. (**C**) The bone graft was covered by a dermal graft to restore soft tissue bulk. (**D,E**) Postoperative views of the same patient 10 years after surgery.