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Aesthetic sequelae of septoplasty

H.D.VUYK & K.J.LANGENHUIJSEN

Department of Otolaryngology / Facial Plastic Surgery, Gooi Noord Hospital, Blaricum, The Netherlands

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VUYK H.D. & LANGENHUIJSEN K . J .
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This prospective study, using standardized pre- and post-operative photographs examined by three independent observers, included 100 septoplasty patients with a minimal follow up of 9 months. A risk of minimal aesthetic changes (21 %) could be documented, but significant post-operative changes (1 %) were rare. Surprisingly, statistical evaluation of operative data in relation to aesthetic changes could not identify specific surgical manoeuvres which may increase the risk of aesthetic changes. All patients must be fully informed about possible changes in nasal shape as a result of septoplasty. Pre-operative photographs should be considered a prerequisite before any type of septal surgery. Keywords *aesthetic sequelae septoplasty*

Introduction

At the beginning of this century septal surgery consisted of 'submucous' cartilage resections. Functional results were disappointing, sometimes marred by the occurrence of septal perforations. Moreover, the surgical aesthetic deformities could be severe. Subsequently, the historical trend has been a development away from aggressive resection toward more conservative septoplasty techniques with emphasis on realignment, weakening and subsequent reconstruction rather than reduction. The broader range of surgical possibilities has improved functional results and diminished the occurrence of aesthetic sequelae. However, considering the number of septoplasties performed, the frequency and magnitude of aesthetic changes after contemporary septal surgery has only been documented sporadically.[1-6] The frequency of aesthetic deformities after septal surgery mentioned in the literature is depicted in Table 1. This compilation of studies encompasses only one prospective study based on pre- and post-operative photographs of 33 patients.[6]

In view of the large number of septoplasties performed and the possible medicolegal consequences of aesthetic sequelae, this aspect of septal surgery deserves more attention.

The purpose of the present prospective study was to evaluate the aesthetic sequelae after septoplasty in a series of 100 patients and possibly identify specific surgical manoeuvres related to the occurrence of aesthetic deformities. We chose to exclude major septal replacements, batten type grafts and septorhinoplasties in order to document these changes which may occur in straight forward 'routine' septoplasties.

Correspondence: H.D.Vuyk, Department of Otolaryngology/Facial Plastic Surgery, Gooi Noord Hospital, Rijksstraatweg 1, 1261 AN Blaricum, The Netherlands.

Table 1. Aesthetic sequelae of contemporary septal surgery

Author	Minimal follow up (months)	Patient series («)	Aesthetic sequelae (%)
Stoksted(1969)	6	63	8
Thomas (1978)	24	48	8
Peacock (1981)	9	53	13
Dommerby (1985)	24	161	8
Tzadik(1988)	6	263	1
Phillipps(1991)	24	33	0
Total		621	5%

Technical development

Attempts to correct deviations of the nasal septum probably began in the 18th century, when Quelmaltz[7] advocated daily digital pressure for gradual septal correction. A more invasive treatment suggested a century later by Adams[8] consisted of fracture and splinting of the septum. Ingals[9] initiated septal surgery by removing acute angulations of cartilage, while even creating (or ignoring) perforations. Subsequently, Freer[10] and Kilian" described resections of deviated septal cartilage while keeping the mucosa intact (submucous resection). Metzenbaum[12] should be credited with the concept of septal realign-

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ment (swinging-door), still valid today. The area of septoplasty (implying remodelling and reconstruction) began with Cottle[13] while subsequent contributions were made by many others.[14,15] Modern surgical techniques for realignment (suture fixation, locking and cartilage shaving) sometimes combined with weakening (resection, castellation, scoring and morselization) and subsequent reconstruction (suture approximation, dorsal and caudal battens) reflect emphasis on preservation of cartilaginous tissue.

These techniques are applied incrementally based on the anatomical deficiency with minimal atraumatic dissection. Minimal dissection implies preservation of the contralateral mucoperichondrial flap for support, nutrition and stability. Only very rarely does the periosteum along the premaxilla and the floor of the nose need elevation.

Along the same modern surgical principles only the most conservative approach, dictated by the anatomical deficiency, is used. A Kilian incision with ipsilateral mucoperichondrial flap elevation gives a satisfactory exposure in a large number of cases. A hemi-transfixion is indicated when there is a caudal septal deviation. A hemi-transfixion with dissection through the membranous septum and elevation of the contralateral mucoperichondrial flap may cause damage to the ligamentous attachment of both medial crurae to the septum. Nowadays a transfixion incision for septal surgery alone has largely been abandoned.

AESTHETIC SEQUELAE

The modern principles of septoplasty, described above aim to prevent untoward aesthetic sequelae. However, in severe septal deformities when there is a need of extreme weakening, mobilisation and partial resections, dorsal septal support may be lost. Indeed the dorsal and caudal strut may not be able to support the middle and lower nasal third adequately. A remaining caudal strut which is too short and mobile may lead to downward and inward rotation of the remaining cartilaginous septal plate. The above mentioned phenomenon may lead to dorsal supratip saddling, loss of nasal tip projection and columellar retraction. These phenomena may occur as a direct consequence of surgery or secondarily by scarring in between the empty mucoperichondrial septal flaps with subsequent inward retraction.

Methods

Standardized lateral photographs using a single lens reflex 35 mm camera and 100 mm lens at a distance of 1.2 m were taken pre- and post-operatively. The minimum post-operative period before photographs were taken was 9 months. Slides were projected life size and examined at a distance of 2 m by an independent panel consisting of two radiologists and one of the authors who did not perform any of the surgery (KL). Each patient slide was looked at for a maximum of 1 min before judgement. The panellists were asked to rate dorsal saddling, columella retraction and loss of tip projection from 0 to 2. Zero being 'no change', 1 being 'minimal change' and 2 being 'significant change'. If none or only one of the three panellists noted a change at a particular site, the patient was categorized as 'no change'.

The operation records of all patients were studied. Six types of surgical manoeuvre which might increase the risk of aesthetic change were documented. These categories include:

(1) width of dorsal strut less than 1 cm
(2) width of caudal strut less than 1 cm
(3) disarticulation of the caudal strut off the premaxillary spine (with or without suture fixation)
(4) vertical shortening of the caudal strut
(5) disarticulation of the septal cartilage off the perpendicular plate in K-area leaving less than 1 cm under the dorsum attached
(6) no replacement of cartilage in the posterior mucoperichondrial envelope.

In none of the patients was the septum completely removed, corrected extracorporally and replaced as a free graft."[1] Patients who underwent a septorhinoplasty or those who had some type of battened grafts applied were not included in this study. Patients were categorized as 'at risk' if one or more of the six above mentioned manoeuvres was done during surgery.

Materials

The series consists of 54 women and 46 men. The age range was from 19 to 64 years with a mean of 38 years. The mean follow-up was 20 months, ranging from 9 to 46 months. Patients undergoing septoplasty in combination with rhinoplasty were not included in this study. A total of 16 patients in this study had had previous septal surgery.

Septoplasties were performed by three different otolaryngologists (S. v.d. Baan, P. Olde Kalter and H.D. Vuyk) having at least 5 years experience in general and university practice. In the vast majority of patients, a hemitransfixion with unilateral dissection of a mucoperichondrial flap allowed enough exposure for resection, remodelling and replacement of septal cartilage and bone.

All patients had silastic splints for 5-7 days with 1 or 2 days of light nasal dressing (Merocel). Two patients had a post-operative infection needing drainage and antibiotics.

Operation records were studied to identify the six technical manoeuvres which might put the patient at risk for an aesthetic change. The operation records of 15 patients had inadequate data for definite categorization. The operation records of 35 patients demonstrated one or more possible risk factors. In 29 patients one surgical risk factor, in five patients two surgical risk factors and in one patient three factors could

be identified. Fifty patients could be categorized as no-risk surgery.

Results

In 22 out of 100 patients an aesthetic change could be noted post-operatively. In 21 patients the changes were considered minimal. Only in one out of 100 patients was the change considered severe. In most of the patients the three investigators agreed with respect to the severity and location of the deformity. There was high 80% concordance between the three investigators (Concording variation 77-88%, Cohen's $\kappa = 0.40$; $Z = 9.95$; $P < 0.001$). Seventeen patients had a change in one of the three locations and five had a change in two out of three locations. Table 2 demonstrates the number of changes, the severity of the change and its location. As five patients showed an aesthetic change in two locations, the number of deformities exceeds the number of patients. In most patients the change was located in the supratip area with some loss of tip projection. Only one patient demonstrated a severe change in the supratip area and some loss of tip projection (Fig. la, b). In the rest of the patients, the change in the supratip area was subtle (Fig. 2a, b). Loss of tip projection (Fig. 3a, b) and columellar retraction (Fig. 4a, b) occurred less often. The frequency of at risk manoeuvres in these 35 patients is given in Table 3. Table 4 shows the number of aesthetic changes in relation to 'at risk' surgery. No significant relationship between aesthetic deformities and 'at risk' surgery could be established ($\%^2$ (2) = 0.005). Even by focusing only on patients with two or more surgical risk factors, no statistically significant relationship with aesthetic changes was demonstrated (x^2 (1) = 0.75). Of the two patients who had a post-operative infection needing drainage and antibiotic therapy, one demonstrated an aesthetic change. Noteworthy is the fact that in 13 out of 100 patients pre-operative dorsal saddling was noted. Previous septal surgery ($n = 16$) did not seem to put the patient at a higher risk for aesthetic changes with revision septoplasty in this study.

Discussion

Over the years an enormous number of reports has appeared in the literature on septal surgery. Only a few, however, specifically address aesthetic complications after septal

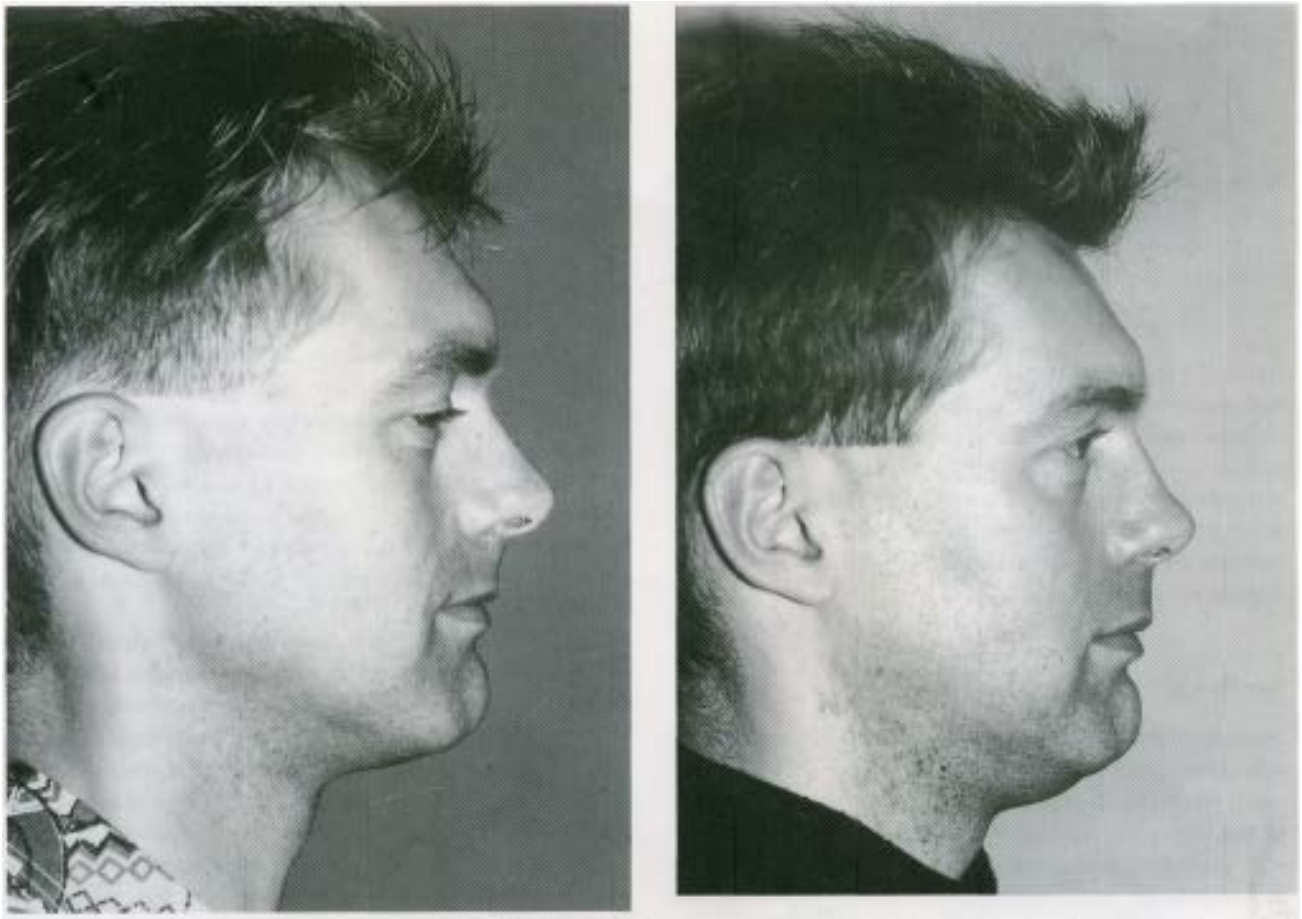

Figure 1. (a) Pre-operative septoplasty; (b) Post-operative significant change supratip area and loss of tip projection.

Figure 2. (a) Pre-operative septoplasty; (b) Post-operative subtle change supratip area and some loss of tip projection.

surgery.[1,6] The frequency of aesthetic complications including dorsal saddling, columellar retraction and loss of tip projection mentioned in these studies varies from O to 13% (see Table 1). It should be noted that the minimal follow-up in these studies ranges from 6 months[1,5] to 9 months[3] up to 24 months.[2,4,6] However, only Phillipps[6] can be credited for performing a prospective study using standardized pre-operative photographs. In this relatively small series of 33 patients, a comparison of pre- and post-operative photographs by the author/operator demonstrated no dorsal saddling or columellar retraction as a result of surgery. However, two out of 33 demonstrated saddling or columellar retraction, which in retrospect was present pre-operatively. This finding stresses the need for pre- and post-operative documentation for septal surgery in general. Interestingly, eight of 33 patients thought a nasal change was induced by surgery, while photographic comparison failed to demonstrate any changes in nasal shape. These findings question the value of retrospective studies lacking pre- and post-operative photographic documentation. Patient questionnaires used in a retrospective fashion may be considered particularly unreliable.

Our prospective study of 100 patients with a minimal follow up of 9 months, showed a 22% aesthetic change rate. This is significantly higher than in previous studies. Although a certain risk of minimal aesthetic changes (21%) could be documented, significant post-operative changes (1%) were rare. These figures represent the overall opinion of three independent observers, including two radiologists, experienced in visual detection, and one medical student (K.L.). The agreement of the three investigators in the large majority of patients does validate our findings.

The relatively high frequency of aesthetic deformities in this study may even be underestimated. First of all, those patients needing more extensive septal surgery (major replacement, batten grafts) were not included in the study. Obviously, more surgery and mobilization may be associated with a higher risk of post-operative deformities. Moreover, patients prone to aesthetic complications occurring as a result of septoplasty were scheduled for a septo-rhinoplasty and excluded from this study.

Theoretically, an aesthetic deformity (dorsal saddling, loss of tip projection, columellar retraction) after septal surgery may occur during the operation or in the postoperative period. It was our clinical opinion that most often the deformity occurs during the operation. In the case of mobilisation of the cartilaginous septum with resection of the bony attachment

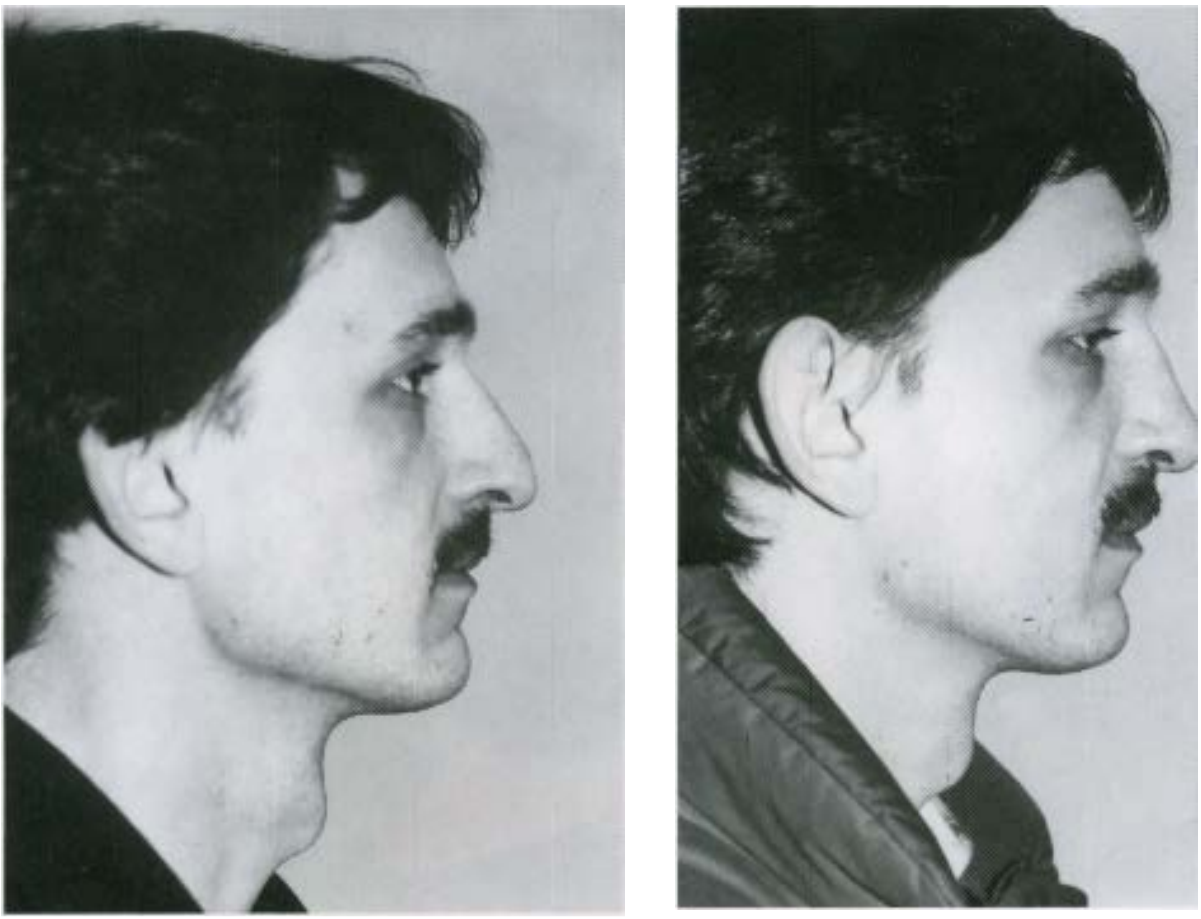

Figure 3. (a) Pre-operative septoplasty; (b) Post-operative loss of tip projection.

to the perpendicular plane together with resection of the basal strip of cartilage, the remaining cartilaginous septum may collapse in a ventral direction.[20] In the case of submucous resection intra-operative deformities may occur if the remaining strength (directly related to cartilage thickness and width) of the dorsal and caudal cartilaginous strut has been diminished considerably. Late depression of the dorsum and retraction of the columella may occur when inadequate dorsal and caudal cartilaginous struts are maintained and the remaining septal area is left unreconstructed. These late deformities may occur because of scar contracture pulling the remaining strut in a ventral and cephalic direction, causing supratip saddling and columellar retraction as well as possible loss of nasal tip projection. In view of the natural maturation and softening of scars from 3 to 4 months post-operatively a minimum of 9 months follow-up does, at least theoretically, seem enough to document even late post-operative changes. The evaluation of operative data in relation to aesthetic changes could not identify a statistically significant relationship between presumed at risk surgical manoeuvres and an increased risk of aesthetic changes. However, the fact that even patients in the 'no-risk surgery group' did show an aesthetic change, does suggest that more, still elusive, factors do play a role in post-operative aesthetic changes after septoplasty. These factors possibly involve septal cartilage dimensions, such as height, width and thickness, as well as its anatomical relationship to the surrounding bony structures.

Our study does show that septal surgery carries a risk of aesthetic complications. In view of this possibility patient counselling should include preoperative information regard-ing the frequency and magnitude of possible postoperative changes in nasal shape.

Indeed, informed consent does dictate that information must be openly discussed with the patient pre-operatively.[17] However, this is not common practice. Only about 25% of otolaryngologists do disclose the potential complication of nasal collapse.[18,19]

Any pre-existent external nasal deformity should be pointed out to the patient beforehand. In view of the possible pre-existing nasal deformities and the risk of post-operative changes, pre-operative photo documentation for septoplasty is a pre-requisite. From a medico-legal point of view photographic

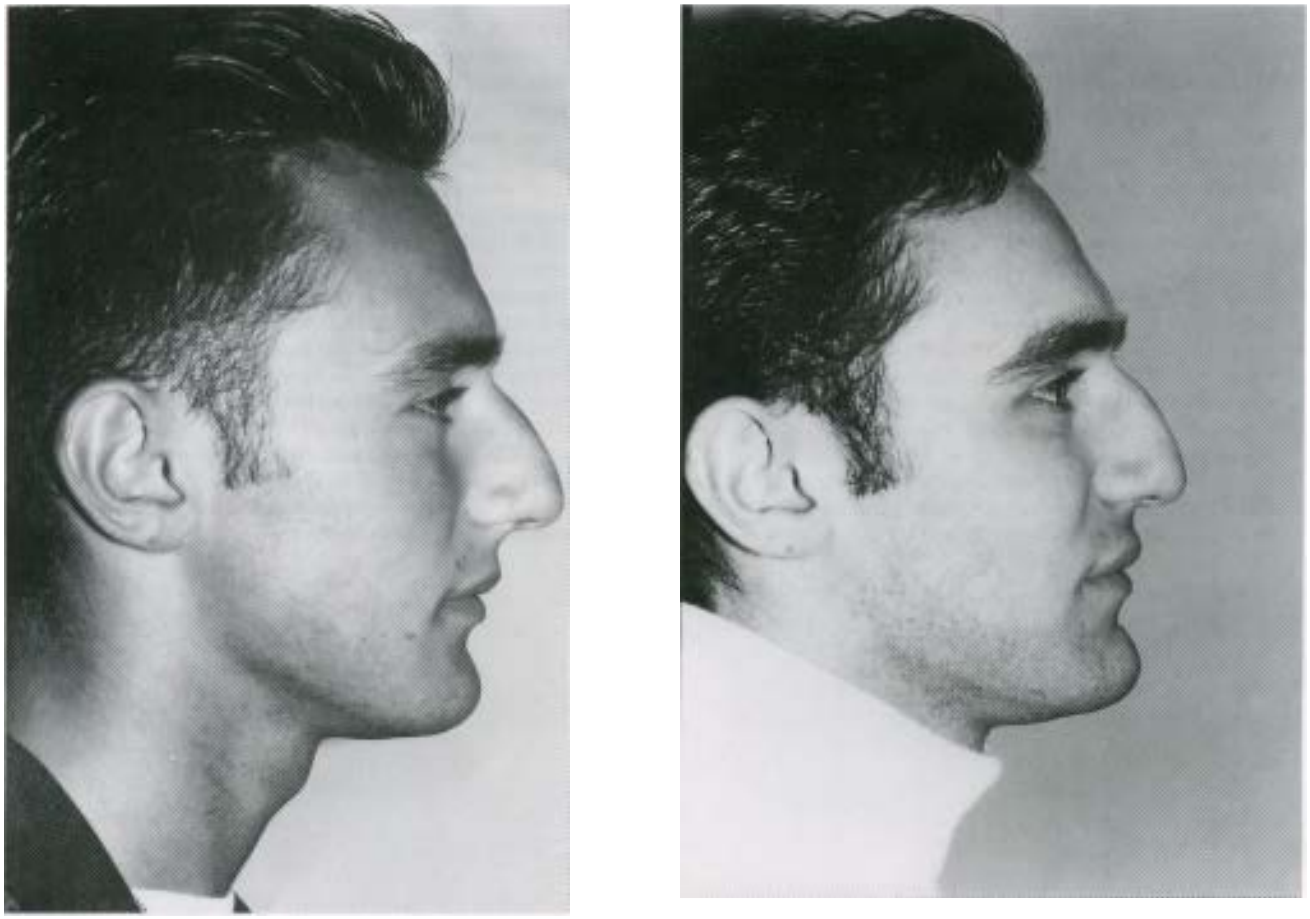

Figure 4. (a) Prc-operative septoplasty; (b) Post-operative columellar retraction (especially nasolabial angle).

Table 2. Post-operative aesthetic changes in relation to degree of deformity (Number of patients *n* = 22)

Aesthetic change				
Degree of deformity	Supratip saddling	Loss of tip projection	Columellar retraction	Total
Severe	1	0	0	1
Minimal	17	6	3	26
Total	18	6	3	27

Table 3. Frequency of at risk manoeuvres (patients *n* = 35)

	n
Dorsal strut< l cm	7
Caudal strut < l cm	3
Caudal strut disarticulated	9
Vertical shortening caudal strut	O
Dorsal strut/perpendicular plate < l cm	8
Empty posterior mucosal pocket	15
Total	42

Table 4. Aesthetic changes in relation to assumed surgical risks

	Total	N o aesthetic changes	Aesthetic changes
Surgical risk	35	27	8
N o surgical risk	50	39	11
Unknown	15	12	3
Total number of patients	100	78	22

No statistical significant relationship between surgical risk factors and aesthetic changes could be established ($\%^2$ (21) = 0.005).

documentation provides the most objective evidence of pre-existent deformities and may prove or disprove the occurrence of deformities post-operatively.

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