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ScienceDirect
British Journal of Oral and Maxillofacial Surgery 50 (2012) 55–59
BRITISH Journal of Oral and Maxillofacial Surgery
www.bjoms.com

Orthognathic patients with nasal deformities: case for simultaneous orthognathic surgery and rhinoplasty

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Accepted 28 December 2010
Available online 18 May 2011

Abstract

Orthognathic surgery is a recognised way of correcting dentofacial deformities and it is common practice to treat problems that affect the chin simultaneously, while deferring or not treating nasal deformities. There is inadequate published information about the prevalence of nasal deformities in such patients, and our aim was to remedy this. We retrospectively studied 75 patients with dentofacial deformities to find out if there was an association between nasal and dentofacial abnormalities. Forty-six of the 75 patients (61%) had mild to prominent cosmetic nasal problems, of whom 27 had deformities of the nasal bridge, 22 of the lobule of the nasal tip, 20 of nasal width, 14 in the width of the alar base, and 11 of the columella; 8 presented with deviation of the nose, and 6 with abnormal nasal length. Skeletal classes II and III had only slightly varied emphasis on nasal deformities. In comparison 14 patients (19%) had problems with the chin that required, or had already had, genioplasty. We also studied 9 patients who had had corrective bimaxillary surgery with simultaneous rhinoplasty. We set no formal questionnaire, but all patients expressed satisfaction with the postoperative results.

Keywords: Simultaneous rhinoplasty and orthognathic surgery; Dentofacial deformities

Introduction

Orthognathic surgery is a recognised treatment for dentofacial deformities, and most problems with the chin are treated simultaneously while those affecting the nose are deferred or not treated. There is inadequate published information about the association between dentofacial and nasal deformities in these patients, so our objective was to find out the prevalence of nasal abnormalities in patients with dentofacial problems.

Patients and methods

We retrospectively studied 80 patients with dentofacial deformities to identify in how many the nose was affected as well. All the patients were white, and were treated at Poole General Hospital NHS Foundation Trust and Dorset County Hospital NHS Foundation Trust from 2002 to 2009. Patients who were excluded were those with a previous history of trauma to the nose, those with cleft lip and palate, and other syndromic patients.

Preorthodontic cephalometric radiographs and photographs of the patients, which included portraits, pictures in profile, and three-quarter pictures of the face, were obtained and analysed. Of these 80 patients, 5 had class I skeletal problems and were excluded from the study because there were so few. The ages of the remaining 75 patients ranged between 17 and 59 years (median 23). Forty had skeletal class II, and 35 skeletal class III, abnormalities. All 75

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0266-4356/$ – see front matter
doi:10.1016/j.bjoms.2010.12.009

patients were having orthodontic treatment in preparation for orthognathic surgery or had completed orthognathic surgery. Patient's nasal deformities were classified according to their nasal subunits and analysed. The classifications were the dorsum or nasal bridge, the lobule of the tip, the alar area, and the columella. The length and width of the nose and the alar base width were also recorded and analysed and nasal deviations noted. All patients with dorsal humps or saddle nose deformities were classified as having nasal bridge deformities. Patients with droopy, over-rotated, boxy, wide, bifid, or asymmetrical tips or excessively long lower lateral crura resulting in increased projection of the tip, were classified as having deformities of the nasal tip. Deformities of the columella included bifid columella, and hanging columella resulting in a poor alar:columellar ratio. Bony or cartilaginous deviations and septal deformities that resulted in a deviated nose were classified as nasal deviations. Discrepancies of the alar base included those alar bases that were too wide or too narrow for the intercanthal width. The length and breath of the noses were also noted.

Patients who had microgenia, macrogenia, progenia, retrogenia, and asymmetrical chin were classified as having genial deformities.

The significance of differences in proportions was assessed with the help of Stata statistical software (version 10.0, Stratacorp, 2007) and probabilities of less than 0.05 were accepted as significant.

Results

In the group of 75 patients, 40 had class II and 35 class III skeletal deformities. Forty-six (61%) had mild to prominent cosmetic nasal abnormalities, of whom 27 had deformities of the nasal bridge, 22 of the lobule of the nasal tip, 20 of nasal width, 14 in the width of the alar base, and 11 had columellar deformities; 8 presented with deviation of the nose and 6 with problems of nasal length (Table 1).

In comparison there were 14 patients (19%) with chin problems that required, or had previously been treated by, genioplasty. There were significantly more deformities of the nose than those of the chin ($p < 0.001$).

Table 1
Number of skeletal class II and III nasal deformities.

Site of deformity	Skeletal class II ($n = 40$)	Skeletal class III ($n = 35$)	p value
Total no. of deformities	25	21	0.41
Tip of lobule	11	11	0.71
Nasal bridge	15	12	0.43
Columella	7	4	Not applicable
Length of nose	2	4	Not applicable
Width of alar base	5	9	0.95
Width of nose	12	8	0.25
Deviation of nose	4	4	Not applicable

In 40 patients with class II skeletal abnormalities, 25 patients had nasal deformities. In 35 with skeletal class III deformities, 21 had nasal problems. The difference was higher among the patients with class II deformities but not significantly so ($p = 0.41$). When we compared the proportions of the different nasal deformities in class II and class III we found that they were comparable but did not differ significantly.

Discussion

Although there are a few anthropometric studies of "white" noses,[1,2] we could find no studies that reported the prevalence of nasal abnormalities in patients with class II and class III skeletal deformities. In this retrospective study we found a high percentage of nasal deformities (61%) among such patients. This is significantly higher than the proportion of chin deformities in the same patients (19%) ($p < 0.001$). When we looked at them separately, 63% of the patients in class II, and 60% of the patients in class III, had some form of nasal deformity. Most of the nasal deformities were dorsal, from saddle noses to mild to prominent dorsal humps (59%), followed by deformities in the lobules of the tip (48%). This was followed by abnormalities in the width of the nasal base width (44%) and the width of the alar base (30%), deformities of the columella (24%), deviations (17%) and abnormalities in nasal length (13%). However, the incidence in the two groups did not differ significantly.

Despite the greater prevalence of patients with nasal deformities than those with deformities of the chin, it has been common practice to operate on the chin at the same time as the dentofacial abnormality. The nose has a prominent place in the face, so should ideally be corrected at the same time as the dentofacial deformities to achieve an attractive profile. This is in line with Obwegeser's philosophy of "profile before occlusion".[3] All this begs the question: should we do a rhinoplasty at the same time as the orthognathic surgery in the same way as we treat the chin?

There are two groups of patients with dentofacial abnormalities who will benefit from rhinoplasty: those with inherent nasal deformities and those who acquired deformities from the orthognathic surgery. Several advantages of simultaneous rhinoplasty and orthognathic surgery have been described by different authors.[4–6] Cottrell and Wolford listed: a single planning procedure; one general anaesthetic, operation, and stay in hospital for the patient; and less postoperative discomfort from infraorbital hypoaesthesia. Technically, the maxillary downfracture allows easier septoplasty, harvesting of the nasal septum, and resection of enlarged inferior turbinates. This avoids the need for additional incisions such as a transfixion incision for access to the septum. Surgeons who prefer to make the nasal infracture with guarded osteotomes can do so easily at the exposed piriform rim. Exposure of the anterior nasal spine by the routine Lefort

I circumvestibular incision allows easy access if the spine is to be removed.

Waite et al. found the concept of correcting both the skeletal deformity and the nose attractive to the patient.[5] In their study of 22 patients who had simultaneous orthognathic and nasal procedures, 21 were in favour of having both operations at the same time, and only 3 would have considered a separate nasal operation if it was not done with the osteotomy. Poor nasal outcome after orthognathic surgery can be corrected immediately, which avoids the prospect of dealing with an unhappy patient.

Criticism of simultaneous rhinoplasty and orthognathic surgery can be categorised into preoperative, perioperative, and postoperative problems. Preoperative planning has generally been considered daunting as there is an element of unpredictability in the nasal position and morphology after maxillary osteotomies, particularly after impaction and advancement. Without doubt, Lefort osteotomy complicates the surgical plan, as the surgeon's initial plan for the nose may be changed. Now he may have to correct not only the inherent nasal deformities but also nasal changes (such as alar widening or rotation of the cephalic tip) caused by the maxillary osteotomies.

Perioperatively, assessment of the nasal changes is further complicated by surgically induced oedema around the nose and paranasal regions. The nose may also be temporarily distorted by the pull of the nasotracheal tube. There is also a need for rigid or semirigid fixation, as training elastics or elastic intermaxillary fixation can be placed only after the second postoperative day when the nasal pack is removed. This means that when there are fractures that require immediate intermaxillary fixation, rhinoplasty may have to be deferred.

Postoperatively, swelling of the nose and paranasal soft tissue makes it difficult to apply the nasal splint.[4] The patient may complain about periorbital swelling caused by the rhinoplasty.

We plan and do simultaneous rhinoplasty and orthognathic surgery to attempt to minimise preoperative, perioperative, and postoperative problems. Good preoperative planning is important for a successful outcome. Nasal changes that accompany maxillary osteotomies are taken into consideration when planning a rhinoplasty.

Maxillary advancement can result in raising the tip with an increase in the supratip break depression, widening the alar base, and lowering the columella. Maxillary impaction can result in raising the nasal tip and upper lip, widening the alar base, and retracting the columella at the subnasal. Maxillary setback can result in widening the nasal bridge, an obtuse nasolabial angle, and decreased projection of the nasal tip, and maxillary downgraft can result in inferior positioning of the alar base and columella, a droopy nasal tip, and an obtuse nasolabial angle.[4,7]

Some nasal deformities that can be corrected by maxillary osteotomies should be identified, and these include a narrow alar base, a slight droopy nasal tip, and a mild dorsal hump, which can be corrected by Lefort I advancement and impaction. Nasal deformities that cannot be improved by maxillary osteotomies include wide alar base, moderate to prominent dorsal hump, saddle nose, broad nasal base, and deformities of the tip and columella. In these cases, simultaneous rhinoplasty can be considered.

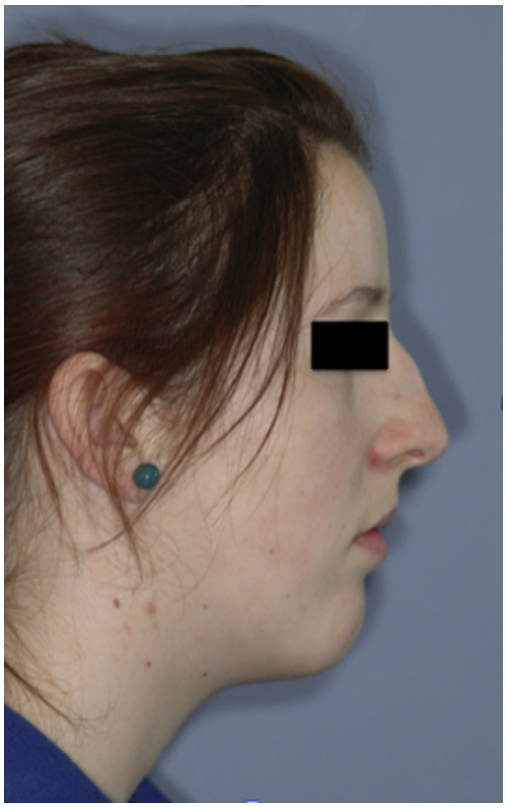

Fig. 1. Preoperative photograph of a female patient.

Perioperatively, changing the nasotracheal to endotracheal intubation requires an experienced anaesthetist. While surgical oedema is inevitable, it can be reduced by a combination of preoperative and perioperative steroids, and hypotensive anaesthesia with effective surgery.

We operated on 9 patients with discrepancies of the skeletal base and nasal deformities during the period 2009–2010 (Table 2). They all had bimaxillary surgery and simultaneous rhinoplasty. Three patients had a closed rhinoplasty and 6 an open rhinoplasty. All aspects of the nasal deformities were dealt with during the rhinoplasty, including those of the tip. All patients had their noses packed postoperatively, and elastic intermaxillary fixation was not applied immediately after the operation. On the first postoperative day all patients had their nasal packs removed and training box elastics or elastic intermaxillary fixation applied. The patients were discharged on the second postoperative day, and were reviewed at one week, 2 weeks, 6 weeks, 3 months, and 6 months. Although we did not give the patients a formal questionnaire, they all said that they were satisfied with their postoperative results. At the time of the review they had had no aesthetic or functional complications from the rhinoplasty (Figs. 1–4).

Table 2
Details of the 9 patients who had corrective bimaxillary surgery and simultaneous rhinoplasty.

Case no.	Age (years)	Skeletal deformity	Nasal deformity	Orthognathic surgery	Rhinoplasty approach
1	19	Class III anterior open bite	Long nose, prominent dorsal hump, boxy tip	Lefort 1 advancement, differential impaction, BSSO setback	Open
2	17	Class I anterior open bite	Dorsal hump, broad nasal base	Lefort I advancement, differential impaction, BSSO advancement	Closed
3	20	Class III anterior open bite	Long nose, dorsal hump, droopy tip	Lefort I advancement, differential impaction with midline split, BSSO setback	Closed
4	19	Class I anterior open bite	Deviated nose, prominent dorsal hump, slight droopy boxy tip, bifid tip and columella	Lefort I advancement, differential impaction, BSSO advancement	Open
5	19	Class III base	Dorsal hump	Lefort I advancement, differential impaction, BSSO setback	Closed
6	21	Class III base	Dorsal hump, long deviated nose, boxy bifid tip	High Lefort I advancement, BSSO setback	Open
7	17	Class III anterior open bite	Dorsal hump, broad nasal base	Lefort I advancement, differential impaction, BSSO setback, genioplasty	Open
8	25	Class III base with asymmetry of the mandible	Slight dorsal hump, asymmetrical nasal tip, deviated nose	Lefort I advancement, correction of maxillary cant, BSSO setback, correction of asymmetry	Open
9	18	Class II base	Dorsal hump, boxy asymmetrical tip, bifid columella	Lefort I setback, BSSO advancement	Open

Case numbers 6 and 7 were male, the rest female. BSSO = bilateral sagittal split osteotomy.

Fig. 2. Female patient after bimaxillary osteotomies and open rhinoplasty.

Fig. 3. Preoperative photograph of a male patient.

Fig. 4. Male patient after bimaxillary osteotomies and open rhinoplasty.

Acknowledgement

The authors would like to thank and acknowledge the help of Mr Reuben Ogollah in the statistics analysis.

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