British Journal of Plastic Surgery (1993), **46**, 1–6

BRITISH JOURNAL OF PLASTIC SURGERY

A morbidity review of children with complete unilateral cleft lip nose at 10 ± 1 years of age

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SUMMARY. **A retrospective study of morbidity due to primary radical nasal correction was undertaken on 33 consecutive cases of complete unilateral cleft lip and palate within one year of their 10th birthday. Primary surgery was performed by one surgeon (RWP) using the Alar Leapfrog technique. Morbidity was assessed by the number of manoeuvres required for revisional surgery up to the age of 10 and was derived from the case notes.**

A total of 12 patients required no revision. The number of revisional manoeuvres was 39 in 27 anaesthetic sessions.

Cleft lip noses treated by a technique of primary radical nasal correction (Alar Leapfrog) required a significant number of secondary manoeuvres to produce an acceptable result. This must be balanced against reduced teasing due to improved symmetry over this period.

The evaluation of the many techniques of surgical repair of the cleft lip, palate and nose deformity can only be assessed once growth is completed. This implies that a surgical lifetime is needed before the validity of the technique can be assessed. Despite the many advances in surgery, the cleft lip nose continues to be a stigma of the cleft deformity. The timing of cleft lip nose surgery remains controversial. One school (Brown and McDowell, 1941; Huffman and Lierle, 1949; Berkeley, 1959; O'Connor *et al.*, 1963) believes in early repair of cleft lip nasal deformity, whereas the other (Gillies and Kilner, 1932; Kilner, 1958; McIndoe and Rees, 1959; Marcks, 1964; Matthews, 1968) believes that a delayed repair is preferable to avoid any possibility that surgical interference might affect the growth of the nose.

This paper is based on the belief that certain tissues, such as mucosa, which would otherwise be discarded from the medial lip element, can be incorporated to release abnormal stresses and that cartilages have a better chance of normal symmetrical development under such circumstances. Although there have been numerous reports describing the different techniques of cleft lip nose surgery (Millard, 1976; Tajima and Muruyama, 1977; Dibbell, 1982), there have been few publications of long term results in the form of cumulative morbidity to set beside the aesthetic results achieved by a standard age. It has been the senior author's practice to undertake such revisional procedures at about age 4 in order to make entrance to primary school in the United Kingdom at the age of 5 as unobtrusive as possible. Symptomatic airway obstruction was also dealt with at this time. The number of operations undertaken are a reflection of the standards expected by the surgeon and parents, and need to be set against some measure of aesthetic achievement which would be considered adequate to distinguish between groups of children treated by different techniques or different surgeons.

This paper is presented in conjunction with studies of the clinical appearance of 25 patients from this group as judged by a lay panel and a computer based method. The 25 patients were selected on the basis that they had photographs which were of an acceptable standard for computer analysis.

The cleft lip deformity was repaired using Millard's rotation-advancement combined with radical nasal correction by V-Y Alar Leapfrog (Pigott, 1985) at 3 months of age. The cleft palate deformity was corrected at 6 months using the Veau-Wardill-Kilner 3 flaps technique.

Materials and methods

The case notes of all 90 patients with cleft lip deformity treated between 1972 and 1979 were reviewed. Out of this group 33 patients with unilateral complete cleft lip and palate were included in the study, as these had photographs taken at the time of primary surgery and at review at 10 years old ± 1 year.

Information extracted included the number of revisional manoeuvres and the number of anaesthetic sessions required. All lip revisions, dental extractions and ear operations were excluded from the study.

Results

Of the 33 patients who underwent radical primary nasal correction for complete unilateral cleft lip, alveolus and palate, 12 required no further surgery up to the age of 10 ± 1 year. Nasal symmetry was considered to be acceptable and there was no symptomatic nasal obstruction. In considering revisional surgery, the word "manoeuvre" is used to permit analysis of the components of the nostril stenosis requiring operation, as distinct from cosmetic pro-

Table 1 Total primary and revisional manoeuvres

Primary surgery	33 patients
No further surgery	12 patients
Revisional manoeuvres	39
Number of general anaesthetic sessions	27

cedures on alar cartilage or alar base. Clearly numerous manoeuvres can be combined in one anaesthetic session. There were 39 revisional manoeuvres in a total of 27 general anaesthetic sessions (Table 1).

The revisional manoeuvres were essentially used to correct two particular problems. There were 30 revisional manoeuvres in 21 patients (64%) to correct nasal stenosis and 9 manoeuvres in 7 patients (21%) to correct external asymmetry in the form of persistently slumped alar cartilages or laterally displaced alar bases (Table 2). Six patients required more than one further manoeuvre to correct the persistent stenosis. However, correction of septal deviation was not undertaken primarily, although some degree of deviation of the septum is an inevitable consequence of the cleft deformity. If these late but primary corrections of the septal deformity are excluded, then the number of revisional manoeuvres needed to correct nasal stenosis falls to 17 in 13 patients (39%) and only 5 patients required more than one revisional manoeuvre for persistent nostril stenosis (Table 2).

As can be seen in Table 3, revisional manoeuvres were made up of the following: 5 patients had 7 mucosal/full thickness grafts (FTSG) for a high nostril floor; 10 patients had 10 Z-plasties for an anterior synechiae of the vestibule; 13 patients had 13 SMR or

Table 2 Total number of revisional manoeuvres to correct nostril stenosis and external asymmetry

Revisional surgery	*Total manoeuvres*	*Total manoeuvres Excluding SMR/ Septoplasty*
Nostril Stenosis	30 (21)	17 (13)
External Asymmetry	9 (7)	9 (7)
	Number of patients	*Number of patients*
Repeat surgery for persistent nostril stenosis	6	5

( ) = Number of patients

Table 3 Breakdown of revisional manoeuvres

Revisional manoeuvres	*No. of patients*
7 mucosal/FTSG for a high nostril floor	5
10 Z-plasties for an anterior synechiae	10
13 SMR/septoplasty for a deviated septum	13
7 relocation of a persistent slumped alar cartilage	6
2 relocations of a wide alar base	2

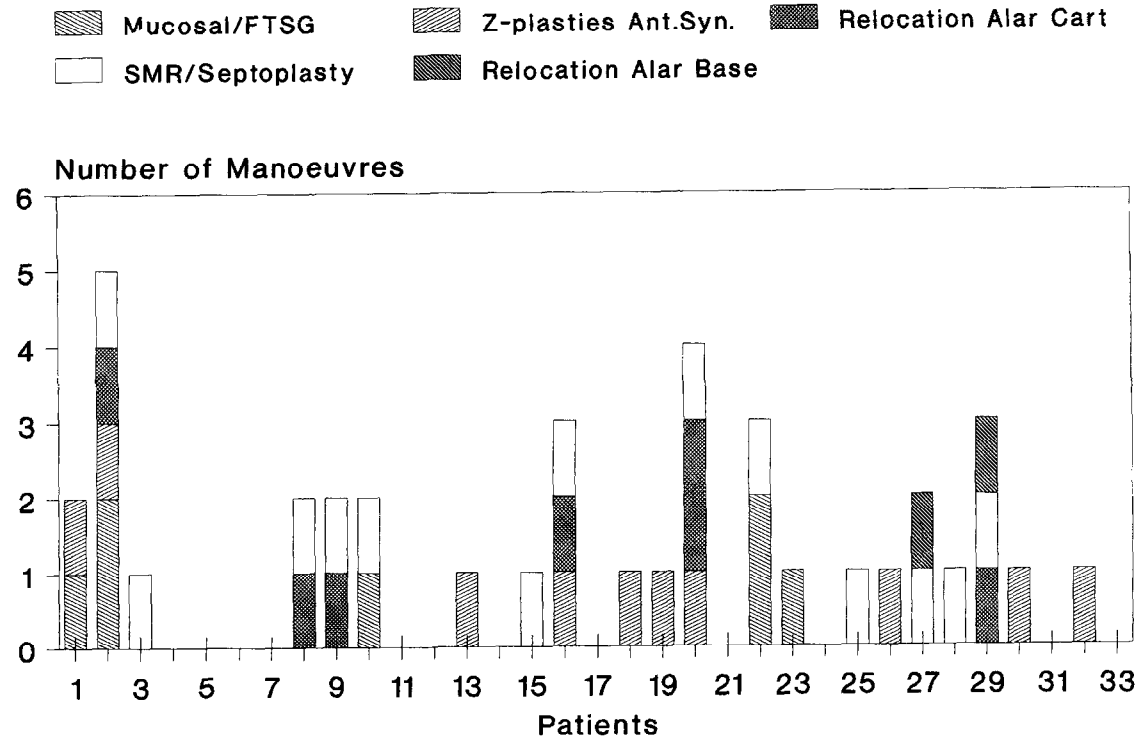

Fig. 1

Figure 1—A stacked histogram to show the breakdown of the revisional manoeuvres to correct the cleft lip nose deformity in the individual patients.

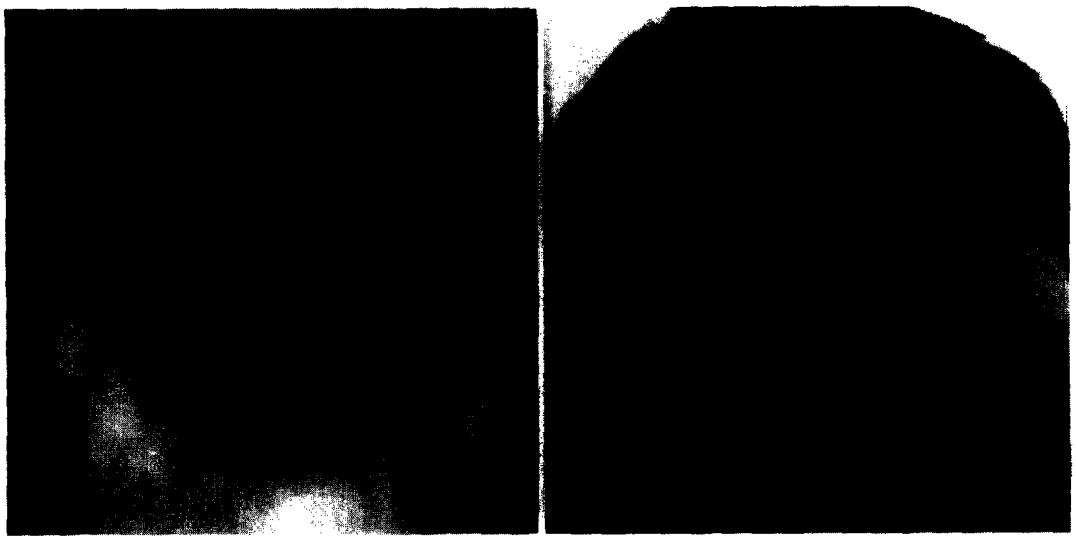

Fig. 2

Fig. 3

Figure 2—A primary radical nasal correction in a wide cleft lip and nose (ST). (A) Preoperative. (B) At age 9, skyline view. No secondary surgery to the nose. **Figure 3**—At 5 years of age (RM), (A) frontal view showing a wide alar base. (B) Skyline view illustrating a persistently slumped alar cartilage and a wide alar base. Following a relocation of the slumped alar cartilage and a wide alar base, good symmetry is seen on the frontal view, (C), and the skyline view (D).

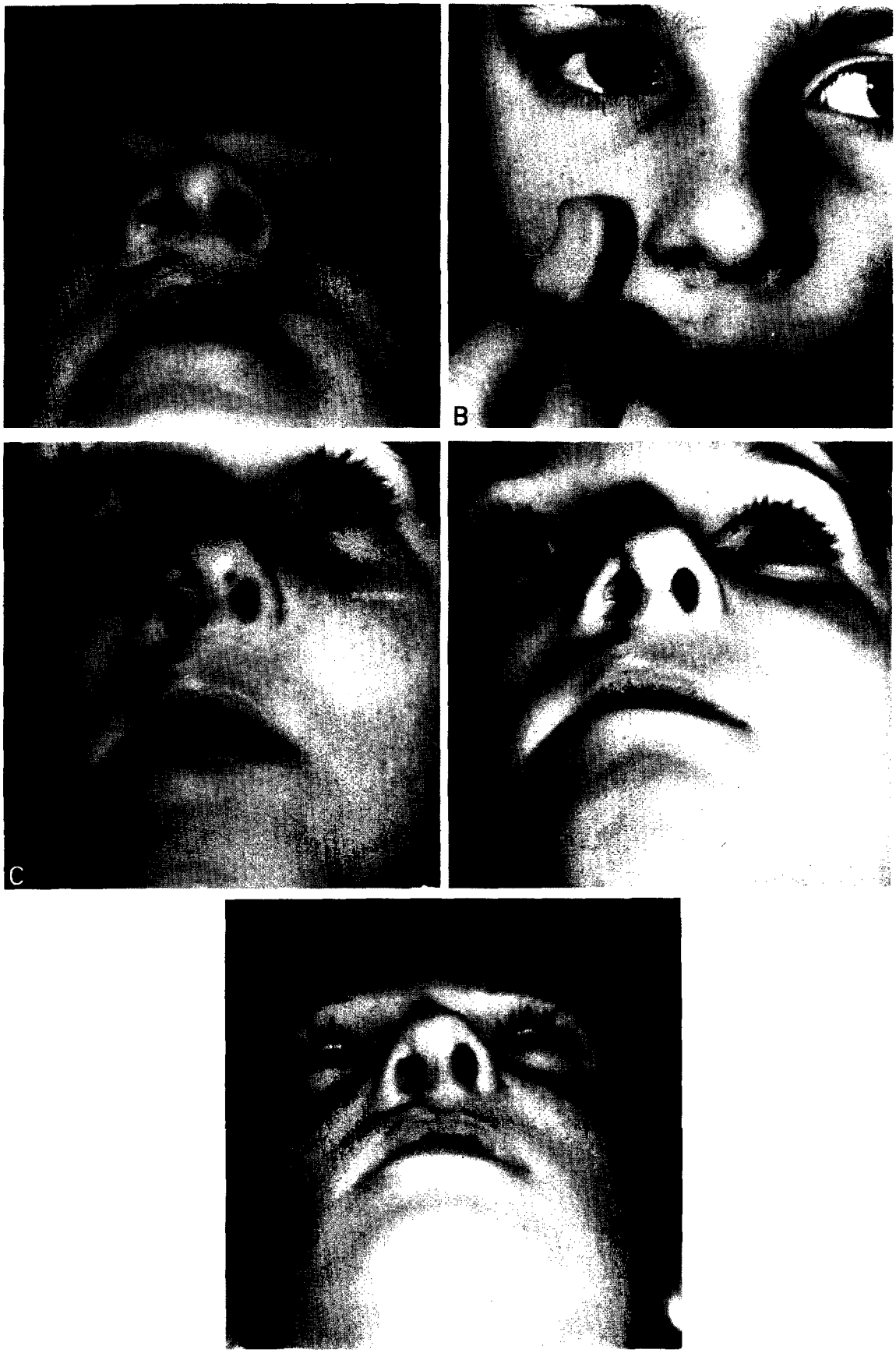

Fig. 4

Figure 4—Primary radical nasal correction of a wide cleft in infancy (TC). At 4 years of age, nostril stenosis secondary to a high nostril floor was observed (A). Following release of the stenosis with a mucosal graft, an acrylic stent was used as shown to maintain patency of the nostril (B). (C) shows the stent *in situ*. One year later, (D), the patency of the nostril is maintained. Four years later, (E), the position is still good.

septoplasty; 6 patients had 7 relocations of a persistent slumped alar cartilage and 2 patients had a relocation of a wide alar base. In order to show the number of manoeuvres performed for each patient a stacked histogram was used (Fig. 1). This shows, for example, that patient no. 2 had a total of five manoeuvres whereas patient no. 10 only had two.

An example of a patient (S.T.) who had a radical nasal correction in infancy is shown in Figure 2. The 9-year-old photograph shows symmetrical nostrils on the skyline view. He required no revisional surgery. The second example, (R.M.), had primary surgery in infancy. At 5 years of age, he had a relocation of the alar cartilage and a relocation of the alar base (Fig. 3). Photographs taken at 9 years of age showed good symmetry of his nose both on frontal and skyline views. Patient number 3, (T.C.), showed nostril stenosis on the skyline view at 4 years of age (Fig. 4). This was corrected with a mucosal graft and maintained with an acrylic stent. Skyline view a year later showed correction of the nostril stenosis. Four years later, the skyline view showed that the correction had been maintained.

A final cause of nasal obstruction which was not analysed in this series was narrowing of the pyriform aperture in association with lateral cross bite of the dental occlusion. In such cases it would be found that the points of a non-toothed dissecting forceps introduced into each internal nasal valve in turn would spring open to a comparable degree, excluding a diagnosis of stenosis, despite difficulty in breathing. This phenomenon was also observed with pure septal deviation.

Discussion

It is generally accepted that patients with the cleft deformity require several operations to correct it. This study set out to accomplish a number of objectives. First, it set out to analyse the constituent parts of revisional procedures, and second, it enabled us to evaluate the morbidity of the primary radical nasal correction performed in infancy.

It is generally felt that secondary corrective manoeuvres should be saved and performed in a single general anaesthetic session in order to spare the patient multiple admissions and anaesthetics. The longer revision is delayed, the fewer the number of admissions. Against this must be set the distress of children thereby forced to endure a greater degree of asymmetry through their most critical early years. Hence in this series, the age of $4–4\frac{1}{2}$ was chosen for revision procedures prior to entry to primary school at the age of 5 years – the first time that significant teasing was likely to be encountered. Randall (1981) suggested that children undergo fewer operations overall if nasal correction was undertaken at the primary operation. Of his series, 51% required no secondary correction and none required more than one secondary correction, whereas 39% of those who had a delayed nasal correction required more than one operation on the nose. This compares well with 17 of our patients who required a secondary intervention (excluding those in whom septal correction only was required). This amounts to 51% of our sample. Anderl (1985) reported a series of 200 cases of early primary nasal correction, out of which 80% achieved a good result and of the remaining cases 50% involved slight asymmetry of the shape and circumference of the nostrils. However, the number of revisional manoeuvres needed was not stated. McComb (1985) reported the results of 10 consecutive cases (three of whom were incomplete) at 10 years of age following his primary nasal correction. None of these had undergone any revisional procedures apart from Äbyholm bone grafting with support to the alar base. However, the series represents a very small percentage of the cases treated, albeit a consecutive one. Salyer (1986) reported a 15-year personal experience of 400 unilateral cleft nasal deformities with an 80% "improvement" in the cleft deformity. 20% required additional manoeuvres to achieve the desired symmetry. The criteria for ascribing an improvement were not stated.

In contrast, Cronin and Denkler (1988) reported a series of 53 cases with delayed nasal correction. Of these, 45 patients required only one operation to correct their nasal tip; 13 of these required an additional nasal operation but not on the tip. Eight others required a revision of their tip with a cartilage graft. Other procedures in the 53 patients included 42 patients requiring an adjustment of the alar bases, 28 patients who required a SMR/septoplasty and 11 patients requiring cartilage grafts over the lateral crus.

These reports compare favourably with our series and reinforce the fact that multiple manoeuvres are required to correct the cleft nasal deformity. These results should be considered in the light of both the expectations of the patients and in particular those of the surgeon. Clearly, the higher the expectation of the surgeon, the more manoeuvres will be undertaken to achieve the ultimate goal, symmetry. The results of the different techniques should therefore be considered both in the form of the final aesthetic result and of the morbidity, as measured indirectly by the number of revisional manoeuvres following the primary correction. An objective measure of nasal symmetry would be one way to assess the final aesthetic result, to set beside morbidity studies. Clearly, a large percentage of cases treated would have to be presented for consideration to avoid "best case" selection.

It would appear that nasal stenosis is a significant problem following the radical nasal correction and revisional manoeuvres (Z-plasties of anterior nostril synechiae and release and grafting of a high nostril floor, usually combined with septal surgery) were often required to alleviate this problem. This disadvantage may be outweighed by the possible advantage of "acceptable" external nose symmetry in 80% of the sample based on the number of patients requiring a second manoeuvre to relocate persistently slumped alar cartilages.

Assessment of symmetry has been attempted using independent panels of observers (Saxby and Palmer, 1986), and by computerised analysis of tracings taken from photographs (Coghlan *et al.* 1987). An analysis of the symmetry achieved in the group of 9–11-year-

olds whose surgical morbidity is analysed in this paper will form the basis of a further communication.

Acknowledgement

We would like to thank the Department of Medical Illustration, Frenchay Hospital, Bristol, for the illustrations.

References

Anderl, H. (1985). Simultaneous repair of lip and nose in the unilateral cleft (a long report). In Jackson, I. T. and Sommerlad, B. C. (Eds). *Recent Advances in Plastic Surgery*. Edinburgh, Churchill Livingstone, p. 1.

Berkeley, W. T. (1959). The cleft lip nose. *Plastic and Reconstructive Surgery*, **23**, 567.

Brown, J. B. and McDowell, F. (1941). Secondary repair of cleft lips and their nasal deformities. *Annals of Surgery*, **114**, 101.

Coghlan, B. A., Matthews, B. and Pigott, R. W. (1987). A computer-based method of measuring facial asymmetry. Results from an assessment of the repair of cleft lip deformities. *British Journal of Plastic Surgery*, **40**, 371.

Cronin, T. D. and Denkler, K. A. (1988). Correction of the cleft lip nose. *Plastic and Reconstructive Surgery*, **82**, 419.

Dibbell, D. G. (1982). Cleft lip nasal reconstruction: correcting the classic unilateral defect. *Plastic and Reconstructive Surgery*, **69**, 264.

Gillies, H. and Kilner, T. P. (1932). Harelip: operations for the correction of secondary deformities. *Lancet*, **2**, 1369.

Huffman, W. C. and Lierle, D. M. (1949). Studies on the pathologic anatomy of the unilateral harelip nose. *Plastic and Reconstructive Surgery*, **4**, 225.

Kilner, T. P. (1958). The management of the patient with cleft lip and/or palate. *American Journal of Surgery*, **95**, 204.

Marcks, K. M., Trevaskis, A. E., Berg, E. M. and Puchner, G. (1964). Nasal defects associated with cleft lip deformity. *Plastic and Reconstructive Surgery*, **34**, 176.

Matthews, D. (1968). The nose tip. *British Journal of Plastic Surgery*, **21**, 153.

McComb, H. (1985). Primary correction of the unilateral cleft lip nasal deformity: a 10-year review. *Plastic and Reconstructive Surgery*, **75**, 791.

McIndoe, A. and Rees, T. D. (1959). Synchronous repair of secondary deformities in cleft lip and nose. *Plastic and Reconstructive Surgery*, **24**, 150.

Millard, D. R., Jr. (1976). *Cleft Craft: The Evolution of Its Surgery, Vol. 1: The unilateral deformity*. Boston, Little, Brown and Company, p. 639.

O'Connor, G. B., McGregor, M. W. and Tolleth, H. (1963). The nasal problem in cleft lips. *Surgery, Gynecology and Obstetrics*, **116**, 503.

Pigott, R. W. P. (1985). "Alar Leapfrog". A technique for repositioning the total alar cartilage at primary cleft lip repair. *Clinics in Plastic Surgery*, **12**, 643.

Randall, P. (1981). Personal communication.

Salyer, K. E. (1986). Primary correction of the unilateral cleft lip nose: a 15 year experience. *Plastic and Reconstructive Surgery*, **77**, 558.

Saxby, P. J. and Palmer, J. H. (1986). The use of an independent panel to assess the long term results of cleft lip repair. *British Journal of Plastic Surgery*, **39**, 373.

Tajima, S. and Muruyama, M. (1977). Reverse-U incision for secondary repair of cleft lip nose. *Plastic and Reconstructive Surgery*, **60**, 256.

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Paper received 11 June 1991.
Accepted 24 October 1991, after revision.
Based on a paper presented at the Cranio-Facial Annual Scientific Meeting, London, 1989.