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THE MANAGEMENT OF CLEFTS*

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Why should orthodontists be interested in clefts, and the cleft literature shows their interest to be equal to that of any other discipline involved in cleft management.

There are a number of reasons:—

1. Our interest is concentrated on the growth and development of the face, the jaws and the dentition and the effect of this on facial esthetics and oral function and health. This is the very area where cleft deformity has its effect.

2. In cleft management we are at the end of the line and are left holding the baby, so to speak, which is then no longer a baby, but a rapidly maturing early adolescent. The end result of our work depends largely on earlier treatment.

3. Pretty well all clefts involving hard tissues, need orthodontic treatment.

4. The use of cephalometrics over the last 25 years, has allowed an immense amount of research on cranio-facial morphology and growth, and quite a bit of this has been done on cleft children. Results of this research has had, and continues to have, an effect on the rationale of cleft management.

I state these facts, not so much to establish our credentials for involvement in this work, as to explain why orthodontists in many areas have taken the initiative in planning better overall services to cleft children.

FACIAL FORM AND FACIAL GROWTH

The face grows downwards and forwards, away from the base of the skull and study of the morphology of the infant face allows us

to predict whether the growth will be predominantly downwards or forwards. Of particular significance, is the form of the mandible and the part mandibular growth plays in locating the chin as part of the profile.

In the lower jaw, the two main growth centres pushing the lower part of the face away from the skull, are the articular cartilages of the condyles. The importance of these is commonly seen when trauma or infection destroys their growth potential and produces the small mandible and very convex profile. The maxillary complex, or the upper jaw is more complicated, and the main growth centres propelling the upper face away from the skull, are thought to be the cartilage of the nasal septum and the fronto-maxillary, pterygo-maxillary and zygomatico temporal sutures with the main impetus coming from the septum.

This is a thumbnail sketch of facial development as a background to discussing cleft deformities.

Incidence: In U.S.A. cleft lip and/or cleft palate occurs once in every 750 live births. The commonest broad classification of clefts is:—

1. Lip and alveolus only.
2. Palatal clefts only — hard or soft or both.
3. Complete — Unilateral.
— Bilateral.

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One-half of clefts, involve the lip and palate, one-fourth involve the lip only and one-fourth involve the palate only. Two-thirds of unilateral clefts of lip or lip and palate, are on the left side. Males have two-thirds of the clefts involving the lip, or lip and palate, and females have two-thirds of the isolated palatal clefts.

While clefts may be broadly classified into groups, there is great variation in the width of each cleft, and in the apparent amount and disposition of soft tissue available for utilisation in the repair.

Facial growth in cleft Palate Children

Adults with surgically repaired clefts tend to have a smaller maxillary complex than the non-cleft population. There are three interpretations of this:—

1. Hypoplasia of the middle third of the face, may be concomitant with the occurrence of certain types of clefts.
2. An inherited tendency towards smaller facial dimensions and a slower growth rate may occur in cleft children.
3. Certain types of surgical procedures may tend to restrain maxillary development.

Graber's original study in 1949 on the Cranio-facial morphology in cleft lip and palate deformities, indicated that maxillary development was deficient in all directions. This was confirmed by other studies and these combined with studies showing normal maxillary growth in unoperated clefts, suggested that surgery was the main cause of growth inhibition. Accordingly, surgery to the palate in many centres was delayed to 4-5 years of age.

Pruzansky in the Cleft Palate Centre at the University of Illinois in 1949 had started a longitudinal growth study, with very comprehensive records of cleft children right from birth. Evidence from this study indicated that generalisations are misleading, as cleft patients show the same variation in general facial morphology and growth potential as other children and in many cases, good surgery is an aid to growth through establishment of more normal function. Pruzansky asserted that many of the findings in the early studies, were misleading, because of the traumatic surgery involved.

Subtelny and others studied the growth of the soft palate and the pharynx in clefts and showed that, while the surgically repaired soft

palate will grow normally up to 3-4 years of age, thereafter its rate of growth may not be adequate to ensure velo-pharyngeal closure. A deterioration in speech may occur around puberty time, as the adenoid tissue atrophies and the growth of the jaws away from the base of the skull increases the vertical and A.P dimensions of the pharynx.

Coccaro and Pruzansky published in the Cleft Palate Journal of 1965, a report of the Longitudinal Study of the Skeletal and Soft Tissue Profiles in Unilateral Cleft lip and palate patients.

They studied the growth of 21 cleft children from 3 months to 7 years and compared their findings with a similar study done by Subtelny on a normal group.

They found the mandible less prognathic in clefts. The convexity of the skeletal profile was greater for the cleft group at all ages and the decrease in convexity was most marked in the normal group.

Despite the fact that the palates of one-half of the group had been repaired under 2½ years of age, there was no indication of the growth inhibiting effect of surgery, reported in earlier studies.

They found a reduction in the convexity of the soft tissue profile of the clefts due to the flattening of the tip of the nose and the thinner upper lip.

This discussion so far, has related to complete clefts as isolated clefts of the palate or the lip only do not cause the characteristic type of deformity.

To complete this general statement on facial growth, clefts and surgery, I will quote largely from Converse and Horowitz, the Director and Associate Director of the Institute of Reconstructive Plastic Surgery, New York, writing in "The Nature of Orthodontic Diagnosis".

Evaluation of the effects of surgery on growth is clouded by:

1. The wide variety of operations that have been used to repair clefts.
2. The varying skill of the individual surgeon.
3. The wide variation in the morphologic defects as they present clinically.

In the past, operations involving the compression of maxillary segments or the removal of the pre-maxillary segment did produce deformity. These operations are no longer used.

Repair of the lip has a mechanical moulding action on the still cleft maxillary bone segments and this moulding action may simply produce an improvement in alveolar arch form or it may produce a marked maxillary collapse both laterally and A-P. The result depends on the type of surgical procedure, the surgeon's skill, the amount and position of tissues originally available, and the number of operations.

Medial rotation of the maxillary segments tends to position the alveolar arches over the tongue and this organ may then impede tooth eruption and vertical growth and development of the maxilla.

Bilateral complete clefts pose special problems. Unrestrained growth of the vomer and septum during foetal development results in varying degrees of pre-maxillary protrusion at birth. Lip repair may be difficult and in turn pressure exerted by the repaired lip may cause rapid collapse of the lateral elements behind the pre-maxillary segment. This same lip pressure often rotates the pre-maxilla down and back so that it finishes well below the level of the lateral segments. In some surgical lip repairs a small wedge of the vomer is excised to allow retraction of the maxilla. The effect of this procedure on maxillary growth is uncertain, and new techniques of pre-surgical manipulation limit the need for its use.

The frequency and severity of maxillary collapse has been reduced by modern surgical techniques.

It is common practice to repair the lip within months of birth (10 lbs.) and the palate at 18 months to 2 years, before speech patterns are firmly established.

Quote: "With regard to the desirable age of palate closure, first consideration should be given to speech development rather than to facial development." This statement is acceptable provided there is no positive correlation between early palate repair and inhibition of maxillary growth.

Pre-surgical Orthopedics: is the name given to procedures aimed at creating ideal alveolar arch form, prior to surgery, through movement of the cleft maxillary segments. It was pioneered by Burston in Liverpool and is commonly

used in a number of English centres in conjunction with bone grafting to stabilise the alveolar arch in its new form.

Its most useful application would seem to be in the bilateral clefts, where the protrusive pre-maxilla complicates lip repair. A series of expanded plates incorporating a bite-block for the lower gum pad, will create space between the two lateral segments, while at the same time the pre-maxilla may be retracted by an extra oral force. I have had very little experience with these procedures and with the exception of the bilateral clefts, I do not understand the rationale. The method is time consuming and until significant long term benefits are demonstrated I feel it will be used routinely only as part of a complete hospital service, administered by full-time personnel.

Orthodontic Treatment: The only sound basis for any dental service to any group of children, is a programme aimed at preventing dental decay through the ingestion of fluoride throughout the years of tooth formation and instruction on correct diet and oral hygiene.

In cleft children, abnormal mouth function and the presence of inaccessible stagnation areas complicates the maintenance of adequate oral hygiene and this is further compounded at a later age when a part denture is placed in the mouth. Fluoride therapy, tablets and topical, and correct diet, thus assume a greater importance in the treatment of the cleft group.

A routine check for the detection and treatment of decay is obviously necessary and because many cleft children belong to the lower income group, a community dental service should be available to them.

Orthodontic treatment may be indicated at two stages of development:—

1. In the early mixed dentition to correct the anterior crossbites and expand the upper cheek teeth. The expansion is aimed at getting the collapsed segment or segments out from over the tongue to allow better tongue function and better vertical growth and tooth eruption. To maintain the expansion an appliance must be left in the mouth for some years creating an oral hygiene problem.

2. The main orthodontic task is carried out at the age of 12-14 years and while results, which are gratifying to the patient, parent and orthodontist, may be routinely achieved the maintenance of long term oral health is usually a problem.

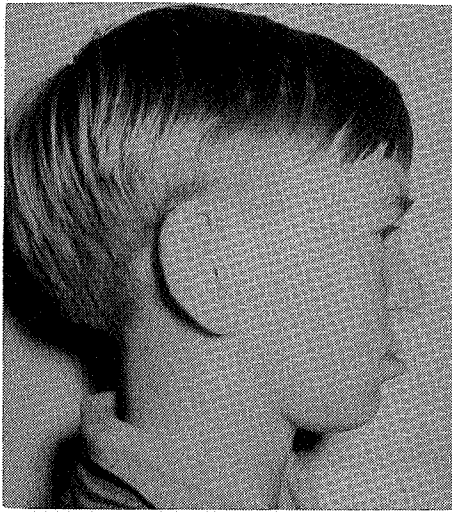


Fig. 1

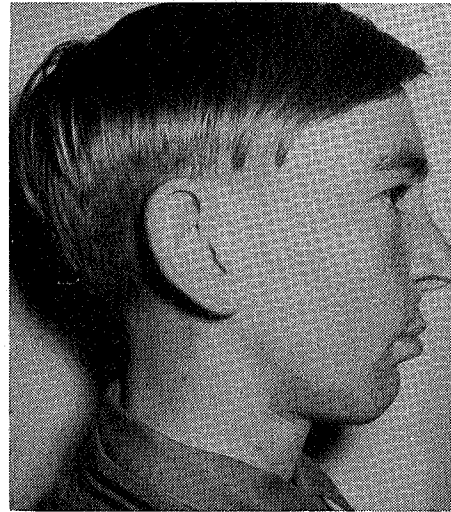


Fig. 2

Figures 1 and 2 show pre and post treatment profile pictures of a 14 year old boy with repaired bilateral lip and alveolar cleft plus complete palatal cleft. The very small pre-maxillary segment carried one poorly formed tooth and the maxillary arch was very contracted laterally. The whole of the maxilla showed a marked deficiency in vertical development. The lower arch form was good, except that the flaccid, everted lower lip had allowed considerable proclination of the lower labial segment.

Orthodontic treatment which involved the extraction of $\frac{1}{4}/\frac{1}{4}$ was aimed at uprighting the lower anterior teeth and expanding the upper arch.

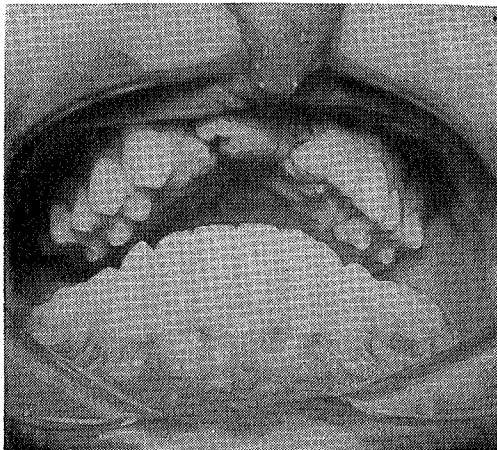


Fig. 3

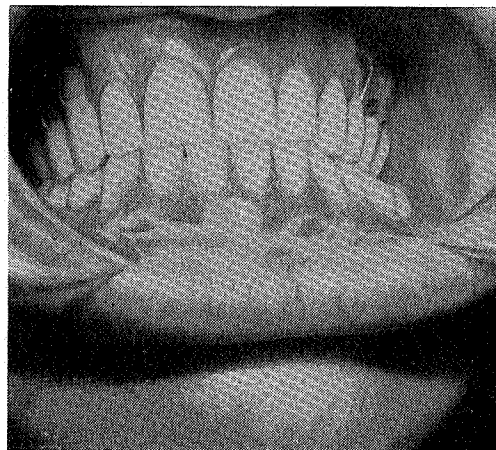


Fig. 4

Figure 3 shows the post treatment occlusion and the greatly increased interocclusal clearance with the mandible in the rest position. Figure 4 shows the final cast metal prosthesis in position. It restores the correct vertical dimension through onlays on the buccal teeth and replaces the missing anterior teeth.

This is an ideal case for such a prosthesis, as the oral hygiene and caries resistance are good to the extent that there is neither a cavity or restoration in the mouth.

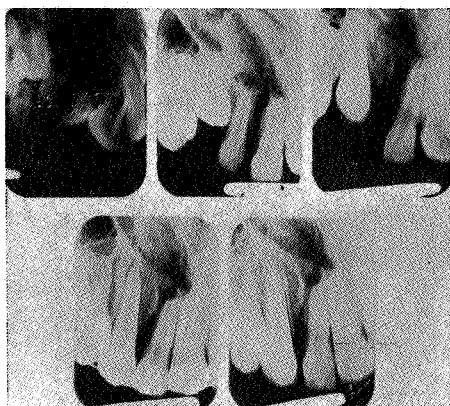


Fig. 5

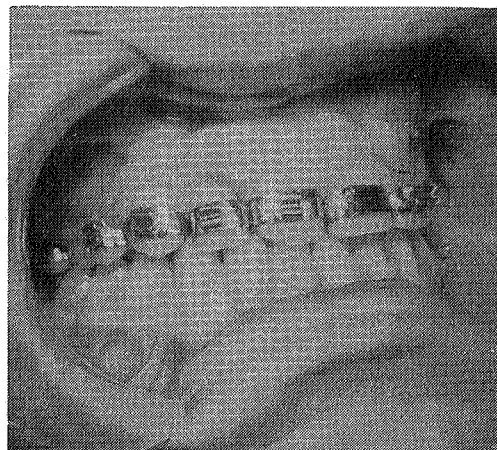


Fig. 6

Figure 5 shows a series of radiographs taken over a four-year period of a girl with a repaired cleft of the right lip and alveolus only. The alveolar cleft was situated distal to 2/ and a supernumerary 2/ lay on the distal margin of the cleft. Just prior to the commencement of orthodontic treatment the supernumerary tooth was extracted and a bone graft performed in an endeavour to obliterate the cleft. 32/ were moved together and although the bony cleft persists there is no apparent cleft in the interproximal gingiva which seems quite healthy.

Figure 6 is an intra oral view of this 32/ area just prior to disbanding. Permanent retention will probably be necessary to maintain 32/ in position but this is preferable to a prosthesis.

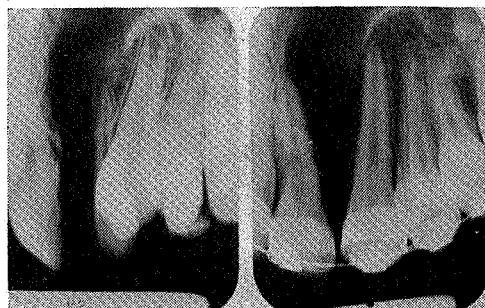


Fig. 7

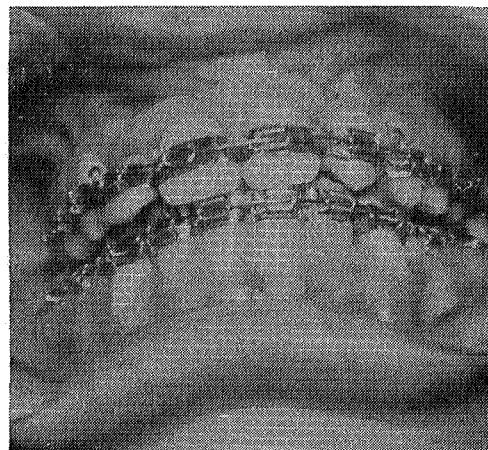


Fig. 8

Figure 7 shows pre and post treatment radiographs through an alveolar cleft lying between /1 and /2. /2 was extracted and the original treatment plan was to retain the space and insert a prosthesis. This was later modified and /3 was placed against /1 as shown in figure 8. There again permanent retention will be necessary.

Space will not permit demonstration of all the clinical material originally presented, but the illustrations show three of the more interesting cases.

Speech: One of the main objectives in early closure of the cleft palate is to establish velo-pharyngeal competence before speech patterns are firmly established. Success in this depends on the mobility and length of the soft palate in relation to the pharyngeal isthmus. In many cases where the anatomical restoration would seem to be remarkably good, there is still considerable nasal escape and development of adequate speech depends on the efforts of the speech therapist and also I believe on the intelligence and application of the parents and child.

Alignment of maxillary incisors is important in the production of labio-dental and linguo-dental speech sounds.

THE MANAGEMENT OF CLEFTS IN ADELAIDE:

Since 1958, I have seen a fairly broad cross-section of the cleft repairs carried out during this period at the Children's Hospital, and also quite a lot of the work done prior to that date.

My first task on being appointed to the Hospital Staff was to examine the records of some 230 cleft patients treated at the Hospital in the preceding 10 years and eventually recall 40 of these for study in relation to their profile, dental occlusion and dental health and speech.

I would like to quote briefly from what was a very brief report of this survey.

"Only 4 of the whole group are receiving any form of orthodontic treatment and in all other cases where such treatment has not been possible, extraction of the malposed teeth has been carried out.

The objectives in cleft palate surgery, must be to restore as far as possible, normal appearance and function, and studying pre and post operative photographs, suggests that the immediate result must be very gratifying to sur-

geon and parent. However, as further development takes place, the limitations imposed on the surgeon become more evident, as does the need for assistance from other fields. Of the patients examined, 12 still had palatal defects of varying sizes and these defects, plus lack of extension of the soft palate produced, in 20 of the group, noticeable speech defects associated with inability to close the nasal airway.

This is no reflection on the surgery performed as, where there is a gross deficiency of tissue it is impossible to restore normal form, but it does emphasise the need for some outside help

When the permanent teeth erupt, it is essential that these patients get the best possible conservative dentistry, so that in the final dentition, the maximum number of teeth may be retained in the best possible occlusion. Unless this phase of the rehabilitation plan is carried out, the principles motivating the original surgery, viz. restoration of appearance and function, have been discarded long before maturity is reached."

My aim in the report was to promote the "group approach" to cleft management and to establish an orthodontic service for clefts at the hospital. Through the enthusiasm of the surgeons concerned, these objectives were achieved. For four years, the Cleft Palate Clinic consisting of 4 surgeons, a speech therapist and two dentists met regularly to examine patients and discuss their treatment, but over the last 2 years, it has ceased to function, mainly because it was felt that we were achieving nothing that could not be achieved by individual consultation.

The situation at the moment is, that I think the majority of clefts are referred for speech therapy, and I think the majority are referred for routine dental and orthodontic care, but I don't know.

My conclusions are simply these:—

Because there are a number of disciplines involved in cleft management and because cleft work represents only a small proportion of the total practice of the individuals concerned, there is a strong tendency for the complete programme to be unco-ordinated. The "group approach" is the method used in most centres

to produce co-ordination, but this has not been successful at the Adelaide Children's Hospital. In the absence of this, I think an individual or a department at the hospital should be made responsible for seeing that the following are carried out:—

1. Full records taken at least prior to lip repair and again just prior to palate repair.

2. Parents referred to the Dental Department at the earliest possible time, for instruction on caries prevention, particularly fluoride therapy.

3. Patients are referred to the speech therapists at the optimum time.

4. As from the age $2\frac{1}{2}$ years, patients are enrolled in the recall system of the Dental Department to ensure a regular caries check.

5. Patients are seen by the surgeon as often as desirable.

6. That all patients are under orthodontic supervision.

At a recent meeting of all personnel involved in the treatment of cleft children at the Adelaide Children's Hospital, it was decided that the responsibility for co-ordinating services to these children and maintaining adequate records, should be assumed by the Dental Department.

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Amendments to Constitution, Australian Society of Orthodontists. The result of the postal vote recently conducted with respect to Section 5 (a) and By-Law 1. Part (i) was overwhelmingly in favour of the amendments as suggested by a meeting of the Full Federal Executive of the Society in Melbourne in March, 1967.