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5.1 Effects of Reversing the Facial Force Diagram

The influence of soft-tissue forces on palatal form and growth has been the topic of several studies. Ritsila and coauthors (1972) reported that there was “slight shortening” of the maxilla, “marked shortening” of the body of the mandible, and alterations of several mandibular angles after closure of the lip.

As perhaps an interesting footnote (Ritsila et al. 1972; Bardach et al. 1982), physical changes to the palate in clefts of the lip and palate in animals are very similar to the corresponding changes that are seen in humans. Bardach et al. (Ritsila et al. 1972; Bardach et al. 1982) studied lip pressure changes following lip repair in infants with unilateral clefts of the lip and palate. They confirmed the belief that lip repair significantly increases lip pressure when compared with a noncleft population.

Berkowitz’s (1959, 1969) data demonstrated that the force of the united lip against

the protruding premaxilla in complete bilateral clefts of the lip and palate (CBCLP) acts first to bring about premaxillary ventroflexion. After 2–3 years, there is some appearance of midfacial growth retardation to various degrees. There is strong evidence that uniting the lip does not “telescope” the premaxilla into the vomer, whereas mechanical premaxillary retraction “telescopes” the premaxilla in almost all instances (see Chap. 21). In very rare instances, it may even cause a vomer fracture.

5.2 Variations in the Palate’s Arch Form

The size and relationship of the palatal segments to each other are highly variable (see Figs. 4.8 and 4.9). As already described, in complete clefts of the lip and palate, the lateral palatal segments are displaced laterally and the slopes of both palatal segments are steeper than normal, with the palatal segments at the cleft space extending into the nasal chamber (Berkowitz 1985). This steepness decreases with time, the slopes becoming more obtuse under the influence of tongue force. In clefts of the lip and palate, uniting the cleft orbicularis oris-buccinator superior constrictor muscle ring or using external facial elastics reestablishes the outer compressive muscular forces. This change in the muscle force vectors causes the laterally displaced palatal segments to move together. Moreover, this reduction in the width of the cleft is not limited to the alveolar process but

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extends as far back as the tuberosities of the maxilla and perpendicular pterygoid processes. The surgeon is challenged to establish muscle balance without disturbing the growth potential of the bony tissue being manipulated and to avoid scars that will tie or bind down the normally expansive forces of growth.

5.3 Reversing Aberrant Cleft Facial Forces in the Neonate

5.3.1 Lip Surgery, Elastic Traction, or Presurgical Orthodontic Treatment (Figs. 5.1, 5.2, 5.3, and 5.4)

1. Lip surgery creates sufficient forces to bring the overexpanded palatal segments medially narrowing the alveolar and palatal cleft spaces. The surgeon often does this in two stages: first, a lip adhesion at 3–5 months followed by a more definitive lip/nose surgery, which is more artistic. A cupid bow and normal nostrils are the eventual goals (see Chap. 8).
2. Head bonnet with elastic strap to be placed over the premaxilla in all lip clefts. The force system needs to be worn for 1 or 2 weeks along with arm restrains to prevent the infant overjet from removing the elastic strap. A premaxillary ventroflexion in CBCLP cases occurs very quickly creating an overjet and overbite. In CBCLP with a protruding premaxilla at birth, the lateral palatal segments move medially behind the premaxilla. This relationship does not cause palatal growth retardation. Should a crossbite occur, the involved palatal segment usually can be moved laterally into proper occlusion at 4–6 years of age when the child is manageable in a dental chair.
3. Presurgical orthopedics: There are active and passive appliances, which are designed to create an alveolar butt joint (Berkowitz et al. 2004). In the distant past, primary bone grafting was utilized with the hope of stabilizing the palatal segment's position. However, with primary bone grafting, it was found to cause midfacial deformity. Berkowitz, in a recent longitudinal palatal growth study, determined that the plates do not stimulate growth. Some surgeons who have used gingivoperiosteoplasty have created an anterior crossbite in most instances, which is hard to correct with expansion. Berkowitz strongly rejects the use of primary bone grafting and gingivoperiosteoplasty (10).



Fig. 5.1 (a–f) The use of an external elastic force to reduce premaxillary protrusion. (a, b) The protruding premaxilla extends forward in the facial profile. (c) Head bonnet with attached elastic placed against the protruding premaxilla causes it to ventroflex with the fulcrum at the premaxillary vomerine suture. (d, e) Facial photographs at 3 years of age. The lateral lip elements are united with the medial positioned prolabium over the protruding premaxilla in one stage. Because the premaxilla is already ventroflexed at the time of surgery, there is reduced muscle

tension at the suture sites. (f) Intraoral photograph shows excellent anterior and buccal occlusion even with bilateral deciduous cuspids in crossbite. Comment: A severe overbite or overjet with a buccal crossbite at this age does not create a functional dental problem or inhibit palatal growth. Midfacial protrusion is expected and even desirable at this age. A straight profile in the mixed dentition usually indicates a concave profile will develop in adolescence after the pubertal growth spurt



Fig. 5.2 (a–f) Case MD (AM-17). Conservative surgery with no presurgical orthopedics in CUCLP. Lip adhesion to start molding action to bring the separated palatal segment together. (a) At birth. (b) After lip adhesion at 5 months. (c) After definitive lip surgery at 9 months. (d, e)

Facial appearance at 8 years of age. (f) Occlusion at 8 years. The right deciduous lateral incisor erupted through a secondary alveolar bone graft performed at 7 years of age using cranial cancellous bone

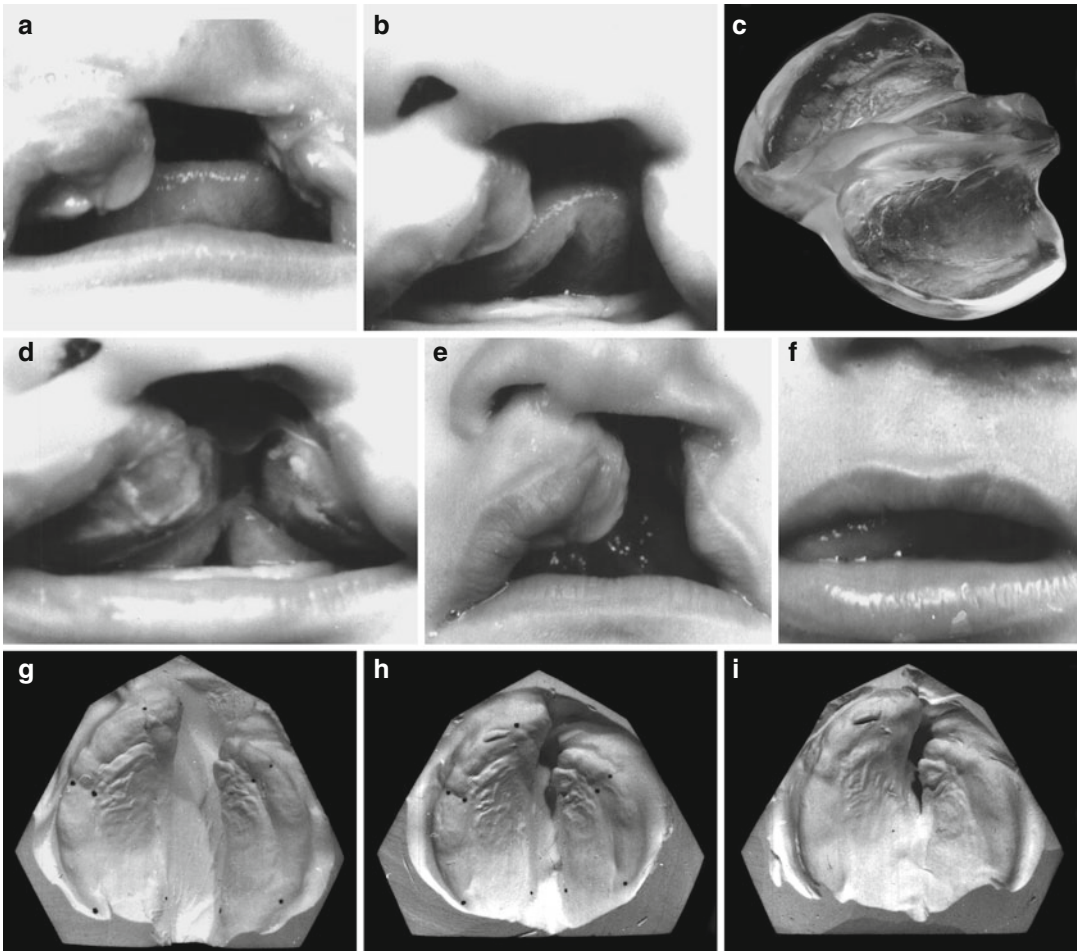


Fig. 5.3 (a–i) Presurgical orthopedic treatment (*PSOT*) appliance for a CUCLP utilized from birth to 1 year and 11 months at the University of Nijmegen (Courtesy of AM Kuijpers-Jagtman). (a) Lip and nose distortion at birth; (b) tongue posture within the cleft; (c) orthopedic appliance; (d) orthopedic plate prevents the tongue from

entering the cleft; (e) 15 weeks after *PSOT* and before lip closure; (f) 6 weeks after palate closure; (g) 17 months before soft palate closure; (h) at 14 months of age, before soft palate closure; (i) 8 weeks after lip closure

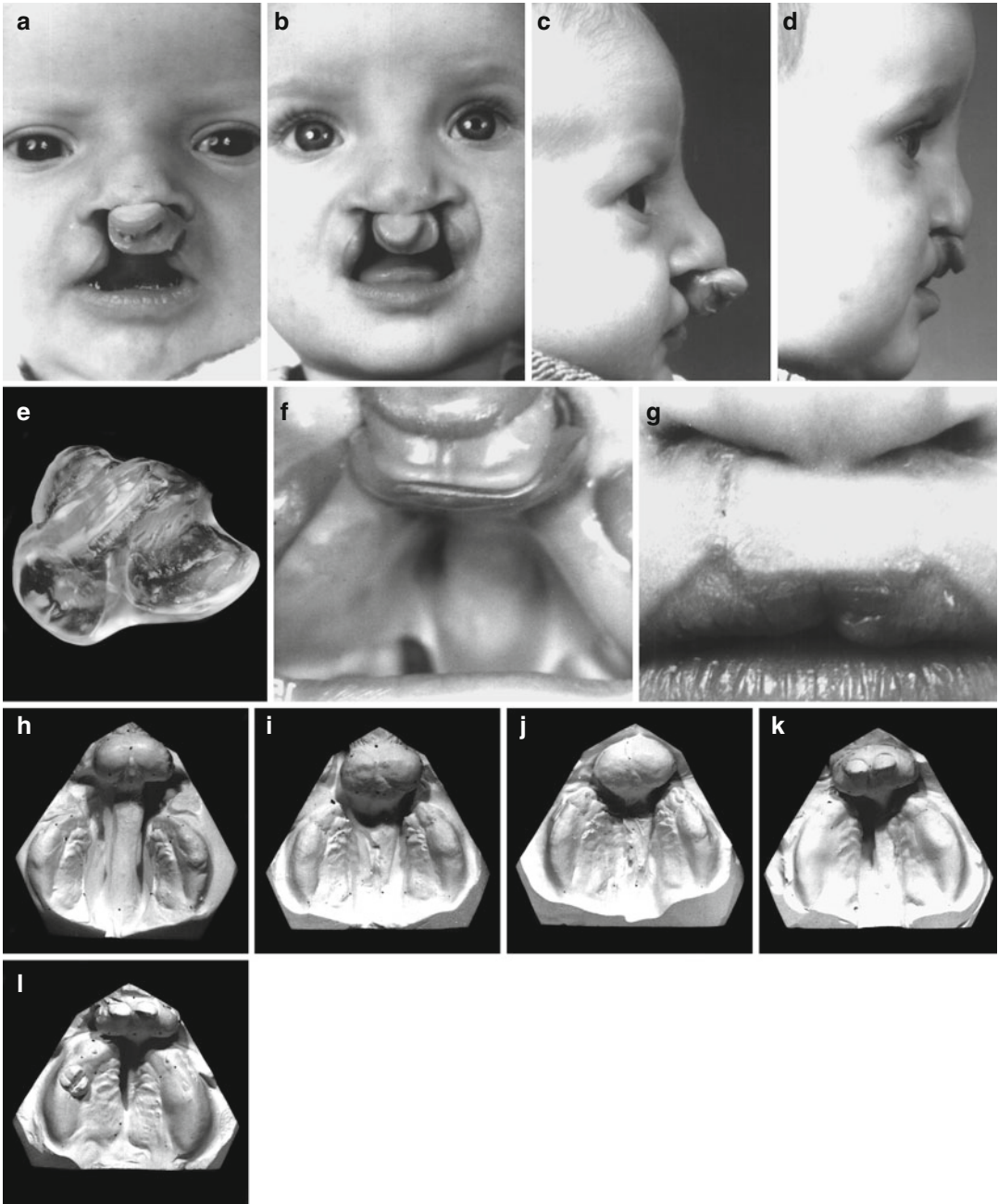


Fig. 5.4 (a-l) Presurgical orthopedic treatment from birth to 1 year for a CBCLP at the University of Nijmegen (Courtesy of AM Kuijpers-Jagtman). Lip closure at 1 year of age. Hard palatal cleft is closed between 6 and 9 years of age together with bone grafting of the alveolar cleft. (a-c) Facial photographs and palatal cast at birth; (d) 6 months after wearing PSOT appliance; (e) presurgical

orthopedic appliance and when placed on the palate; (f) wearing appliance; (g) 8 weeks after lip closure; (h) at birth, (i) after 6 months of PSOT and before lip closure; (j) 8 weeks after lip closure; (k) 1 year and 6 months, before soft palate closure; (l) 6 weeks after soft palate closure

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