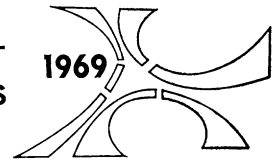
The Management of Premaxillary and Maxillary Segments in the Newborn Cleft Patient



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The object of early maxillary orthopedics is to obtain a satisfactory relationship between the maxilla and mandible. The attainment of this satisfactory alignment of the maxillary segments in the infant with an alveolar-palatal cleft is one that has been of considerable interest to many of us for the past few years (*1–4, 7–10*).

The management of the maxillary arch segments varies with the type of deformity present. As shown in Figure 1, the types of maxillary arch deformities which have been observed are: A, collapse of the lateral maxillary segment; B, protrusion of the medial maxillary-premaxillary segment; C, abnormal width of the alveolar cleft with lateral displacement of both maxillary segments; and D, protrusion of the premaxilla in the bilateral cleft of the lip and/or palate (collapse of the maxillary segments medially blocking out the premaxilla).

The management of the maxillary segments, therefore, is one that quite often necessitates adjustment of the maxillary arches and premaxilla preoperatively, and stabilization and further adjustment postoperatively.

Unlike previously described prosthetic appliances utilizing extraoral traction and stabilization devices or intraoral appliances utilizing jack screws and single pin fixation (*6, 11*), the author has designed and utilized a "staple" pin fixation device in conjunction with a clear acrylic prosthesis. The stainless steel pin resembles the ordinary staple in size; however, its arms are slightly longer, and it is inserted palatally through the previously made holes in the clear plastic prosthesis at an oblique angle so as not to interfere with the dentition (Figure 2).

The prosthetic appliances utilized are either of a one-piece solid acrylic type or a "split" prosthesis with a specially designed spring wire with approximately a one-eighth of an inch loop centered with each arm inserted into the split prosthetic appliance. This special spring wire is capable of producing considerable steady lateral forces up to 3–5

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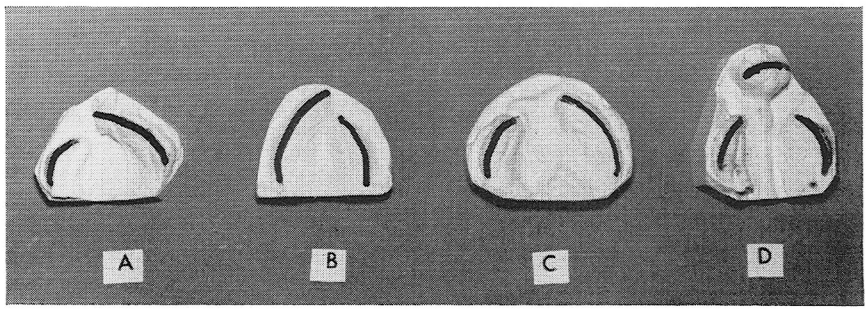

FIGURE 1. A, B, C, and D show the most common palatal cleft, maxillary deformities. The malalignment of the maxillary segments is corrected by use of the specially designed prosthesis. D represents a particularly difficult alignment problem involving not only a markedly protruding premaxilla but also medial collapse of the maxillary segments.

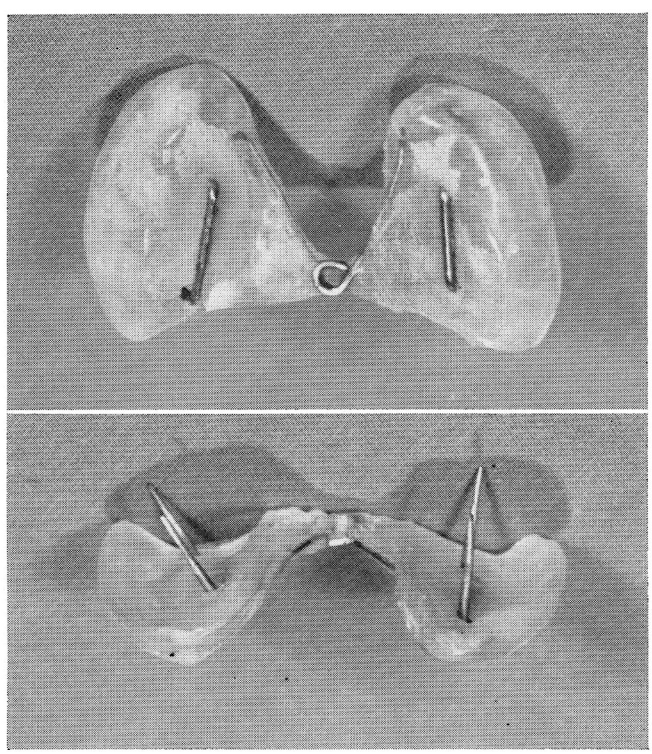

FIGURE 2. The prosthesis shown is designed with an expanding heavy spring wire capable of expanding the maxillae when indicated in infants with maxillary collapse. Note the unique stainless steel staple-type pins which are inserted obliquely into the prosthesis and then into the lateral palatal areas for positive retention of the prosthesis for as long as desired.

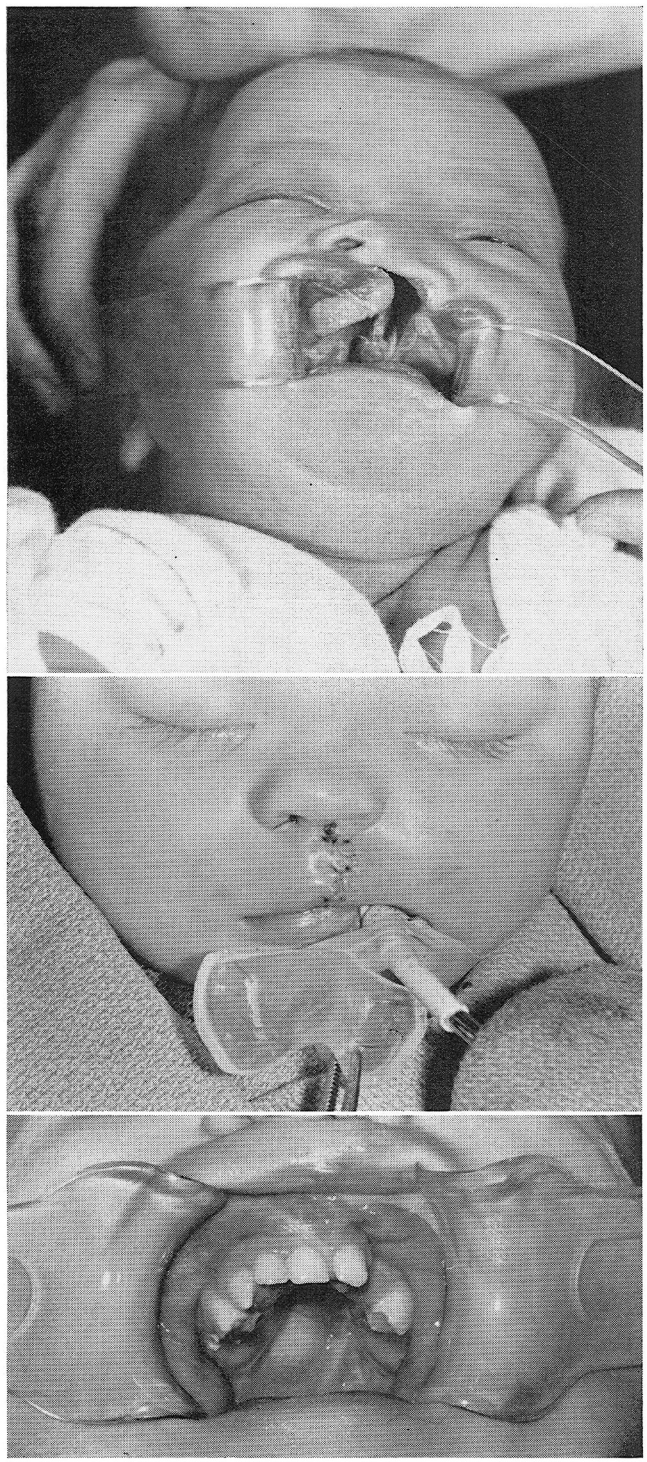

FIGURE 3. *Top,* shows the appearance of an infant with a markedly protruding maxillary, premaxillary segment. In the center, solid clear acrylic prosthesis is inserted immediately after the cleft lip repair. Note the position of the staple pin fixation. At the *bottom,* appearance of patient's arch is shown two years later.

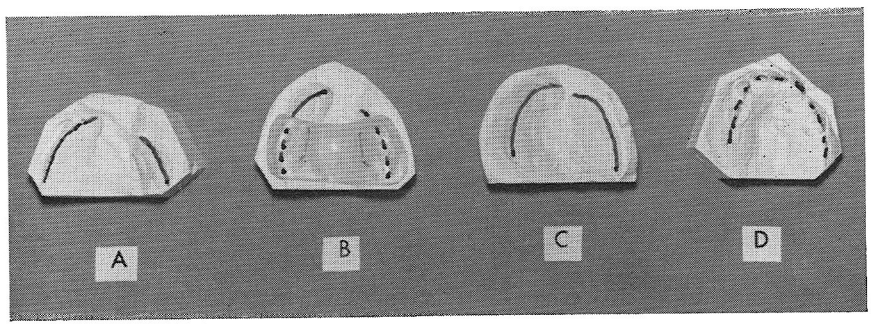

FIGURE 4. The study casts of the patient shown in Figure 3 reveal the progressive alignment of the maxillary segments over a two-year period.

pounds, depending on the length of the spring, which readily produces expansion of the lateral maxillary segment. A clear type of plastic prosthesis is always inserted so that the underlying mucosa can be examined for any evidence of undue pressure on the mucosa.

Collapse of the lateral maxillary segment necessitates the use of this expanding type of prosthesis (Figure 2) which can be inserted and maintained in position for weeks at a time, if necessary, in order to obtain the desired arch form. Once this has been obtained, the spring type of appliance is usually replaced with a solid clear plastic prosthesis for maintenance of the maxillary segments in the desired position (Figure 4, B).

A protrusion of the medial maxillary-premaxillary segment is corrected by insertion of a solid prosthesis at the time of the surgical repair of the cleft lip and alveolus and maintained in position for at least two or three months postoperatively until the maxillary segments are in apposition to each other (Figures 3 and 4). The prosthesis is usually trimmed around the alveolar ridges so as not to interfere with dentition in the later months, and the forces are exerted on the palatal shelves and not on the ridges.

Abnormally wide clefts with displaced maxillary segments laterally are allowed to become narrowed with the molding action of the newly repaired lip. When the desired spatial relationship has been attained, a palatal space maintainer is inserted (Figure 5).

The bilateral cleft lip-palate patient with a protruding premaxilla is probably the most difficult of the group to correct. The basic problem involves the positioning of the premaxilla in its proper relationship in the maxillary arch and at the same time preventing collapse of the maxillary segments "locking out" the premaxilla. If the maxillary segments have collapsed posterior to the premaxilla, then expansion of the segments must be carried out concomitantly with the positioning of the premaxilla (*5*). The technical aspects have been accomplished by use of an internal pin-traction device utilizing rubber band traction from the premaxillary pin to the fixed previously inserted posterior Kirschner

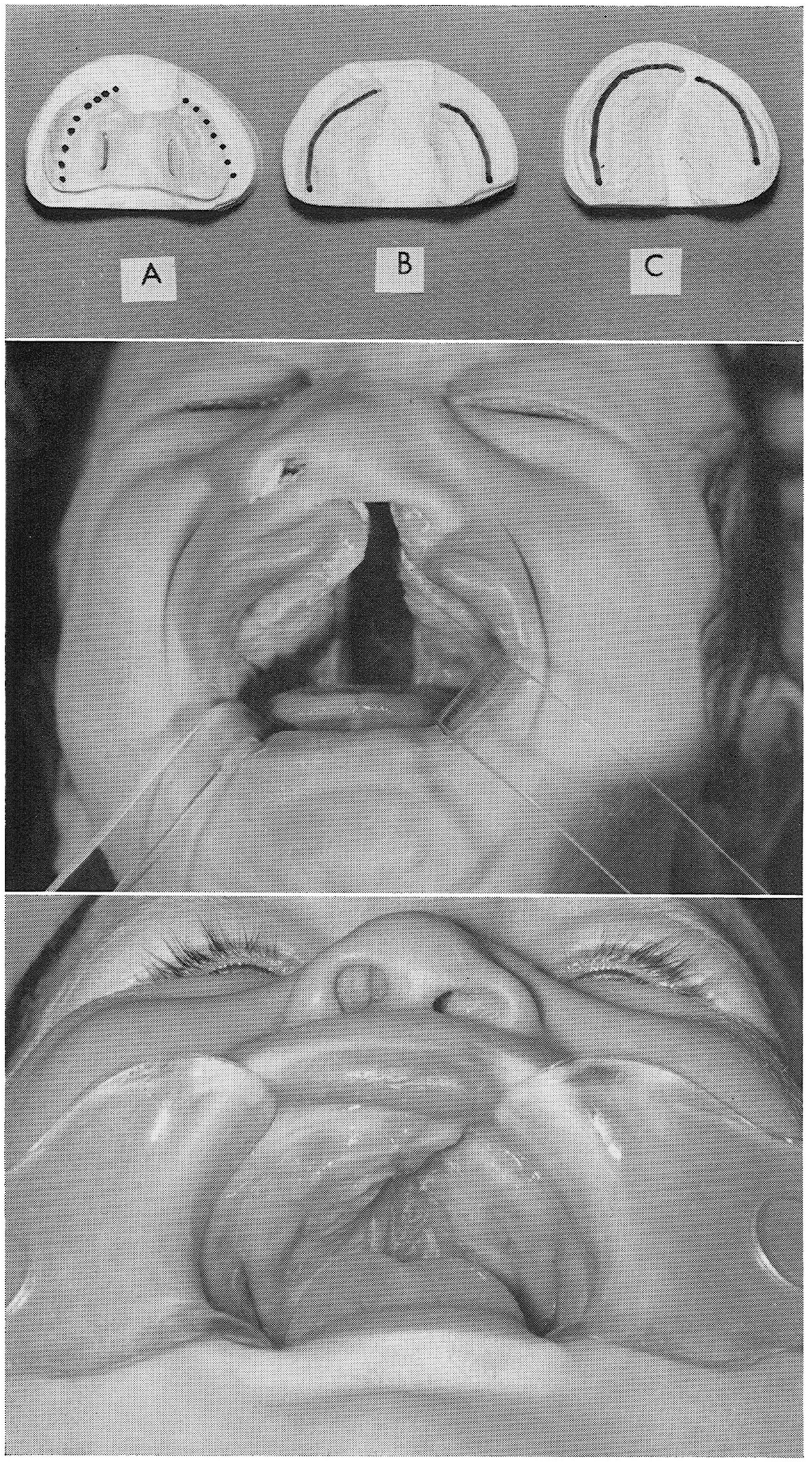

FIGURE 5. *Top,* the rearrangement of the maxillary arch is shown in the study casts. *Center,* appearance prior to cleft lip repair and insertion of the solid prosthesis. *Bottom,* postoperatively cleft lip repair and maintenance of palatal prosthesis for approximately six months.

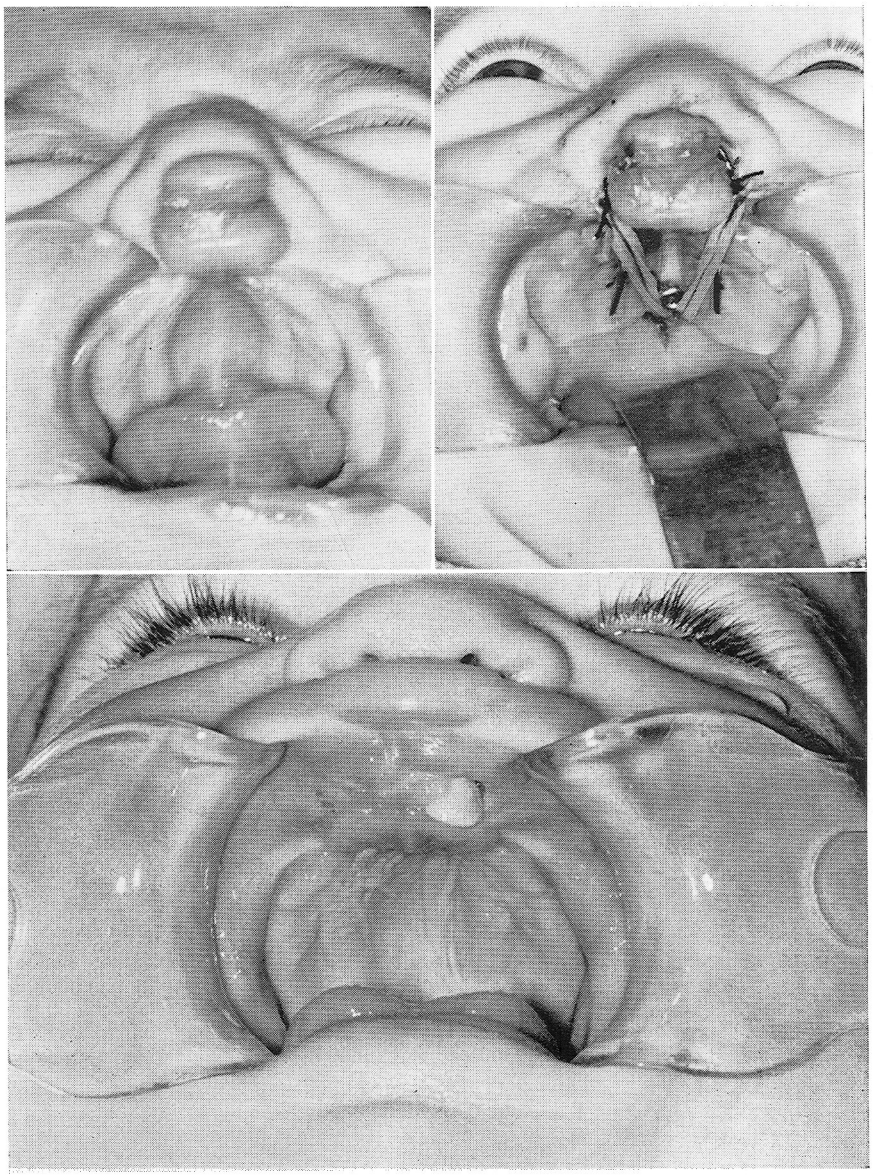

FIGURE 6. *Top,* preoperative appearance of an infant with severe protrusion of premaxilla and bilateral cleft of the lip and alveolus. *Center,* intraoral traction apparatus in place with rubber band traction established in order to pull back and align the maxillary segments. Note also the split maxillary prosthesis with spring wire and staple pin fixation utilized to expand the maxillary segments to allow the premaxilla to come into the arch. *Bottom,* appearance of maxillary arch eight months later.

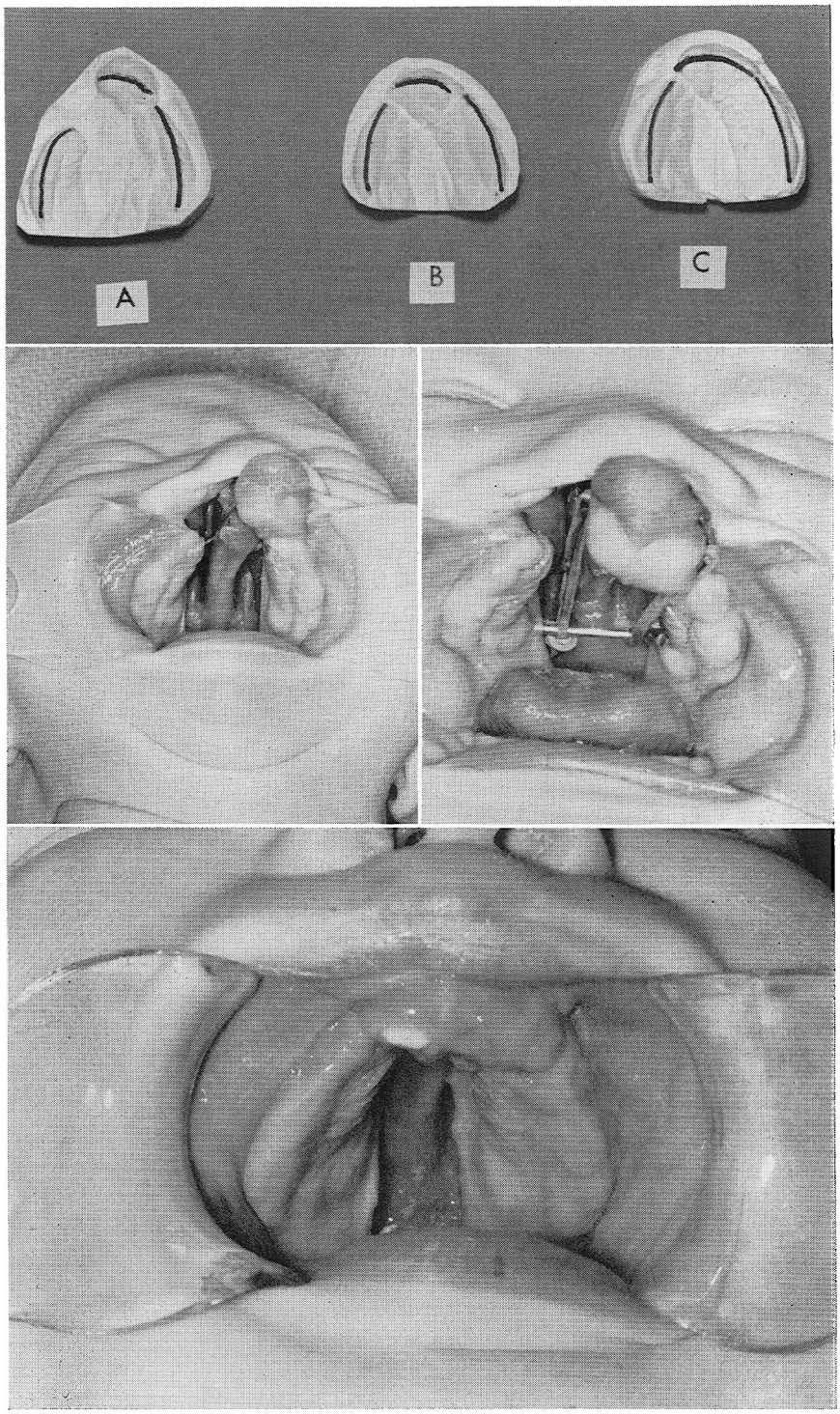

FIGURE 7. *Top,* study models showing the progressive alignment of the maxillary segments over a period of eight months. *Center left,* preoperative appearance of this newborn infant with a severe bilateral cleft of lip, alveolus, and palate with premaxillary protrusion. *Center right,* intraoral traction being applied to bring the premaxillary segment into a more suitable relationship with the maxillary segments. *Bottom,* post-reduction of the premaxillary protrusion and alignment with the lateral maxillary segments. (Note study casts A, B, C.)

wire. The utilization of this technique will in a few days bring the premaxillary segment into a satisfactory arch form allowing simultaneous repair of both sides of the bilateral cleft lip if desired. At the same time either an expansion or a solid prosthesis can be inserted to manage the lateral maxillary segments (Figure 6).

In infants with any of the above mentioned deformities, the earlier the maxillary and premaxillary deformities are corrected, the easier will be the task, as the bony framework of these infants is incompletely calcified and malleable during the first few months of life. Infants in our series have had their initial impressions taken and appliances constructed, when considered necessary, within the first week of life (Figure 7).

Summary

Malalignment of the maxillary segments may be present at birth and when present should be corrected prior to surgery; otherwise the tension produced by the lip repair will increase the deformity already present and make correction at a later date more difficult. The author has described some of the newer techniques and appliances he has designed to correct existing maxillary and premaxillary deformities.

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References

1. Burston, W. R., The presurgical orthopedic correction of the maxillary deformities in clefts of both primary and secondary palate. *Trans. Int. Soc. plastic Surg., Second Congress,* 28–36, 1959.
2. Dennison, W., and C. K. McNeil, Recent trends in the treatment of cleft lip and cleft palate. *Surg., 41,* 71–77, 1957.
3. Forshall, I., R. Osborne, and W. Burston, Early treatment of cleft lip and palate. R. Hotz (ed.), International Symposium, 1964.
4. Georgiade, N., Early utilization of prosthetic appliances in cleft palate patients. *Plastic reconstr. Surg., 34,* 617–623, 1964.
5. Georgiade, N., Positioning of the premaxilla in bilateral cleft lips by oral pinning and traction. *Plastic reconstr. Surg., 41,* 240–243, 1968.
6. Hagerty, R., W. Mylin, and D. Hess, The pin-retained expandable prosthesis in cleft palate treatment. *J. S. Carolina med. Assoc., 61,* 221–229, 1965.
7. Latham, R., and W. Burston, The effect of unilateral cleft of the lip and palate on maxillary growth pattern. *Brit. J. plastic Surg., 17,* 10–17, 1964.
8. Maisels, D. O., The timing of the various operations required for the complete alveolar clefts and their influence on facial growth. *Brit. J. plastic Surg., 20,* 230–243, 1967.
9. McNeil, C. K., Congenital oral deformities. *Brit. dent. J., 101,* 191–198, 1956.
10. Monroe, C., B. H. Griffith, S. Rosenstein, and B. Jacobson, The correction and preservation of arch form in complete cleft of the palate and alveolar ridge. *Plastic reconstr. Surg., 41,* 108–112, 1968.
11. Mylin, W., R. Hagerty, and D. Hess, The pin-retained prosthesis in cleft palate orthopedics. *Cleft Palate J., 5,* 219–227, 1968.