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## **ARCH EXPANSION IN CLEFT LIP AND PALATE PATIENTS**

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### **ABSTRACT**

Arch widening for alignment of teeth is one of the presurgical orthodontic requirements in cleft palate cases. Methods of expansion (dental / skeletal) that can be undertaken in cleft patients are discussed here.

**Key Words:** Expansion, Unilateral Cleft Palate, Cleft Lip and Palate, Cleft Patients, Presurgical Orthodontic Requirements, Cleft Management, Arch Expansion, Widening

### **INTRODUCTION**

Patients may present with maxillary deficiency in transverse plane, in a unilateral or bilateral cleft involving the palate, lip and/or alveolus. Adult unilateral cleft palate cases requiring presurgical orthodontics for arch expansion and tooth alignment will be discussed here in this article. Soft tissue and hard tissue analyses show that the maxillary arch is constricted in the unilateral cleft patients. One of the published studies on the cleft palate patients in Kerala shows that the maxillary dental arch dimensions in unilateral cleft are different from that of the normals, and arch expansion is almost always a part of the general treatment protocol in the management of the unilateral cleft palate. Maxillary deficiency in the transverse plane of space often accompanies the cleft. Narrow maxillary arch dimensions are seen in cleft studies, indicated by narrow width of the interpremolar region; it has been assessed in the dental casts of cleft patients in Kerala population; this has been studied for the cleft patients who reported to the Department of orthodontics, Government Dental College, Thiruvananthapuram. Transverse deficiency in maxillary and mandibular arches can be measured accurately from dental casts. Since tooth movement is also needed, in addition to the skeletal expansion, space creation in the dental arch is also needed for the tooth alignment.

### **MATERIALS AND METHODS**

Skeletal expansion to widen the maxilla and dental arch expansion by moving the teeth relative to bone is attempted in cleft palate patients. Different methods and appliances for expansion are available in the management of transverse discrepancies in the cleft patients. Rapid and slow expansion procedures can be undertaken in the management of transverse discrepancies, however the overall results of rapid and slow expansion is said to be similar. The quad helix, the coffin spring, the RME (rapid maxillary expansion, e.g. hyrax), the niti expander etc are some of the examples in expansion aids. The Y plate is not so commonly used in cleft cases. The crossbite with the skeletal component is addressed and taken care of by the expansion procedures. Fixed appliance therapy is preferred over removable appliance therapy for positioning of individual teeth. NiTi open coil springs are used in space creation in the dental arch needed for the tooth alignment. Advantages of arch expansion: Space creation needed for the tooth alignment is achieved (to achieve a normal arch form). Also, as a presurgical orthodontic procedure, an additional amount of space is made available in the cleft region for placement of the graft. (In many cases, to achieve an optimal positioning of the cuspid tooth, it is of utmost importance to obtain a successful bone graft). According to Profitt, age of the patient is a factor in obtaining separation of the suture; pre mid adolescence years is the best time for achieving expansion. According to Bishara, mixed dentition stage is the ideal timing for expansion in cleft cases. But this is not always possible, especially in the conditions prevailing in Kerala, as is evident from the adult untreated cases reporting to the Department

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of Orthodontics at the Government Dental College, Thiruvananthapuram. Opening the sutures for patients in their twenties is not impossible, according to some authors. It has not been much cited in literature on the expansion procedures effectively carried out in cleft cases of the Kerala population. Periapical radiographs, occlusal view and orthopantomogram are valuable aids in evaluating the expansion achieved.

### **RESULTS AND DISCUSSION**

Rapid and slow expansion procedures are used in orthodontics to aid treatment plan. The expansion achieved in orthodontic non cleft cases has been a motive to employ it in cleft cases too. NiTi open coil springs are often used for space creation in the dental arch, in cleft cases also. The transverse expansion of the maxillary arch can be derived from a variety of orthodontic appliances. Measures of transverse expansion achieved are influenced by varying the type of appliance and amount of force delivered (for example, coffin spring, quadhelix, NiTi expander etc). Many studies were attempted to discern these changes. The previous surgeries of the palate, undergone by the patient; the age, maturational status, sex and facial morphology, all influence the expansion achieved.

#### **Early Intervention**

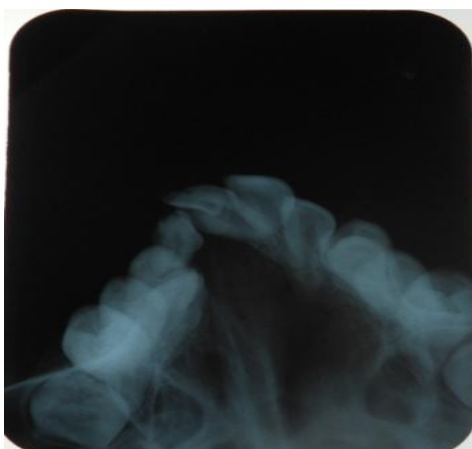
James Mc Namara (2002) examined whether the early intervention in the transverse dimension was worth the effort. The maxillary dental arch dimensions in unilateral cleft are different from that of the normals,



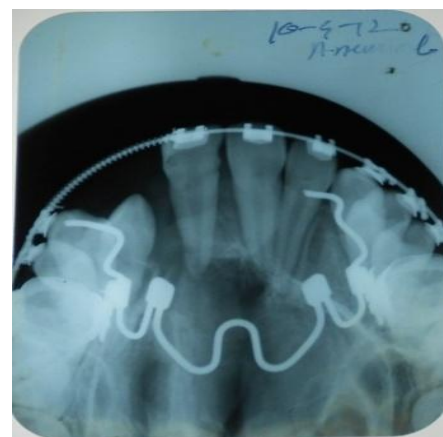
**Figure 1: Maxillary arch pre treatment**



**Figure 2: Maxillary arch after expansion using NiTi palatal expander**



**Figure 3: Maxillary occlusal view pre treatment expansion**



**Figure 4: Maxillary occlusal view (after and alignment)**

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as reported in an earlier study. The mandibular dental arch length dimensions in unilateral cleft sample are also different from that of the patients without cleft, as reported in another study, it is less for the cleft sample when compared with the normals. Arch expansion is needed in most of these cases.

The niti expander can be employed successfully in adult cleft palate patients. A study to evaluate the efficacy of NiTi palatal expander demonstrated that it mainly shows orthodontic expansion. Figure 1 shows a constricted maxillary arch, in a cleft case. Figure 2 shows the widening achieved in the cleft region for a patient using the niti expander. The occlusal radiographs (figure 3 and figure 4) demonstrate the widening achieved successfully in the cleft region for a patient with cleft palate. The usefulness of radiographs as a presurgical requirement in cleft cases for bone grafting has been discussed. Figure 5 and figure 6 show the widening achieved in the cleft region for another patient using the quad helix appliance. Figure 7 shows the widening achieved in the cleft region for another patient using RME. Figure 8 shows the arch widening achieved in the cleft region for another patient, using the NiTi open coil spring. Figures are of cases done in the dept. of Orthodontics, Govt. Dental College, Thiruvananthapuram during latter half of 2011 to end of 2012.



**Figure 5 Maxillary arch pre treatment using quad helix**



**Figure 6 Maxillary arch after expansion**



**Figure 7: RME**



**Figure 8: Open coil spring**

### **Conclusion**

Arch expansion can be successfully carried out in adult cleft palate patients, using rapid or slow expansion procedures, using removable or fixed appliance therapy. The expansion procedures aim for a favorable arch form and alignment, for improvement of dental function and esthetics; to aid our attempts to enhance aesthetics, function and structural stability, in cleft palate patients. A study on the long term stability of the results achieved still remains to be evaluated for our population, in the orthodontic perspective.

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