

"CONSIDERATIONS WHEN UNDERTAKING THE CHALLENGE OF COMBINED
ORTHODONTIC AND PROSTHODONTIC TREATMENT" *

Aris-Petros D. Tripodakis, DDS, MS, Dr.Odont. **

* Presented at the 64rd Congress of the
European Orthodontic Society,
Rhodes, Greece, October 26-30, 1987.

** Private practice limited to prosthodontics
Athens, Greece.

Address all correspondence to:

Dr. A.- P. Tripodakis,
92, Vas. Sophias Avenue,
Athens 115 28
GREECE

December 1987

Introduction

In many oral rehabilitation cases, prosthodontic treatment in fixed partial dentures becomes almost an impossibility if it is not preceded by orthodontic treatment. However, the involvement of preprosthetic orthodontics is always followed by an undesirable complication of the total treatment plan. The additional time and effort that such an approach requires has to be justified in all aspects of the treatment including the proper initial diagnosis, the following of the correct clinical procedures and finally the achievement of a successful result and its maintenance.

The aim of this paper is to analyze the considerations that should be given in undertaking the challenge of a combined treatment by exploring the clinical management of such cases.

The minor tooth movement

In treatment planning a prosthetic rehabilitation whether extensive or not, the minor tooth movement can often become an important step towards a successful result. On many occasions the abutment teeth can easily gain a more favorable alignment in the dental arch, when moved slightly labio-lingually (fig. 1a-c). On the other hand, improper interdental spaces can be altered when the teeth are moved in a mesio-distal direction, while allowing proper room for the pontics (fig. 2c-d). The importance of diagnostic waxing in evaluating the usefulness of such an approach, can not be overemphasized (fig 2a-b).

The anterior cross-bite

The anterior guidance has universally been proclaimed to be the Mother of Aesthetics and the Pilot of Occlusion. Anterior cross-bites are more or less suffering in both aspects: Aesthetically are compromised. Also the mandible is obliged to occlude in a forced forward position, far anterior to C.R. and functionally unfavorable (fig.3a-b).

The insertion of a flat-plane occlusal splint would reposition the mandible into a proper relationship with the maxilla and increase the vertical dimension, so that retrusion of the lower anterior teeth through orthodontic movement becomes feasible (fig. 3c). During treatment the occlusal splint can be replaced by flat plane temporary bridges in the posterior upper segments that will maintain the increased vertical dimension (fig.3d). As soon as the lower incisors have passed under the upper teeth, the vertical dimension can be slowly reduced by trimming the temporaries. The case will then be finalized when the normal horizontal and vertical over-bite have been established (fig.3e). The newly established anterior guidance will allow disocclusion of the posterior teeth in the lateral movements and provide the required aesthetic improvement (fig. 3f).

Periodontal breakdown and posterior-bite collapse.

The classic case of anterior flaring of periodontally involved teeth is often caused by the inadequate occlusal support provided by the posterior teeth (fig. 4a-d). This situation represents a perfect candidate for the combined treatment. However, the three specialities of Orthodontics, Periodontics and Prosthodontics should interact and collaborate by close and continuous communication.

After the initial periodontal therapy, the temporary bridges in the posterior segments of the upper arch will establish a new vertical dimension and improve anchorage for the orthodontic treatment. The orthodontist will then close the wide interdental spaces by moving the upper anterior teeth into an intruded lingual position (fig. 4e-f). The prosthodontist will stabilize the result by temporary splinted crowns immediately after the braces are removed (fig. 4g). The periodontist will accomplish his therapy with surgery (fig.4h). After healing, the case will be finalised with the restorative procedures (fig. 4i-g).

In general, extensive splinting creates problems in prosthetic dentistry. Such cases however are rather vulnerable to relapse. Proper stabilisation therefore should be provided. Semi-precision interlocks could assist in achieving this goal.

Congenital Partial Anodontia

Most frequently the tooth congenitally missing is the upper lateral incisor¹. When this happens, the permanent canine often erupts into a more mesial position, leaving wide interdental spaces, both mesially and distally. The treatment plan in such cases can be debatable involving either strictly orthodontic treatment or prosthodontic treatment, or most often both².

If orthodontics are impractical for a patient, a fixed bridge from cuspid to first premolar would fill the edentulous space with a cuspid pontic while the natural canine would be transformed into a lateral incisor (fig. 5a-b). However, the large cervical periphery of this tooth in most cases will not be able to simulate the cervical anatomy of a lateral incisor (fig.6a).

If orthodontics are considered, the decision should be made, whether to close the spaces or open them and place a fixed bridge.

The inherited scepticism of the orthodontist towards the prosthetic replacement of the lateral incisor by a fixed bridge (eventually causing gingival irritation and questionable aesthetic results) often encourages the orthodontic closing of the spaces^{3,4}. This would lead to the replacement of the missing incisor with a reshaped canine made to resemble a lateral incisor. However the color and size incompatibility between these two teeth inevitably creates an aesthetic compromise (fig.7a-b).

Several authors have suggested that ideally orthodontic movement of the canine into a distal class I relationship followed by the placement of a bridge would result in a better occlusion and correct the flattening of the facial contour⁵. The extensive distal bodily movement of a cuspid however, is mechanically quite difficult. On the other hand, reduced anchorage due to the missing lateral incisor and the relative alveolar concavity between the cuspid and first premolar

roots may limit the achievement of the ideal labial root prominence of the cuspid (fig.8a-b). The combined effort in this case would have to compensate for any orthodontic inefficiencies (fig.8c-f).

In conclusion if orthodontic treatment is to be decided upon the choice between lateral incisor space opening or space closure will be influenced by the position of the cuspid as well as the presence of a generalized malocclusion.

Cases with severe malocclusion requiring extraction of permanent teeth, or cases in which cuspids have erupted in close proximity to central incisors, are best treated by space closure. The absence of malocclusion combined with a class I buccal relationship favors treatments by orthodontic space opening and prosthetic lateral incisor replacement⁶.

In severe cases of oligodontia, there is no question about the necessity of the combined treatment. Treatment planning in such cases becomes a complicated but challenging task. Due to the fact that very few permanent teeth are present, oligodontia cases usually present missplacement of the teeth and inadequate occlusal support. As a result the vertical dimension is reduced and often is combined with an extremely deep bite also causing severe aesthetic problems (fig. 9a-c).

The orthodontic treatment should aim to achieve the following goals:

- To bring the teeth that will eventually be used as abutments for the prosthetic treatment into suitable positions while allowing proper room for the pontics.
- To correct the maxillomandibular relationship by reduction of the deep bite. However the inadequate anchorage that is provided by the few permanent teeth present makes the achievement of these goals complicated and time consuming (fig. 9d-h).

The prosthodontic treatment on the other hand should involve replacement of the missing teeth and stabilization of the occlusion in a proper maxillomandibular relationship. Ultimately the treatment should involve fixed partial dentures. Nevertheless the number of permanent teeth that could be used as abutments is more or less limited. For this reason certain primary teeth with well developed roots (i.e.canines) could also eventually be used as abutments. On many occasions the involvement of removable partial dentures is inevitable (fig. i-l).

Summary

In evaluating the considerations that enter the clinical management of cases requiring combined treatment, one should recognize that every individual case presents itself with unique clinical needs and special demands - there lies the challenge. Nevertheless there is always a common, basic and vital factor to be considered - the factor of cooperation.

The cooperation among the specialists should involve full understanding of the common goal. Proper communication based on the mutual understanding of what each can contribute will lead to the correct interacting clinical procedures. More over the importance of the patient's

cooperation cannot be overemphasized. His full understanding of what is actually required to achieve the ultimate reconstruction results, as well as his determination to achieve them, will become the foundation on which to base the successful treatment.

References

1. Muller, T.P., Hill, I.N., Peterson, A.C., Blayney, J.R., A survey of congenitally missing permanent teeth. *J.A.D.A.* 81:101-107, 1970
2. Asher, C., Lewis, D.H., The intergration of orthodontic and restorative procedures in cases with missing maxillary incisors. *Br.Dent.J.* 160:241-245, 1986.
3. Tuverson D. Orthodontic treatment using canines in place of missing maxillary lateral incisors. *Am. J. Orthodont.* 58:109-127, 1970.
4. Roth, P.M., Gerling, J.A., Alexander, R.G. Congenitally missing lateral incisor treatment *J.C.O.* Vol. XIX Number 4:258-262, 1985.
5. D'Amico, A. The canine teeth-normal functional relation of the natural teeth of man. *J.So.Calif.Dent.Assoc.* 26:200-204, 1958.
6. McNeil, R.W., Joondeph, D.R., Congenitally absent maxillary lateral incisors: Treatment planning considerations. *Angle Orthod.* 43:24-29, 1973.

List of figures

- 1a. Labial displacement of a periodontally involved central incisor.
- 1b. Minor orthodontic movement in the labiolingual direction allows the left central incisor to gain its proper alignment in the dental arch.
- 1c. A common path of insertion can be obtained upon tooth preparation for all five anterior teeth so that prosthodontic treatment can be accomplished, by one piece six unit bridge.
- 2a. Preoperative condition of a case that involves misplacement of the abutment teeth. Note the unsuccessful attempt to fill the wide interdental spaces with prosthetic material by a previous restoration.
- 2b. Diagnostic waxing suggests the normal dimensions for the teeth to be restored.
- 2c. Minor mesial movement of the central incisors reduces their wide interdental space while allowing proper room for the lateral incisor pontics.
- 2d. The final restoration.
- 3a. Anterior cross bite forcing the mandible to occlude in a forward position.

- 3b. When the mandible is in Centric Relation the incisal edges of the lower anterior teeth contact lingually the incisal edges of the upper anterior teeth.
- 3c. A flat plane occlusal splint in the upper posterior teeth allows the mandible to gain its proper position anteriorposteriorly while introducing an increase of the vertical dimension,so the orthodontic treatment of the lower anterior teeth can be accomplished.
- 3d. The splint can be replaced by flat plane temporary bridges. As soon as the lower incisors have past under the upper incisors, the vertical dimension is reduced by trimming the temporaries.
- 3e. The case is finalised by the insertion of the final restorations in the upper posterior segments,when the proper orizontal and vertical overbite have been established.
- 3f. The newly established canine guidance will allow disocclusion of the posterior teeth in the lateral movements.
- 4a. Panoramic x-Ray reveals reduced periodontal support for all upper teeth.
- 4b-c. Inadequate occlusal support provided by the posterior teeth, has resulted to a labial displacement of the upper anterior teeth and an increase of both vertical and horizontal overbite
- 4d. The patient's smile preoperatively reveals the aesthetic problems that also involve a shift in the midline.
- 4e. The insertion of temporary bridges in the posterior segment increased the vertical dimension and improved achorage for orthodontic treatment. The anterior teeth were intruded and the interdental spaces were closed after the initial periodontal therapy.
- 4f. The patient's smile after the orthodontic treatment.
- 4g. After the braces are removed the teeth are stabilized in their new position by temporary splinted crowns.
- 4h. The periodontal treatment is accomplished through surgery.
- 4i. The case is finalized by two fixed ceramometal bridges that are united in the midline by a semi-precision interlock.
- 4j. The patient's smile post-operatively.
- 5a. Preoperative condition of a case with congenitally missing lateral incisors. The mesially positioned canine and the two premolars have previous restorations.
- 5b. Prosthetic treatment involves a fixed partial denture from canine to second premolar, (cantilever a third premolar). The edentulous area has been filled with a canine pontic while the natural canine has been transformed into a lateral incisor.

- 6a. Fixed partial denture from canine to first molar. The canine has been transformed into a lateral incisor. Note that the wide cervical periphery of the canine fails to simulate the cervical anatomy of a lateral incisor.
- 7a-b. Orthodontic closing of spaces in a case that involves congenitally missing lateral incisors. The canines have been reshaped to resemble lateral incisors (courtesy of Stavros Papaconstantinou).
- 8a. Panoramic x-Ray of a case with congenitally missing lateral incisors. The canine in the right side has erupted mesially to the remaining deciduous canine, and the impacted canine in the left side is followed by the presence of the primary canine and lateral incisor.
- 8b. After the extraction of the deciduous teeth, orthodontic treatment has brought the canines in Class I position. Note the improper labiolingual inclination.
- 8c. The clinical crowns of the canines have been surgically increased by the periodontist.
- 8d. The tooth preparation for full coverage has attempted the correction of the axial inclination of the clinical crown.
- 8e. Prosthetic replacement of the lateral incisors involving resin bonded retainer on the central.
- 9a. Panoramic x-Ray of a case with severe oligodontia. In the lower arch the only permanent teeth present are the first molars. In the upper, the permanent canines have erupted distally of the primary canines.
- 9b. The intraoral condition reveals an extremely deep bite.
- 9c. The patient's smile preoperatively.
- 9d. The orthodontic treatment attempted the mesial movement of the canines and reduction of the deep bite by intrusion of the central incisors.
- 9e. A temporary partial overdenture was inserted in order to disocclude the molars so that the application of extruding forces through vertical elastics was feasible.
- 9f-g. The orthodontic treatment resulted to mesial movement of the canines and some correction of the deep bite through intrusion and correction of the axial inclination of the central incisors. Extraction of the molars did not occur and the facial axis remained unaltered (fig. 9g Courtesy of Stavros Papakonstantinou).
- 9h. The patient's smile after the orthodontic treatment.
- 9i. The upper teeth were prepared for two fixed partial dentures from central incisor to first molar. The mandibular deciduous canines were also used as abutments for a fixed bridge.

- 9j. Prosthetic treatment in fixed partial dentures also involved a mandibular removable partial denture in the posterior segments.
- 9k. Through the prosthetic build up, the deep bite was further reduced and the facial axis opened (Courtesy of Stavros Papakonstantinou).
- 9l. The patient's smile postoperatively.

Abstract

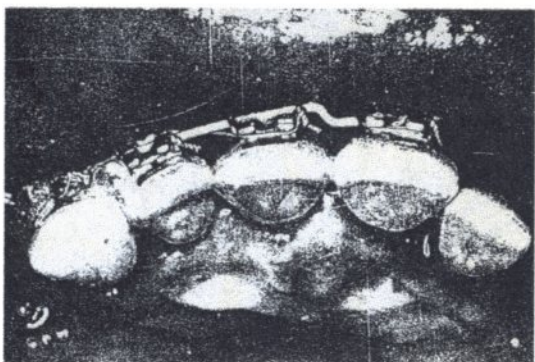
Preprosthetic orthodontics always induce additional complication of the treatment plan of a reconstruction. The considerations that enter when undertaking the challenge of rehabilitation of cases that require the combined treatment are described by exploring their clinical management.

Acknowledgements

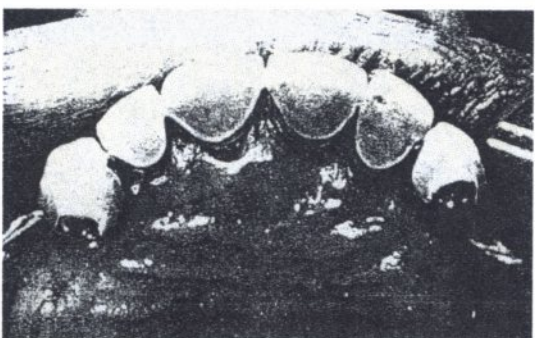
The author wishes to thank the orthodontists Dr.M.Makou, Dr V.Charlaftis and Dr. S. Papakonstantinou for their excellent cooperation in treating the patents involved in this paper. Also special thanks go to the late periodontist Dr. A. Katechis for his contribution in treating periodontally several of the above cases. Moreover, his warmth and considerations as a colleague and friend will always be remembered.



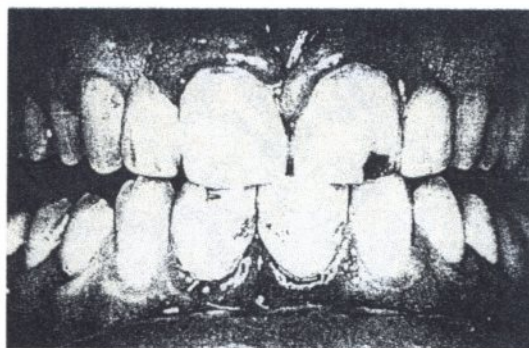
1a



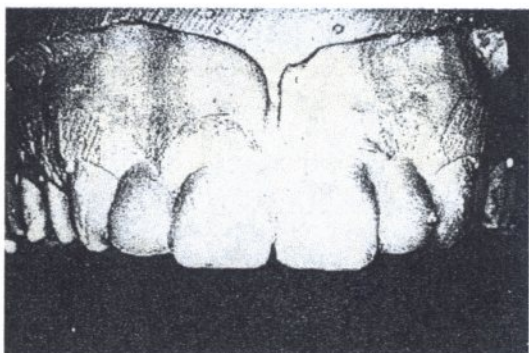
1b



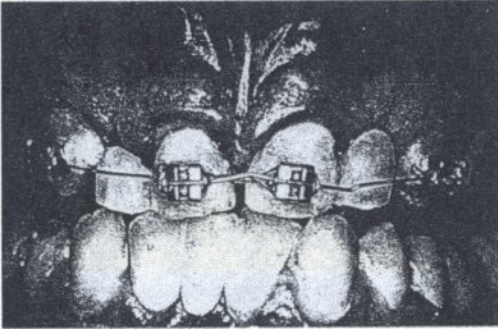
1c



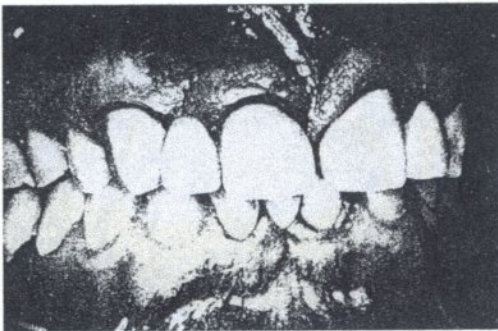
2a



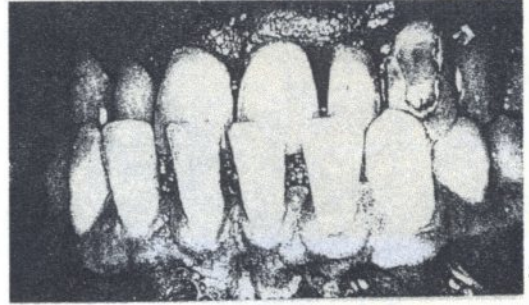
2b



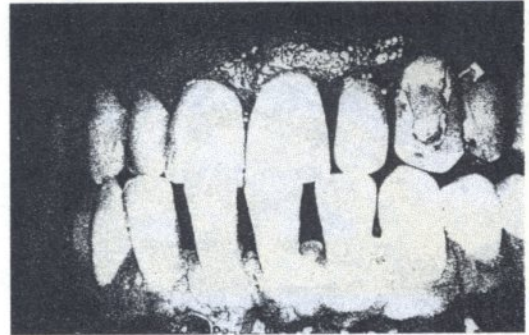
2c



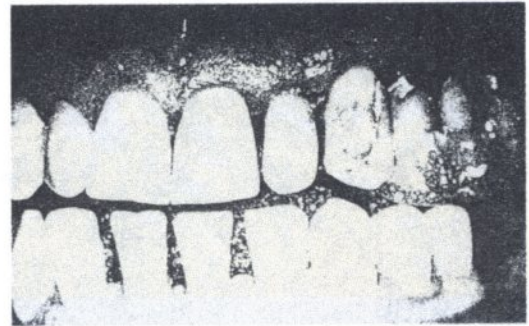
2d



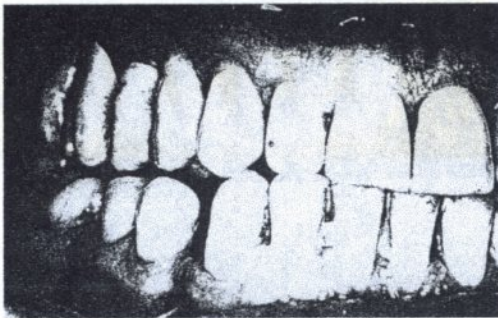
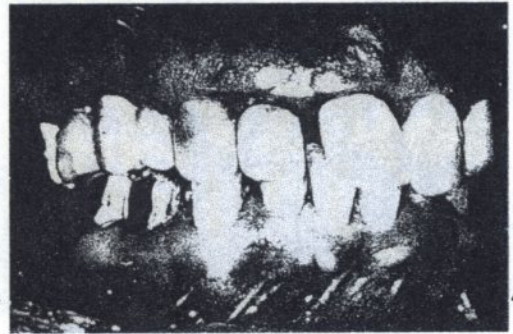
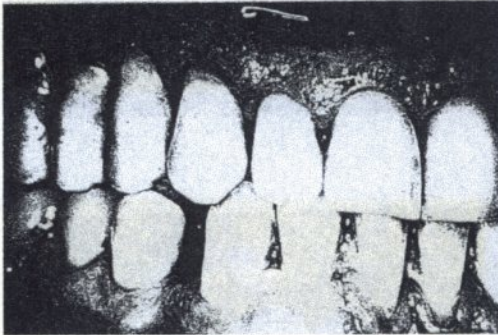
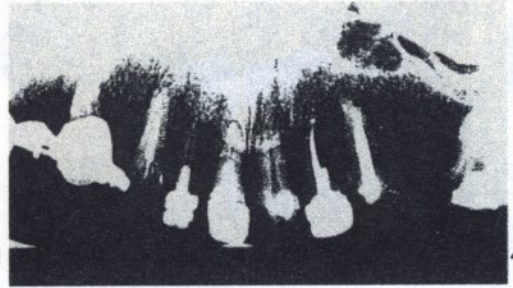
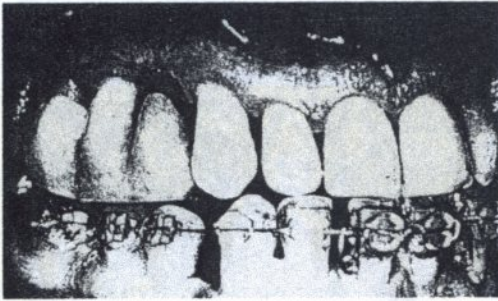
3a

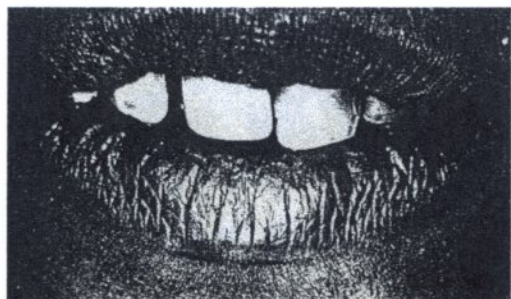


3b

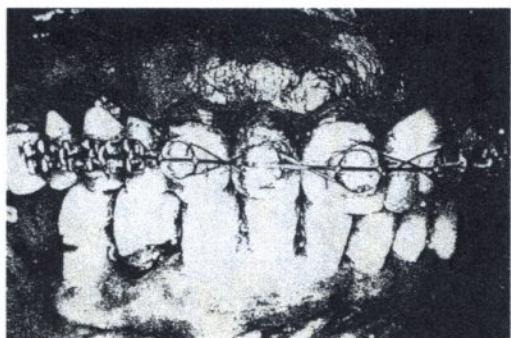


3c

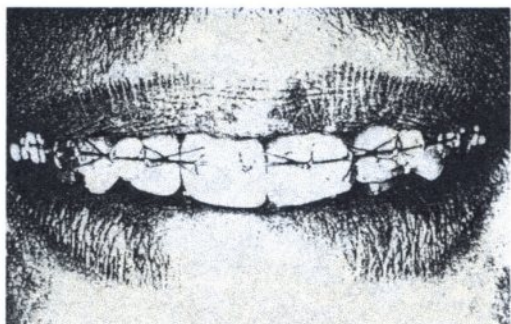




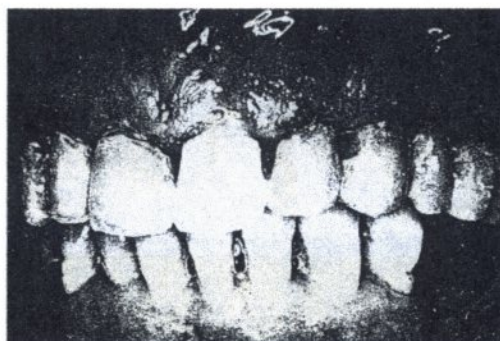
4d



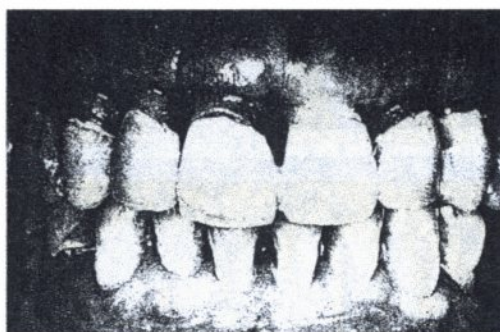
4e



4f



4g



4h



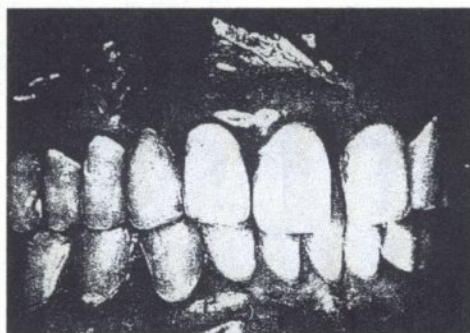
4i



4j



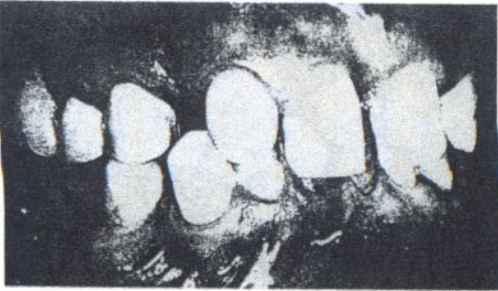
5a



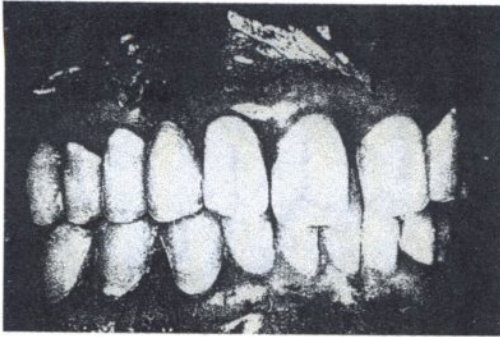
5b



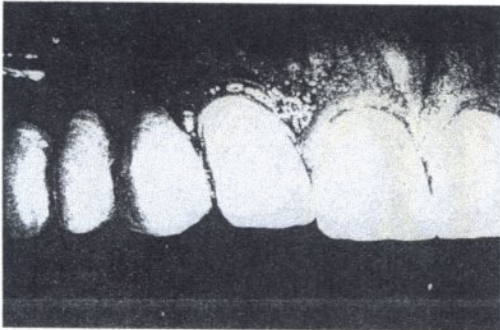
6a



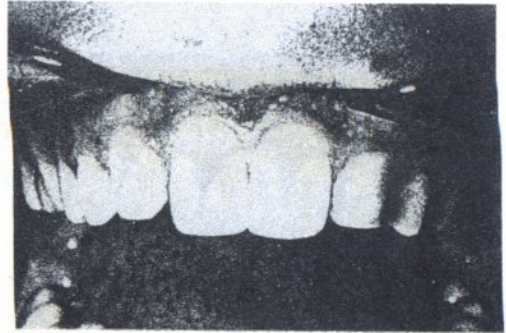
5a



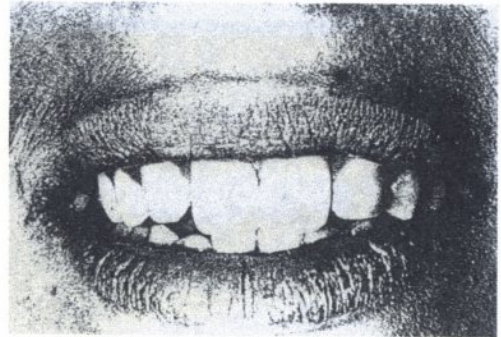
5b



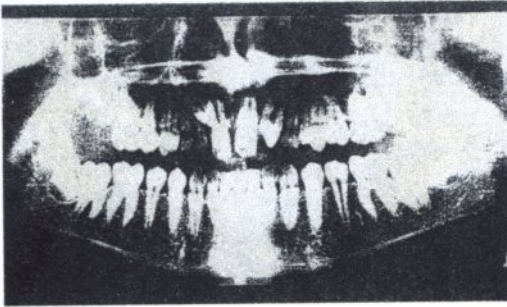
6a



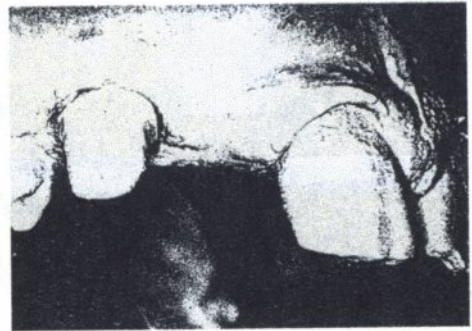
7a



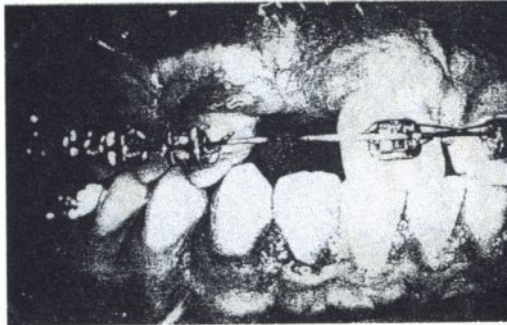
7b



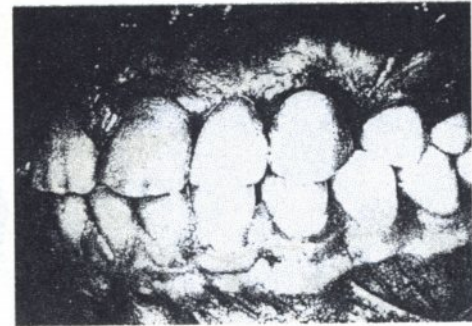
8a



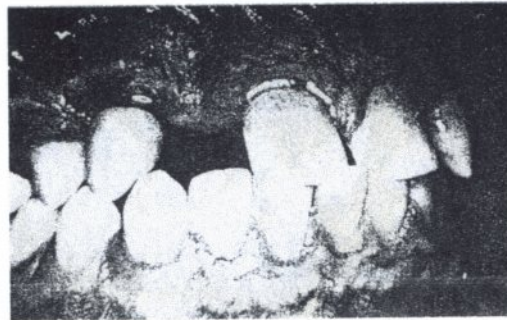
8d



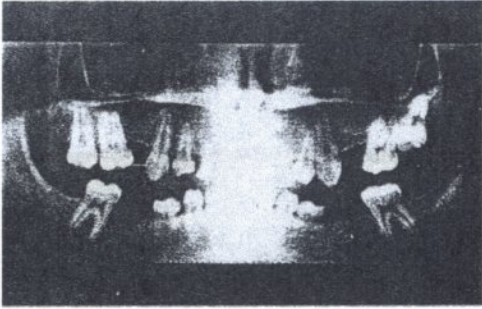
8b



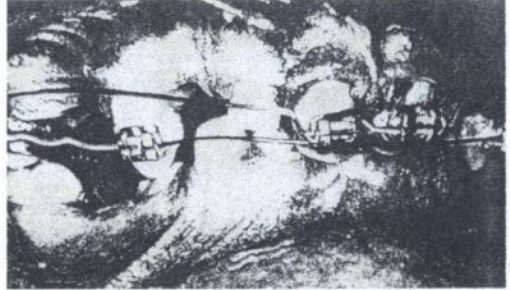
8e



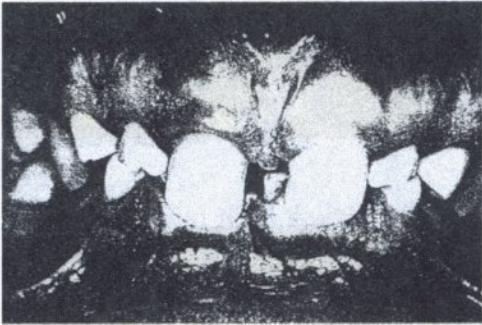
8c



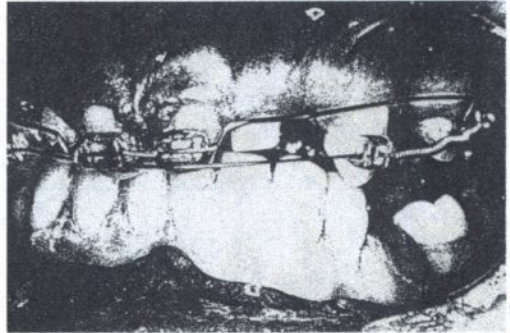
9a



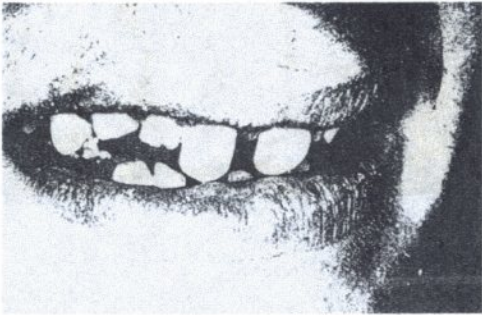
9d



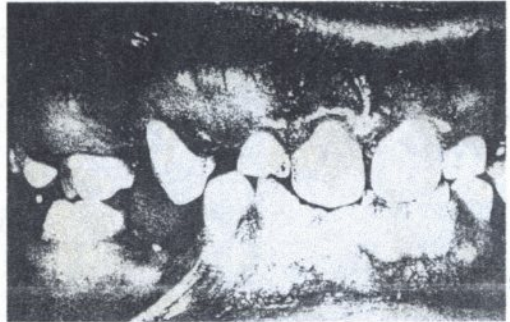
9b



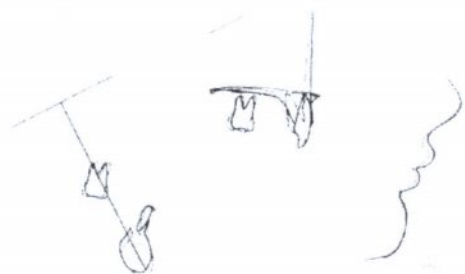
9e



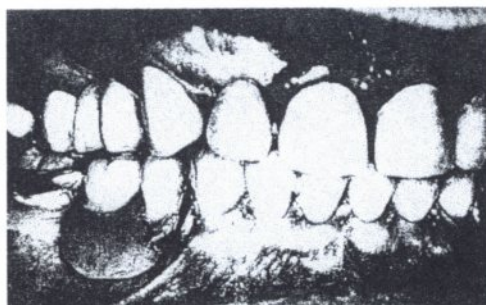
9c



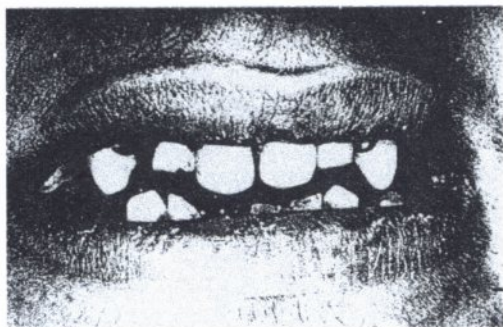
9f



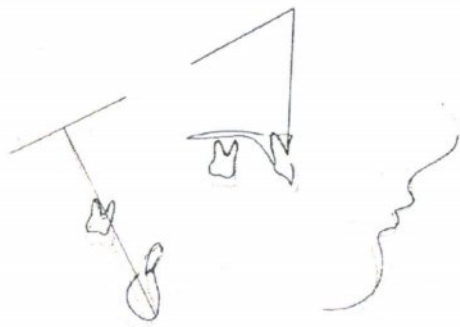
9g



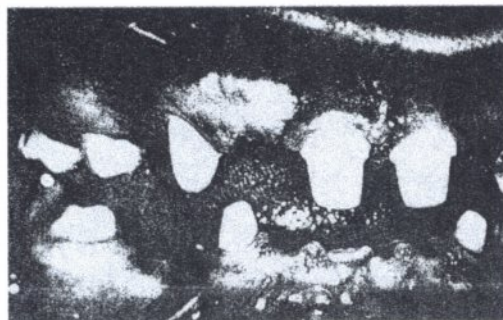
9j



9h



9k



9i



9l