Post-Orthodontic Retention and Post-Prosthodontic Occlusion in Adult Complete Unilateral and Bilateral Cleft Subjects

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Introduction

The need for a multidiciplinary approach to the cleft palate problem has been widely recognized for a number of years. From 1945 a dental treatment routine, closely integrated with the work of the other relevant specialists, has been developed in the Oslo area of Norway based on the work of Harvold first published in 1947 (*8*). It was generally implied at that time that the typical cleft palate malocclusion was caused by the scar tissue pull on each individual tooth. All teeth that were to be moved orthodontically would therefore have to be permanently retained in their corrected positions. Very extensive splints would be required, and this was considered an almost impracticable undertaking. Harvold showed that the main factor in the development of the cleft palate malocclusion was an inward rotation of the maxillary segments round a fulcrum in the region of the maxillary tuberosity, rather than mere individual tooth movement. Further, in working out orthodontic principles for correcting the malocclusion, Harvold demonstrated that the dislocated segments could be relocated by orthodontic means (*9, 10*). The positions of the individual teeth could then be corrected by more or less standard orthodontic procedures. The segments and teeth had, in turn, to be permanently retained in order to avoid relapse. The prosthodontic problems were solved by Böhn in close cooperation with Harvold (*3, 6*). It was established that the postorthodontic result could be permanently retained by means of a relatively short splint across the cleft (Figure 1a, b and c). In addition to retaining the segments and teeth the splint provided oportunities for replacing missing teeth and correcting malformed teeth in the cleft area. These basic principles were worked out on the adolescent and adult patients.

Since then, the orthodontic and prosthodontic treatments have been further improved by Bergland and Böhn and systematically applied to the patients from birth until adulthood. This work has been carried out in

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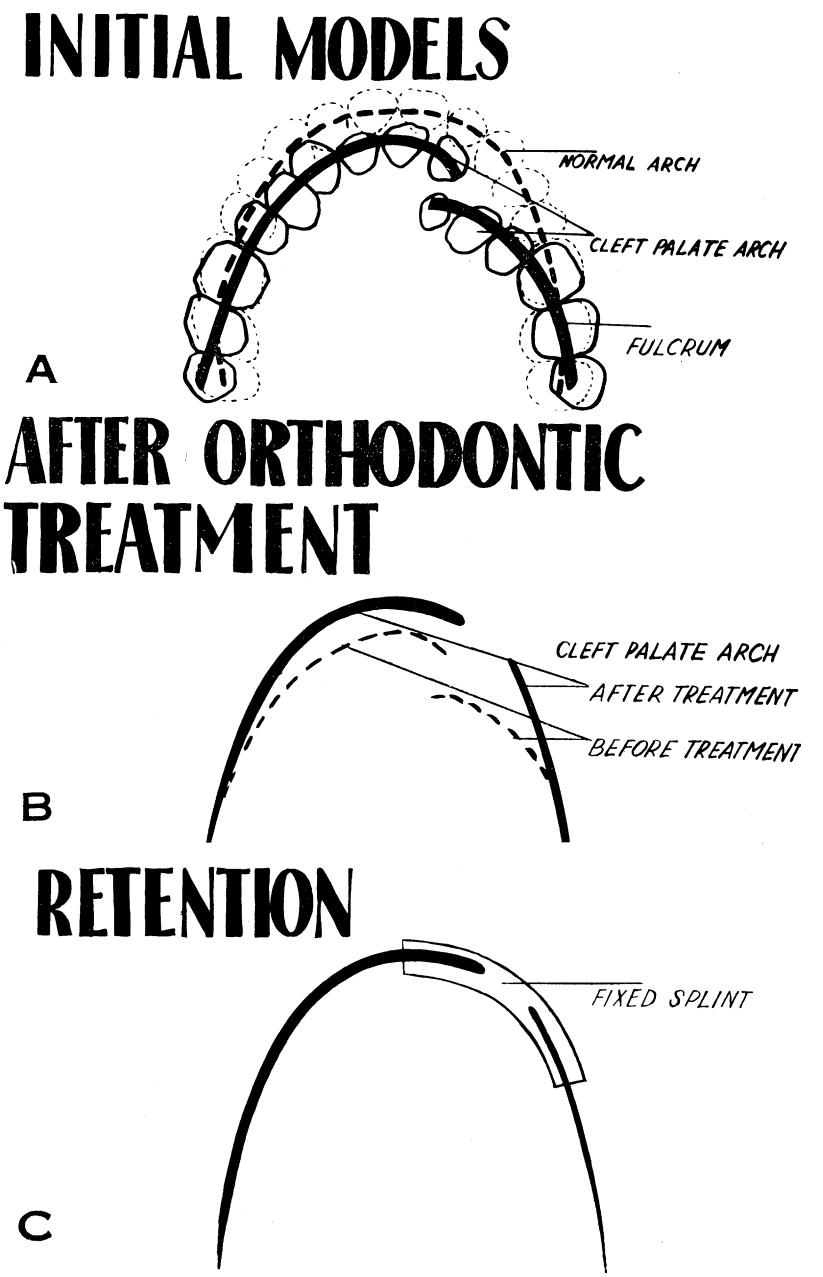

FIGURE 1. Summary of dental treatment principles. a. Preorthodontic upper arch of unilateral cleft case characterized mainly by segmental dislocation and underdevelopment of the alveolar process. b. Upper arch after orthodontic relocation of maxillary segments and alignment of misplaced teeth. c. Post-orthodontic permanent retention by means of a short splint across the cleft with replacement of missing teeth and correction of other abnormalities in the cleft area. (Courtesy Böhn.)

close cooperation with the plastic surgeons. The main intention of the Harvold-Böhn procedure is: An *adult* facial morphology as close to normal as possible.

The occlusion is a relatively good yardstick for evaluating the development of the upper jaw. A study of the adult post-treatment occlusion would therefore be of great interest because the results would indicate the degree of upper jaw normality achieved, thus providing criteria for total treatment evaluation.

The purpose of this article is a) to describe the main prosthodontic principles and problems in planning and construction of the permanent retention splint in unilateral and bilateral complete cleft cases, and b) to describe the occlusal relationships in a sample of adult complete cleft cases where the orthodontic treatment had been completed, and where the prosthodontic treatment in the form of the permanent retention appliance had given the upper jaw, and therefore the occlusion, its final form.

Material

A congenital bony bridge across the cleft will effectively reduce the tendency to maxillary collapse, and it is only the complete clefts which generally present the greatest retention problems. Unilateral cases demonstrating a bony bridge, or bilateral cases with a bony bridge on one side, were therefore not included in the sample. A detailed pre-surgical diagnosis was not available in most cases, and the diagnosis was therefore mainly made on the basis of the orthodontic records, X-ray and clinical examinations. Information regarding soft tissue bridges at birth was not available. There was thus a small chance of including incomplete clefts in the sample. Patients who had undergone corrective operations in the lower jaw were not included. With the above reservations the sample consists of the last 83 consecutive complete cleft cases who had followed the Harvold-Böhn treatment routine. Distribution of sex and cleft type is presented in Table 1. Mean age at the time of completion of the prosthodontic treatment was:

Unilateral cases: 20 years 6 months, range 18 years 4 months to 29 years 0 months.

Bilateral cases: 20 years 10 months, range 18 years 4 months to 24 years 10 months.

TABLE 1. Sex and cleft type. All clefts complete.

type of cleft	*female*	*male*	*N* (%)	*unilateral clefts combined*
left unilateral	12	29	41 (49.4)	
right unilateral	6	16	22 (26.5)	63 (75.9)
bilateral	3	17	20 (24.0)	
Total			83 (100)	

SURGERY. Primary surgery was in most cases performed by general surgeons employing different techniques. From about 1950, an increasing number of operations were performed by one plastic surgeon, W. Loennecken. A few of the first patients operated by him are included in this sample. Secondary surgery was mainly performed by Loennecken and other plastic surgeons. Pharyngeal flap operations had almost completely eliminated the need for pharyngeal speech aids, and improved surgical closure of residual fistulae had reduced the need for other types of prosthetic obturators.

ORTHODONTIC TREATMENT. Most cases were treated according to the Harvold principles. None of the patients had received any form of presurgical orthopedic treatment. Orthodontics was started after eruption of the upper permanent incisors, and continued until the age of about 12–14, when the malocclusion was mainly corrected. At this age the patients entered a period of temporary retention, lasting until about age 18. Right from the start the treatment was directed toward creating an optimal basis for construction of permanent retainers. This implies that no orthodontic attempt was made to close the cleft gap in cases with missing lateral incisors. Due to inadequate retention of the anterior teeth by the temporary retainer, and because of occlusal changes due to growth, further orthodontics was required in some cases before the patient was ready for the final prosthodontic treatment at the age of 18–20. The sample includes some cases that reported for orthodontic or prosthodontic treatment at a relatively late age, and this accounts for the somewhat high mean age at which prosthodontic treatment was completed.

Methods

PERMANENT RETENTION. In addition to the normal requirements, the demands for the permanent retention splint for cleft palate patients may be listed as follows:

The permanent retainer should:

1) be extended just sufficiently to retain the maxillary segments and teeth in their optimal position.
2) replace missing and lost teeth and correct malformed and too short teeth in the cleft area.
3) have sufficient strength to withstand the possible abnormal stresses and strains to which it is subjected.
4) make up for anatomical deficiencies in the cleft area in such a way that the lips are given adequate support and normal speech articulation is made possible.
5) facilitate oral hygiene in the cleft area.

More than 20 years of experience, and the treatment of some 400 cases, have convinced us that these objectives are, as a rule, best met by a fixed bridge as opposed to a removable partial prosthesis. From a prosthodontic

point of view, then, an optimal basis for a fixed bridge, as far as tooth position goes, implies abutment positions allowing optimal functional and esthetic results to be obtained with minimum removal of tooth substance. Parallel abutments and a correct midline are important factors in this respect. Further, the cleft width should give room for an even number of pontics. When the incisors are in a slight infra-occlusion, and the overjet approaches an edge-to-edge relationship, very little incisal and labial tooth reduction is required in order to establish a normal overjet and overbite. An excessive overjet is, however, accepted whenever this results in a favourable relationship between the upper and lower lip.

Factors determining number of abutments. Each case is discussed with the orthodontist before final details of the bridge are decided upon. Degree of preorthodontic segmental dislocation, and the calculated stability of the orthodontic end-result are the most important factors to be considered. Additional factors determining bridge extension may be listed as follows: Distance between the teeth either side of the cleft, root and crown lengths of the abutments, any need for retention of the lower anterior teeth by means of an overbite, degree of premaxillary mobility in bilateral cases, condition of the lateral incisor (if present), periodontal area (which is usually reduced on the teeth adjacent to the cleft), pulpal conditions, esthetic requirements and requirements for tooth replacements outside the cleft area.

Dental and regional anatomy. The central incisors adjacent to the cleft are often small in all dimensions, and this makes their preparation simple. On the contrary, the frequently occurring labial cervico-incisal convexity and the commonly exaggerated disto-labial convexity of the crown makes sufficient tooth reduction risky because of danger of severing the pulp (For literature on cleft palate dentition see *7, 11* and *15*). Pulpal anatomy often deviates from the normal and expected, and a very careful X-ray examination is required in all cases. The lateral incisors in the cleft area are, as a rule, inadequate as bridge abutments with regard to their position and periodontal support. A certain amount of hard and soft tissue is, of course, lost after extraction of any tooth. The tissue loss following extraction of the lateral incisor may increase the width and depth of the cleft, and their preservation would therefore be an advantage. The short clinical crown of the canine present in many cases requires careful preparation of this tooth. Gingivectomy may be required in some cases in order to obtain maximum retention form. Generally full veneer crowns must be used on all abutments in order to correct crown form and length and in order to secure maximum retention. Because of these factors and pulp size the pin-ledge type of preparation can seldom be used.

Because of the danger of rapid relapse all abutments must be prepared and a temporary bridge fitted in the course of one sitting. This tendency to relapse means, however, that an orthodontically overexpanded tooth will quickly move palatally if allowed to do so. Minor controlled tooth move-

ments may therefore be achieved in the course of a few days. Satisfactory dental position is generally attained orthodontically, but in some cases the central incisor and the canine are inclined towards the cleft. Apposition of bone on the alveolar plate bordering the cleft may be insufficient to allow complete uprighting of these teeth, and there may be a danger of root resorption if this is attempted (Figure 2a and b). The axial inclination of the central incisors usually deviate from that of the first premolars, requiring a somewhat heavy reduction of the distal surfaces of the latter teeth. Because of pulpal anatomy the central incisors determine the direction of preparation. A certain dental hypermobility in the horizontal plane is a common finding. Where the roots are of normal length this is attributed to active orthodontic treatment. A reversion to normal periodontal conditions takes place after a period in retention. Because of lack of bony continuity with the buccal segments the premaxilla in bilateral complete cleft cases may present some degree of mobility which in this sample was fortunately only in the horizontal plane in all cases. The above mentioned factors and the use of full veneer crowns means that the demand for

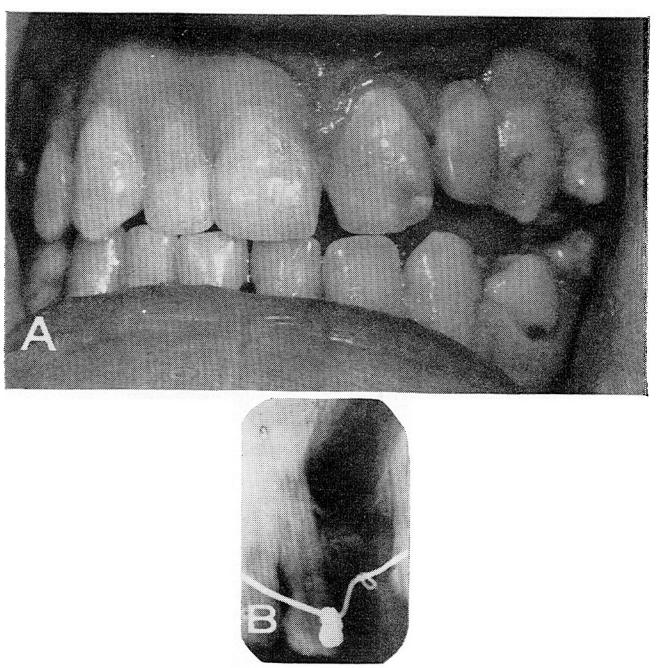

FIGURE 2. Left complete cleft case. a. Lack of parallelism due to $\underline{|1}$ inclination towards the cleft. The two central incisors approximate in the cervical area with absence of a normal interproximal space. After insertion of a retention bridge including both central incisors this area would become very difficult to keep clean. Missing $\underline{|2}$ has been temporarily replaced by a tooth attached to temporary palatal retention arch, *ad modum* Bergland. b. Radiograph illustrating very little bone apposition on cleft aspect of the $\underline{|1}$ apex and consequently risk of root resorption if orthodontic uprighting is attempted.

abutment parallelity is not very critical. Serious parallelity problems are, however, overcome by the use of double crowns.

Any clinically detectable vertical premaxillary mobility is due to surgery on the nasal septum, resulting in a floating premaxilla. In these cases the fixed bridge is avoided, and some other prosthodontic solution is sought. Occasionally, a preorthodontic buckling arch may require that the second premolar on one or both sides be retained. Residual fistulae that for some reason cannot be closed surgically, must be prosthetically obturated in order to create a functionally adequate hard palate. The obturator is made removable and is attached to the pontic area of the bridge for hygienic reasons (Figure 4b and c). Local anaesthetics are seldom required. When required, however, the technique for administration of anaesthesia to the anterior teeth is simple because of the abnormal course of the nerves to the central incisors, or because of the thin bony covering on the palatal surface of the teeth adjacent to the cleft (*4, 5*).

Gingiva. Due to the danger of rapid relapse, orthodontic appliances must be in position until tooth preparation is actually commenced. Optimal gingival conditions may therefore be difficult to attain in some cases prior to prosthodontic treatment. During surgery soft tissue from the buccal mucosa may have been brought into the cleft area creating pseudopockets, particularly on the mesial aspect of the canine, thus creating areas for plaque retention.

Gross post-prosthodontic gingival retraction has been observed in two bilateral complete cleft cases. In one of these cases, where the central incisors were affected, the probable cause was surgical closure of a residual fistula in the anterior region of the hard palate, after insertion of the bridge. In the second case a canine was affected. The tooth had been orthodontically extruded at the relatively late age of 16–17. At that age the growth of the alveolar bone may fail to keep pace with the extruding tooth, and gingival retraction may result (*2*).

Esthetics. A sloping midline and a midline deviation towards the non-cleft side in unilateral cases sometimes present serious esthetic problems, especially when the deviation is less than the full width of one central incisor. In some cases an acceptable result may be achieved by changing the midline one unit. Similar problems arise whenever the cleft gap does not equal the combined widths of the teeth that are to be replaced. Visible tooth length is determined by lip position at rest with due regard to articulation and phonetics and in some cases one may have to accept an inadequate visible length. The reverse situation may arise when an overbite must be established in order to retain the lower incisors. Edge-to-edge incisor relationship must be accepted in a few cases, as seen from Table 3.

In unilateral cases with the central incisor and canine on the cleft side in infraocclusion, these teeth must be given excessive crown length in order to correct the occlusal plane. Likewise the pontics in the cleft area tend to be excessively long. In such cases the esthetic qualities will be

inferior if the cervical areas are exposed on smiling. Secondary bonegrafts may minimize this problem. Supraocclusion of the lower antagonists to the cleft area may necessitate a certain preparatory incisal grinding of these teeth so that pontics of correct length may be constructed.

The amount of tooth reduction of the abutments is partly determined by pulpal anatomy. From a technical point of view this may sometimes be less than optimal, and the esthetic qualities of the porcelain or acrylic facings may suffer. Frequently, however, the cervical areas are not exposed on smiling because of poor lip mobility. The shoulderless type of preparation is employed in such cases thereby saving tooth substance. Sufficient labial bulk of facing material is obtained by making the shoulder in gold.

Hygiene. The anatomical anomalies in the cleft area, and the frequently abnormal labial sulcus, complicate oral hygiene. The interproximal spaces between the canine and the first premolar on the cleft side, and between the central incisors, are sometimes so reduced that the teeth may approach contact in the cervical area (Figure 2a and b). Due to the danger of root resorption the teeth adjacent to the cleft may have to be orthodontically uprighted round a fulcrum close to their apices, resulting in a slight apical movement towards the cleft. In this way the wedge-shaped interproximal spaces are reduced in size, and interdental cleansing may become almost impossible. If esthetically acceptable, the gingival surfaces of the pontics are made spheroid. Because the soft tissue overlying these surfaces is often very loose and sometimes mobile, and therefore easily traumatized, tissue-pontic contact may have to be avoided altogether, seemingly with no detrimental effect on speech as far as our experience goes. As a prophylactic measure against periodontal disease the cervical margins of the crowns are placed supragingivally unless positively contraindicated. Since nearly all complete cleft patients require some form of permanent retention, no one can be denied treatment because of lack of cooperation. It has been observed over the years that in cases of gross dental neglect the abutments, generally, are the last teeth to reach an irreparable state. Deviations from the treatment routine may, of course, have to be made if the patient is mentally deficient. Treatment must, in such cases, be adjusted to the mental capabilities of the patient.

A typical unilateral complete cleft case is shown in Figure 3a, b and c, before and after prosthodontic treatment. Figure 4a and d, shows anterior views of a bilateral complete cleft case before and after prosthodontic treatment. This case had a residual palatal fistula, and Figure 4b and c, shows a palatal view of the case with and without the obturator in place. Apart from the fistula this case serves to illustrate a typical bilateral complete cleft case.

Occlusion. Tabulation of the transverse and incisal relations of the upper and lower teeth, are based on similar studies by Kling (*12*) and

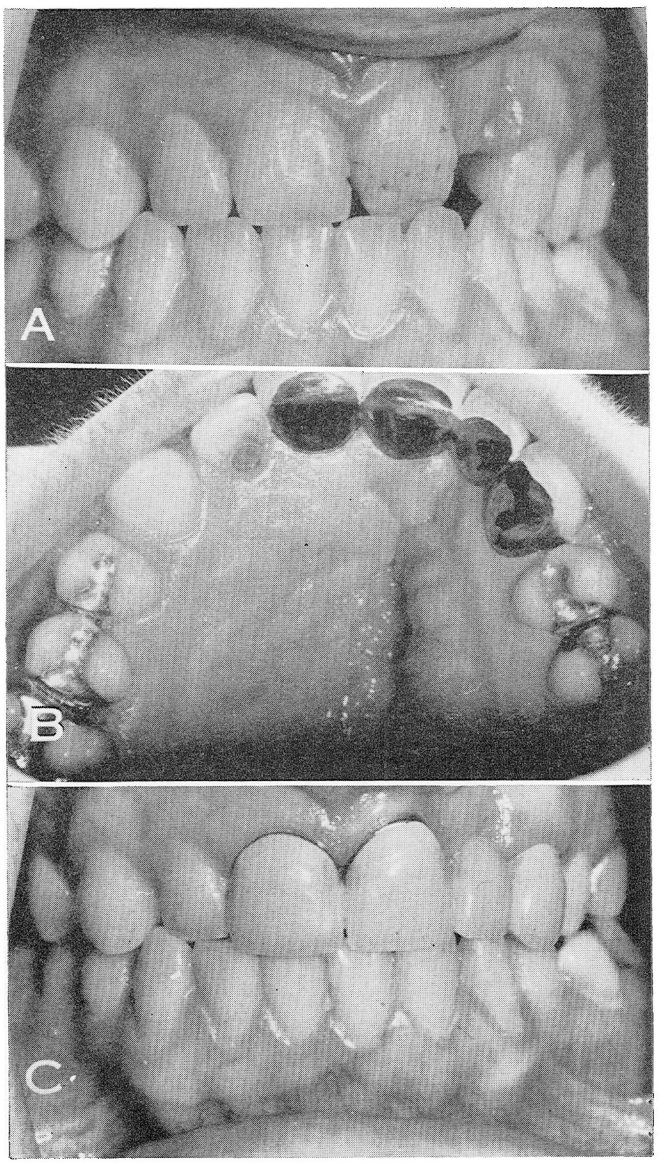

FIGURE 3. Typical unilateral complete cleft. a. After orthodontic treatment. 1|1 roots are parallel but the incisal edge of |1 is inside the lower incisors because of a marked cervico-incisal curvature of the crown. b. Palatal view of 4 unit permanent retention bridge. c. Anterior view showing incisal relationship. Central incisors prepared shoulderless and necessary shoulder is made in gold.

Pruzansky (*13*) on decidous dentitions. The recordings in the buccal segments were based on the transverse relations of the canine, first and second premolars and the first molar. Borderline relationship of one or more buccal teeth was recorded as "No crossbite". "Buccal incomplete

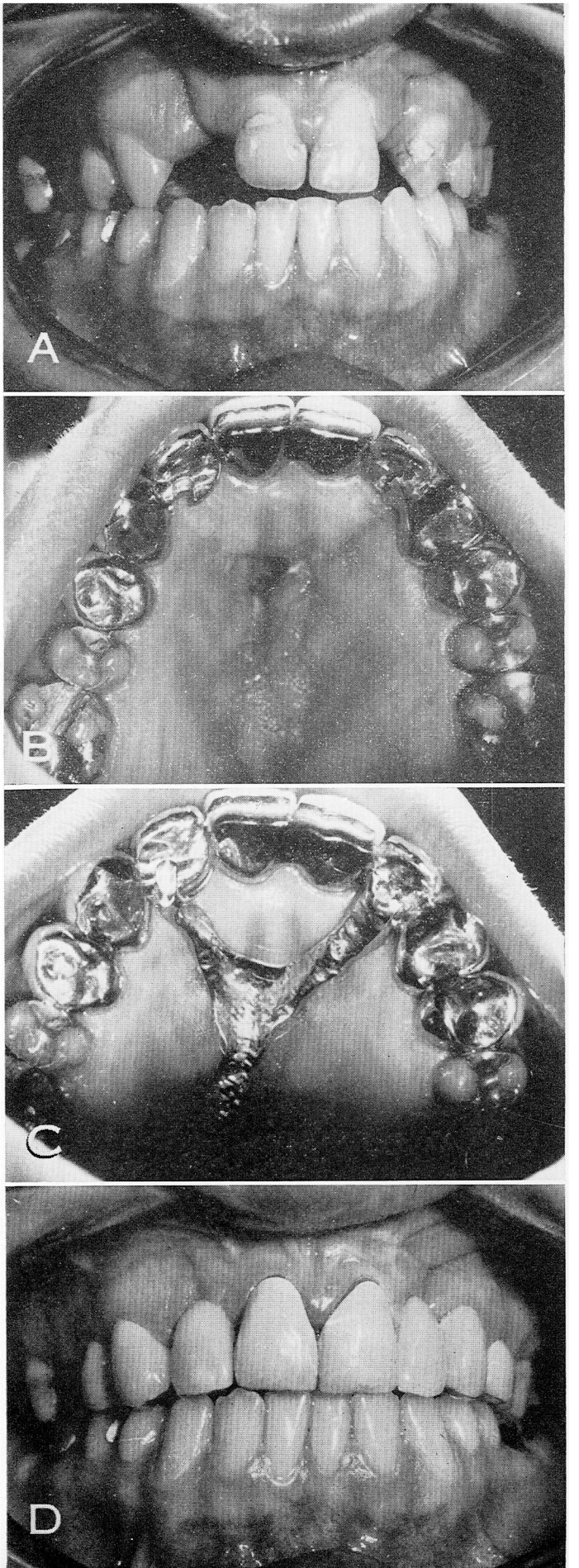

FIGURE 4. Typical bilateral complete cleft case apart from the presence of a fistula in the hard palate. a. After orthodontic treatment. Note infraocclusion and almost edge-to-edge relationship of the incisors requiring very little removal of tooth substance during preparation. b. Palatal view of 8 unit retention bridge. Female parts of precision attachments in $\frac{2}{}\,|\,\frac{}{2}$ pontics for the retention of a removable fistula obturator. c. Palatal view with fistula obturator in position. No interference with oral hygiene in the interproximal areas of the pontics. d. Anterior view showing incisor relationship.

crossbite" implies crossbite on one or more, but not all, buccal teeth in that segment. Incisor relationship was recorded as edge-to-edge whenever the upper and lower incisal edges were in contact in centric occlusion.

Treatment Results

UNILATERAL COMPLETE CLEFT CASES. Number of abutments adjacent to cleft in the unilateral cleft group is presented in Table 2. Two or less abutments on either side of the cleft occurred in 50 of the 63 unilateral cases (79.4%). The central incisor on the cleft side was missing in 9 cases (14.3%). Only 3 lateral incisors in the cleft area were of sufficient quality, or in such position as to be used as abutments. 2 of these occurred on the distal side end 1 on the mesial side of the cleft. There was one fistula obturator in this group.

Table 3 shows the transverse relations of the upper and lower buccal teeth, together with the incisor relations in the unilateral complete cleft group. 40 cases (63.5%) had no buccal crossbite. A positive anterior overjet occurred in all cases, except in the 4 cases with anterior edge-to-edge relations. Of the 17 cases with unilateral incomplete crossbite 8 occurred on the cleft side and 9 on the non-cleft side.

BILATERAL COMPLETE CLEFT CASES. Table 4 shows the number of abutments in the buccal segments adjacent to the cleft in the bilateral complete cleft group. Two abutments in either buccal segment were generally required in these cases because of a certain horizontal premaxillary mobility. In addition to the abutments in the buccal segments 36 of a possible 40 central incisors in the 20 bilateral cases were utilized as abutments. One central incisor was missing in two cases (10%). Both centrals were missing in the case where three abutments in either buccal segment were used. Here retention was secured by means of a bar connecting the seg-

TABLE 2. Unilateral complete clefts.

	number of abutments		*N* (%)	*total* (%)
	anterior segment	*buccal segment*		
2, or less than 2, abutments on either side of cleft	2	2	27 (42.9)	
	1	1	13 (20.6)	
	2	1	5 (7.9)	
	1	2	4 (6.4)	
	0	1	1 (1.6)	50 (79.4)
More than 2 abutments on one or both sides of cleft	3	2	10 (15.9)	
	3	4	3 (4.8)	
	2	4		
	2	3		13 (20.6)
				63 (100)

TABLE 3. Unilateral complete clefts. Post-prosthodontic buccal and incisor relations. Overjet and overbite in mm.

buccal relations N	*incisor relations N*						
	no anterior crossbite				*edge-to-edge*	*anterior crossbite*	*total (%)*
	Overjet 0–3 + overbite 0–3	*overjet 0–3 + overbite >3*	*overjet >3 + overbite >3*	*overjet 0–3 + neg. overbite 0– ÷2*			
no buccal crossbite	31	5	1	2	1	0	40 (63.5)
buccal crossbites							
unilateral incomplete	12	2		2	1	0	17 (27.0)
bilateral incomplete	3				1	0	4 (6.3)
unilat. complete + unilat. incomplete	1					0	1 (1.6)
unilateral complete					1	0	1 (1.6)
Total	47	7	1	4	4	0	63 (100)
(%)	(74.6)	(11.1)	(1.6)	(6.3)	(6.3)	(0)	

ments, and the missing anterior teeth were replaced by means of a removable partial prosthesis establishing normal anterior relations. This is our standard prosthodontic approach to the solution of this particular problem, a rare one in our cleft population (Figure 5a, b, c and d). This case, together with one unilateral case, were the only two cases in this sample where an ordinary fixed bridge could not be constructed. Only one lateral incisor, occurring in the premaxilla, could be used as abutment. There were three fistula obturators in the bilateral complete cleft group.

The bilateral case with all incisors missing was excluded from the study of the bilateral complete cleft occlusion, as the overjet and overbite in this case were determined by a removable prosthesis. Table 5 shows the buccal transverse relations and the incisor relations in the remaining 19 bilateral cases. 15 cases (78.9%) had no buccal crossbite. All cases had positive overjet and overbite.

TABLE 4. Bilateral complete clefts. All satisfactory incisors utilized as abutments in addition to abutments in buccal segments.

number of abutments in buccal segments		*N* (%)
right side	*left side*	
2	2	18 (90.0)
1	2	1 (5.0)
3	3	1* (5.0)
Total		20 (100)

* All incisors missing.

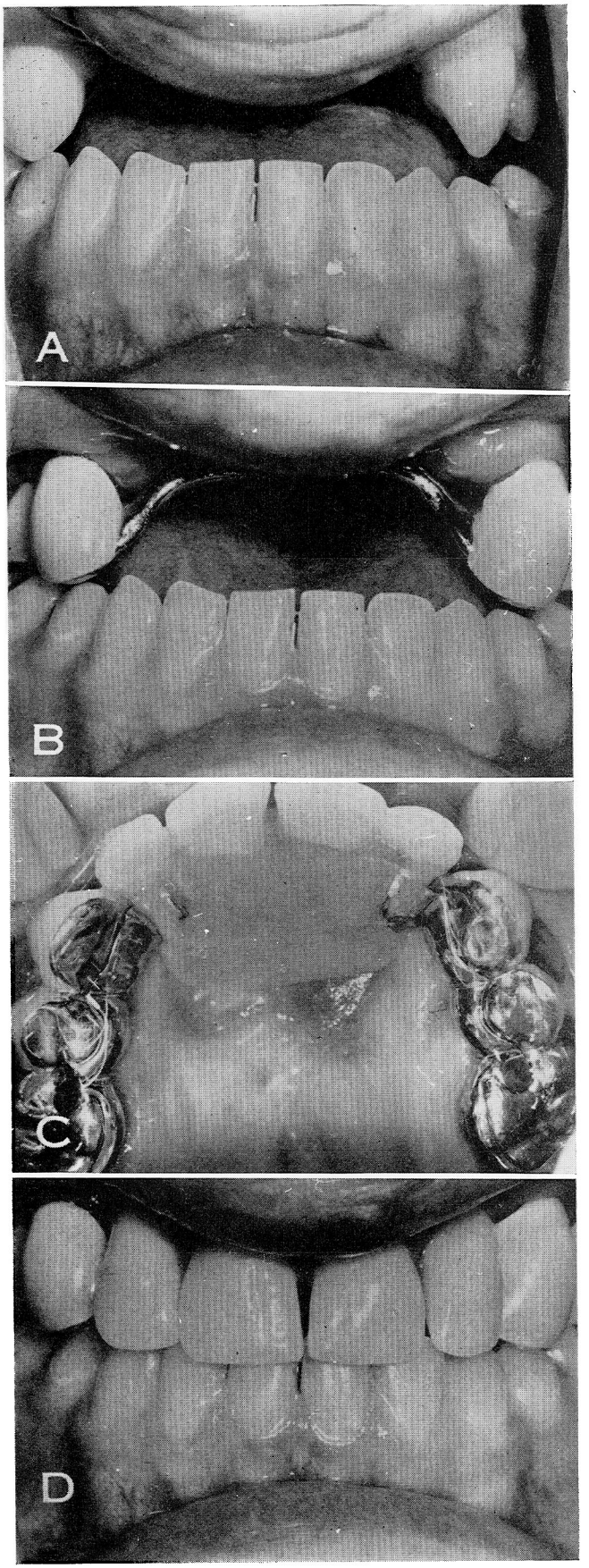

FIGURE 5. Atypical bilateral complete cleft case with all incisors missing. a. After orthodontic treatment. b. Retention secured by means of a bar connecting soldered crowns on 653|356 (4|4 missing). The bar joins the canines in the areas of the normal contact points allowing easy cleansing of the mesial surfaces of the canines. c. Palatal view with the removable partial prosthesis in position. The prosthesis is retained to the bar by precision attachments. Additional retention is obtained by continuous clasps trimmed into the occlusal thirds of the palatal surfaces of the gold crowns ending in back-action clasps on the first molars. The prosthesis is kept clear of the gingiva and all interproximal spaces are open for cleansing even without removal of the prosthesis. d. Anterior view with partial prosthesis in position.

TABLE 5. Bilateral complete clefts. Post-prosthodontic buccal and incisor relations. Overjet and overbite in mm.

buccal relations N	*incisor relations N*				
	no anterior crossbite			*anterior crossbite*	*total* (%)
	overjet 0–3 + overbite 0–3	*overjet 0–3 + overbite >3*	*overjet >3 + overbite 0–3*		
no buccal crossbite	11	4		0	15 (78.9)
buccal crossbites					
unilateral incomplete	1			0	1 (5.3)
bilateral incomplete	1		1	0	2 (10.5)
unilat. complete + unilat. incomplete	1			0	1 (5.3)
total	14	4	1	0	19 (100)
(%)	(73.6)	(21.1)	(5.3)	(0)	

Discussion

To the author's knowledge, no comparable studies have been published on the adult cleft palate occlusion so no comparison with other materials is possible. Quinn, however, in a preliminary orthodontic evaluation of 100 cleft lip-palate patients aged 23 to 29 years, states that "collapse of the maxilla and/or crossbite of the teeth could be demonstrated in nearly every case" (*14*), and the statement presumably refers to incomplete as well as complete clefts, isolated cleft palate cases excepted. Further, Quinn noted that the overall dental health was poorer in patients with partial dentures than in those with a fixed prosthesis, which agrees with our long term observations. It should be noted that very little prosthodontic correction can be made in the horizontal plane by means of bridge construction, and Tables 3 and 5, therefore, largely represent the post-orthodontic situation. Vertically, however, there are more possibilities for prosthodontic correction by means of a bridge. Abutment numbers are, of course, based on a subjective evaluation of the factors listed previously. It is, therefore, possible to misjudge, and slight relapses of single teeth outside the bridge area have been observed in a few cases due to underextension of the bridge. The lateral incisor on the non-cleft side had to be included in the bridge in 11 unilateral cases (Table 2). This was, in most cases, done for esthetic reasons or in order to retain the lower opposing teeth by means of an overbite.

Traumatic surgery is an important factor in the development of the traditional cleft palate malocclusion. The great majority of the cases in this sample were operated by surgeons with little cleft palate experience,

and had therefore supposedly been subjected to such surgical methods. Despite this a positive overjet has been achieved in about 95% of all cases in this sample, the remaining cases presented edge-to-edge anterior relations. Loennecken's introduction of improved surgery represented a milestone in cleft palate treatment in the Oslo area, and his conservative

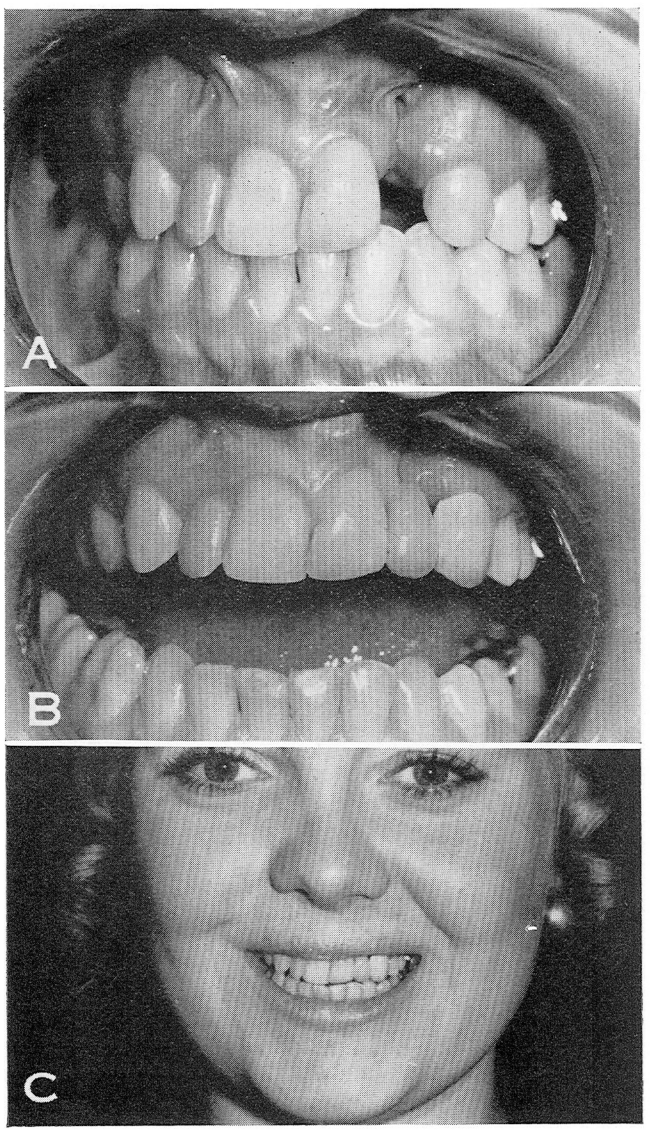

FIGURE 6. Left complete cleft case a. After orthodontic treatment. b. Missing $\underline{\lfloor 2}$ replaced by means of a cantilever bridge on $\underline{\lfloor 3}$. The irregularities in the $\underline{2 \mid 1}$ area were considered to be within the acceptable range of normal variation and no prosthodontic correction was deemed necessary. c. Anterior view of patient after prosthodontic treatment.

procedures led to a marked improvement in maxillary development (*1*). The first patients operated by him are now completed prosthodontically. A comparison between the group of patients operated by the Loennecken procedure and patients operated by other methods, will be made when there is an adequate number of patients. It seems clear at this stage that the conservative surgical procedures have reduced the tendency towards maxillary collapse to a very considerable extent. This has in turn reduced the need for prosthodontic retention, thus making the reduction in bridge extension possible at least in the unilateral cases.

Achievement of optimal results with minimum total treatment must surely be the goal towards which we must strive. The replacement of a missing lateral incisor by means of a cantilever bridge on the upper left canine, was all the prosthodontic treatment required in the left complete cleft case shown in Figure 6a, b and c. One looks forward to the day when this becomes the rule rather than the exception.

Summary

The routine dental treatment for cleft lip and palate patients in the Oslo area of Norway is described with particular attention on maintaining the post-orthodontic arch form while correcting the dental abnormalities in the cleft area. The fixed bridge is the prosthodontic treatment of choice. Problems concerning number of abutments, dental and regional anatomy, gingiva, esthetics and oraly hygiene are discussed.

An evaluation of the treatment results with reference to the post-prosthodontic adult occlusion in 63 unilateral and 19 bilateral complete cleft cases is presented. No buccal crossbite occurred in 63.5% of the unilateral- and in 78.9% of the bilateral cleft cases. Positive overjet and overbite occurred in almost 90% of the unilateral- and in all the bilateral cases.

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