The Monobloc

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The monobloc has been used in Europe for many years. As contact with European orthodontists increased after the Second World War, its use by North American orthodontists has become more widespread.

The first appliance of this type was introduced by Robin[1] in 1903. It was called a monobloc and differed from the one used now in that it had an expansion screw incorporated in it. Professor Viggo Andresen[2,3] of Oslo modified the appliance in 1909 and described it again in 1942 and 1953. This appliance has been given many names. It is known as the "activator," "Andresen method," "Andresen appliance," "Norwegian System" and "monobloc." In this paper the appliance will be referred to as the monobloc.

Björk[4] in 1951 gave a detailed description and cephalometric analysis of this method of orthodontic treatment. He not only explained the various types of activator appliances used for different malocclusions, but also showed that cephalometrically the main changes through the use of the appliance appear to be confined to the alveolar process.

The author became acquainted with the use of the monobloc in 1952. It has been predominantly used in Class II, Div. 1 malocclusions in conjunction with other appliances; occasionally it has been the only appliance used. As a general rule, orthodontists are trained in a specific basic appliance mechanism and later combine different appliances in order to realize improved treatment results. Thus, orthodontists trained in the universal, twin arch or edgewise mechanism will often incorporate extraoral mechanics, lingual arches or bite planes in order to effect more efficient tooth movements. The monobloc, too, may be used as an adjunct in treatment, particularly in correction of anteroposterior jaw relationships. In order to understand the principles involved in treatment more fully,[4,5] it is important that aspects of its construction be reviewed.

Monobloc Construction

Construction of this appliance has been previously reported[1,6] and also well described in a recent text.[7] The reason for describing it once again is that certain steps have been eliminated and its fabrication simplified.

Accurate maxillary and mandibular molds are taken and plaster or stone casts made. One of the most important steps in monobloc fabrication is the registration of the bite.

Bite Registration

The patient is asked to bring the teeth into occlusal contact as in centric occlusion. The maxillary center line is noted as it is related to the mandibular midline. The patient is then directed to bite into a piece of softened base plate wax, three-eighths of an inch in thickness and three-quarters of an inch wide. The bite is registered in protrusion, not past an end-to-end relationship of maxillary and mandibular incisor teeth. The posterior teeth should be approximately one-quarter or five-sixteenth of an inch apart or about two millimeters beyond the patient's freeway space (Fig. 1). The center lines of maxillary and mandibular teeth must correspond as when noted prior to registering the wax bite. It is important that the mandible not protrude too far as that may cause overstrain and discomfort to the patient while wearing the appliance.

The bite is now placed on the plaster

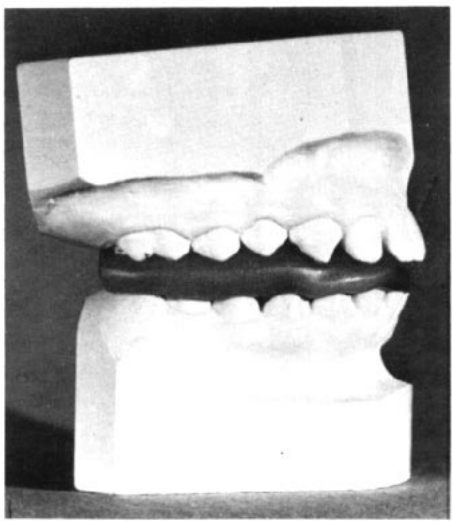

Fig. 1 Position of mandibular teeth with the bite registered in protrusion.

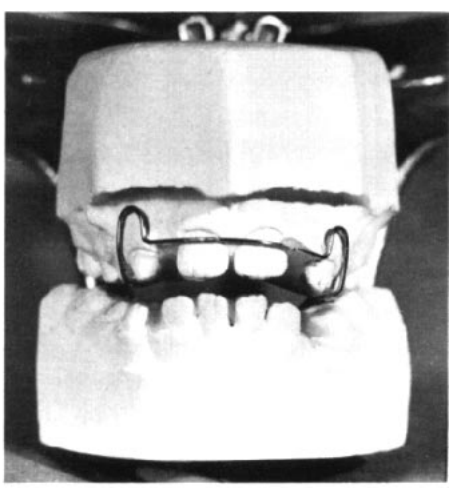

Fig. 2 Illustrating a malocclusion with the Hawley wire adapted on the maxillary arch after the wax bite has been removed and the articulator locked in position.

casts and articulated in a hinge-type articulator with the vertical relationship fixed by a set screw. A labial wire .028 or .030 in diameter is adapted to the maxillary arch (Fig. 2). A Hawley type of retainer is constructed using quick curing acrylic which is not removed from the cast; similarly the mandibular

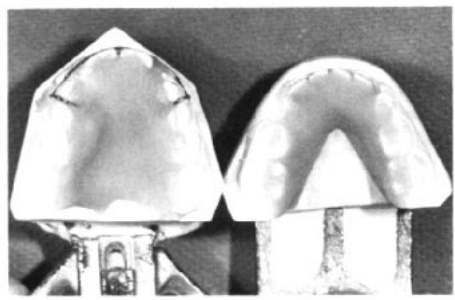

Fig. 3 Illustrating molds after the quick cure acrylic was poured on the maxillary and mandibular casts.

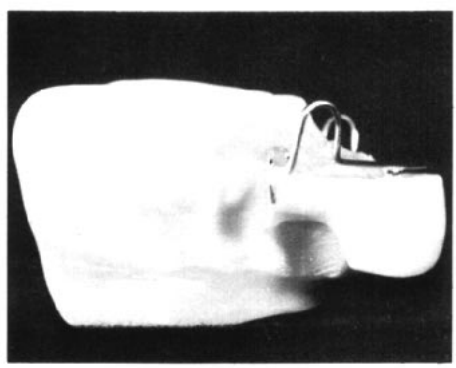

Fig. 4 Monobloc after trimming and polishing; note the maxillary and mandibular incisors are covered about two millimeters at the incisal edges for added retention during the initial appointment.

arch is molded as a retainer but without the wire (Fig. 3).

The articulator is now closed to the preset lock screw and the maxillary and mandibular acrylic appliances are fused by the addition of more quick setting acrylic. The maxillary and mandibular incisors are covered about two millimeters over the incisal edges with acrylic material (Fig. 4).

Trimming the monobloc around the posterior teeth has been previously described;[4,5,6] the method depends on whether it is a Class II or Class III type of malocclusion. However, the author has not followed the procedure described and has merely relieved the occlusal surfaces of both maxillary and

mandibular posterior teeth. This allows the posterior teeth to erupt and the maxillary posteriors free to move distally as is desired in Class II, Div. 1 treatment. In this type of malocclusion the material contacting the lingual surfaces of the maxillary incisors is trimmed if lingual tipping of the maxillary anterior teeth is desired.

The maxillary incisors and canines are covered with material about two millimeters over the incisal and labial surfaces, thus providing retention necessary at the beginning of treatment. This assists the patient to become accustomed to the appliance. If labial tipping of the mandibular incisors is required, the material is cut away from the incisal aspect of the teeth.

Force Application

The distal force on the maxillary arch is obtained as follows. When the patient inserts the monobloc in the mouth, the mandible is forced in a protrusive position (See bite registration). The response of the muscles of mastication acting on the mandible is an attempt to return it to its initial position of rest, but the acrylic extensions lingual to the mandibular teeth tend to hold the mandible in this protrusive position. This creates a force on the maxillary teeth, i.e., in a distal direction through the labial archwire. Reciprocally an anterior force is placed on the mandibular anterior teeth and alveolar process.

The optimum treatment time appears to be during the eruption of premolars and canines; however, success with the monobloc is attained during any growth period. When mandibular growth is favorable, improvement in the anteroposterior direction is noted regardless of the appliance used. The monobloc is no exception to this clinical observation.

The author limits the use of the monobloc appliance to Class II, Div. 1 with these characteristics:

1. No anterior spacing, where an overjet is present and mandibular teeth are fairly well-aligned.

2. Well-aligned maxillary incisors with a minimum of crowding in the mandibular arch.

3. A short upper lip. The mouth is open through habit but the nasal passages are not obstructed. Such patients will greatly benefit from this appliance. Nasal breathing seems to improve as the patient is forced to breathe through the nose when the monobloc is worn.

4. The maxillary arch and lip are not protrusive but an overjet is present. The degree of protrusion of maxillary incisors may be determined clinically or through photographs and cephalometric analysis.[8,9] If the maxillary incisors are in excessive labial inclination and no anterior diastemas are present, monobloc treatment may create bimaxillary protrusions. The monobloc is used as a retainer after treatment of severe Class II, Div. 1 malocclusion, particularly extraction cases.

Because of the bulky appliance, speech is impossible and the patient may find it difficult to become accustomed to it. The patient is instructed to wear the monobloc a few hours during the early part of the evening, gradually increasing the time of wear until he can sleep with it. Reassurance by the orthodontist will facilitate and hasten continuous wear throughout the night. Some patients go to sleep with the appliance in the mouth but rarely awaken with it still in place; they seem to be unaware of its removal during sleep. This may be overcome by incorporating a headgear bow in the anterior part of the monobloc.

The monobloc will produce dramatic results if properly used in selected malocclusions. The following are a few examples of the results attained.

Case 1. The patient, Marion S., was a female age twelve, exhibiting a Class II, Div. 1 malocclusion. The overjet was twelve millimeters with a freeway space of six millimeters. The musculature was hypotonic and the facial profile (Fig. 5) indicated a favorable upper lip posture. The total profile would improve immeasurably if the mandible would continue to grow in a horizontal direction. The Downs analysis showed a low mandibular plane angle and low Y axis, generally indicating a favorable growth potential of the mandible in a horizontal direction. But the denture to skeletal cephalometric analysis indicated an extreme discrepancy between the relationship of maxillary and mandibular teeth. The procumbency of the mandibular incisors (lower incisors to the mandibular plane, +24) precluded the use of Class II elastics. If one accepted the concept of an upright position of mandibular incisors then extraction of premolars was mandatory.

The monobloc was inserted in April, 1955 and a Class I relationship was established by October, 1956. Monobloc treatment was continued until June, 1957 when further records were taken. At this point it was suggested to the patient that the maxillary arch be banded in order to correct arch form, particularly to increase the curve of spee. This would further reduce the overbite. The patient would not proceed further and treatment was discontinued.

This patient was not seen again until April, 1964. Upon examination no changes were noted either in the occlusion or profile (Figs. 5, 6 and 7). The result remained as stable as when treatment was discontinued.

Case 2. The patient, A. L., a female age 10, exhibited a Class II, Div. 1 malocclusion. The overjet was ten millimeters with a freeway space of approximately five millimeters. The lips

Fig. 5

were hypotonic. The model analysis showed that the maxillary canines were about to erupt and the mandibular premolars erupted. The mandibular left lateral incisor was partially blocked out of the arch.

The Downs analysis showed an excellent skeletal pattern with a good facial appearance. From the photographs (Fig. 8) dated 18-1-62, it was difficult to detect that the patient had a malocclusion of such magnitude. The prognosis was favorable and the use of the monobloc was successful. Within four months the overjet was reduced from ten to six millimeters and by March 1964 the overjet was less than

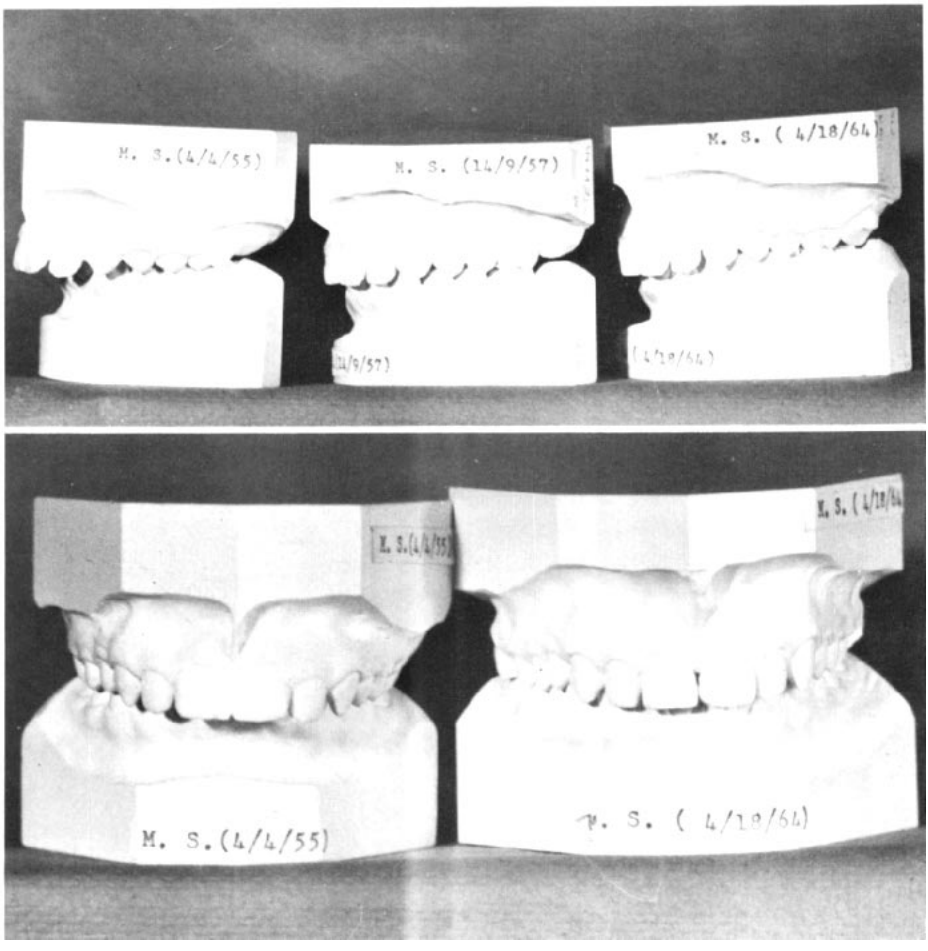

Fig. 6 Patient Marion S. Comparison of seven years out of retention indicates no change when compared with the completed casts of 1957.

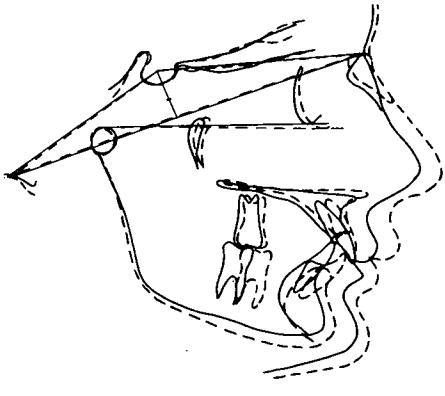

Fig. 7 Tracings before treatment and seven years out of treatment.

Fig. 8

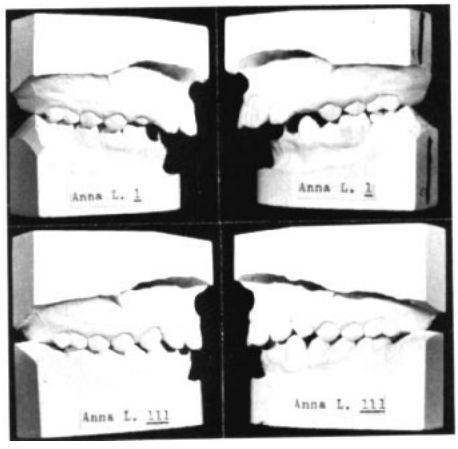

Fig. 9

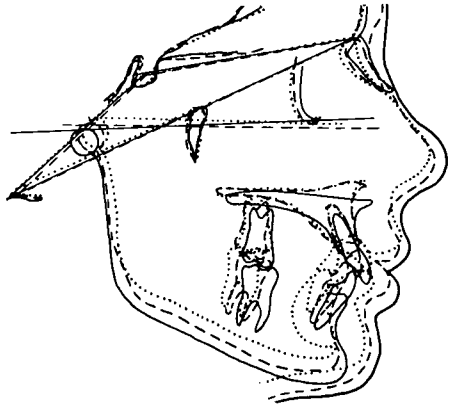

Fig. 10 Tracings showing reduction of overjet and improvement in the anteroposterior relationships. Dotted line, before treatment; dashed, after four months of monobloc treatment; solid line, completion of all treatment.

two millimeters. Models of the teeth are seen in Figure 9 and the tracings in Figure 10.

From these records it may be noted that detailed tooth movement was relatively easy to accomplish using a full banding technique since the major anteroposterior tooth relationship was corrected by use of the monobloc.

Case 3. Michael S., a male twelve years of age, possessed a Class II, Div. 1 malocclusion (Fig. 11).

Both maxillary lateral incisors were positioned slightly to the lingual of the maxillary centrals and canines. The overjet was seven millimeters. There was a tongue habit present and the lips and cheeks were hypotonic.

Prior to the insertion of the monobloc a maxillary Hawley-type palatal appliance was constructed with finger springs to move the lateral incisors labially to align with the central incisors. Spurs were incorporated in the palate of the appliance lingual to the maxillary incisors to discourage the tongue habit. This appliance was worn for six weeks during the day while the monobloc was worn at night. The

Fig. 11 Photographs of patient Michael S.

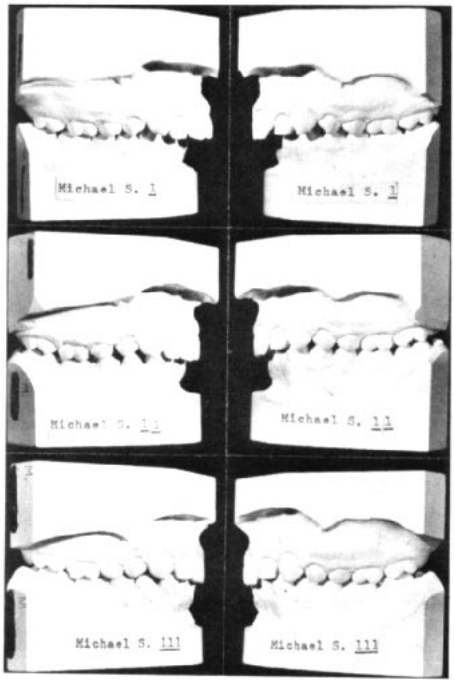

Fig. 12 Four months of monobloc treatment; note improvement in relationship of maxillary and mandibular posterior teeth.

monobloc was worn approximately four months. It is noted that the overjet has been reduced and there is improvement in the anteroposterior relationship (Figs. 11, 12 and 13).

The maxillary arch was banded in order to torque the incisor roots lingually. A cervical headgear was placed. The mandibular teeth were banded in order to improve arch form. Bands were removed on August 4th, 1964 and a monobloc was used for retention until December, 1964 (Figs. 13 and 14).

Discussion and Summary

The monobloc, like the headgear or biteplate, is a useful adjunct in treatment, particularly of Class II, Division 1 malocclusions. There are some malocclusions in which this appliance works better than in others. For example, Class II malocclusions with diastemas in the arches will respond better to multiband and cervical traction treat-

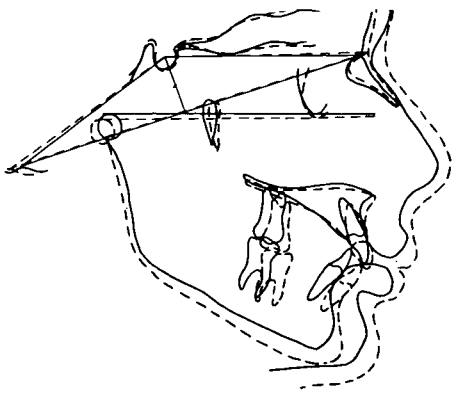

Fig. 13 Final records of patient Michael S. for whom treatment with monobloc, cervical headgear and edgewise appliances was combined.

ment rather than the monobloc. En masse movement of teeth also respond better to a multiband technique.

The three cases reported in this paper are representative of many more that have been treated partially or entirely with the monobloc. When the child is growing the monobloc may be used in preference to other methods whenever the following conditions are present.

1. Well-aligned maxillary and mandibular arches with no diastemas.
2. Maxillary lip posture is normal.
3. In retention, when a severe Class II, Division 1 malocclusion has been treated with other appliances, whether it be conservative or through the extraction of premolars, the monobloc makes an excellent retainer at night. The monobloc can be trimmed to allow eruption of posterior teeth or it can be adjusted so that posterior teeth do not erupt as in open-bite malocclusions.
4. It may be used in conjunction with mandibular bands during the levelling stages to correct intermaxillary Class II relationships.

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