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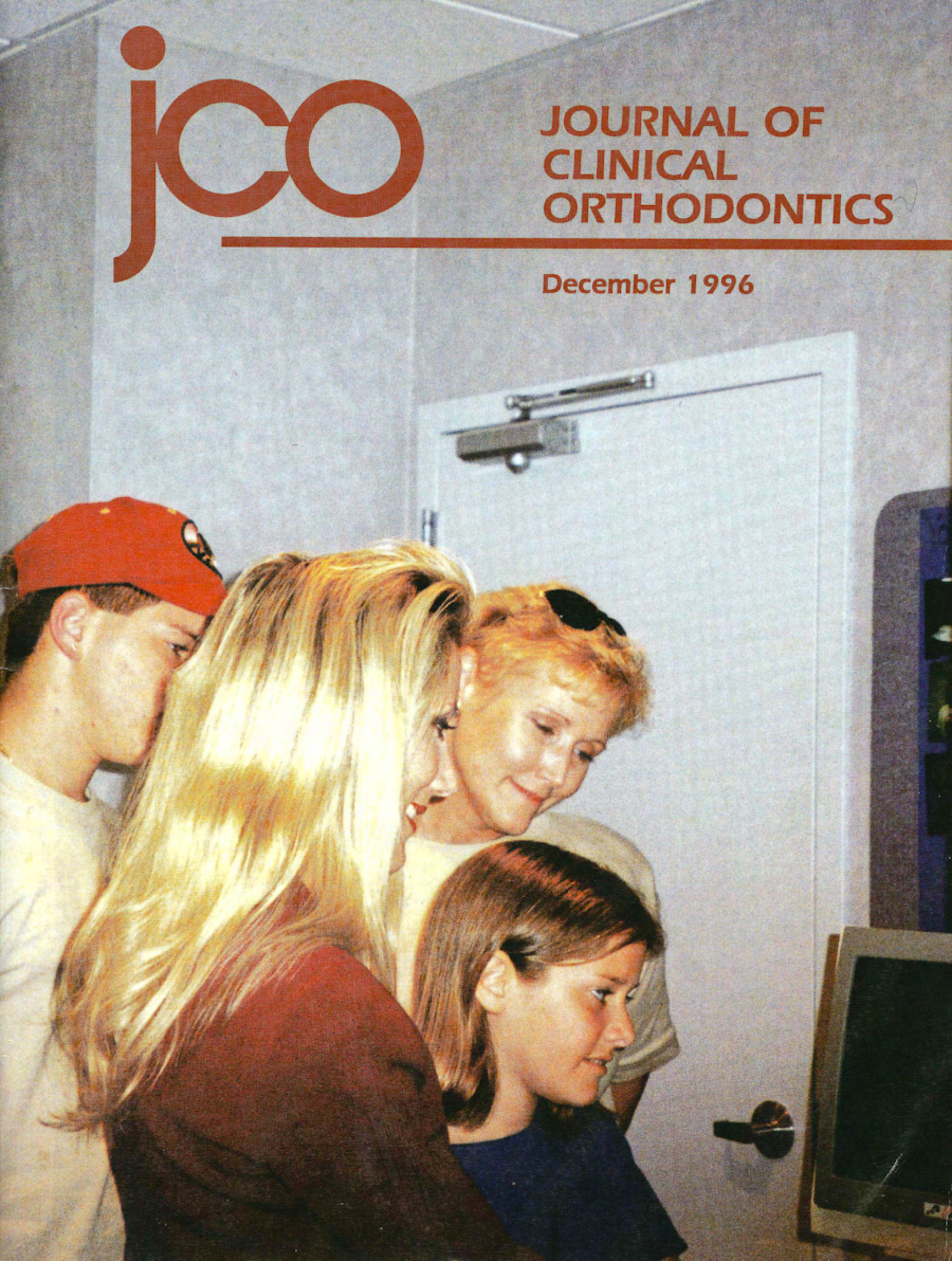

The Speed Positioner

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Since the introduction of the positioner by Kesling in 1945, various methods of fabrication from elastic materials including rubber, thermoplastic vinyl, and resin have been described.[1,2] In 1977, a highly elastic silicone elastomer made of polydimethyl silicate was introduced.[3-8] Today, silicone materials can be made by a number of vulcanization methods, with catalysts such as peroxide, platinum, and tin.

Although the common silicone elastomers are biologically inert and have excellent mechanical properties,[9,10] they have not been widely used in orthodontic practices. Reasons may include the time and cost of fabrication, the uncertainty of clinical performance, and the need for patient cooperation. These problems have been solved in our office by the Speed Positioner.

The Speed Positioner is a highly efficient and precisely fabricated appliance designed to establish and retain gnathologic functional occlusion during the final phases of orthodontic treatment (Fig. 1). It can be made in the office, without alginate impressions, from a clear or transparent silicone elastomer called Odontosil.* This material vulcanizes without added pressure or temperature, using a platinum-hydroxyl-group vinyl siloxane hardener that is biocompatible and hypoallergenic. Odontosil resists shrinkage and, like other silicone elastomers, displays a high resetting ability, permanent elasticity, high tear resistance, and stain resistance; it is odorless, tasteless, and disinfectable.

When coupled with miniaturized brackets, the Speed Positioner provides three-dimensional control and allows individual tooth movements of as much as 3mm. Appliances with maximum interbracket distance, such as SPEED,** Ultra-

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**Strite Industries Ltd., 298 Shepherd Ave., Cambridge, Ontario, N3C 1V1 Canada.

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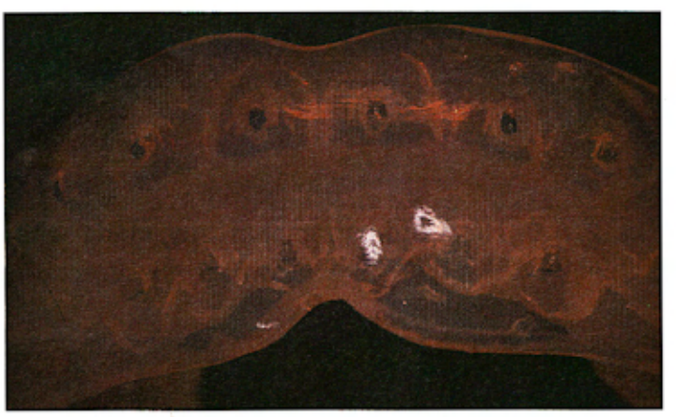

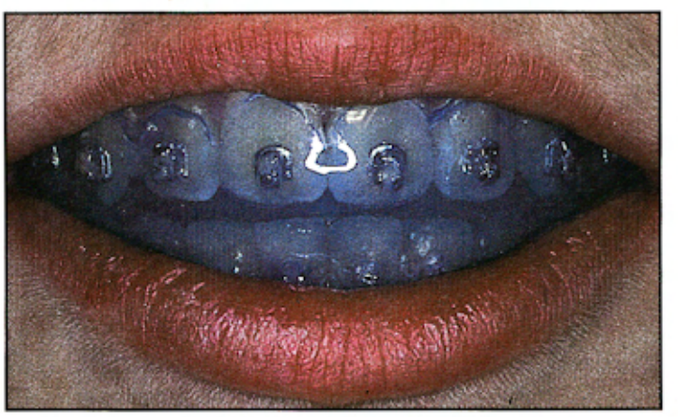

Fig. 1 Speed Positioner.

Mini-Trim,*** Mini-Dyna-Lock,† Mini-Mono-Line,‡ Mini-Twin,†† Mini-Friction-Free,‡‡ Mini-Taurus,§ and Mini Diamond,§§ are preferable because they extend the working range of the positioner and improve patient comfort.

Positioner Fabrication

1. Precise impressions of the upper and lower arches are required with the bonded miniaturized brackets in place. Sharp tie-wing edges and hooks should be removed or reduced by grinding, and severe undercuts blocked out with elastic O-rings or Hug-Caps# (this blocking is not necessary with the SPEED appliance).
2. A split-tray impression technique will ensure accurate reproduction. Take a pre-impression of each arch using soft Zerosil* silicone putty. With a scalpel, trim away any elastomer tags or undercuts that could hinder the repositioning of the tray (Fig. 2). Blow-dry the pre-impression tray and reinsert it. This hard tray will then guide a thin, thixotropic silicone elastomer impression material around the teeth and brackets. Use the hydrophilic, fast-setting Zerosil Supersoft* to create the actual impression.
3. After the impression material has set, remove the hard tray, then carefully peel the silicone

***Dentaurum, Inc., 10 Pheasant Run, Newtown, PA 18940.

†3M Unitek, 2724 S. Peck Road, Monrovia, CA 91016.

‡Forestadent USA, 10240 Bach Blvd., St. Louis, MO 63132.

††"A"-Company, 11436 Sorrento Valley Road, San Diego, CA 92121.

‡‡American Orthodontics, 1714 Cambridge Ave., Sheboygan, WI 53082.

§RMO Inc., P.O. Box 17085, Denver, CO 80217.

§§Ormco, 1717 W. Collins Ave., Orange, CA 92667.

#Kreative Koncepts, 105 E. First St., Hinsdale, IL 60521.

*Dreve-Dentamid, Max-Planck-Strasse 31, 59423 Unna, Germany.

Fig. 2 A,B. Hard pre-impression tray made with Zerosil silicone putty. C. Elastomer tags and undercuts trimmed away with scalpel.

Fig. 3 Surface tension of silicone reduced with KKD Release Spray.

Fig. 4 Plaster cast removed from silicone tray.

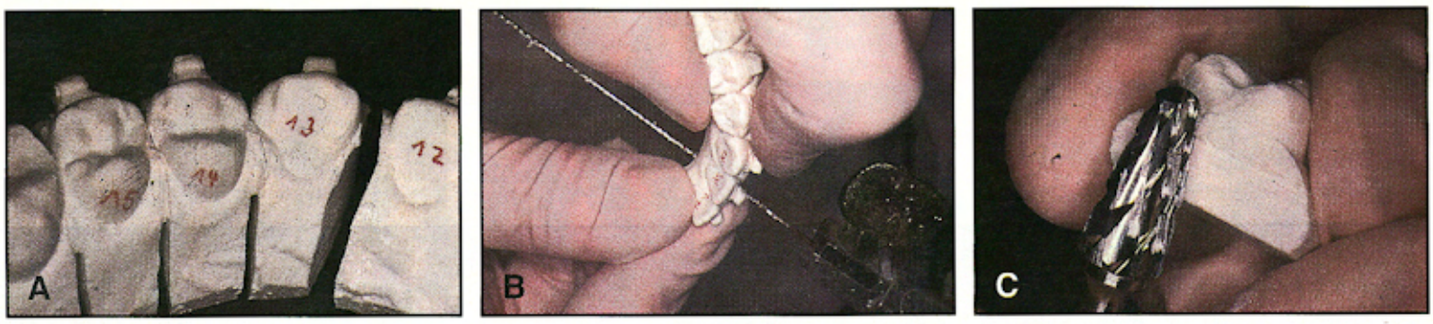

Fig. 5 Individual teeth marked (A), cut away from plaster cast (B), and ground with conical bur (C).

material toward the lingual, away from the teeth and brackets. Replace the silicone tray in the hard tray. Reduce the surface tension of the silicone by spraying it with KKD Release Spray** (Fig. 3). Let the impression stand for an hour.

4. A high-quality, Class IV synthetic superstone plaster (Tewestone***) is recommended for exact reproduction of the miniaturized bracket outlines. After the plaster has set, carefully remove each cast from the silicone tray (Fig. 4). Mark the individual teeth, cut them away from the cast, and grind the apical areas with a conical bur (Fig. 5). Replace the individual teeth in the silicone trays, and pour in wax to make setup models (Fig. 6).

5. Take a centric bite registration using a transparent, fast-setting silicone material (Regofix*). Because of the elasticity of this material, it is important that the patient close to the correct position just short of occlusion. The bite registration will resist deformation and can be kept as a permanent occlusal diagnostic record. Take an arbitrary facebow registration, then replace the archwires and reactivate them as necessary.

6. Using the centric bite registration and facebow, mount the setup models on a semi-adjustable articulator such as Dentatus**** (Fig. 7). Position the teeth according to gnathological

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**Kentzler-Kaschner Dental GmbH, Muehlgraben 36, 73479 Ellwangen, Germany.

***Kettenbach GmbH, Postfach 61, 35713 Eschenburg, Germany.

****Knapstein-Import, Ostwall 237, 47798 Krefeld, Germany.

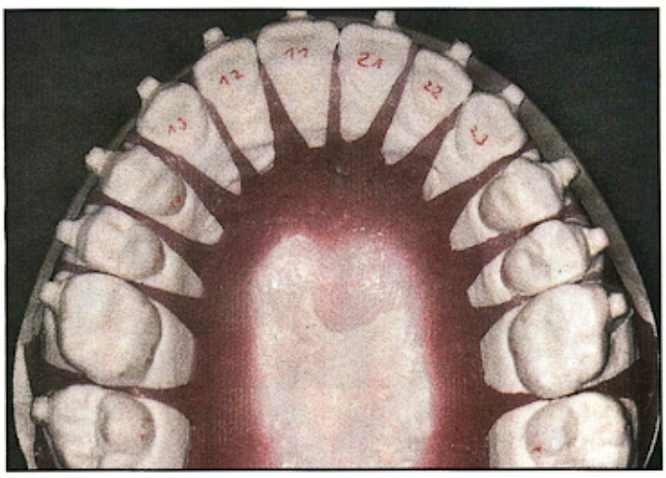

Fig. 6 Individual teeth replaced in silicone tray and poured with wax.

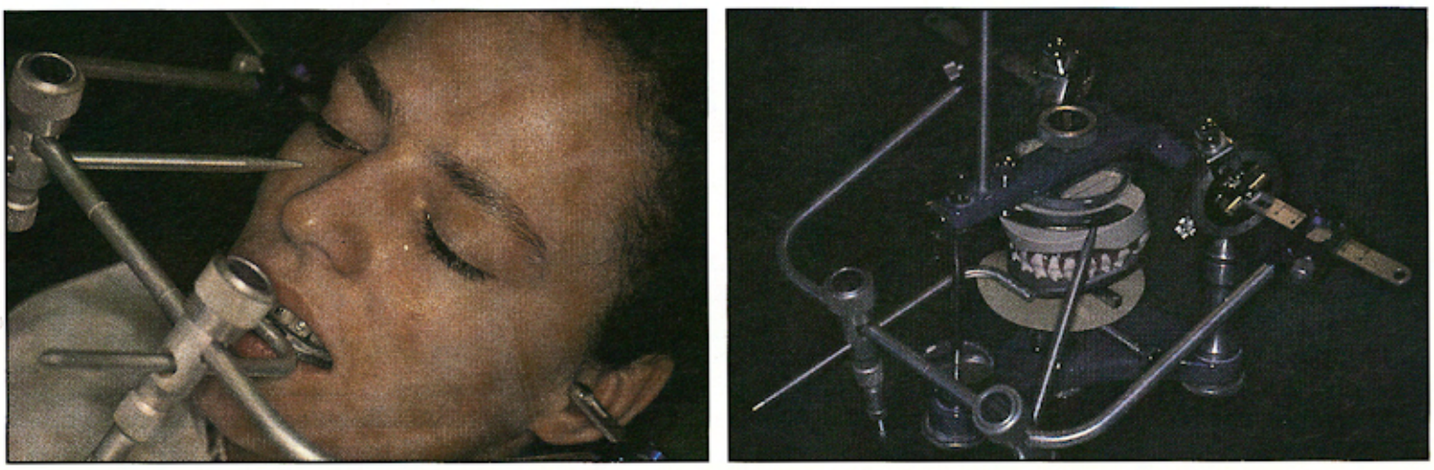

Fig. 7 Facebow transfer of centric bite registration to semi-adjustable articulator.

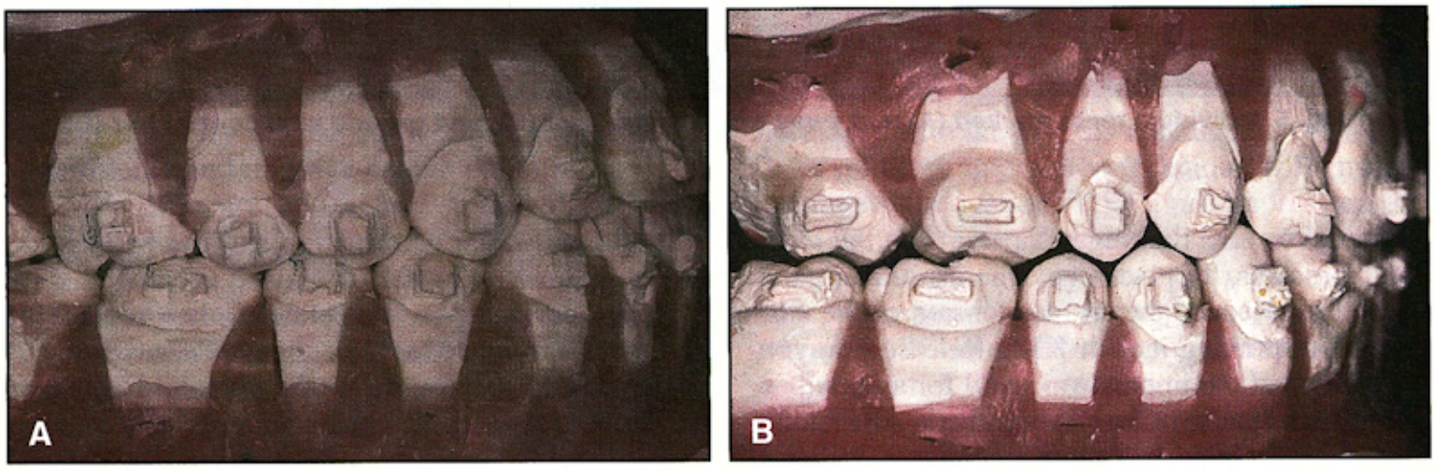

Fig. 8 Teeth moved to ideal gnathological positions on lower arch (A) and upper arch (B).

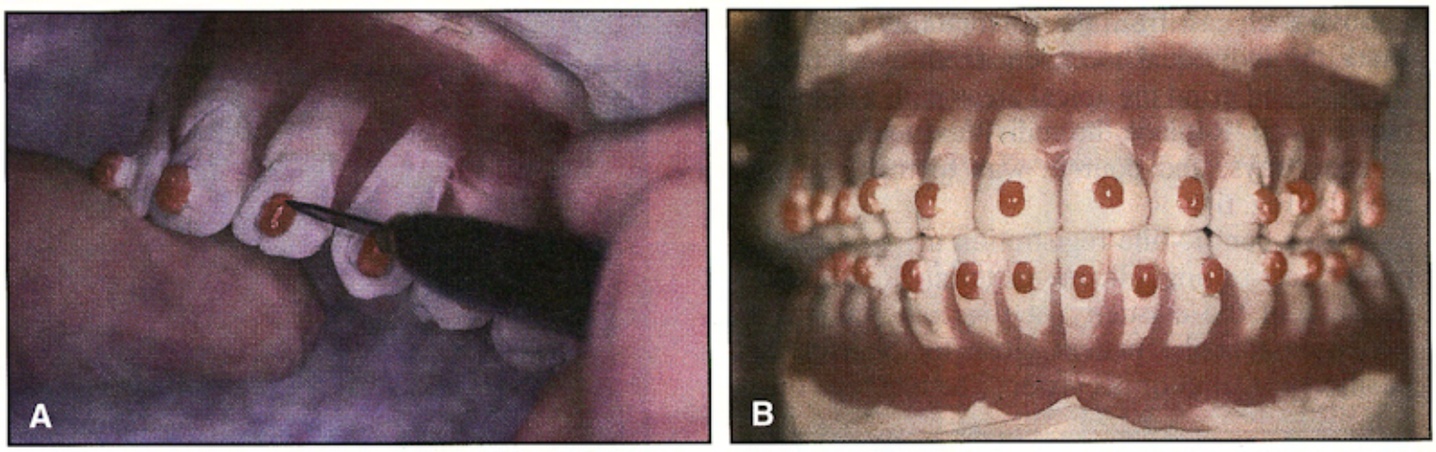

Fig. 9 A. Bracket contours detailed with gluing wax. B. Ideal setup finished by contouring gingivae and smoothing wax base.

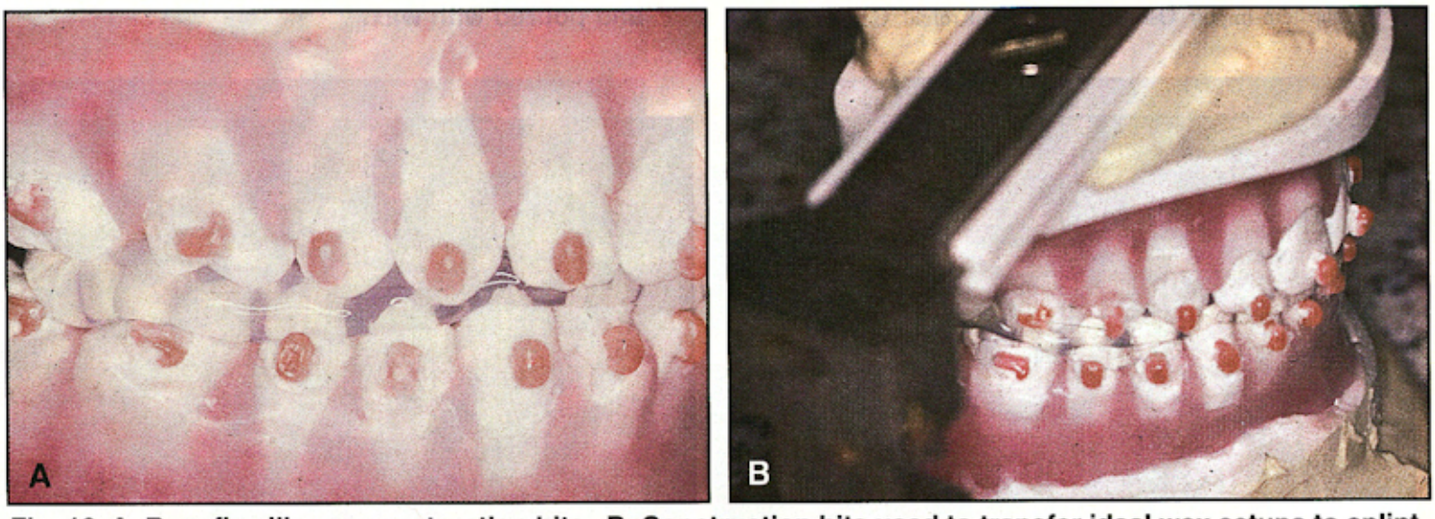

Fig. 10 A. Regofix silicone construction bite. B. Construction bite used to transfer ideal wax setups to splint-fixator.

criteria,[11,12] first in the lower arch and then in the upper (Fig. 8). Considering the thickness and elasticity of the positioner material and the inter-bracket distances, individual tooth movements should generally be kept within 3mm.

7. Detail the fine slots and contours of the brackets on the setup models with gluing wax (Fig. 9). Smooth the wax bases, and contour the gingival areas.

8. Raise the incisal pin of the articulator 2.5mm. In Class II or deep-bite cases, a mandibular advancement of 1mm is reasonable. Over-correction is not a concern, because the positioner will not be worn full-time. Take a construction bite using Regofix,* and transfer the ideal wax setups to a splint-fixator† (Fig. 10). Save the silicone construction bite for later use.

9. The two components of Odontosil come in separate cartridges and are vulcanized at room temperature by mixing them in a cannula in a 1:1 ratio. Separate the two ideal wax setups, then inject the Odontosil onto the occlusal surfaces, first of the lower arch and then of the upper (Fig. 11). Remount the setups on the fixator, and complete the positioner by applying the labial and lingual sections of Odontosil.

10. Carefully mold and smooth the silicone with a finger soaked in soapy water. Trim the contours with a wax knife. The better the modeling, the less finishing will be required after polymerization. To eliminate air bubbles, place the fixator in a pressure pot for about 30 minutes, at room temperature and at least two bars of pressure. The final set takes about two hours.

11. Carefully peel the lingual portions of the positioner away from the setup models with the fingers, then remove the rest with an instrument. Trim the positioner with sharp scissors, and grind it to final form, using removable, pear-shaped grinding caps in rough and fine gradations (Fig. 12).

*Dreve-Dentamid, Max-Planck-Strasse 31, 59423 Unna, Germany.

†Scheu-Dental GmbH, Postfach 7562, 58613 Iserlohn, Germany.

Fig. 11 Odontosil injected onto occlusal surfaces of lower (A) and upper (B) arches, then on labial (C) and lingual surfaces of mounted setups.

Fig. 12 A. Removal of Speed Positioner from wax setup. B. Trimming with sharp scissor. C. Grinding with pear-shaped cap.

Fig. 13 A. Surface lacquer brushed on positioner in thin layer. B. Heat lamp accelerates polymerization of lacquer with silicone elastomer. C. Finished surface is transparent and shiny.

12. Apply the Odontosil surface lacquer* in a thin layer with a brush (Fig. 13). This lacquer bonds chemically with the silicone elastomer and leaves the surface transparent, shiny, and durable.

Appliance Delivery

The archwires must be removed before the Speed Positioner can be inserted. Have the patient place the positioner over the miniaturized brackets on the upper arch with a dry thumb and forefinger. The patient then closes the mandible until a click indicates proper seating of the positioner (Fig. 14).

At first, the patient should check the fit by biting down while supporting the appliance with the fingers. Less malpositioned teeth will move quickly into their ideal positions, and the other teeth will follow soon thereafter. Once the ideal intercuspation is reached with the mandible in centric relation, the positioner becomes a passive retention appliance.

Educate the patient thoroughly in how the Speed Positioner works. Demonstrate how mobile the teeth are after removal of the archwires, and emphasize the importance of wearing the positioner as prescribed in the first few days. The ideal setups and photographic records make effective visual aids. Give the patient a one-minute cleaning foam‡ to keep the positioner clean and fresh-tasting. Schedule the next few appointments at short intervals to maintain the patient's motivation.

Intermittent muscle activity will enhance the continuous force exerted by the positioner, and the brackets will keep it in place during sleep. Neither biting exercises nor night-time "stabilizers" are needed. Most patients should wear the Speed Positioner four hours per day and eight hours per night for about four weeks, then at night only for another four weeks. At this point, the gnathologic functional occlusion will usually have been achieved (Fig. 15), and the brackets can be removed.

*Dreve-Dentamid, Max-Planck-Strasse 31, 59423 Unna, Germany.
‡Block Drug Company, Inc., 257 Cornelison Ave., Jersey City, NJ 07302.

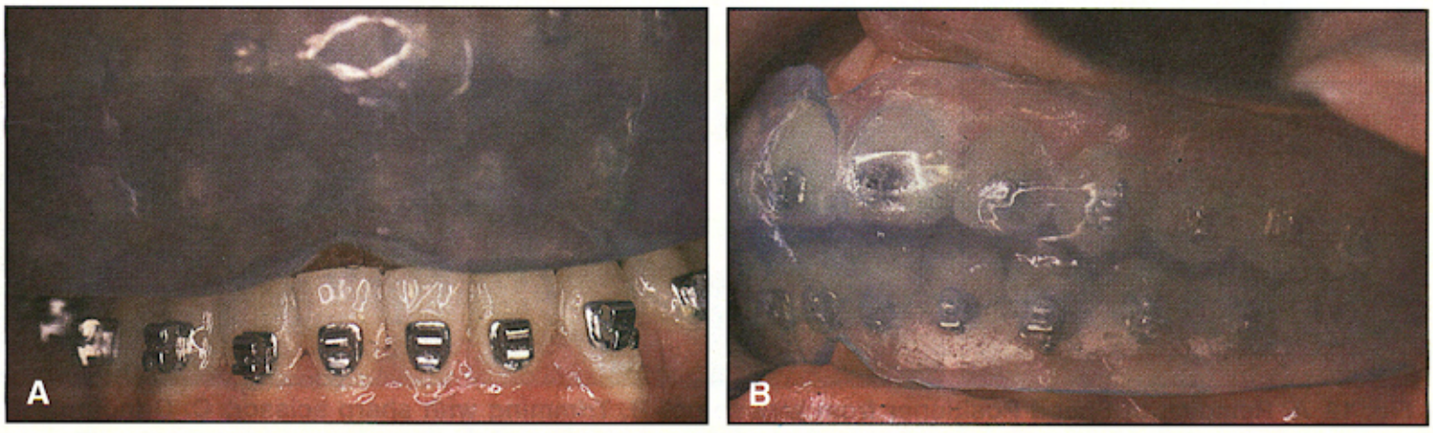

Fig. 14 A. Speed Positioner placed over upper arch and brackets. B. Lower arch clicks into place.

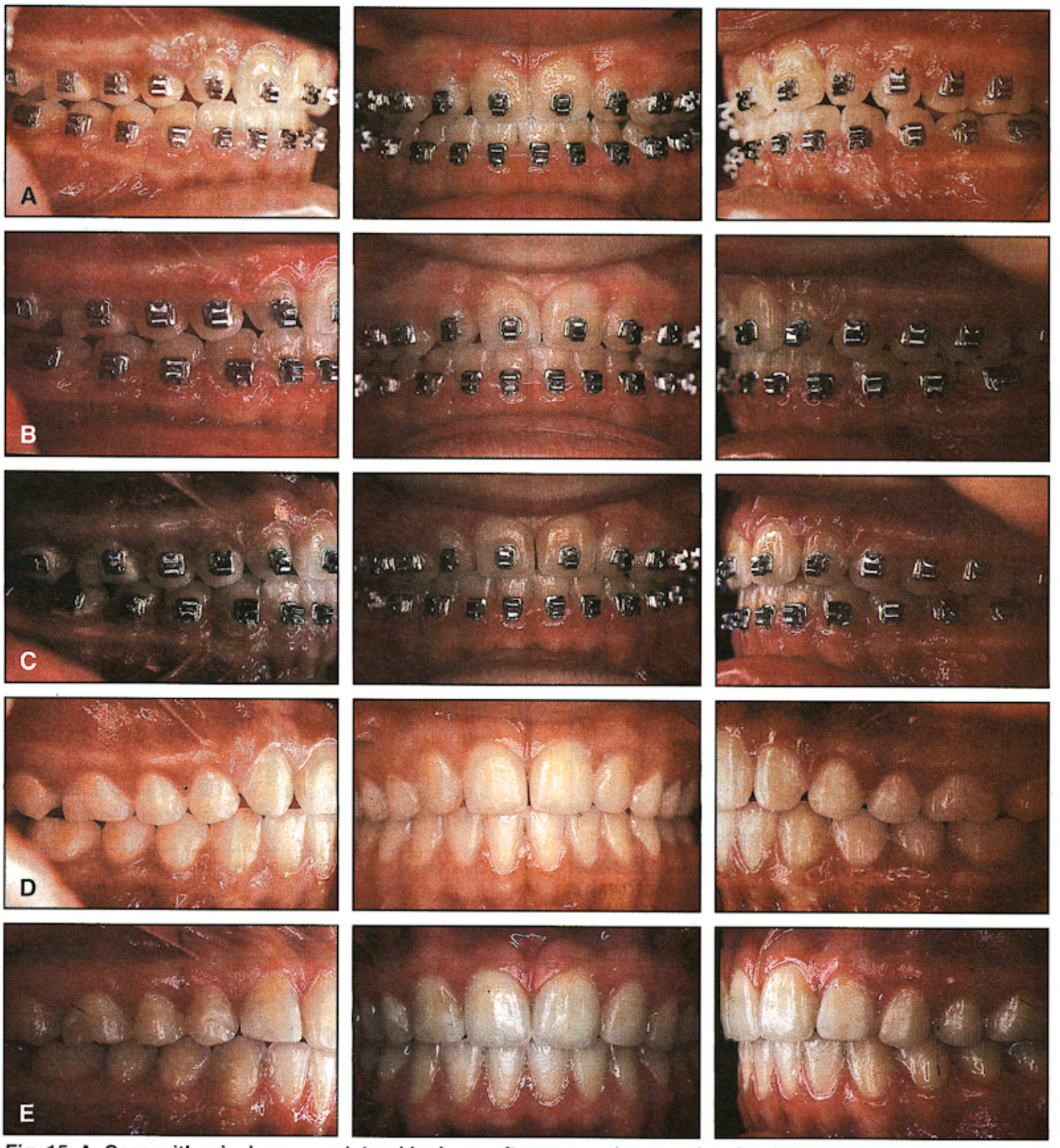

Fig. 15 A. Case with missing upper lateral incisors after space closure, showing cusp-to-cusp relationship on both sides, misaligned individual teeth, and severe midline deviation. B. After one week of wearing Speed Positioner 12 hours per day. C. After five more weeks of wearing Speed Positioner 12 hours per day. D. After two weeks of wearing Speed Retention Positioner eight hours per day. Minor tooth-size discrepancy shown by small diastema between upper central incisors. E. After cosmetic recontouring and composite build-up.

Speed Retention Positioner

Although conventional retainers can be used, we and most of our patients prefer to retain the ideal occlusion with a Speed Retention Positioner. This is made on the original wax setup models, mounted on the splint-fixator with the original construction bite. The brackets should be carefully ground away from the plaster teeth before pouring the Odontosil.

The Speed Retention Positioner will fit snugly because of its lack of bracket recesses and its close adaptation to the ideally positioned teeth. Since there is little strain on the elastomeric material, this retainer can be worn long-term.

If necessary, a substitute or follow-up Speed Positioner can also be made quickly from the original wax setups and construction bite.

Discussion

The Speed Positioner ensures precise control of final gnathological tooth positions in three planes of space. In growing patients, it can also help correct skeletal discrepancies.

The mounted setup allows the orthodontist to study the functional occlusion from different perspectives. Misalignments of individual teeth and tooth-size discrepancies will be revealed, and the plaster teeth can be moved until an ideal occlusion is reached.

Individual tooth movements of more than 3mm should be accomplished with fixed appliances. If the Speed Positioner is uncomfortable or does not fit properly at first, it can be saved until further detailing has been carried out.

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