

# The Role of Occlusal Forces in Open-Bite Treatment

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**O**cclusal forces have acquired a bad name in dentistry. Obviously, clenching, grinding, and other such abnormal activities can lead to TMJ disorders, headaches, and attrition of the teeth.<sup>1,2</sup> Normal occlusal forces, however, are vital to keeping the teeth in balance during orthodontic treatment.<sup>3</sup>

The significance of this stabilizing effect can be observed in a patient who never squeezes the teeth together. In such a case, the absence of occlusal forces will allow the teeth to extrude, tip, and generally get out of control.<sup>4-6</sup> If the archwires are removed and the patient is encouraged to squeeze down and chew sugarless gum, the teeth usually return to normal within four or five weeks.

How important are occlusal forces in growth and development? Studies have shown that patients with vertical skeletal patterns have less occlusal strength than those with normal patterns.<sup>7-9</sup> Is this genetic, or is form following function? Since infants are rarely seen to have vertical skeletal patterns, vertical development could certainly be caused by an insufficiency of occlusal forces during growth.

## The Role of the Musculature

Inhibition of occlusal forces is clearly a function of the muscles in and around the oral



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cavity, as evidenced by patients with mouth-breathing, thumbsucking, and tongue-thrusting habits.<sup>10,11</sup> Open bite is usually associated with mouthbreathing, which should be addressed as necessary. Consultation with an otolaryngologist may be required for correction of nasal blockages, allergies, or enlarged tonsils or adenoids.

A patient with digital sucking problems should not be treated until the habit has been corrected. Many techniques have been proposed for this purpose.

Control of the tongue is critical in treating high-angle, open-bite malocclusions. No system of orthodontic bite closure will be successful if the tongue does not develop normal functional patterns.<sup>12,13</sup> Over the years, I have developed a method of instructions and exercises that has proven helpful in treatment of tongue thrusters. Like any procedure, this one depends on the patient's ability to follow the instructions, as outlined below.

## Patient Instructions

First, no liquid is to be taken when eating solid food. Although my grandmother knew nothing about tongue function, she was right when she taught me not to wash down my food. In the swallowing pattern of a true tongue thruster, the tongue does not push the food down the throat; it thrusts forward, leaving the food at the base of the tongue. The liquid then washes the food down, as in taking a pill. If liquids are not allowed, the patient is forced to swallow properly.

The tongue is a voluntary muscle and, therefore, can be trained like other muscles in the body.<sup>14</sup> The following three exercises will help the patient learn to swallow properly and thus control the vertical growth pattern:

1. "Click". Place the tip of the tongue in the anterosuperior area of the palate, press, and then

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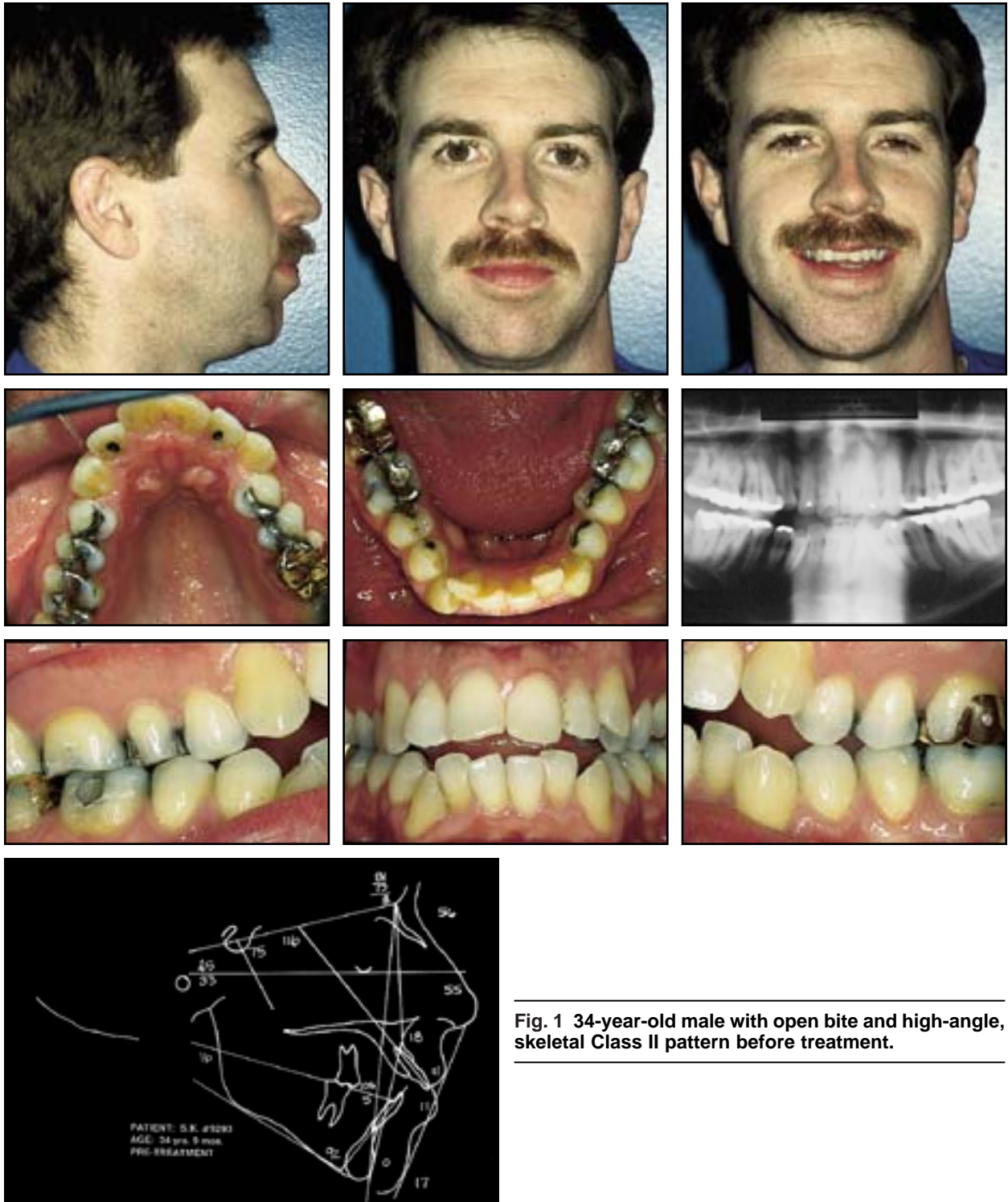


Fig. 1 34-year-old male with open bite and high-angle, skeletal Class II pattern before treatment.

bring it down forcefully to make a clicking or popping sound. Repeat this exercise as often as possible throughout the day. The tongue will begin to feel more comfortable resting in the palate, rather than around the mandibular teeth, where it usually stays in a high-angle patient.

2. "*Slurp*". After practicing the first exercise, place the tongue as if to "click", but instead suck air back into the esophagus. This pulls the tongue distally. Now swallow while pressing the tongue against the palate, without allowing the tongue to thrust forward.

3. "*Squeeze*". This is where the occlusal forces come into play. While swallowing, constrict the muscles of mastication, and force the teeth together as strongly as possible.

Patients find it easier to remember these exercises if they are encouraged to make the appropriate sounds as they practice—clicking, slurping, or squeezing (an "ugh" sound). It also helps to have the patient exercise in front of a mirror, holding the lower lip down so the teeth and tongue are visible. Some patients will find it almost impossible to hold the tongue in its proper position, slurp, and swallow. It may take con-

siderable practice and determination to resolve the problem.

Another exercise regime for strengthening occlusal forces has been developed by Thompson.<sup>15</sup> Ask the patient to squeeze the teeth together as hard as possible for 15 seconds, relax, and repeat three times for a total of one minute. This exercise should be done five times a day. I also instruct the patient to chew sugarless gum and squeeze the teeth together as much as possible.

As long as the bite is open and the anterior teeth are apart, the vertical growth pattern will not be corrected by exercises alone. The teeth must also be moved orthodontically, as the following case shows.

### Case Report

A 34-year-old male presented with a Class I occlusion on the right side and a Class II on the left (Fig. 1). He had an open bite of 4mm and an overjet of 11mm. Space analysis showed a maxillary discrepancy of 6mm and a mandibular discrepancy of 9mm. Cephalometric evaluation confirmed a high-angle, skeletal Class II.

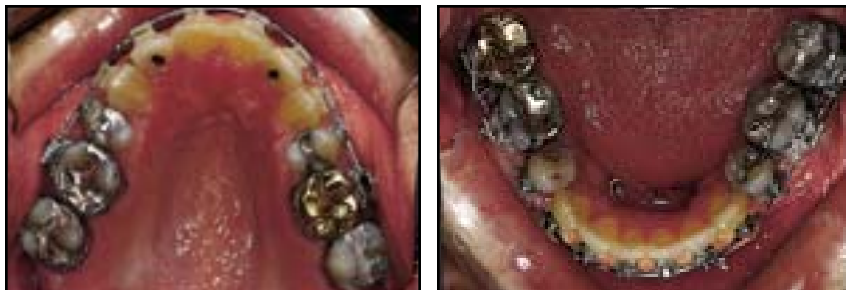


**Fig. 2** After six months of treatment with maxillary .016" stainless steel archwire and mandibular .017" × .025" TMA sectional wires.





**Fig. 3** After five months of treatment with maxillary .017" × .025" TMA closing-loop archwire and mandibular .016" stainless steel archwire. Note anterior bite closure.



**Fig. 4** After four more months of treatment with maxillary .017" × .025" TMA closing-loop archwire, with mandibular archwire changed to .016" × .022" stainless steel.

Initial space closure was performed in the maxillary arch using an .016" round stainless steel archwire with coil springs and power chains, and in the mandibular arch using .017" ×

.025" TMA\* sectional wires with closing loops (Fig. 2). (Note: "Driftodontics" is not effective in

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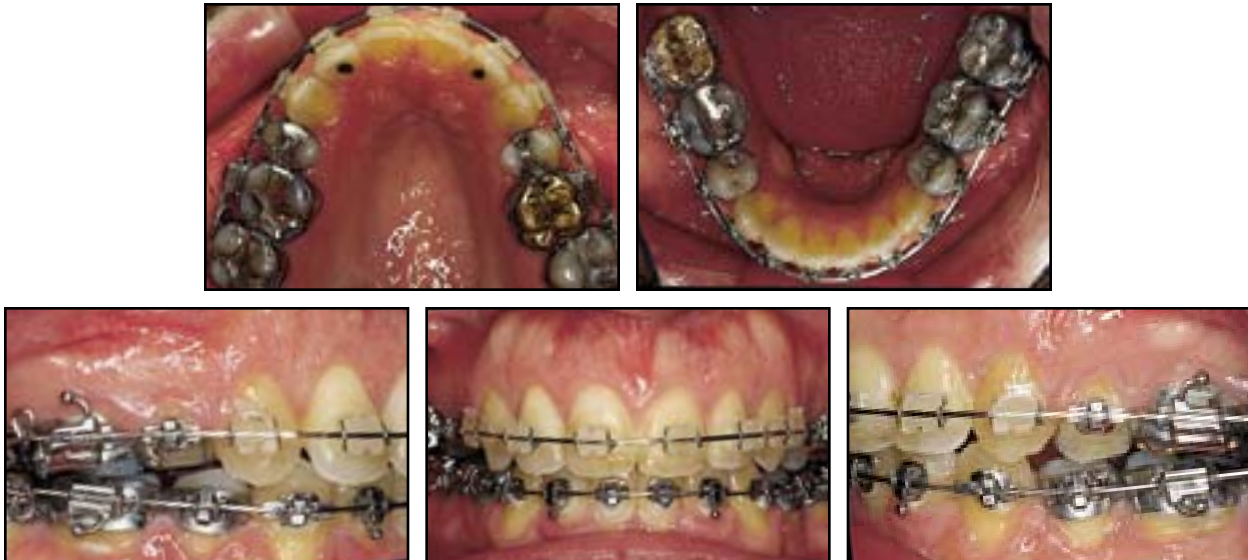


Fig. 5 After six months of finishing with .017"  $\times$  .025" stainless steel archwires.

adult patients.)

Six months later, an .017"  $\times$  .025" TMA archwire with closing loops was placed in the maxillary arch, and an .016" stainless steel archwire with power chain in the mandibular arch (Fig. 3). After another five months, the mandibular archwire was changed to .016"  $\times$  .022" stainless steel (Fig. 4).

Four months later, .017"  $\times$  .025" stainless steel finishing archwires were placed in both arches (Fig. 5). Fixed appliances were removed after 25 months of total treatment time (Fig. 6).

### Retention and Stability

A 3mm hole in the anterosuperior palatal acrylic of the maxillary retainer can serve as a reminder on correct tongue placement. The patient is instructed to place the tip of the tongue in the hole and to press into it while swallowing. For further reinforcement, the patient should place the tongue as suggested and hold it in position as he or she goes to sleep.<sup>16,17</sup>

The long-term stability of open-bite treatment depends on proper tooth positioning for the patient's particular skeletal pattern. The most

critical factor, however, is the establishment of normal muscular function in and around the oral cavity.<sup>18</sup> My experience has been that when patients can successfully control the tongue, permanent bite closure is possible (Fig. 7). It is especially rewarding to see these results in adult patients.

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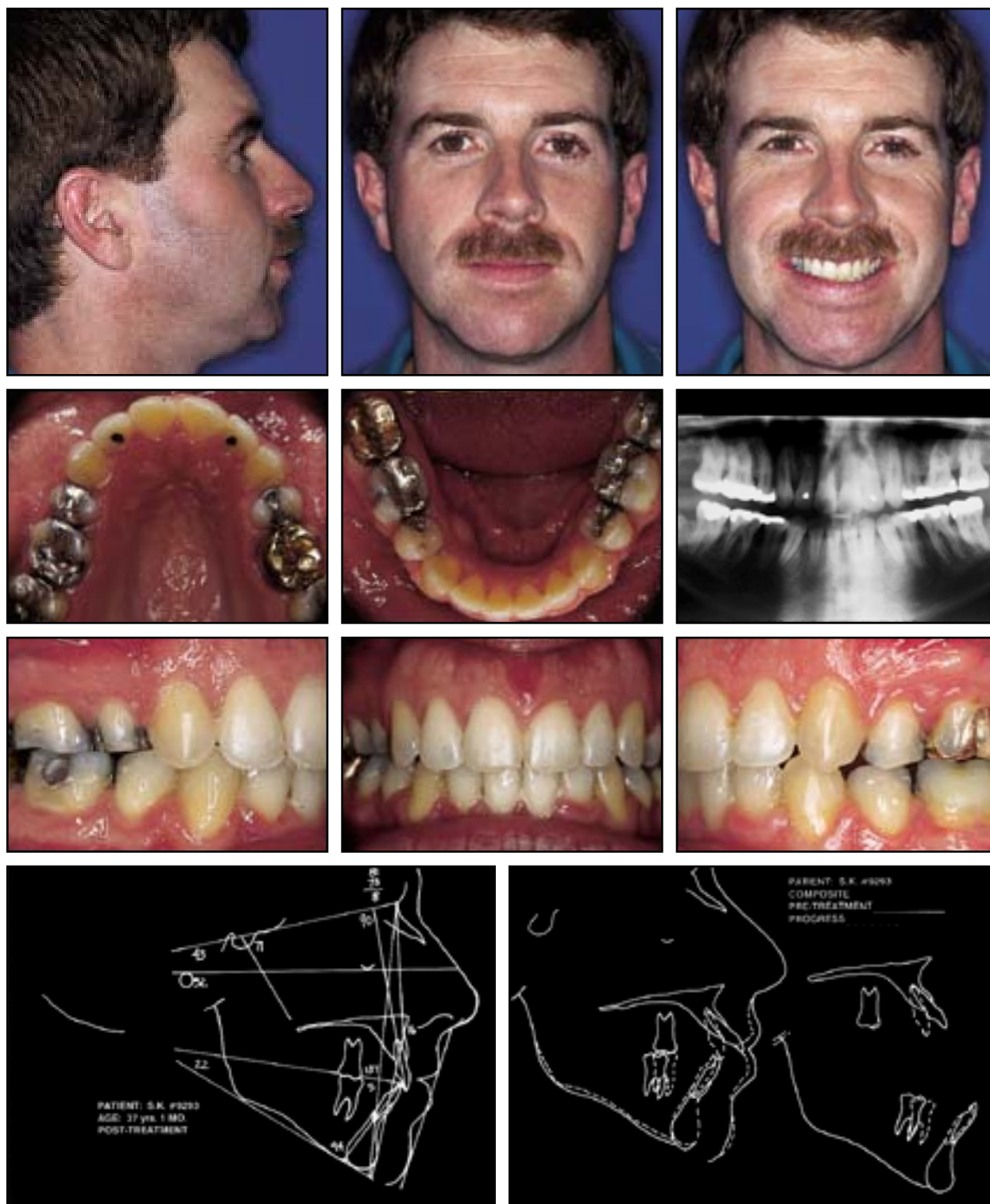
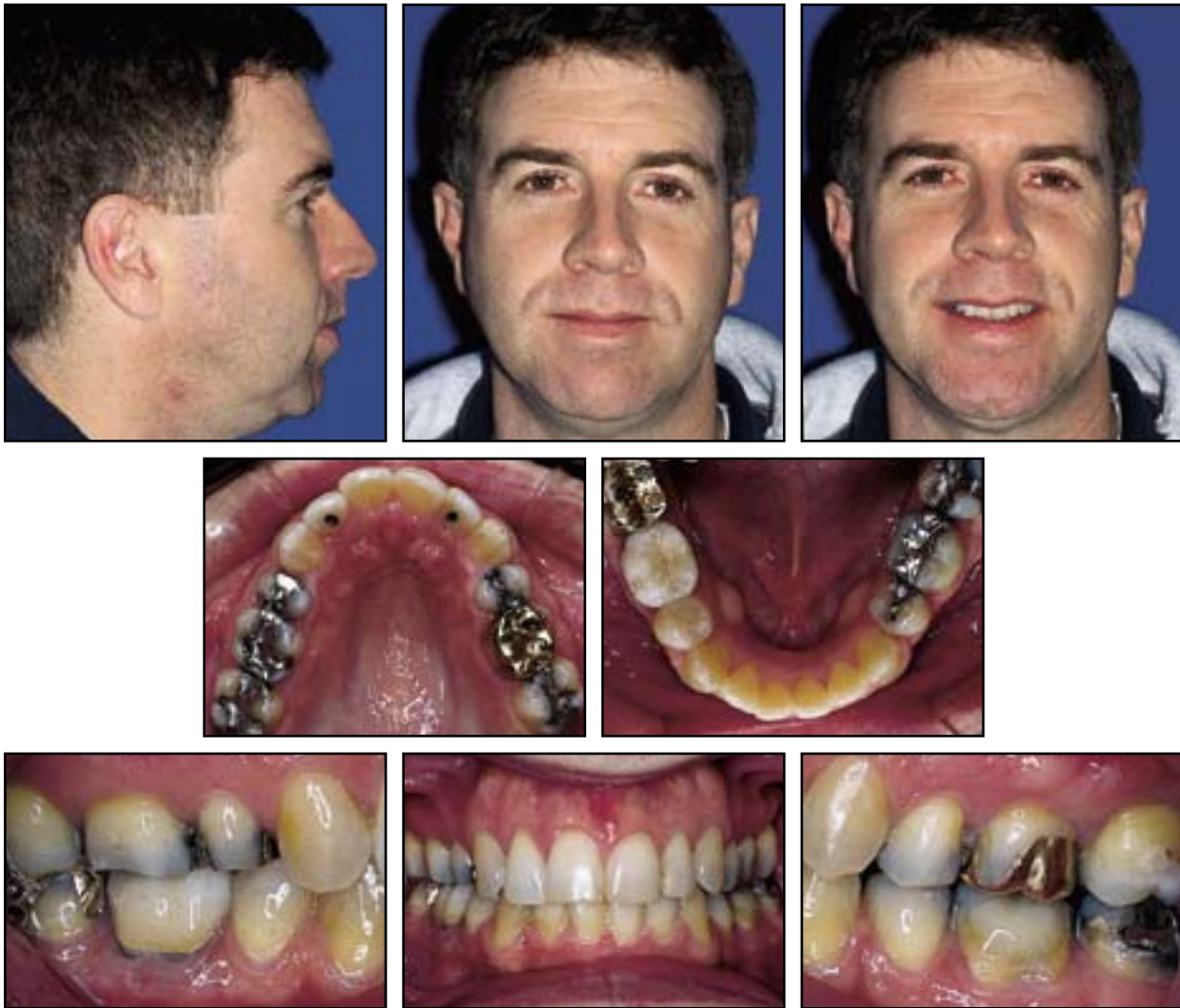


Fig. 6 After removal of orthodontic appliances (25 months of treatment).





**Fig. 7 Seven years after removal of appliances (no retainers worn for four years).**

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