

## Vibratory Stimulation as a Method of Reducing Pain after Orthodontic Appliance Adjustment

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Pain is an all-too-common experience of patients undergoing any form of dental treatment, to the extent that 77% of a patient population reported some degree of pain from a visit to the dentist.<sup>1</sup> Pain following orthodontic adjustments appears to be equally prevalent.<sup>2-10</sup>

Jones and Chan showed that compliance with orthodontic treatment may be predicated on the amount of initial pain and discomfort experienced.<sup>5</sup> Other studies indicate that plaque control may suffer as a result of the pain associated with orthodontics.<sup>7,11</sup>

Although analgesics have been found to reduce such discomfort, in most cases they do not totally eliminate it.<sup>12-15</sup> Moreover, some patients may be allergic to these agents, and one report suggested that nonsteroidal anti-inflammatory drugs may adversely affect the rate of tooth movement.<sup>14</sup>

Patients who do not respond to or elect not to use pharmacological therapy have had few practical alternatives. Some orthodontists recommend chewing on gum or a plastic wafer immediately after adjustments.<sup>16</sup> Proffit suggested that lower force levels could reduce pain,<sup>17</sup> but Lim and colleagues showed that pain or discomfort was still experienced by most patients even when "physiologic and light forces" were used.<sup>18</sup>

Recently, there have been major developments in the understanding of pain mechanisms and of new approaches to the management of pain.<sup>19</sup> Low-level laser therapy has been shown to produce analgesic effects in many clinical applications, including orthodontics.<sup>18</sup> Transcutaneous electrical nerve stimulation (TENS) is another non-pharmacological, non-invasive method of reducing post-orthodontic adjustment pain.<sup>20,21</sup> Vibratory stimulation, a classic non-invasive and non-medicinal method of reducing pain, could also be effective in orthodontic patients.<sup>21-26</sup>

The orthodontic application of this method was first investigated by Dr. Powers on a patient with a history of painful post-adjustment episodes during closure of a wide maxillary midline diastema with elastic chain. After placing a new elastic chain, Dr. Powers observed that gentle vibration of the maxillary central incisors produced two effects: the blanching of the tissue between and above the incisors was quickly reversed, and the previous level of pain did not occur.

This encouraging observation was the impetus for the commercial fabrication of a patient-controlled appliance that could translate a vibratory effect to all the teeth. A small, battery-operated vibrating motor with two amplitude settings was coupled to a flexible, detachable, soft acrylic mouthpiece for this purpose (Fig. 1).

Random testing by other orthodontists indicated that gentle vibration of the teeth eliminated or significantly reduced post-adjustment orthodontic pain. It was observed, however, that the appliance had to be used before the pain was evident, because once the pain was manifest, the vibratory effect did little to ameliorate it. This corroborates the theory that the cause of orthodontic pain is a