

When *ketamine* is used, pain intensity is reduced, as are the need for rescue analgesia, use of patient-controlled opioids, and postoperative nausea and vomiting. If doses are kept below 0.5 mg/kg, the risk of psychomimetic effects is minimized. Ketamine is especially helpful for patients who are opioid-tolerant. For dental procedures, ketamine reduces postoperative pain after third molar extraction whether it is given topically, submucosally, or intravenously.

Gabapentin and *pregabalin* have antineuropathic analgesic effects but studies indicate just a marginal improvement in postoperative analgesia and an increased risk of serious adverse events, such as excessive sedation. Pregabalin has been used preemptively for patients having bimaxillary surgery and reduced postoperative pain scores and opioid use, but the routine use of gabapentinoids is not supported by most evidence unless the benefit outweighs the attending risk.

Corticosteroids can reduce postoperative pain and swelling in orthognathic and third molar surgery with minimal risk of adverse events. Dexamethasone and methylprednisolone are among the corticosteroids used in dentistry.

The commonly used α_2 *adrenoreceptor agonists* are dexmedetomidine and clonidine. The oral or intravenous administration of these agents reduced the need for morphine for the first 24 hours postoperatively by 25% and 30%, respectively. Their reduction in acute pain was considerable but lasted only 48 hours. Clonidine has been associated with clinically significant hypotension and bradycardia. A dose of 0.2 mg of clonidine given orally did not improve pain or morphine consumption and higher doses were likely to be associated with hypotension and bradycardia. Dexmedetomidine has reduced postoperative pain and opioid use, but bradycardia was also a risk.

PSYCHOLOGICAL, PHYSICAL, AND ALTERNATIVE APPROACHES

Relaxation has been proposed as a way to manage postoperative pain, but insufficient evidence supports this approach. *Hilotherapy*,

acupuncture, or the use of cold compression through a facemask at 15°C, significantly reduces pain and swelling for 48 to 72 hours postoperatively. Its efficacy for specific procedures and optimal duration of treatment remain to be determined. In addition, *acupuncture* has been shown to significantly reduce postoperative pain and the use of opioids, with a 29% reduction in morphine use at 72 hours postoperatively. Finally, patients who have moderate or severe pain will likely see the greatest pain reduction through the use of well-resourced *acute pain services*. Acute pain teams should target those at highest risk for pain.

Clinical Significance

Acute pain after dental surgery is important not just for its impact on the patient but also for the effect on the health care system itself. A multimodal approach to analgesia is likely to be the best approach, according to current evidence. This involves the use of 2 or more analgesics with different modes of action delivered in the same or different ways. Evidence indicates that it's important to identify patients who are most at risk for moderate to severe postoperative pain well before surgery, coordinate the efforts of a multidisciplinary team to manage the pain, and employ multimodal analgesia. With less postoperative pain, there may also come fewer complications, less distress, shorter duration of hospital stay, and less risk of developing chronic pain syndromes.

Evans SW, McCahon RA: Management of postoperative pain in maxillofacial surgery. *Br J Oral Maxillofac Surg* 57:4-11, 2019

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ORTHODONTICS

Clear aligners versus fixed braces



BACKGROUND

Fixed braces have been the conventional and very effective orthodontic appliance for more than 100 years. However, clear aligners are now able to treat nearly everything from mild to severe malocclusions and patients are demanding a

more esthetic and comfortable orthodontic treatment technique, which has led to the popularity of the clear aligners. Whether clear aligners are a viable alternative to braces in terms of treatment effectiveness was addressed in a systematic review and meta-analysis.

METHODS

The PubMed, Web of Science, Embase, Scopus, and Cochrane Central Register of Controlled Clinical Trials databases were searched for studies published up to August 20, 2018 that assessed the effectiveness of clear aligners compared to braces. Eight papers were selected for review. Four studies were conducted in America, 3 in Europe, and 1 in Asia. Two were randomized controlled trials, 1 was a prospective clinical comparison, and 5 were retrospective clinical comparisons. A total of 353 participants received clear aligners and 353 received fixed braces. Patients' mean age ranged from 15.5 to 35.2 years, and patient number per study ranged from 11 to 76.

RESULTS

Treatment Effectiveness

The treatment effectiveness of the clear aligners and braces was compared using the objective grading system (OGS), which consisted of measurements of alignment, marginal ridges, buccolingual inclination, occlusal contacts, occlusal relationships, overjet, interproximal contacts, and root angulation. The OGS score was the total number of points lost. The clear aligners group lost significantly more OGS points than the braces group on average in 1 study, but the other found no significant difference in OGS score between the 2 groups. The meta-analysis found no statistically significant difference between the clear aligners groups and the braces groups.

Analysis of the components of the OGS score indicated that the clear aligner scores were consistently lower than the braces scores in buccolingual inclination and occlusal contacts, but no significant difference was found for alignment, marginal ridges, inter-proximal contacts, and root angulation. Occlusal relationship and overjet scores were lower for the clear aligners group than the braces group in 1 study but not the other. When postretention dental changes were compared, no significant difference in total OGS score was noted from posttreatment to postretention but patients with clear aligners were more likely to relapse than those receiving braces.

The Peer Assessment Rating (PAR) index was used to evaluate maxillary anterior segment alignment, mandibular anterior segment alignment, anteroposterior discrepancy, transverse discrepancy, vertical discrepancy, overjet, overbite, and midline. Neither total PAR score reduction nor the changes in all 8 components differed significantly between the 2 groups. However, the clear aligners group had a significantly lower rate of receiving substantial improvement than the braces group. Substantial improvement was defined as a PAR score reduction exceeding 70% or a reduction in PAR score of more than 22 or a score of 0 in the end.

Two studies reported treatment effectiveness relative to the dental arches. Clear aligners tended to increase mandibular intercanine width during alignment compared to braces. Braces produced significantly greater transverse dentoalveolar width of

the maxillary intercanine and interpremolar than clear aligners. The increases in intermolar width and maxillary arch depth were similar between the 2 groups.

Two studies noted the effect of clear aligners and braces on the proclination of mandibular anterior teeth. Braces significantly decreased the proclination of the mandibular canines compared to clear aligners, which tended to increase the intercanine width instead of decreasing inclination. Braces produced more mandibular incisor proclination during alignment than the clear aligners but the difference did not reach statistical significance.

Treatment Efficiency

When the treatment duration was compared between the clear aligners and braces groups, 4 studies showed the clear aligners had a shorter treatment duration than the braces, 3 found no significant difference in treatment time, and 1 found braces were more efficient than clear aligners for patients who had extractions. When 3 studies were evaluated in the meta-analysis, clear aligners had a statistically significant shorter treatment duration than braces.

DISCUSSION

Clear aligners are associated with better esthetics, comfort, and oral hygiene for patients compared to braces. However, this study found that clear aligners were less able to control several tooth movements. Overall, however, the treatment effectiveness of the clear aligners was comparable to that of conventional brace appliances.

Clinical Significance

Both clear aligners and braces have proven themselves to be effective in treating malocclusion. Clear aligners offer advantages in the segmented movement of teeth and in a shorter treatment duration. Braces are more effective in achieving substantial improvement, producing adequate occlusal contacts, controlling teeth torque, increasing transverse width, and retention. Clinicians need to carefully consider each case and weigh the needs of the patient and his or her dentition against the strengths of each of these orthodontic appliance types.

Ke Y, Zhu Y, Zhu M: A comparison of treatment effectiveness between clear aligner and fixed appliance therapies. *BMC Oral Health* 19:24, 2019

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