What's New in Dentistry

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Ultrasound enhances healing during mandibular osteodistraction. Distraction osteogenesis is considered a successful technique to gain bone and soft-tissue mass in persons with a variety of craniofacial deformities. However, the healing of the surgical site in mandibular osteodistraction can be negatively affected by mastication and bending of the callus in the distraction site. Therefore, any means of enhancing healing of the osteotomy site could be beneficial. In the past, surgeons have realized that ultrasound can be stimulatory to fracture repair. Ultrasound can be administered in a continuous or pulsed mode. Which mode would be stimulatory to mandibular osteodistraction? In a study published in the *Journal of Dental Research* (2008;87:953–957), researchers tested the hypothesis that pulsed ultrasound can produce better bone formation during osteodistraction than continuous ultrasound. The authors used a sample of 36 New Zealand male rabbits, which were divided into three groups of twelve animals each. One group received only mandibular osteodistraction. The distraction was started three days after the surgery, and was performed at the rate of 1.5 mm every 12 hours for 5 days. A second group received distraction and pulsed ultrasound for 20 minutes each day. The third group received distraction and continuous ultrasound for 20 minutes each day. The histologic response of the healing across the osteotomy site was evaluated at 1, 2, 3, and 4 weeks after the conclusion of the distraction. In the first two weeks post-distraction, the group that received the continuous ultrasound showed enhanced bone formation compared to the group that received the pulsed ultrasound. However, in the 3rd and 4th weeks, the group with the pulsed ultrasound showed more bone formation than the continuous ultrasound group. Both of the ultrasound groups showed improved healing compared to the distraction only group. The authors conclude that bone formation during rapid distraction osteogenesis of the mandible can be improved with both pulsed and continuous ultrasound.

Laser therapy does not enhance nonsurgical periodontal treatment. Chronic periodontitis is initiated by microbial plaque, which accumulates on the tooth surface at the gingival margin and induces an inflammatory reaction. The pathogenesis and severity of periodontal disease differ among individuals, and some individuals are at a higher risk for developing periodontal disease. The primary goal of periodontal therapy is to arrest the inflammatory process by removing the microbial factors. A proposed method of controlling subgingival microorganisms is laser therapy. Would laser therapy produce a better result than conventional nonsurgical approaches to periodontal therapy? A systematic review published in the *Journal of Periodontology* (2008;79:2021–2028) reviewed the evidence on the effectiveness of laser therapy as an adjunct to nonsurgical periodontal treatment in adults with chronic periodontitis. The authors performed a systematic search of existing literature, which resulted in the identification of 25 publications. After carefully scrutinizing these studies, 21 were eliminated for a variety of reasons. This resulted in four publications that met the specific criteria outlined by these researchers. However, each of these studies used a different type of laser. The results of these studies varied from the laser having an adjunctive effect to having no effect whatsoever. The authors concluded that there is no consistent evidence to support the efficacy of laser treatment as an adjunct to nonsurgical periodontal treatment in adults with chronic periodontitis. The authors believe that more randomized controlled clinical trials are needed.

High doses of caffeine increase alveolar bone loss. Periodontitis results in attachment loss and alveolar bone resorption. Previous studies have demonstrated that systemic and environmental factors may modulate periodontal disease progression and severity. Caffeine is one of the most commonly ingested compounds in the world, being a major component in beverages, foods and medications. Laboratory studies have tested the influence of caffeine on bone metabolism and have demonstrated some negative effect of caffeine on bone cell viability, histomorphometry, and bone mineral index. A study published in the *Journal of Periodontology* (2008;79:2356–2360) evaluated the influence of caffeine consumption on ligature-induced periodontitis in rats. The sample consisted of 22 Wistar rats that were assigned to one of two groups. The first was a non-caffeine group consisting of 12 animals without caffeine ingestion. The caffeine group consist-

ed of 10 animals that ingested 10-mg/100 g body weight per day of caffeine via drinking water for 8 weeks. Two weeks after the beginning of caffeine intake, one of the mandibular molars was randomly assigned to receive a ligature, whereas the contralateral molar was left unligated. After five weeks, the animals alveolar bone levels were evaluated histologically. Specifically, the area of periodontal ligament and/or bone loss in the furcation region of the first molars was histometrically determined. The authors found that caffeine intake did not have a direct effect on the alveolar bone loss in unligated teeth. However on the ligated tooth, a greater area of bone loss was observed in the animals that ingested caffeine compared to those that did not. The authors state that although the effects of caffeine on bone metabolism are not fully understood, some researchers have demonstrated that caffeine inhibits the proliferation of osteoblast-like cells and has deleterious effects on the viability of osteoblasts, increasing the rate of apoptosis of these cells. Whatever the mechanism, the authors have shown that daily intake of high doses of caffeine increases ligature-induced periodontitis in rats.

Osteoporosis does not affect implant success rates. Osteoporosis is a skeletal disorder characterized by compromised bone strength that predisposes a person to increased risk of fractures. For a diagnosis of osteoporosis, a patient must have a bone mineral density score more than 2.5 standard deviations below the mean. Given the changes in bone micro-architecture, which accompany loss of bone mineral density, could osteoporosis be a risk factor for dental implant survival. A study published in the *International Journal of Oral and Maxillofacial Implants* (2008;23:905–910), compared the osteoporotic status of postmenopausal women to the survival rate of dental implants placed in these women. The authors gathered a sample of 192 postmenopausal females who had 646 implants placed and also had a bone mineral density score taken within 3 years of implant placement. The number of failed implants in this sample was 37 after 5 years. Then the authors determined the osteoporotic status of each patient based upon their bone mineral density score. The distribution was: 49% of the women with a diagnosis of no osteoporosis; 30% had a diagnosis of osteopenia; and 21% of the women had a diagnosis of osteoporosis. Then the authors determined the number of implant failures in each group. There were 10 implant failures in the osteopenia group and 10 failures in the osteoporosis group. The other 17 failures occurred in the group of patients without a diagnosis of osteoporosis. After statistical analysis, the authors concluded that a diagnosis of osteoporosis and osteopenia do not contribute to an increased risk of implant failure.

Membranes and enamel matrix derivatives both successful in treating intrabony periodontal defects. A relatively common periodontal osseous defect is the three-walled intrabony defect. Today, two possible treatments are recommended for these types of osseous defects in patients with chronic periodontitis. Both treatments initially involve open debridement of the intrabony defect. Then one possible treatment is to use a resorbable membrane placed over the defect to prevent epithelium from migrating apically and to permit the connective tissue attachment to migrate coronally. The other option is to fill the defect with an enamel matrix derivative (Emdogain—Straumann, Basel, Switzerland) in the defect to promote connective tissue reattachment. Which technique is more successful? A study published in the *Journal of Periodontology* (2008;79:2281–2289), compared the outcome of each of these treatment regimens. The sample consisted of 40 three-wall intrabony defects, with a depth greater than 4 millimeters measured from the crest of the bony defect. The patients were randomly assigned to either the membrane or the enamel matrix derivative groups. After 12 months, the amount of clinical attachment gain was compared between these two groups. The results showed that both groups responded favorably to the treatment; however the enamel matrix derivative group showed a slightly better improvement in clinical attachment gain. The authors conclude that the treatment of three-wall intrabony defects in patients with chronic advanced periodontitis using either membranes or enamel matrix derivatives lead to significantly improved clinical parameters after one year.