Primary Tooth Trauma Leads to Developmental Disturbance of Permanent Dentition

Traumatic Intrusion of Primary Teeth and Its Effects on the Permanent Successors: A Clinical Follow-Up Study.

Altun C, Cehreli ZC, et al:


Approximately 50% of the developing permanent teeth can be expected to have developmental pathology after corresponding primary tooth trauma/ intrusion.

Background: Traumatic injury to primary teeth is a very common phenomenon as kids are often involved in facial trauma, and because the central incisors hold a prominent position in the facial profile. The standard of treatment is to extract the teeth if severely mobile or to leave them if stable. Of interest is the effect of the injury to the developing permanent dentition. These effects can range from hypoplasia, crown dilaceration, root angulation, sequestration of the permanent tooth germ, and disturbances in eruption.

Objective: To evaluate the effect of trauma to primary teeth on the developing permanent dentition, and to specifically see if the type of injury to the permanent dentition is correlated to the age at which injury occurred.

Design/Participants: This prospective study took place over a 7-year period; 78 patients had a total of 138 affected teeth.

Methods: The patient demographics, type of injury, and type of post-traumatic sequelae were recorded. Patients were followed with clinical examinations and radiographs until complete eruption of the permanent incisors. At the end of follow-up, developmental disturbances were recorded. These included enamel hypoplasia, hypocalcification, hypoplasia, discoloration, tooth malformation, and ectopic eruption pattern.

Results: 93.47% of all intruded primary teeth were maxillary incisors; 36 teeth were extensively mobile and had to be extracted. Almost all remaining teeth had either partial or total spontaneous eruption, and 29.7% of these teeth developed necrosis, resorption, or ankylosis. Approximately 53.6% of the permanent successors (74 teeth in total) had developmental disturbances. These included hypoplasia, crown/root deformation, ectopic eruption, or a combination of these. Conclusion: The right central maxillary incisor was the most frequently injured primary tooth, and pulp necrosis was the most common consequence of intrusive injury. Severe injury to a primary tooth will result in a developmental disturbance to the permanent successor. Most commonly this will be enamel hypoplasia. There was no correlation between age of intrusion and frequency of subsequent development disturbances.

Reviewer’s Comments: The biggest concern parents have after their child suffers trauma is how the trauma will affect their teeth. This is a well done study that gives us a figure of approximately a 50% chance of developmental defect on permanent incisors. It is also important to note the high percentage of spontaneous re-eruption that occurs. The best treatment for intruded primary teeth is to leave them alone. (Reviewer-Ryaz Ansari, DDS).

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Keywords: Primary Tooth Intrusion

Print Tag: Refer to original journal article
Collagen promotes hemostasis and wound stability by promoting platelet aggregation in addition to promoting fibroblast migration, which could accelerate wound closure.

**Background:** Treatment of periodontal and endodontic defects includes nonsurgical debridement of root surfaces or root canals, as well as approaches taking a surgical direction that provide better access to clean the apical lesions and root surfaces. During this surgical approach, bone is sometimes removed for access or to create better physiologic contours with healing being almost always by repair. The definition of repair is the healing of a wound by tissue that does not fully restore the architecture or the function of the part. The endodontic ideal would be a regenerative procedure of debridement to restore lost tissue be it soft tissue or hard tissue.

**Methods:** The type of healing that occurs after conventional endodontic and periodontal therapy is dependent on the cell type that repopulates the wound first. The initial healing phase is domination by the cells with the fastest migration rate. Epithelial cells migrate 10 times faster than other periodontal cell type, which is why periodontal therapy typically results in the formation of long junctional epithelium. If we could exclude epithelial cells from the wound long enough for other cell types with regenerative potential to become established, epithelial downgrowth may be prevented. This process is referred to as guided tissue regeneration (GTR). An important difference between endodontic and periodontal surgical treatment is that the periodontium is usually healthy in endodontic treatment situations. Tissue removal is only for apical access, while periodontal treatment is initiated in diseased tissues. Also, the periodontal defect is essentially an open wound, and the endodontic lesion is primarily a closed wound environment.

**Results:** Case selection is very important to the success of regenerative techniques. Factors that affect success can be divided into patient-specific, defect-specific, and healing categories. Patient factors that might contribute to positive GTR outcomes include good plaque control, anti-infective therapy, compliance, nonsmoking, and systemic health. Selecting a defect that is amenable to regeneration is also critical for achieving success. GTR improved the outcome of transosseous lesions with 2-walls, but was not necessary for 4-walled defects. Adequate tissue thickness and keratinized gingiva support favorable outcomes also. Other factors that can negatively affect the healing process include occlusal trauma, early mechanical disruption, improper surgical technique (eg, excessive flap tension), and contamination during surgery which can lead to postoperative infection.

**Conclusions:** Although traditional nonsurgical periodontal and endodontic therapy can be predictably used to arrest mild to moderate defects, it may be inadequate for the treatment of disease characterized by deep pockets or wide circumferential apical defects caused by endodontic infection or surgery.

**Reviewer's Comments:** It is important to know what materials are available and when and where they should be used in regenerative procedures to increase clinical success. (Reviewer-Gregori M. Kurtzman, DDS).
Perforations of a root canal can be very problematic. Radicular perforations can occur in 3 circumstances: (1) by a pathological process, such as resorption or dental caries; (2) by accident (e.g., the operating dentist can perforate the canal wall by instrumentation during making the access opening or filing; and (3) after the root canal therapy is complete a canal wall can be perforated during the post-preparation. A perforation makes a connection between the root canal system and the external tooth surface, and can damage the periodontal tissues. Inflammation occurs, bone resorbs, and granulomas form. There can be a proliferation of gingival epithelium to produce a periodontal pocket. Perforation can significantly complicate any attempt at revision therapy. Published reports show that perforations occur in 3% to 10% of root canal cases. Most perforations happen during the post-preparation. Most also occur in maxillary teeth, probably because the roots of maxillary teeth tend to be more curved and gracile than mandibular roots. In maxillary anterior teeth, perforations tended to occur in the facial aspect during the post-preparation. In posterior teeth, the pulpal floor can be perforated during the search for the canal orifices. This shows the importance of the anatomical morphology and configuration of the internal root canal system. Before beginning treatment, a thorough examination of the radiographs is important. Radiographs can demonstrate pulp stones, canal configuration, size, shape, and depth of the pulp chamber and anatomical variations. The best way to address a root canal perforation is to prevent it. Careful preoperative evaluation is an absolute. Repair of the perforation should be done immediately. A delay allows bacterial contamination. The exact location of the perforation can be done with an apex locator or at times on a bitewing radiograph depending on the location. The canals should be cleaned and thoroughly dried so that there is no bleeding on a paper point in contact with the perforation. Generally, the prognosis for new, small, furcal or coronal perforations is good. There is a poor prognosis for old, infected, or large perforations. In the past, the most commonly used repair materials were amalgam, zinc-oxide-eugenol, calcium hydroxide, glass ionomer, and resin-modified glass ionomer, Gerestore™. Mineral trioxide aggregate (MTA), also known as Portland cement, was first used as a root-end filling material. It is made up of tricalcium silicate, silicate oxide, tricalcium oxide, bismuth oxide, and mineral silicate.

**Reviewer’s Comments:** We cannot seem to get away from including bismuth in our endodontic materials. That said, MTA appears to be very biocompatible. Periodontal ligament will grow over the MTA, but gingival fibroblasts do not, which is probably a good thing. (Reviewer-Dennis Flanagan, DDS).

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**Keywords:** Perforation Repair With MTA

**Print Tag:** Refer to original journal article
Objective: To assess the development of periapical pathology, and to determine the accuracy of radiographic assessment of such processes.

Methods: 64 roots were assigned randomly into 4 groups. The subjects were 4 approximately 1-year-old dogs and the teeth studied were maxillary and mandibular premolars. The animals were anesthetized and periapical lesions were induced by carrying out pulpectomies and leaving the root canals exposed to the oral environment. The access openings were then sealed. The 4 groups were examined at different time periods (7, 15, 30, and 60 days). The animals were killed at the predetermined time periods and block resections of the teeth were carried out, followed by buccal lingual sections for histological analysis. The radiographs were scanned and analyzed in computer software. Periapical lesions were outlined by the use of a mouse. Similarly, the histologic slides were assessed using a computer software and the lesions were outlined using a mouse.

Results: No statistically significant difference was noted in radiographic size of the lesions at 7 and 15 days and at 15 and 30 days. Lesions assessed at 60 days were significantly larger in size than the other time periods. The histological lesions showed similar sizes at 7 and 15 days and these were significantly smaller than the lesions at 30 and 60 days. When compared to each other, the lesions at 7 and 15 days were smaller radiographically than histologically. At 30 days, the 2 methods were similar. At 60 days, radiographic lesions were larger than the histologic lesions. Discussion: On days 7 and 15, radiographic assessments revealed smaller lesions than at histological assessment. This is consistent with the fact that radiographic inaccuracies arise from superimposition of cortical bone on the less dense medullary bone. Early lesions that result in loss of medullary bone do not show up on radiographs. At 60 days, the radiographs showed lesions larger than the histological analysis. The authors attribute this to fixation and paraffin embedding, which require reduction of volume of the histological specimen. The radiographic lesions increase in size at each time period. However, histologically the sizes remained similar at 30 and 60 days although bone resorption was greater. This could be from the fact that more cortical bone was lost; hence, the lesions appeared larger radiographically but similar histologically.

Conclusions: Periapical radiography does not reveal pathology in the initial 15 days. It becomes more evident in the later stages at 30 to 60 days after induction of the lesion.

Reviewer's Comments: This study used conventional radiographs and scanned them to digitize them. It would be interesting to see if digital radiography is more consistent with the histological progression of periapical disease. (Reviewer-Ryaz Ansari, DDS).

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Keywords: Periapical Lesion Development

Print Tag: Refer to original journal article
The introduction of maxillofacial CBCT in the 2000s radically altered the oral and maxillofacial radiology landscape.

**Background:** Dental imaging is undergoing rapid change. After being limited to 2-dimensional intraoral, panoramic and cephalometric radiographs, a giant leap forward has occurred with the introduction of cone beam computed tomography (CBCT) with its 3-dimensional capabilities. Medical CT has been available since the 1970s, but it has not been widely used by dentists. Initially, this was due to a lack of access to the machines and the high cost of scans. The introduction of maxillofacial CBCT in the 2000s radically altered the oral and maxillofacial radiology landscape. Among the reasons for the change is the tremendous decrease in dose compared with medical CTs. The lower capital cost of a CBCT machine, making it affordable for the dental market, also played a major factor in its growing use. The development of dental-specific software applications by a variety of vendors, especially in the areas of implantology, has helped with the general acceptance of CBCT in dentistry.

**Results:** One of the legal issues concerns ownership of a CBCT unit; specifically, who may own and operate one. In some states, the acquisition of medical x-ray equipment (primarily CT, MRI, and PET scanners) is based on the perceived need for the machines. This is called a certificate of need. Due to the cost of a CBCT unit, some dentists have considered joint ownership with a physician. If a dentist is considering this option, they should be aware that they might run afoul of the Stark law, which prohibits physicians from making referrals for a "designated health service," payable by Medicare or Medicaid, to any entity with which the physician has a financial relationship. These designated health services include CT scans in a physician's office or freestanding facility. If a dentist were to enter into a business relationship with a physician with regard to purchasing one of these units, since almost all of the physicians accept Medicare and/or Medicaid payments, the dentist, even though he does not participate with Medicare and Medicaid, might find himself under investigation together with the physician for potential violations of the Stark law.

**Conclusions:** CBCT holds great promise for both patients and dentists, but it comes with potential pitfalls. With careful planning and the use of appropriately qualified individuals to aid in interpretation, dentists can enhance their practice and best serve the interests of their patients providing better diagnosis and treatment especially in implant dentistry.

**Reviewer's Comments:** CBCT can provide better information from a 3D perspective than can be accomplished with current standard radiographs and given time, it will become standard practice in dental examinations. (Reviewer-Gregori M. Kurtzman, DDS).

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Keywords: Cone Beam CT

Print Tag: Refer to original journal article
Ledges and Blockages Often Avoidable Complications

Ledging and Blockage of Root Canals During Canal Preparation: Causes, Recognition, Prevention, Management, and Outcomes.

Lambriandis T:

Endod Topics 2009; 15 (1): 56-74

Blockages are prevented by using copious irrigation, completely removing pulp tissue, and using clean files; they are managed by finding a weak spot in the blocking, and with copious irrigation, filing into it with a 08 or 10 file, and expanding for access.

When an error occurs during endodontic therapy, the outcome is jeopardized. If an endodontic file cannot be advanced to the complete working length, then there is a ledge or blockage of the canal that prevents this. These can be formed by an error in filing or debris blocking the canal space. A ledge is a platform or notch that is created on the root canal wall, usually the apical end. It can be made by improper filing technique. A ledge prevents incomplete instrumentation and sealing of the apex and can contribute to postoperative apical pathology. Ledging commonly occurs in the outer wall in curved canals. Unidentified aberrations of canal space anatomy contribute to the incidence of ledging. Preoperative radiographic examination may not obviate intricate apical anatomy adequately to identify aberrant canal anatomy. Generally, the causes of ledging are related to inadequate access preparation, incorrect determination of the direction of the root canal, an error in length assessment, not using pre-curved files when needed, not using the files in proper order, attempting a bypass of a canal obstruction, revision treatment, and filing a calcified or narrow canal. Ledges can be identified on radiographs or sensed with the working file that does not advance to the working length. Managing a ledge involves regaining access to the root apex. This means copious rinsing with sodium hypochlorite and chelating agents to remove any curves and then probing with a 08 or 10 file. Once the working length is re-established, filing is then done to allow for an appropriate seal. If there is no re-establishment of the apical length, then a new base for a seal may be filed about 1-mm coronal to the ledge and then sealed. Curved canals that are straightened may result in a perforation, which would add to the dilemma. The prognosis of a treated ledge depends on the preoperative condition of the tooth. Necrotic teeth do not fare so well. Ledging may be prevented by having excellent preoperative radiographs, noting canal anatomy, having adequate access, using precurving files with copious irrigation with light force and frequent file recapitulation. A blockage occurs when there is dental debris packed into the canal space or there is pulp tissue or endodontic materials that are blocking access.

Reviewer’s Comments: Blockages are prevented by using copious irrigation, completely removing pulp tissue, and using clean files. Blockages are managed by finding a weak spot in the blocking, and with copious irrigation, filing into it with a 08 or 10 file, and expanding for access. Ledges and blockages are complications that may be avoidable in many situations. (Reviewer-Dennis Flanagan, DDS).

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Keywords: Ledging & Blockage

Print Tag: Refer to original journal article
Brain abscesses can result from hematogenous spread of oral infections.

**Background**: Brain abscesses can be divided into 3 types: (1) Those resulting from trauma or surgery (10% to 20%); (2) infection from parameningeal foci, such as otogenic or paranasal (20% to 40%), and (3) hematogenous spread from a distant focus (20% to 30%). The cause remains unknown in 10% to 20% of the cases.

**Objective**: To take cultures from nontraumatic brain abscesses and compare them to oral infective sources for a bacterial match.

**Participants/Methods**: Subjects for this study were selected from the patient population of the Department of Neurosurgery in Basel, Switzerland. All patients with a post-admission diagnosis of nontraumatic brain abscesses were included. The differential diagnosis was made with history taking, clinical findings, MRI, and CTs. The diagnosis was confirmed by surgical evacuation of the brain abscess by neurosurgeons. Swabs were then taken for bacterial and fungal cultures. All patients were clinically assessed for oral foci of infection within the first 24 hours and after the brain abscess diagnosis. If abscesses were detected in the oral cavity, cultures were taken. A periodontal screening was carried out to identify probing depths of ≥3.5 mm. These pockets were also cultured.

**Results**: The patient's age ranged from 44 to 69 years. Admitting signs and symptoms included headaches, fever, and meningismus. Examination of other areas revealed distant abscesses in 3 cases, a lung abscess, liver abscess, and necrotized esophageal carcinoma. Oral examinations revealed an additional 3 oral abscesses. The periodontal examination showed 1 patient with pockets of >3.5 mm on all teeth, but no focal abscess. All remaining 10 subjects had multiple areas of pockets >3.5 mm and areas of bleeding. Of the 11 patients, 9, who were treated surgically, showed cultures of the *Streptococcus milleri* group in 5 cases and periodontitis-associated flora in 4 cases. The remaining 2 showed blood cultures of *Prevotella* and *Veillonella*. **Conclusion**: The bacterial match between oral infective sources and brain abscesses reflect the underestimation of oral infective sources in brain abscesses in a retrospective analysis. This needs to be verified in a future study using DNA analysis of the bacterial samples. Bacterial cultures of oral infective sources might be useful for determining whether or not the brain abscess can be clinically assigned to an oral origin.

**Reviewer's Comments**: Bacterial colonies undergo fast recombination and are rarely monoclonal. Hence to identify definitively a brain abscess organism with an oral origin would require DNA testing, which is very expensive and beyond the scope of this study. However, there is enough evidence here to make us beware of yet another implication of the impact of oral health on the distant organs that it shares a blood supply with. (Reviewer-Ryaz Ansari, DDS).

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Keywords: Nontraumatic Brain Abscesses

Print Tag: Refer to original journal article
Ten percent to 30% of the population has dentinal hypersensitivity.

**Background:** Dentinal hypersensitivity is defined as an exaggerated response when exposed dentin is contacted with thermal, tactile, osmotic, or chemical stimuli. Depending on the intensity, the hypersensitivity can affect the patients eating, drinking, and breathing and hinder one’s ability to brush their teeth and maintain oral hygiene. Among reported cases of dental emergencies, dentinal pain is considered the most frequent complaint.

**Objective:** Among the theories that have been proposed to explain the mechanism of dentinal hypersensitivity, the hydrodynamic theory is considered the most widely accepted explanation. This theory states that dentin exposure to the oral environment and the patency of the dentinal tubules are the main factors associated with dentinal hypersensitivity.

**Results:** Dentin exposure typically results from enamel loss due to erosion, abrasion, abfraction, or exposure of the root surface due to gingival recession. Some clinical studies have reported that the placebo effect influences how dentinal hypersensitivity is treated. This effect is a complex physiological and psychological interaction that depends to a large extent on the relationship between the patient and the dental professional. A positive mental attitude toward treatment may activate the central system’s pain inhibition, which controls the painful stimulus of the periphery by releasing endorphins. Trust in one's dentist and a desire for relief both contribute to this effect. Clinical studies evaluating different desensitizing agents noted that saliva could dissolve and carry the desensitizing agents to adjacent teeth, causing the desensitization of nontreated teeth known as the carryover effect.

**Conclusions:** Dentinal hypersensitivity is a complex condition with a multifactorial etiology. The literature is filled with many treatment modalities ranging from simple procedures that can be performed by the patient to complex procedures that involve combination therapy that need to be performed by dental professionals. To effectively treat dentinal hypersensitivity, dentists must be aware of the available desensitizing treatments and what products are available as well as the factors involved in dentinal hypersensitivity.

**Reviewer's Comments:** The majority of our patients will present with dentinal hypersensitivity either of an acute nature or as a chronic problem, and we need to know how to address this, as it can easily improve the quality of the patients’ lives. (Reviewer-Gregori M. Kurtzman, MD).

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Salivary calculi should always be considered in patients with floor of the mouth symptoms.

Sialoliths are hard calcifications or calculi that accumulate in the ducts and parenchyma of salivary glands. Nuclei that cause accumulation include bacteria colonies, epithelial cells that are exfoliated, mucus plugs, and bits of foreign bodies. Most sialoliths (80% to 90%) occur in the submandibular gland, while approximately 10% to 20% are seen in the parotid gland, and only 1% is found in the sublingual gland. Most stones are solitary. Multiple sialoliths do occur and these are mostly found in the parotid (32%) and less so in the submandibular gland (22%). There can be a prodromal period of 6 months to 30 years. The submandibular gland has a copious flow of saliva, and its relatively large duct can tolerate a stone without it interfering with its function. A total obstruction of the duct can be an emergency situation where the gland and duct is swollen and there can be a super-infection that may be life-threatening due to airway compromise in the submandibular space. Sialoliths are usually <1 cm in diameter. This dysfunction can result in bacterial colonization and infection as well as atrophy of the gland. Effects on the gland depend on the location of the calculus in the duct, how long it has been there, and the back pressure produced by the blockage. There is an exchange of calcium and phosphate ions in saliva. When there is an alkaline pH, then there is a favorable condition for precipitation of calcium phosphate dihydrate in the salivary duct. Plain film radiographs can detect around 95% of salivary stones, although, as many as 20% may not be seen because of a low mineral content. CT scans are especially useful when there are multiple stones or stones in the body of the gland. Some salivary calculi originate in the hilus of a gland and tend to be oval, but may become very large and produce dramatic patient symptoms.

Treatment for sialoliths can be conservative when they are small. Moist heat, increased hydration intake, sialogogues, and self massaging of the area by the patient to encourage passing of the stone can be successful in relieving the situation. A large calculus will require surgical intervention. Sialoliths located in the gland itself probably require complete removal of the gland.

**Reviewer's Comments:** If the stone is <4 mm, a scope removal can be done. When the stones are ≥4 mm, laser lithotripsy may be successful treatment. Caution must be observed to not allow the stone as a whole or as fragments to migrate proximally into the gland where significant scarring may occur. Salivary calculi should always be considered in patients with floor of the mouth symptoms. (Reviewer-Dennis Flanagan, DDS).

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Keywords: Sialoliths

Print Tag: Refer to original journal article
Alveolar bone is strengthened by induced strains caused by increased forces applied.

**Background:** Alveolar bone contains the teeth and is an important factor in orthodontic movement and implant placement. Bone, when it is inadequate, inhibits orthodontic and implant treatment. Inadequate available bone can result in tooth and implant dehiscences and tooth root resorption during orthodontic movement. Animal research has shown that bite force can influence alveolar bone. Bone mass, dimensions, apposition, and formation are bone parameters affected by masticatory force. Thicker masseter muscles and the number of posterior teeth can cause an increased alveolar bone mass and thickness. An indication of bite function is the maximum bite force. Maximum bite force is easily measured and affects the microscopic anatomy and physiology in the form of strains in alveolar bone. Increased strains leads to bone hypertrophy and turnover.

**Objective:** To determine how alveolar bone thickness and arch width are affected by maximum bite force.

**Design/Participants:** Observational study of high-school students aged 12 to 14 years with an Angle Class I occlusion.

**Methods:** Maximum bite force was measured by a force sensing resistor device. A force sensor is placed between stainless steel plates encased in rubber. Calibration showed a 3.9% error. The load range was 200 to 1400 N. During testing, the dimension between incisors was 12 to 14 mm. Casts were made of all mandibular arches for measurement. Casts were made with alginate impression; however, alginate is not very accurate. Arch dimensions were made in various aspects.

**Results/Conclusions:** The results of 285 male and female students tested found that males were capable of a stronger bite force. Bite force did affect alveolar arch thickness but slightly affected (ie, 3%) arch width. A stronger bite force influenced alveolar bone thickness by 10% to 20%. Alveolar bone is strengthened by induced strains caused by the increased forces applied. Genetics and gender are also an influence of alveolar anatomical morphology. Typically, males are larger than females. Obese subjects were found to have larger jaws as compared to those with a normal body mass index. Forces that are of low magnitude but highly frequent cause an increase in bone mass. Chewing forces of high magnitude may be more likely to be responsible for an increase of alveolar bone thickness.

**Reviewer's Comments:** This study used casts made from alginate impressions for measuring mandibular arch dimensions. Firstly, alginate is not a very accurate material, hence casts will not be accurate. Secondly, gingival thickness was not measured. Gingival thickness can be from 1 to 4 mm thick, thus skewing anatomical measurements. (Reviewer-Dennis Flanagan, DDS).

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Keywords: Maximum Bite Force

Print Tag: Refer to original journal article
Core-design modification significantly improves the characteristic strength for porcelain fused to metal and for glass-infiltrated alumina (In-Ceram).

The strength of all-ceramic restorations has improved greatly over the last decade. Glass-infiltrated alumina (In-Ceram; ICA) has now shown what looks like sufficient strength to withstand the pounding to which posterior teeth are subjected. They have shown strength in the range of 320 MPa to 550 MPa for core structures of glass ceramic and glass-infiltrated alumina. In-Ceram, an aluminous ceramic, is one core material that is later veneered with feldspathic porcelain for esthetics. The authors fabricated 4 stainless-steel dies replicating a premolar tooth preparation. They conducted single-load failure (SLF) testing of porcelain-fused-to-metal (PFM) crowns with standard and modified core designs and ICA crowns with standard and modified core designs. Although clinical failures are believed to be the result of cumulative damage and slow crack growth, this study seems to provide some insight into the failure process. The fabrication of a more robust framework did provide additional strength to the restorations. Although PFM still remains the gold standard for strength, comparative to other prosthodontic core materials, design modifications proposed for ceramic or metal cores significantly affected the fracture resistance of restorations for both core types.

**Reviewer's Comments:** Dental clinicians are faced with many challenges and decisions on a daily basis in terms of materials and esthetics in many areas including prosthodontics. While some embrace change readily, others often sit back and wait until results have been proven through multiple studies. Some materials for crown fabrication have shown high failure rates. The simple design modification for PFM and ICA crowns has shown good improvement for SLT compared to the standard design and would be worthy of discussion with your provider of fixed prosthodontic services.  (Reviewer-Ralph J. Bozza, DDS).

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Keywords: Crown Failure & Framework Design

Print Tag: Refer to original journal article
The elevation of the maxillary sinus membrane alone without the addition of bone grafting material results in bone formation in the sinus.

**Background:** Implant placement in the maxillary sinus area is often problematic due to the ridge resorption and the pneumatization of the sinus, resulting in disuse atrophy or resorption following extraction.

**Methods:** The authors conducted a small study of 9 patients with the placement of 10 implants >4 mm in diameter (range, 4 to 6 mm) in the maxillary sinus, after the elevation of the maxillary sinus membrane, without placement of any additional bone-grafting materials. Four months after implant placement and sinus elevation, the sinus area was evaluated for bone gain via CT and dental radiographs. The mean vertical bone gain was 3.5 mm. The authors placed these implants when the residual bone height was 4 to 6 mm and when primary implant stability could be achieved in adults ranging in age from 47 to 66 years (mean age, 52 years). A vertical incision was placed on the buccal cortical plate about 8 mm away from the alveolar crest. A 5-mm round opening was made in the bone using a round bur, being careful to avoid membrane perforation and then carefully curetting the membrane free from the sinus wall to allow enough room to place the implant. Then the implant was placed flaplessly, allowing only enough opening for implant placement through the ridge crest. A cover screw was placed, and the ridge was sutured. Once coagulum was noted below the membrane, the vertical incision was sutured. Amoxicillin was given 1 hour before surgery and 2 days afterward, along with chlorhexidine 2 times daily for 2 weeks.

**Results:** 4 months after surgery, CT images revealed the presence of new endo-sinus bone with a mean gain of 3.5 mm.

**Reviewer's Comments:** The authors’ investigation into the actual process of bone formation in the maxillary sinus is quite interesting. Without the placement of grafting materials between the elevated sinus membrane and the wall of the maxillary sinus, they found that some bone augmentation occurs. Of course, the sample size was small, and we do not know the quality of the augmented bone. However, this may prove valuable for patients who are particularly fearful of graft materials, and the procedure can be done quite conservatively. Further investigation is warranted before we can use this technique and accept its results unquestioningly. (Reviewer-Ralph J. Bozza, DDS).

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Keywords: Bone Augmentation

Print Tag: Refer to original journal article
Immediate Loading of Implants in Full-Arch Edentulous Maxillae

Immediate Functional Loading of TiOblast Dental Implants in Full-Arch Edentulous Maxillae: A 3-Year Prospective Study.

Collaert B, De Bruyn H:


Provisionals that are reinforced and rigid prevent micro-movement of a newly placed implant. It is thought that, to prevent fibrous replacement, the implants cannot be allowed to move >100 microns.

**Background:** Since the advent of implant treatment, patients have been asking to decrease treatment time. Most patients would like immediate treatment results. When patients have full-arch treatment in the mandible, the bone density and the cross-arch stability imparted by the fixed prosthesis allows for immediate functional loading. The maxilla, however, is a different story. Maxillary bone is usually less dense and, therefore, is less able to support occlusal forces without the implants overloading the supporting bone. Immediately loading implants may improve the osseous characteristic outcome. The mandible is better suited for immediate loading. The surface of the tested implant is rated moderately rough and is expected to increase the bone-to-implant contact and subsequent increased surface area for osseous support. **Objective** To report the 3-year outcomes of immediately functionally loaded Astra Tech Dental implants in edentulous maxillae.

**Participants/Methods:** 25 patients received full-arch maxillary implants (TiOblast), primarily 13 to 15 mm, which were immediately functionally loaded. The immediate provisional fixed full-arch prostheses were made of a laboratory-processed acrylic reinforced with fiber acrylic mesh or a cast metal bar. This important feature dramatically increases the strength of the screw-retained prosthesis that minimizes fracture and, thus, undue overloading of the un-fractured portion supporting the implants. The provisionals were left in place for 6 months before the definitive prostheses were constructed.

**Results:** None of the implants were lost during this study. At 3 years, 86% of cases had <1.5 mm bone loss between baseline and 1 year.

**Conclusions:** "Immediate loading of a full-arch maxillary bridgework on...Astra Tech TiOblast implants is a predictable treatment option with 100% fixture survival and stable bone-to-implant contact up to 3 years."

**Reviewer’s Comments:** The cases studied here were in the maxilla where, generally, the osseous density is less than that in the mandible where immediate functional loading has been previously studied. In addition, the implants were very long. Most importantly, the provisionals were reinforced and rigid. This helps prevent micro-movement of the newly placed implant. It is thought that, to prevent fibrous replacement, the implants cannot be allowed to move >100 microns. This allows osseointegration to occur. (Reviewer-Dennis Flanagan, DDS).

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Keywords: Loading

Print Tag: Refer to original journal article
Abutment Connection Sealing Capability of Different Implant Systems

**In Vitro Evaluation of the Implant Abutment Connection Sealing Capability of Different Implant Systems.**

Coelho PG, Sudack P, et al:

J Oral Rehabil 2008; 35 (917-924):

If we can we absolutely seal the implant abutment connection, would it make a difference in successful implant treatment? Perhaps we should turn to an inter-connection cement.

**Background:** Implant treatment has been a successful modality and one that has relieved millions of patients from a lesser quality of life. Most implant systems are composed of a surgically placed implant fixture with an abutment that is screwed into the implant body. The abutment provides a purchase for fixed and removable prostheses and transfers occlusal forces to the supporting bone. The abutment is secured with a screw that is torqued into place and provides clamping forces to hold the 2 components together. Retaining screw failures are associated with misfits between the implant fixture and the abutment. This misfit becomes very apparent with cyclic loading, especially in single implant-supported crowns. A misfit promotes peri-implant inflammation. Previous research has shown that all screw-retained interfaces are bacterial leakers.

**Objective:** To determine the sealing capability of various implant systems by laboratory evaluation.

**Methods:** 3 different implant connection designs were tested with the dye toluidine blue.

**Results:** All implant interfaces showed an increase of leakage with time. Even a system that was advertised to have a superior abutment seal showed dramatic leakage.

**Conclusions:** Implant manufacturers have changed the design of the connections to address this problem because bone loss, prosthetic failures, and peri-implant inflammation are associated with connection misfit. Even the famous Morse taper has demonstrated leakage at the connection. Connection design and increased torque force do not seem to be able to prevent leakage of dye material in laboratory testing.

**Reviewer's Comments:** It appears that there are questions. Can we absolutely seal the implant abutment connection? If so, would it make a difference in successful implant treatment? Perhaps we should turn to an inter-connection cement. Such a cement would have to meet the obvious bio-compatibilities of conventional tooth-to-prosthetic cements. (Reviewer-Dennis Flanagan, DDS).

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Keywords: Abutment Connection Sealing

Print Tag: Refer to original journal article
Periodontal Debridement Methods

One-Stage Full-Mouth Disinfection Versus Quadrant and Full-Mouth Root Planing.

Swierkot K, Nonnenmacher CL, et al:

J Clin Periodontol 2009; 36 (240-249):

There has been some evidence that chlorhexidine inhibits healing that may be reflected in the inability to reduce pocket depths. Clinicians are concerned that full-mouth scaling and root planing may induce periodontal abscesses.

Background: Periodontal diseases are generally treated with removal or reduction of periodontal pathogenic bacteria and bacterial products. Periodontal bacteria are harbored in the tongue, mucosa, and tonsils and may promote continual reinfection even if the bacteria are routinely removed by scaling and root planing. In the past, there has been a debate as to the best sequence of initial treatment of the new periodontal patient. Chlorhexidine gluconate has not been shown to be an important dramatic adjunct to initial therapy when used either supra-gingivally or sub-gingivally. A 1-stage method of full-mouth disinfection may be an appropriate therapy. Two appointments on 2 consecutive days are used to scale and root plane patients. Long-term studies demonstrated promising results with this method. Another method in which quadrants are debrided is a conventional treatment.

Objective: To determine if 1-stage full-mouth scaling and root planing with and without chlorhexidine is better than quadrant scaling and root planing.

Participants/Methods: 25 patients were in the study, and the 3 methods were tested. Several patients were excluded for various reasons, which is unfortunately typical for clinical studies.

Results/Conclusions: There were positive outcomes for all 3 methods. All 3 groups of patients had improvements. However, at the 1- to 2-month interval, the full-mouth group without chlorhexidine had a higher reduction in periodontal pocket depth. After 8 months, all 3 methods had the same results.

Reviewer's Comments: There has been some evidence that chlorhexidine inhibits healing that may be reflected in the inability to reduce pocket depths as shown in this study. Also, many clinicians are concerned that full-mouth scaling and root planing may have an induction of periodontal abscesses subsequent to treatment in which small areas of debris and bacteria are inadvertently missed. The gingival margin may form an attachment with the root surface and entrap the left-behind bacteria, thus forming an abscess. (Reviewer-Dennis Flanagan, DDS).

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Keywords: Periodontal Diseases

Print Tag: Refer to original journal article
In patients with severe posterior tooth wear and minimal anterior tooth wear, it is usually not indicated to open the bite as a means of providing more interocclusal space for restorative materials.

**Background:** Patients who have significant posterior occlusal wear with minimal or no anterior wear present a significant treatment challenge. One part of this challenge is to accurately diagnose the cause of the posterior tooth wear and the second part is to develop an appropriate treatment plan for it.

**Objective:** To describe the diagnosis and treatment of patients who present with severe wear on the posterior teeth with minimal wear on the anterior teeth. **Discussion:** In this article, Dr Spear emphasizes the importance of diagnosing the cause of the posterior tooth wear, which can be a result of attrition, an anterior open bite, a flat condylar imminence, or acid erosion. Acid erosion can be intrinsic, resulting from such conditions as acid reflux or bulimia, or extrinsic resulting from the ingestion of acidic drinks or mulling on the pulp of citrus fruits. The different causes of acid erosion present very different tooth wear patterns which can be used to diagnose the cause. When there is significant occlusal wear on the posterior teeth, these teeth passively erupt and result in vertically short crowns with very little interocclusal space for restorative materials. Restorative dentists often believe that the treatment of this condition should result in increasing the vertical dimension, which is inappropriate because the vertical dimension is being established by the anterior teeth. Crown lengthening and surgical impaction of the posterior segments has been used to treat this condition; however, both of these treatment modalities can have significant negative side effects. Dr Spear believes that the use of temporary anchorage devices (TADs) provide an excellent means of intruding the posterior teeth to gain interocclusal restorative space in a way that has few negative side effects.

**Conclusions:** Patients with severe wear on the posterior teeth present a significant diagnostic and treatment challenge for the restorative dentist.

**Reviewer’s Comments:** This was an excellent article. If you have a patient who presents with severe wear on the posterior teeth with minimal wear on the anterior teeth, I would strongly suggest that you read this article in its entirety. I found it very interesting that the use of TADs to intrude the posterior teeth may present the best way of treating patients with this condition with minimal negative side effects when compared to crown lengthening or orthognathic surgical procedures. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Severe Posterior Tooth Wear

Print Tag: Refer to original journal article
Most information on the Internet about cleft lip and palate comes from U.S.-based sources that are most often hospitals or universities. The mention of orthodontics as an integral part of the cleft treatment process is limited.

**Background:** Parents and families increasingly get information about medical issues from the Internet. However, the quality of information about cleft conditions that is easily accessible on the Internet is unknown. **Objective:** To investigate the quality of information on the Internet regarding cleft conditions easily accessible from 3 different search engines. **Methods:** General cleft-related search terms were entered into 3 popular Internet search engines. The first 25 listings from each search were included and duplicates and irrelevant sites discarded. Forty-nine sites remained that were assessed for origin, referencing, links, advertising, orthodontic content, illustrations, up-to-date content, and readability. The resulting information was summarized and generalizations were made. **Results:** Most websites (92%) were U.S. based and 45% originated in universities or hospitals. Most sites were not cleft specific, but rather the information was just part of a larger set of health information. Most sites had links for additional information and <10% included advertising. There was very limited information about the role orthodontics plays in the treatment of cleft conditions on most of the sites. More than 50% of the websites included some illustrations, and most information was up to date. The general readability was at the 9th-grade level, although it varied considerably. **Conclusions:** There is a variety of cleft-related information easily available for families on the Internet. This information is of varying depth and quality and generally gives little information about orthodontic involvement in the treatment process. **Reviewer's Comments:** I was actually surprised that the information easily available on the Internet was as good as it was. I believe this may be because of the general non-commercial characteristic of cleft treatment. When I do a similar search on “orthodontics” and ”family information,” I get mostly individual practice websites and a few commercial sites. The American Association of Orthodontists’ public website with consumer information came up number 11. The relevance and quality of information that our patients get via the internet will continue to be an important issue for our profession. (Reviewer-Brent E. Larson, DDS, MS).

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Keywords: Cleft Lip & Palate

Print Tag: Refer to original journal article
Practical Ways to Adjust to Downturn in Economy

Thriving in the Current Economy.
Levin RP:

J Am Dent Assoc 2008; 139 (December): 1683-1684

In a poor economy, it is important not to reduce expenditures for critical areas such as communication and patient service.

**Objective:** The purpose of this guest presentation article was to suggest ways for dental professionals to adjust to the current downturn in the economy. **Discussion:** Dr Levin suggests that it is important to see new patients as soon as possible after they contact your office. It is also important to closely monitor accounts receivable. Patients who are notified of a delinquent payment as soon as it occurs are less likely to develop long-term overdue balances. Closely monitoring accounts receivable does not mean you cannot make payment adjustments for patients who are experiencing significant financial difficulties. It simply means that whatever arrangements are made for payments must be monitored closely. If you are making staffing cutbacks in your office, it is critical not to make reductions in the areas that affect patient communication and service. Making cuts in these areas can result in a financial impact on your practice. The cutback in patient service and marketing areas of your practice can take a long time to recover from once they are reduced. Tough economic times can also provide the incentive to closely evaluate the efficiency of your practice and make appropriate changes.

**Conclusions:** Poor economic times can provide the incentive to closely evaluate the efficiency of your practice and make appropriate changes.

**Reviewer's Comments:** I found this to be a very practical article. In difficult financial times, it is easy to make changes that address the short-term needs of the practice as opposed to maintaining services that positively affect the long-term needs. Based on the many articles I have read, the best thing you can do in difficult economic times is to maintain the quality of your treatment. (Reviewer-John S. Casko, DDS, MS, PhD).

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Keywords: Economy

Print Tag: Refer to original journal article
Objective: To determine the success rates of secondary root canal treatment (retreatment) and to assess the effect of clinical factors on outcomes of retreatment.

Design: Systematic review and meta-analysis.

Methods: The authors identified 40 papers of which 17 studies met the inclusion criteria of their review; 12 of the investigations were retrospective and only 5 were prospective.

Results: The success rate for secondary root canal treatment varied over a range of 28% to 93%, with a pooled estimated success rate of 77%. A large number of study characteristics were assessed for the 17 studies that met the inclusion criteria for this review. The assessed characteristics included duration of follow-up after treatment, year of publication, geographic location of study, qualification of operators, and a variety of patient characteristics and operative factors. The presence of a preoperative periapical lesion, the apical extent of the root canal filling (short or ideal length was better than overly long root canal fillings), and the quality of the coronal restoration were the only factors that were prognostic for the outcomes of secondary root canal treatment.

Conclusions: Operators should focus on canal preparation, a well condensed root canal filling, and a well-sealed coronal restoration to obtain predictable secondary root canal outcomes.

Reviewer's Comments: We know that root canal therapy is not 100% successful. Despite the best efforts of dentists, some teeth will require endodontic retreatment. What may not be clear is what can be expected when retreatment is indicated and which factors are relevant in optimizing the chances of the success of that retreatment. The outcomes of endodontic retreatment or secondary root canal therapy and the factors that may determine success of secondary treatment are of interest to both dentists and their patients. Based on the evidence from this review, the authors suggested that the focus in root canal retreatment should be on canal preparation to obtain good access to the apical area, sufficient canal shaping to allow decontamination of infective material, and a well condensed root canal filling that does not extrude beyond the apex that is followed up with a well-sealed coronal restoration. This review demonstrated that there are no special tricks for successful retreatment of a failed root canal treated tooth. The goals are the same as those for successful initial treatment, access to the apex and decontamination followed by root and coronal fillings that seal the tooth from bacterial recontamination. (Reviewer-Michael J. Casas, DDS).

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Keywords: Secondary Root Canal Treatment

Print Tag: Refer to original journal article