SMART DENTAL UPDATES

Dear Doctor,
Greetings from Micro Labs Limited. We are happy to bring you **"SMART DENTAL UPDATES"** whichcontains latest and interesting news in the field of Dentistry.
This issue contains

- A Micro CT Evaluation of Dentinal Microcrack Formation after Root Canal Instrumentation
- Evaluation of Lip Bumper versus Schwarz Appliance for treatment of Lower Dental Arch Crowding
- A case report of Papilliferous keratoameloblastoma

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Looking forward to your valuable feedback

Best Regards,
Medical Team, Micro Labs Limited

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A Micro CT Evaluation of Dentinal Microcrack Formation after Root Canal Instrumentation

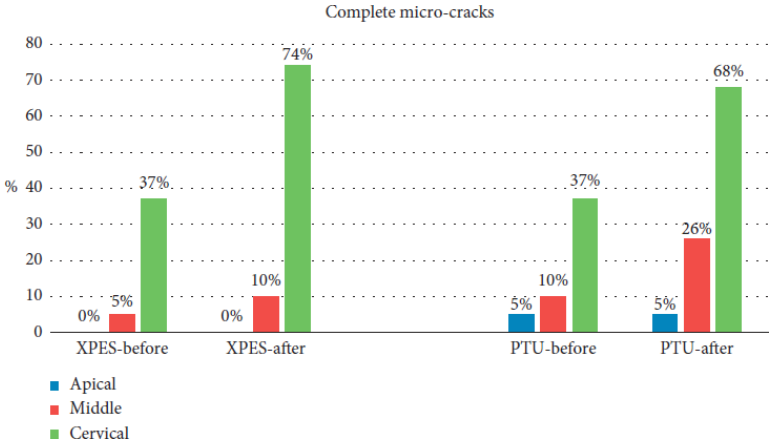
The ProTaper Universal (PTU) Ni–Ti rotary system is one of the most commonly used files. It is machined from conventional superelastic (SE) austenitic Ni-Ti wire. It features a variable taper over the entire cutting blade length with convex triangular cross sections. This file design can help clinicians properly instrument and flare canals with anatomical difficulties. However, PTU has been reported to be associated with a high incidence of microcrack formation.

There was no significant difference in the dentinal microcrack formation between XPES and PTU in the apical and cervical thirds of the root.

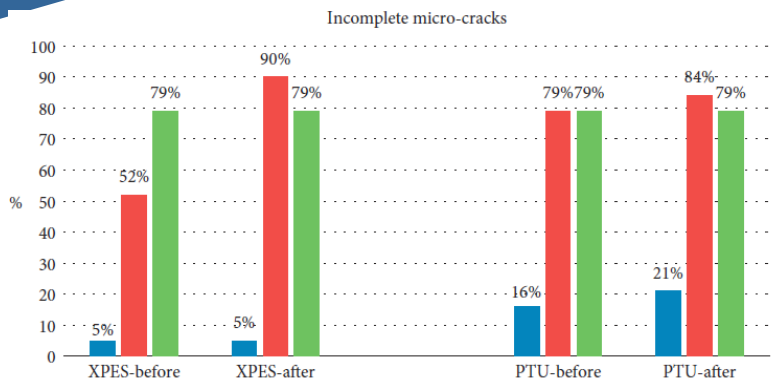
The XP-endo shaper (XPES) is made of MaxWire alloy, a martensite-austenite-electropolish thermomechanically treated NiTi alloy. This file will curve on exposure to body temperature, due to the phase transformation from the M-phase (martensitic state) to the A-phase (austenitic state). The manufacturer claims that the flexibility and pre-set shape enable the XPES to contract and expand within the canal itself and to reach areas that conventional files cannot access.

There is paucity of studies which have exposed the XPES files to body temperature during the instrumentation. Therefore, this study, evaluated dentinal microcrack formation on root canals instrumented, continuously in the body temperature, with the XP-endo shaper (XPES) and ProTaper Universal (PTU), by means of microcomputed tomographic (micro-CT) analysis.

Nineteen mesial roots with thirty-eight root canals were selected and included in this study (N = 38). Each root was mounted in clear acrylic block with a mark on the buccal side. This mark will assist the positioning of each sample in the same orientation for pre- and postinstrumentation micro-CT scan. The root canals (N = 38) were divided into 2 groups. Group 1 (n = 19): all MB canals were instrumented with XPES. Group 2 (n = 19): all ML canals were instrumented with PTU. All roots were scanned with micro-CT before and after instrumentation. Two precalibrated examiners evaluated the cross-sectional images of each sample with DataViewer program. The dentinal microcracks (complete and incomplete) were counted in each third of the root for the preinstrumentation and the postinstrumentation images.



A total of 17,430 cross sections were evaluated by two examiners. The inter-rater percentage agreement was excellent (90%). The percentages of complete microcracks in each group are illustrated in Figure 1, while the percentages of incomplete microcracks in each group are illustrated in Figure 2.



Most micro-CT images showed microcracks in the cervical and middle thirds before the instrumentation (52%–79% incomplete and 5%–37% complete microcracks). In general, the number of microcracks in the cervical and middle thirds increased after instrumentation (Figures 3).

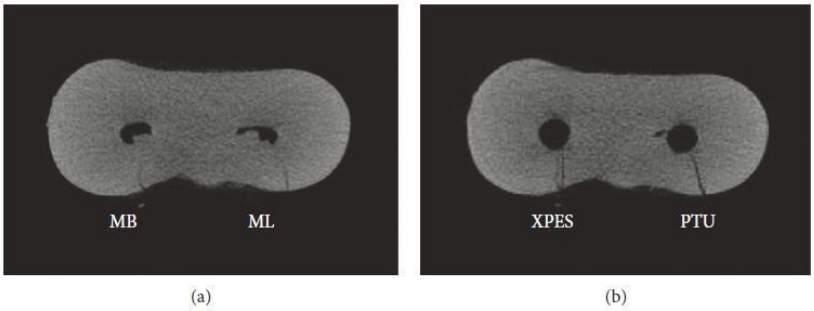


Figure 3: Micro-CT cross-sectional image of the cervical third of mandibular molar mesial root: (a) Preinstrumentation; (b) postinstrumentation.
The MB canal (left) instrumented with XPES and the ML canal (right) instrumented with PTU. The microcracks that appeared in the postinstrumentation image for both canals were the propagation of previous microcracks observed in the preinstrumentation image.

The number of complete micro cracks in the cervical third increased significantly ($P < 0.05$) after instrumentation in both XPES and PTU groups, while the number of incomplete micro cracks in the middle third increased significantly ($P < 0.05$) after instrumentation only in the XPES group. The apical third in all groups did not show any complete micro cracks and only a few incomplete micro cracks. There was no significant increase in the number of micro cracks in the apical third after instrumentation. There were no significant intergroup differences in the number of incomplete microcracks in the cervical and apical thirds. However, in the middle third, the XPES induced significantly more incomplete microcracks than PTU.

Source: Alkahtany SM et al. Intl J Dentistry. 2020 Apr. ID 4030194:1-6

Evaluation of Lip Bumper versus Schwarz Appliance for treatment of Lower Dental Arch Crowding

Dental malocclusions are one of the common complaints. In the last several decades, there has been constant debate between the two treatments of crowding: extracting teeth or dental arches expansion. A space-saving procedure in the lower arch in patients with mixed dentition is possible with devices that induce a remodelling of the alveolar bone, and an improvement of teeth inclination.

This procedure usually translates into an increase in arch perimeters and transverse dimensions of the lower dental arch. evaluate the dimensional variations of the mandibular arches in patients with mixed dentition affected by mild to moderate dental crowding, treated with two different types of orthodontic devices—the Lip bumper (LB), and the Schwarz appliance (SA).

Lip bumper and Schwarz appliance are both useful in reducing crowding in mixed dentition.

Pre- and post-treatment orthodontic records of twenty subjects (10 males and 10 females) were analyzed in the present study. Inclusion criteria were: first/second molar class malocclusion; crowding of the mandibular arch, from mild to moderate (4–6 mm); mixed dentition; age > 9 years at the beginning of the treatment; stage CS1 or CS2 of maturation of the cervical vertebrae analysis (CVM) at the beginning of the treatment. Ten subjects were treated with a lip bumper, and ten with the removable Schwarz appliance. The primary outcomes were the variations in dental crowding and arch dimensions from pre- to post-treatment.

Figure 1. Lip bumper appliance.

Figure 2. Schwarz appliance.

Both the two appliances caused a statistically significant mean improvement/reduction in crowding, of 3.5 mm and 2.9 mm, for the Schwarz appliance and lip bumper, respectively. The Schwarz appliance resulted more effective in increasing arch dimension at the inter canine level, and arch perimeter, while the lip bumper achieves a higher increase in arch length.

Table: Distribution of data before and after the orthodontic treatment, with statistically significant differences, and the interaction between time and treatment

	Pre					
ICD	2.01 ± 0.14	2.33 ± 0.1				
IPD	2.36 ± 0.1	2.8 ± 0.24	(0.44)			
IMD	3.14 ± 0.16	3.58 ± 0.23	(0.44) < 0.001 *			
AL	2.31 ± 0.19	2.26 ± 0.23	(−0.05) 0.057	2.42 ± 0.1		
AP	7.25 ± 0.42	7.61 ± 0.46	(0.36) < 0.001 *	7.54 ± 0.22	7.2 ±	
CRO (mm)	−5.0 ± 2.1	−2.5 ± 2.4	(3.5) < 0.001 *	−4.6 ± 1.2	−1.7 ± 1.2	(2.9)

* Two-way ANOVA for repeated measures significant differences ($p < 0.05$). Interaction time#treatment; indicates that the treatments show different results over time.

Source: Quinzi V et al. Dent. J. 202. 8(34): 1-8. doi:10.3390/dj8020034

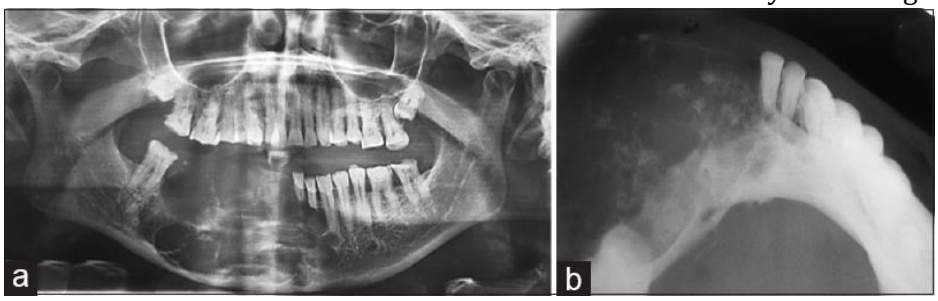
A case report of Papilliferous keratoameloblastoma

Ameloblastomas are one of the common odontogenic tumor. A 71-year-old male patient reported with a chief complaint of swelling and pain in the right side of the lower jaw present for 12 weeks. Past dental history revealed that the patient had undergone extraction of the mandibular right premolar 6 months ago due to deep caries and following that swelling had appeared in the same region.

On extraoral examination, the swelling was present from the lower jaw midline to the right side body of the mandible, measuring approximately 3 cm × 2 cm in size. The swelling extends from the midline to 1 cm anterior to the angle of the mandible on the right side anterio–posteriorly. The swelling extends from the angle of the mouth to the line joining the tragus of the ear to the lower border of the mandible superio–inferiorly. The skin over the swelling appeared normal with no secondary changes. On palpation, the lesion was nontender, was firm in consistency and was noncompressible, and there was no local rise in temperature.

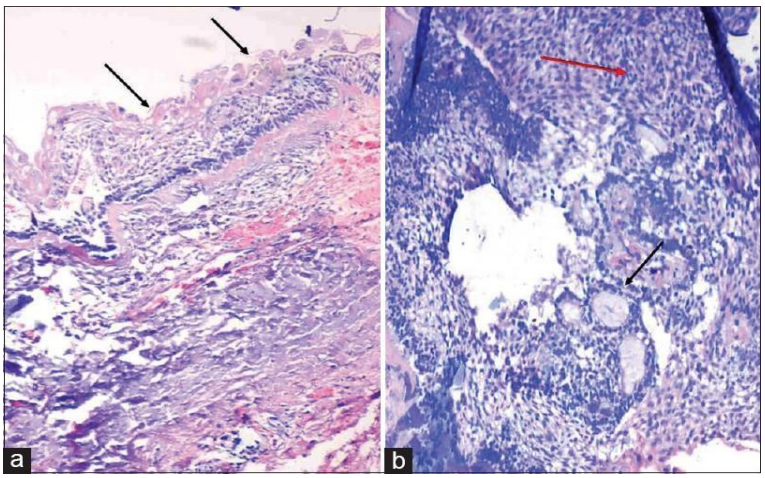
Intra-orally, a diffuse swelling was present on the edentulous alveolar ridge extending from the distal aspect of 31 to the mesial aspect of 47 measuring approximately 3.5 cm × 2.5 cm. The swelling extended from the lingual vestibule to the labial vestibule anterio–posteriorly. The mucosa over the swelling appeared partly erythematous and partly bluish hue, and the surrounding mucosa appeared normal

Panoramic examination revealed a multilocular radiolucency extending from 33 to 46 region, with intact lower border of the mandible with root resortion of 31 and 32. Occlusal radiograph showed buccal cortical expansion with internal multilocular radiolucency. Based on clinical and radiographic features, a differential diagnosis of odontogenic keratocyst (OKC), ameloblastoma and congenital gingival granular cell tumor was made, with a provisional diagnosis of ameloblastoma.



Microscopically, the lesion shows cystic lining, with basal columnar cells showing nuclear reverse polarity and cytoplasmic vacuolization, and basilar hyperplasia with hyperchromatic nuclei are seen in few areas. The overlying layer of the epithelium resembles stellate reticulum, with the surface epithelial cells demonstrating ghost cells. Focal epithelial lining shows luminal proliferation consisting of nodule of odontogenic epithelium showing rosette formation and pseudo glandular structures.

Subepithelial hyalinization areas with multinucleate giant cells are evident with mature connective tissue. Based on these features, calcifying odontogenic cyst (COC) with adenomatoid odontogenic tumor (AOT) was suspected.



After that, the patient was referred to the oral surgery department for complete excision of the lesion. Excisional biopsy was sent to the department, where the representative tissue was grossed, processed, sectioned and stained with H&E.

Microscopically, the lesion was un-encapsulated consisting of solid tumor islands and multiple cystic spaces of variable size lined by a thin stratified epithelium separated by narrow bands of fibrous connective tissue. Under ×40, the cystic spaces were lined by a keratinized stratified squamous epithelium which is made up of 4–5 cells in thickness, consisting of polygonal cells with distinct cell outline and abundant eosinophilic cytoplasm with focal papillary projection into the lumen. Surface cells of the cystic lining showed loss of intercellular adherence, resulting in desquamation, and individual cell keratinization with faint nuclear outline.

Ameloblastomas are highly polymorphic, benign odontogenic tumors, giving rise to many histologic variants.

Papillary projections extending into the lumen and connective tissue were made up of 2–3 layers of cells made up of low columnar cells with sparse central cells. These papillary projections arising from the cystic lining are interconnected, giving a plexiform appearance. Odontogenic islands are lined peripherally by tall columnar cells with hyperchromatic nucleus, showing reverse polarity, and subnuclear vacuolization and center angular cells resembling stellate reticulum are seen. Many islands showed squamous metaplasia with keratin pearl formation, and even focal areas showed plexiform variant. Correlating histopathological features, a definitive diagnosis of PKA was made.

Source: Kuberappa et al. J Oral Maxillofac Pathol. 2020 Feb;24(Suppl 1):S2-S6