in the fracture resistance between the non pin-retained e.max press restorations and the pin-retained e.max press restorations (Fig. 11). An unpaired t-test result using P < .05 was P = .4443 in this assessment. Data were obtained by using an analysis of variance (ANOVA). Significant differences were set at a 0.05 level (Fig. 11).

Discussion

There was no statistical difference between the control group (non-pin-retained restorations) and the test group (pin-retained restorations) in fracture resistance. The results indicated that the test group exhibited greater variability. This could be due to pin location, pin length, differences in pin angulations or variations in the widths of the onlay preparation margins. The highest fracture resistance value was a pin-retained e.max onlay, which could be related to the increased surface area and subsequent bond strength. Pin-retained e.max onlays had a tendency to fracture in a very controlled manner, with much of the tooth restoration complex remaining intact. Conversely, non-pin-retained e.max onlays typically fractured in such a violent manner that the tooth restoration complex was destroyed.

Due to the degree of variability, further laboratory testing would be warranted with a larger sample size. A clinical investigation, highlighting the procedural aspects, would also be an ideal extension of the research. Further studies should isolate variables and establish a greater sample size. With advances in technology, the digital workflow of records, design and output could be easily implemented for pin-retained restorations. It has been previously shown that digital impressions have the ability to capture all aspects of a pin-occluded substructures (Fig. 12). It has also been demonstrated that CAD/CAM technology has the precision and accuracy to mill (Fig. 13) the subsequent pin-bored restoration from an e.max CAD block. A digital approach seems to represent a simple and predictable chairside alternative for the clinician.

Conclusions

This study explored combining retentive titanium pins with indirect e.max press onlay restorations in extracted human molar teeth. Teeth were then subjected to axial loading in a universal loading machine. There was no statistical difference in fracture resistance between the two groups. However, the highest fracture resistance was displayed from a pin-retained e.max onlay. This may be related to the increased surface area and subsequent bond strength. Observationally, pin-retained e.max onlays fractured in a manner that seemed more controlled than non-pin-retained e.max onlays.

Digital dentistry could simplify the potential alternative by providing the clinician with the tools required to acquire the digital impression, design and fabricate the final restoration. Although pin-retained was termed for the investigative restorations, perhaps pin-reinforced would seem more logical. Further investigations are required to substantiate the research and identify whether this approach may be considered as a clinical alternative.

Conflict of Interest

Research was supported by the Schuchardt Dentistry Summer Research Project and by Research Driven Inc. Les Kalman is the co-owner and President of Research Driven Inc.

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XP-endo® Shaper - 3D-Shaping - Clinical Cases

By FKG

The XP-endo® Shaper is the latest instrument of the FKG’s range of 3D instruments. It is the epitome of what incremental innovation can create for modern dentistry. It features the combination of a dual technology and a unique expertise.

Firstly, the exclusive MaxWire® allows the instrument with an exceptional flexibility and an extreme resistance to cyclic fatigue. It allows the XP-endo® Shaper to shape and to progress inside the root canal with agility, whilst expanding and contracting its shape, adapting itself to the specific morphology of each canal.

In addition, the Booster Tip, thanks to its six cutting edges, guides the instrument easily toward the apical terminus and enables to start the shaping at an ISO diameter of 1.5, then gradually to increase its working scope to reach an ISO diameter 90.

CLINICAL CASE n°1

Pulpectomy on a first upper right molar A 60 years-old caucasian female presented a symptomatic pulпитis on tooth 16.

After a glide path of 15/02 with a hand file, the canals were shaped using a Gutta Percha 01/04. Finally, the canals were obturated with TotalFill® BC Points™ and TotalFill® BC Sealer™.

Conclusions

This study explored combining retentive titanium pins with indirect e.max press onlay restorations in extracted human molar teeth. Teeth were then subjected to axial loading in a universal loading machine. There was no statistical difference in fracture resistance between the two groups. However, the highest fracture resistance was displayed from a pin-retained e.max onlay. This may be related to the increased surface area and subsequent bond strength. Observationally, pin-retained e.max onlays fractured in a manner that seemed more controlled than non-pin-retained e.max onlays.

Digital dentistry could simplify this potential alternative by providing the clinician with the tools required to acquire the digital impression, design and fabricate the final restoration. Although pin-retained was termed for the investigative restorations, perhaps pin-reinforced would seem more logical. Further investigations are required to substantiate the research and identify whether this approach may be considered as a clinical alternative.
CLINICAL CASE n°2
Treatment (ex-vivo) of a first upper right premolar.
Endodontic treatment of a first upper right premolar (Tooth 14), extracted for orthodontic reasons. The aim of this procedure was to assess the ability of XP-endo® Shaper to instrument irregularities of the canal system and prepare it for the filling.

After preparing a glide path to 20/.02, the canals were shaped thanks to the XP-endo® Shaper to the desired final size 30/.04. The XP-endo® Shaper could get to canal irregularities, and maintained the original shape of the canal.

Finally, the canals were obturated with TotalFill® BC Points™ and TotalFill® BC Sealer™.

CLINICAL CASE n°3
A 42 years-old caucasian male presented a symptomatic pulpitis.

After preparing a glide path to 20/.02, the mesial canals were shaped thanks to the XP-endo® Shaper to the final size 30/.04. The distal canals initially larger than the mesial canals were also shaped with the XP-endo® Shaper creating a space to adapt a size 40/04 TotalFill® BC points™.

After shaping, disinfection was completed with the XP-endo® Finisher for all canals. The obturation was carried out with TotalFill® BC points™ and TotalFill® BC sealer™.

These technical advantages combined with high-speed continuous rotation and minimum torque, minimise the stresses exerted onto the canal walls and prevent debris compaction in the dentinal tubules, they also promote the creation of micro-debris which can be easily eliminated thanks to the turbulence generated by the instrument. It provides the patient with a non-aggressive, conservative treatment.

This instrument is an amazing new single file system from FKG. It allows faster treatment in the majority of the root canals. With its enhanced flexibility compared to instruments of the same size and its high cyclic fatigue resistance, shaping becomes a simple, safe and quick process.

This high-tech instrument helps the dentists to perform their procedures with reproducible success.