

Iatrogenic fracture of a lithium disilicate crown during cementation



Matthias Karl PD Dr. med.dent., Nina Moore Dr. med. dent.
Zahnklinik 2, Zahnärztliche Prothetik, Friedrich-Alexander-Universität Erlangen-Nürnberg

Purpose

Lithium disilicate ceramic is frequently used for the fabrication of all-ceramic restorations and shows promising long-term results. For the successful use of all-ceramic systems, manufacturer specific guidelines with respect to processing, design and cementation have to be followed.

Materials and Methods

Following chamfer preparation of a maxillary left second molar, a single crown was manufactured from lithium disilicate ceramic. This crown fractured during cementation using self-adhesive cement. Fractographic analysis of the fracture surfaces was subsequently performed using a scanning electron microscope.

Results

At the fracture origin, the overall thickness of the crown was only 0.4 mm. A small radius of curvature, potentially carried out manual adjustment as well as porosities in the glaze all occurring in that area may have promoted the fracture.

Conclusions

Strictly observing material-specific preparation guidelines seems to be a prerequisite for successful all-ceramic restorations. Frequently advocated minimally-invasive restorations with reduced material thickness require adhesive cementation prior to loading.

References

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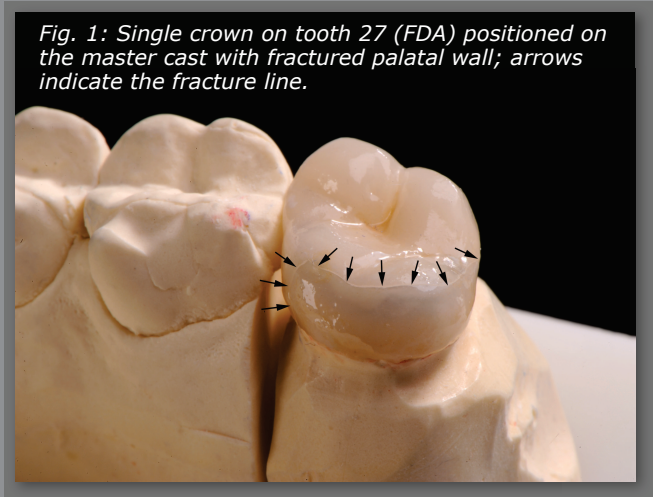
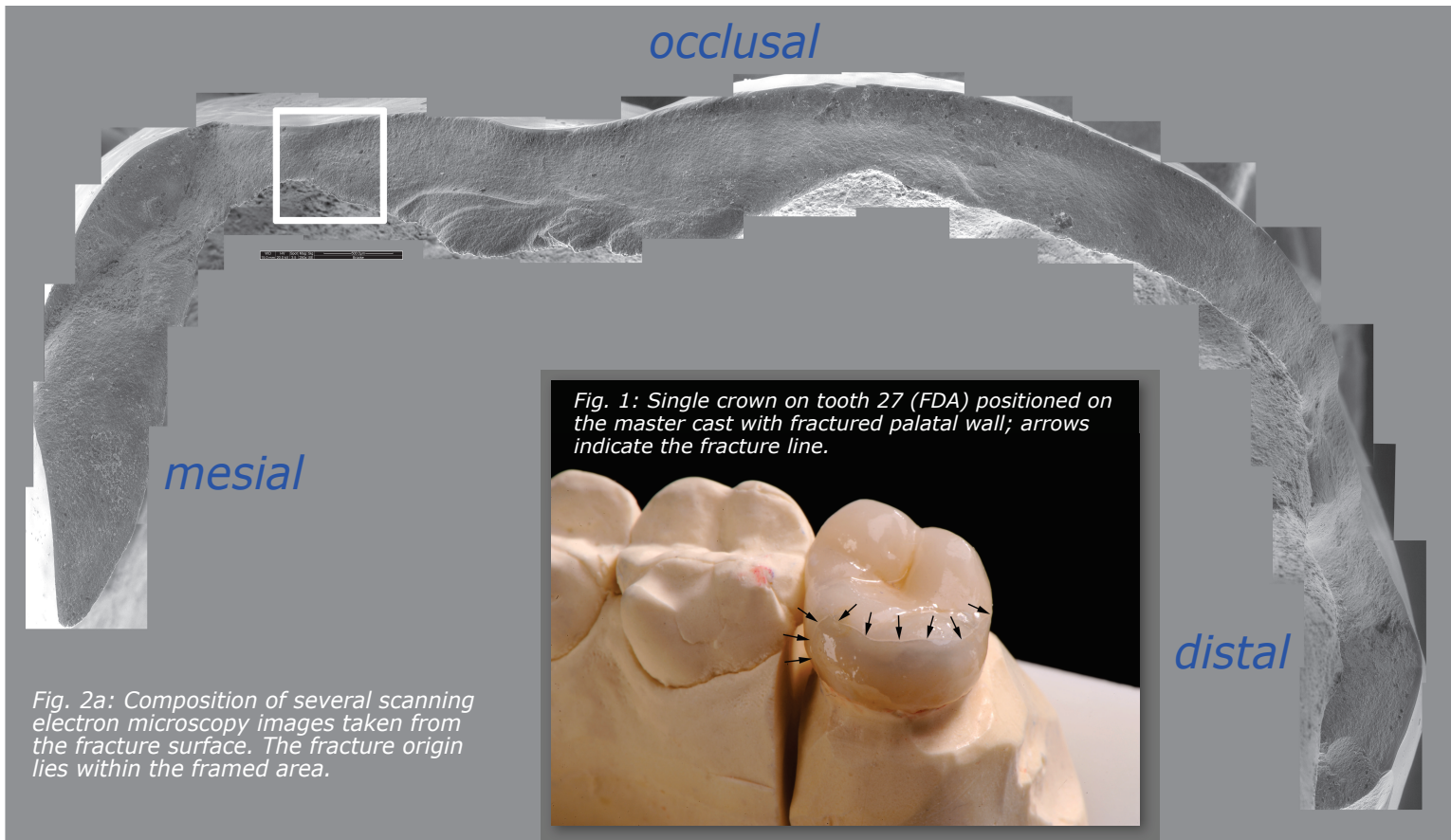


Fig. 2a: Composition of several scanning electron microscopy images taken from the fracture surface. The fracture origin lies within the framed area.

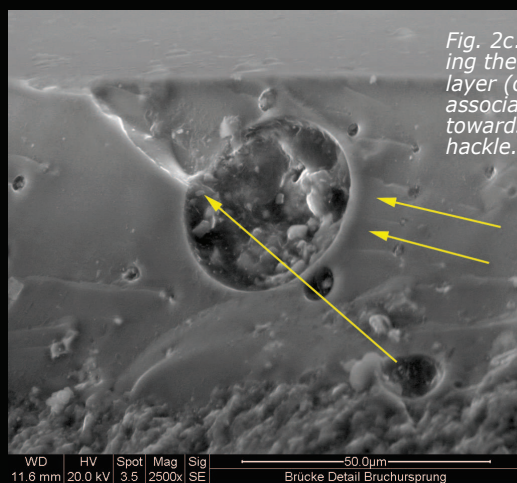
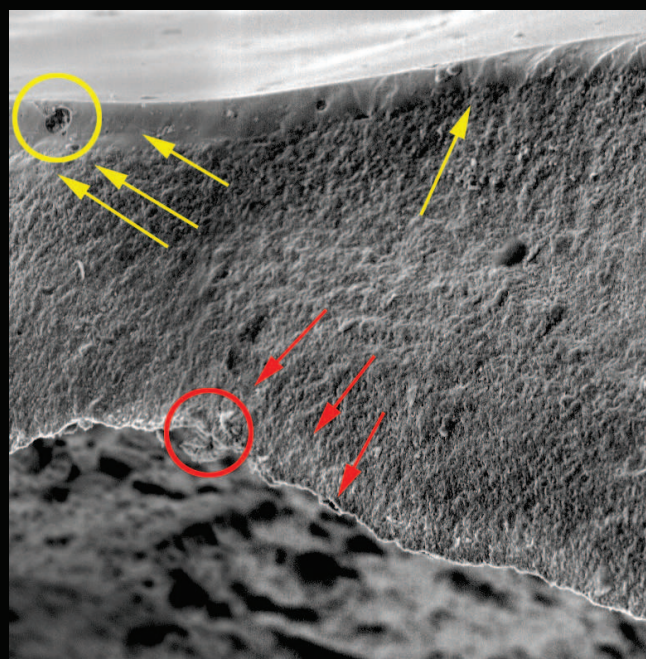


Fig. 2c: High resolution image showing the porosities within the glaze layer (cf. Fig. 2b). The small porosities associated with (in this case) a line towards the left side are called wake hackle.

Fig. 2b: Higher resolution image showing the fracture origin. Starting from porosities within the glaze layer, wake hackle (yellow arrows) can be seen indicating a direction of crack propagation towards the occlusal surface. The circled region at the inner crown surface depicts an area of irregularities showing twist hackle (red arrows) indicating a direction of crack propagation towards the lumen of the crown.