Fracture resistence of monolithic lithium disilicate ceramic crowns with different thicknesses

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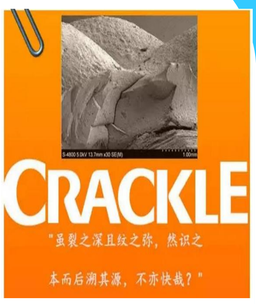
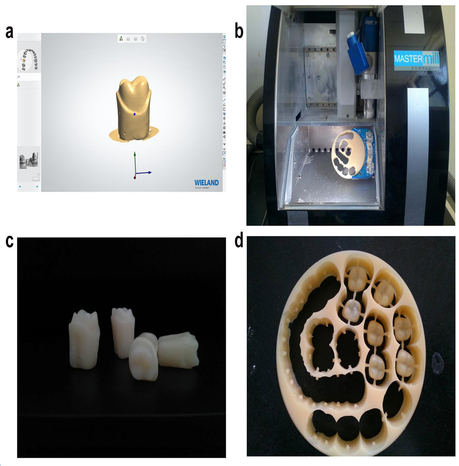
Objective: To Evaluate the fracture resistance of two types of lithium disilicate ceramic crowns with different thicknesses
Methods: Eighty anatomical molar ceramic crowns with different thicknesses (0.5,0.8,1.0,1.2 and 1.5mm; n=8 for each thickness) were fabricated from IPS e.max Press (EMAX) and an experimental lithium disilicate ceramic(ELDC).All crowns were luted on PMMA abutments and subjected to compression loading until fracture .Fracture load (F(u)) value and fractographic analysis were performed by SEM to determine the fracture modes of the failed specimens.

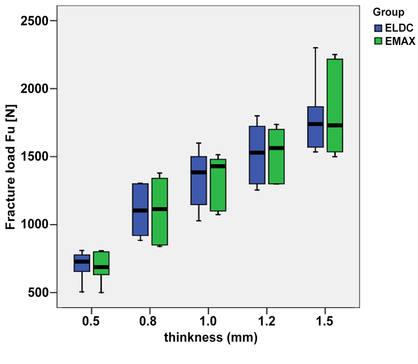


Results: The fracture load (Fu) values of the EMAX crowns at different thickness ranged from 685~1827N, and those of the ELDC ceramic from 700~1791N. There was no statistically different between ELDC and EMAX at the same thickness. There was an increase tendency of the fracture load (Fu) values with an increase in thickness.
Conclusion: Thickness played an important role in determining the fracture resistance of monolithic lithium disilicate ceramic crows and an thickness rage from 1.0 to 1.2mm was recommended for EMAX and ELDC

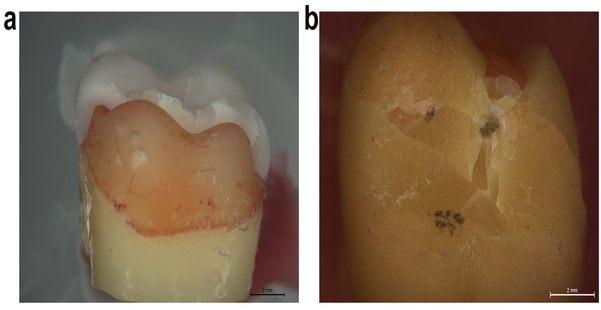
Key words: Monolithic crowns lithium disilicate ceramic Fracture load Thickness



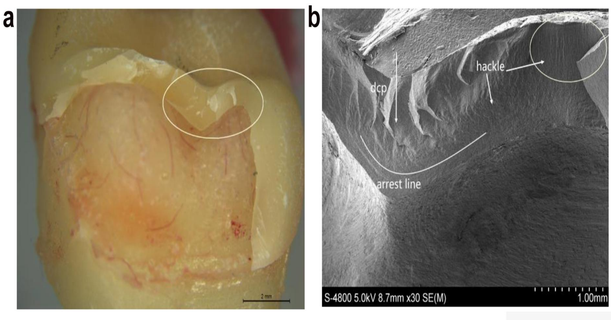
Preparation of the PMMA abutments and crowns (a). Scanning of a prepared maxillary first molar (b), milling the dental resin disk, PMMA abutment tooth (c), and PMMA crowns with different thicknesses (d).



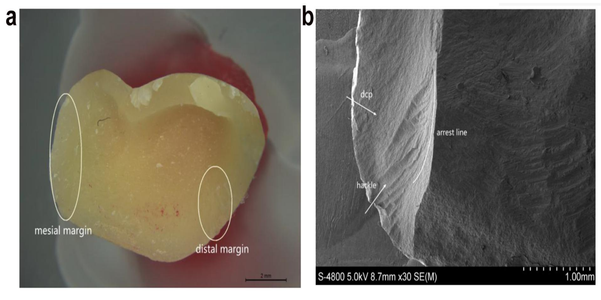
F(u) of ELDC and EMAX crowns with different crown thicknesses. (*) indicated a significant difference compared with 0.5 mm groups (P < 0.01). (#) indicated a significant difference compared with 0.8 mm groups (P < 0.01). (&) indicated a significant difference compared with 1.0 mm groups (P < 0.01).



The cracks propagated perpendicularly from the occlusal fissures downward to the inner surface, and the crack path extended along both the mesiodistal and buccal fissures.



(a) High magnification of area indicated by the white ellipse in the image (b).The hackle and arrest line on the occlusal surface confirmed the dcp on the fracture surface extending from top to bottom



(a).Additional hackles were found on both mesial and distal side of the broken surface (b). The arrest lines indicated that the crack hackle originated from the exterior and extended perpendicularly to the inner margin.