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Thickness and yttria percentage influences the fracture resistance of laminate veneer zirconia restorations

Abstract

Objectives: Mechanical properties are cardinal for the long - term clinical success of laminate veneer restorations but the selection of new restorative materials should ideally be based on clinical evidence, therefore, in vitro testing of dental materials is a good alternative to evaluate their properties and understand their behavior so this study aimed to compare and evaluate the effect of two different thicknesses and yttria percentage on the fracture resistance of laminate veneer zirconia restorations.

Materials and Methods: Forty laminate veneer restoration prepared from partial sintering zirconia of 3Y (yttria), 5Y (yttria), combined 3Y&5Y (yttria), and lithium disilicate. Specimens were assigned into four main groups according to their percentage of yttria content (n = 10) and subgrouped into two thicknesses (0.5mm thickness and 0.3mm thickness) (n = 5) as follows: Group I, II, III, and IV (Group I for lithium disilicate (control), Group II for 3Y zirconia, Group III for 5Y zirconia, and Group IV for combined 3Y&5Y zirconia), each of them subdivided according to their thickness into two subgroups (n = 5 for each one) and resistance to fracture for each restoration was evaluated using a universal testing machine. Data were analyzed using a one - way analysis of variance and Duncan's tests at a 5% level of significance.

Results: The thickness of laminate veneer restoration significantly affects the fracture resistance value of all type of laminate veneers restorations (fracture resistance mean value was highest for 0.5 mm thickness and lower for 0.3 mm thickness restorations) and yttria percentage significantly affect fracture resistance value of zirconia laminate veneer restorations (fracture resistance mean value was highest for 0.5 mm thickness of 3Y zirconia [865 N] and combined 3Y&5Y zirconia [846 N]).

Conclusions: Reducing the thickness of laminate zirconia veneer restorations to 0.3mm reduces its fracture resistance and increasing yttria percentage had an adverse effect on fracture resistance of zirconia laminate veneer restorations.