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 高橋純造¹ (阪大・歯・補綴I, ¹阪大・歯・理工)

Accuracy of full crowns fabricated by CAD/CAM using two different materials

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□INTRODUCTION□

When dental restorations are fabricated using CAD/CAM, the material is exposed not only to friction but also to cutting force from the milling. If the material is subjected to some force during the milling the accuracy of the restoration might be influenced by the flexural behavior of the material and its support size. Based on this point of view, the deflection behavior for different CAD/CAM materials was reported at the 35th meeting of the Japanese Society for Dental Materials and Devices. However, the effect of the deflection behavior on the accuracy has not been determined.

The purpose of the present study is to evaluate the accuracy of full crowns fabricated by CAD/CAM using two different materials such as composite and ceramic and to investigate the effect of the deflection behavior on the accuracy of the full crowns.

□MATERIALS AND METHODS□

16 stone die models were prepared from a silicone rubber impression taken from a metal mold which had a shape of conical frustum (taper: 1/10, diameter at 10mm below top: 10mm). For each of these models, a full crown was fabricated using a dental CAD/CAM system (Dental CAD/CAM GN-I, GC Corporation). To investigate the effects of material and support diameter on the accuracy of a full crown, two different materials (composite: GN-I composite block, GC Corporation ceramic: GN-I ceramic block, GC Corporation), and two support diameters (4mm and 6mm) were used to fabricate the crowns. The baseline for the margin of the crown was set at 6 mm below the top of the model. The distance between the baseline and the margin (marginal gap) was measured to evaluate the accuracy of the fabricated

crowns. Four replications were made for each combination of the material and support diameter. The data were analyzed for two main factors which were material and support diameter, using a two-way ANOVA and a Tukey's multiple comparison test.

□RESULTS AND DISCUSSION□

The result of a two-way ANOVA and Tukey's test showed that the ceramic crowns had significantly lower marginal gap than the composite crowns (Fig 1). This may be related to the difference in the deflection behavior between these two materials. Although the effect of the support diameter was not significant, the marginal gap of the composite crowns tended to decrease with the increase of the support diameter, which may also be related to the deflection of the material during machining.

In the present study the marginal gap was measured to evaluate the accuracy of the crown, but another parameter such as discrepancy between the die surfaces and inner surfaces of the crown should be measured in the future.

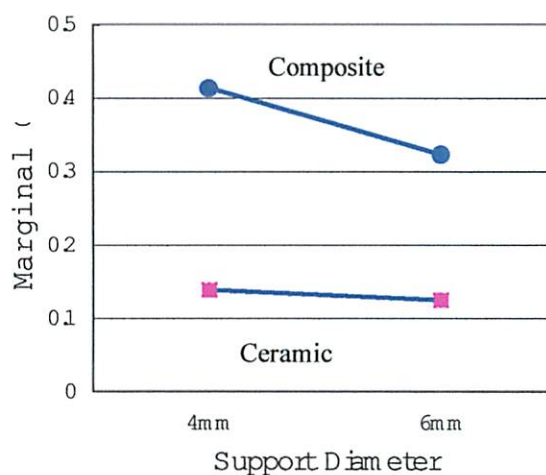


Fig 1 Marginal gap of full crowns

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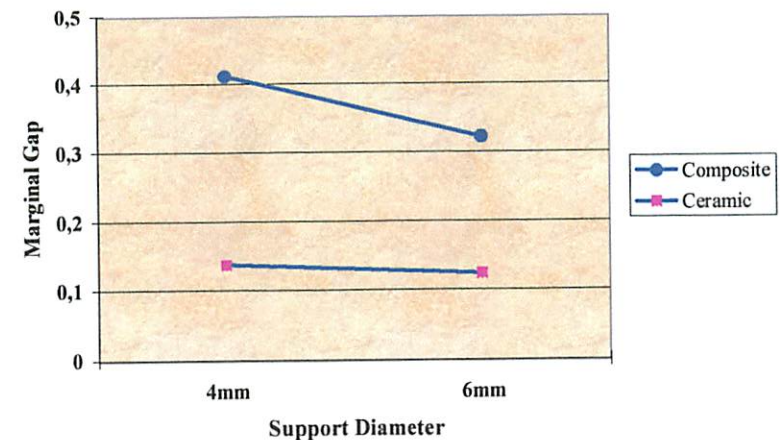
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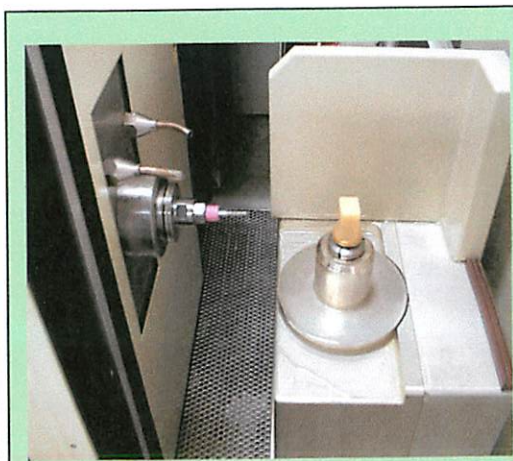


Material	Composite		Ceramic	
Diameter	4mm	6mm	4mm	6mm
1	0,208	0,318	0,224	0,147
2	0,33	0,194	0,073	0,1
3	0,367	0,292	0,205	0,27
4	0,745	0,485	0,051	-0,02
average	0,4125	0,32225	0,13825	0,12425
SD	0,23184262	0,12092525	0,08884209	0,11993992

Material	Composite		Ceramic	
Diameter	4mm	6mm	4mm	6mm
average	0,4125	0,32225	0,13825	0,12425
SD	0,231843	0,120925	0,088842	0,11994

SUMMARY

The Accuracy of full crowns fabricated by CAD/CAM using composite and ceramic materials were investigated. The results of the present showed that the ceramic crowns had significantly lower marginal gap than the composite crowns (Fig 1). This may be related to the difference in the deflection behaviour between these two materials



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