

# Storage time effect on marginal fit of full crown patterns made of wax, autopolymerized and light polymerized resin materials

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الهدف من هذه الدراسة تقييم التصاق حواف التاج الكامل والمصنعة قوالبه من ثلاث انواع مختلفة من المواد بعد تخزينه في درجة حرارة الغرفة لمدة تتراوح من ساعة إلى ٢٤ ساعة. تحت مقارنة الفجوات الحفافية لنماذج التيجان الكاملة المصنوعة من الشمع. تم صنع النماذج على أمثلة العمل الجبسية المصنوعة من طبعات أعطائها السيليكوني متعدد الفينيل وفقاً لتعليمات الجمعية الأمريكية لطب الأسنان لإعداد طبعات التيجان الكاملة المصنوعة من مادة الستانلس ستيل تم تخزين ثلاثين نموذجاً من كل مادة على المثال الموافق ضمن درجة حرارة الغرفة لفترة زمنية من ساعة واحدة إلى أربع وعشرين ساعة جرى بعد ذلك تقييم الفجوات الحفافية للنماذج على الأمثلة المعدنية الأساسية. أجرى بعد ذلك التحليل الإحصائي باستخدام تحليل أنوفا واختبار t المزوج وذلك بمستوى دلالة إحصائية ٠.٠٥. دلت النتائج على أن الانطاق الحفافي للتيجان المصنوعة من المواد المذكورة أعلاه كان الأفضل خلال الساعة الأولى مقارنة بأربعة وعشرين ساعة وعند الأخذ بعين الاعتبار حالتي التخزين فقد أبدت النماذج الشمعية الأنطباق الحفافي الأفضل ومن ثم الراتنج ذو التصيب الضوئي والذاتي الميكرو.

The purpose of this study was to evaluate the marginal fit of full crown patterns made from three materials after storing at ambient temperature for 1 hour and 24 hours. The marginal gaps of full crown patterns made from wax, autopolymerized and visible light cured acrylic resin materials were compared. The patterns were fabricated on stone (Vel Mix) working dies made from polyvinyl siloxane impressions of an American Dental Association full crown stainless steel die. Thirty patterns of each material were stored on their corresponding stone dies at room temperature after fabrication for 1 hour and 24 hours. The marginal gaps of patterns were evaluated on the metal master die. The data were subjected to one-way and two-way analysis of variance (ANOVA) and paired t-test. All the tests were conducted at 0.05 level of significance. The results indicated that patterns made from each of the three materials (wax, autopolymerizing and visible light-cured resins) had better marginal fit at 1 hour than at 24 hours after fabrication. Under the two storage conditions, the wax patterns showed the greatest marginal gap followed by visible light-cure resin and autopolymerizing acrylic resin

## INTRODUCTION

A cast dental restoration is fabricated by forming a pattern on a stone working die that can be removed and embedded in a refractory mold material from which it is eliminated by the use of heat and casted. Traditionally, wax has been used as a pattern material.<sup>1</sup> There is an increasing use of acrylic resin as pattern material such as autopolymerizing or visible light-cured VLC acrylic resin.<sup>2</sup> The accuracy of the pattern is of major importance for obtaining well-fitted cast restorations regardless of the pattern material used.

Desirable properties of wax include adequate strength, rigidity, ease of manipulation and absence of residue on burnout.<sup>2</sup> Thermoplastic characteristics of wax, however, can lead to distortion.<sup>3</sup> *Shrinkage of wax patterns on the dies was*

found to create marginal gaps at shoulders and bevels.<sup>4</sup> This has been attributed to relaxation of elastic stress introduced during normal laboratory practice where the construction of patterns often involves re-melting part of it.<sup>2</sup> It has been reported that the maximum time a wax pattern can be stored at room temperature without noticeable distortion is approximately 45 minutes.<sup>2</sup>

Shrinkage was also reported to occur after removal of wax patterns from dies and this was attributed to relaxation of elastic stress in wax.<sup>4,5</sup> Iglesias *et al.*<sup>6</sup> examined the marginal gap of full crown wax patterns on a metal die 1 and 24 hours following fabrication on a stone working die. They found marginal discrepancy to range from 15 to 23  $\mu\text{m}$  and the change at 24 hours was significantly larger than at 1 hour.

Received 7 March 2005, Revised 11 June 2005

Accepted 20 August 2005

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