

CLINICAL DIE SPACER: NEW TECHNIQUE

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يجب أن يصنع التاج المصبوب لينطبق بدقة على السن المحضرة . لكن هذا يؤدي إلى صعوبة هروب الأسمت من بين سطوح السن وبالتالي فإن التاج لا يستقر مكانه بشكل صحيح مما يؤدي إلى حدوث فراغ حفاقي بعد الإصاق .

ومنذ زمن بعيد لوحظ أنه لتحسين استقرار التيجان الكاملة المصبوبة أثناء الإصاقها ، فإن الطبقة الأسمتية اللاصقة تحت السطوح الإطباقية للتيجان الكاملة يجب أن تقلل بتخفيف تأثير ضغط السوائل أثناء الإصاق وذلك بعمل ثقب في التاج أو التقليل من سطوح الانطباق الداخلية للتاج . إن إحداث ثقب في التاج المصبوب يسهل هروب الأسمت الزائد من خلال هذا الثقب الطاسح ويؤدي ذلك إلى تحسين استقرار التاج الملصق . إلا أن الصعوبة من الناحية العملية في إغلاق هذا الثقب بعد الإصاق حد من استعمال هذه الطريقة بشكل واسع .

إن التقليل من السطوح الداخلية للرممات الذهبية تميز عن الطريقة السابقة لسهولة ، واستعملت هذه الطريقة لتؤمن هروب الأسمت اللاصق من خلال السطوح المحورية وبنفس الوقت تكون هذه الطريقة كعامل أمان للتقليل من شدة انطباق التاج ولتحسين استقراره . إن التخفيف الداخلي لسطح التاج يمكن تأمينه بعدة طرق مثل السحل الميكانيكي للسطوح الداخلية للتاج بواسطة السنابل أو تحت النموذج الشمعي للتاج من الداخل قبل صبه . إلا أن التخفيف الداخلي يجب أن يشمل كامل السطوح الداخلية مع الإبقاء على سلامة 0.75 إلى 1 ملم عند الحواف . وقد وجد أن استعمال طلاء النماذج أو الأظافر هو أبسط وأسهل الطرق المستعملة في تخفيف السطوح الداخلية .

على أي حال الطريقة المعتادة في استعمال الطلاء هو تطبيق الطلاء على النموذج الحجري ولكن هذه الطريقة قد تؤدي إلى نتائج غير مؤكدة .

تم تطوير طريقة جديدة حيث يستعمل الطلاء سريراً من قبل طبيب الأسنان بتطبيقه مباشرة على السن المحضرة ، وبعد تطبيقه توحد الطبعة النهائية ، وهذه تتضمن طبعة موسعة بشكل دقيق لكل سن محضرة .

والطبعة المفرغة تنتج نماذج أوسع قليلاً مع سطوح ملساء . وهذا سوف يسهل إجراءات التشميع ويعطي صبة معدنية ذات انطباق جيد .

A well seated and accurately fitting restoration is essential in fixed prosthodontics. The conventional method of using die spacer is to apply it on the die stone by the technician which may give uncontrollable result. A technique has been developed where the die spacer is applied clinically by the dentist directly on each tooth preparation, and then a final impression is made over the die spacer. The relieved impression will produce controlled relief of dies with smooth surfaces. This will facilitate waxing procedures and give good fitting casts. The result is atraumatic, simple and incorporates an accurately relieved impression of each prepared tooth in the overall final impression. The die spacer will compensate for the slight contraction of elastomeric impression materials during curing as a result of a reduction in volume on cross-linking.

Introduction

A cast crown restoration must be made to fit the prepared tooth accurately. This, however, makes it difficult for the cement to escape from between the tooth and the casting, creating hydraulic pressure within the cement. Consequently, a crown may fail to seat properly.¹ This may lead to post-cementation marginal gap.² The incompletely seated cast crown may require a further

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occlusal adjustment and correction of the faulty margins. It has long been recognized that to improve the seating of a complete veneer crown during cementation, the cement film thickness on the occlusal floors should be reduced by relieving the hydrodynamic effect of the cementation using the technique of venting or internal surface relief.³ Venting of crowns by perforating a non-critical area on the occlusal surface provides an escape for the excess cement. This considerably improves

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seating of the cemented crown.¹⁴ However, the impracticality of repairing the perforation in the crown after cementation has prevented wide acceptance of this technique.

Internal surface relief in cast gold restorations is favored in the practice of restorative dentistry.⁵ It is used to provide an escape for the excess cementing medium along the axial walls⁶ thus improving the fit of the restoration.⁷ Internal relief can be achieved by several methods, such as carving the internal aspect of the wax pattern or altering the internal surface of the casting by grinding, etching (stripping) with aqua regia for 5 minutes or electro-chemical milling with cyanide solution for 5-60 seconds.⁸

Relief should be provided throughout the internal portion of a casting, but maintaining the integrity of an area 0.5 -1.0 mm wide adjacent to the margin. Die spacing is the simplest and safest of all methods previously mentioned. Applying the paint to the surfaces of dies to achieve relief of castings has become very popular. The material is usually painted on the die in multiple coats to within 0.5 to 1.0 mm of the margins.

By varying the number of coats, different amounts of relief can be produced on the internal surface of wax patterns and subsequently, on the resultant castings. It has been reported that the thickness of commercial die spacers are not consistent with those reported by manufacturers and authors.⁹

The problem of incomplete seating of casting may also be due to the many manipulative procedures involved in their fabrication. Impingement of the casting at the axial-occlusal line angles of the tooth preparation may be a major cause of incomplete seating. Additionally, this could impede the flow of the luting agent at the time of cementation.^{10,11} It has been reported that die spacer thickness at the axio-occlusal line angle is significantly less than on the other surfaces.^{12,13} Additional coats of spacer applied to these areas of the die before the fabrication of the casting may reduce this discrepancy.⁹ The relief should be uniform and not be so great as to reduce the strength of the cement layer, since retention diminishes approximately one third as the cement thickness increases from 20 to 140 microns.^{8,12,13} The laboratory technicians may not be aware of these facts and sometimes the die spacer is either

too thick or not enough or over extended to the margin of the preparation.

Although the rubber impression materials are very accurate, there are a number of sources of dimensional changes: 1) all rubbers contract slightly during curing as a result of a reduction in volume on polymerization; and 2) the condensation silicone rubbers lose alcohol during setting. Similarly, the loss of volatile accelerator components causes a marked contraction in polysulfide rubbers. In general, it is evident that elastomeric impression materials change dimensionally with time, and that such a change is greater in magnitude for the condensation silicone and the polysulfide rubber materials than for the polyether and addition polymerizing silicone elastomers.¹⁴ The stone die should be constructed within the first hour after removal of the impression from the mouth, particularly if a condensation polymerizing silicone or a polysulfide polymer rubber is employed.¹⁵ The effects of distortion upon storage may be seen and discrepancy in fit may occur even when the stone die is poured within 2 hours. The resulting fit would be obviously unsatisfactory. Therefore, using the clinical die spacer may help in producing a better fit of the cast restoration. A technique for applying the die spacer directly on the prepared tooth prior to final impression making is described. The employed die spacer in this technique is a new generation of a nail varnish which is a water based polymer.

Materials And Methods

After the tooth preparations are accomplished by the appropriate use of special diamond stones,^{16,17} all traces of debris are thoroughly rinsed away using a gentle stream of water. The teeth are then dried using air stream or cotton pledget. Isolation of the prepared teeth is achieved by placement of cotton rolls in the sulcus to absorb moisture and prevent contamination of the cleansed areas. One drop of die spacer, nail varnish*, is dispersed directly onto a disposable brush. The brush is held steady to apply an even coat of die spacer to completely cover the occlusal and axial surfaces of the preparation to within 0.5 to 1.0 mm of the margins of the preparation (Fig. 1). This is to ensure

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maximum adaptation in these critical areas. Two or more coats may be used as required, allowing each coat to dry before applying the next one. Each coat of the spacer provides a relief of approximately 5-7 microns.



Fig. 1. Clinically applying die-spacer to the prepared core surface to within 0.5-1 mm of the margins using disposable brush tip.



Figs. 2A & 2B. The painted preparation with die-spacer to compensate for casting deficiency and provide space for cement is ready for final impression.

The painted surfaces are checked for any spacer extended over the finish line and an excavator used to scrape and remove it from the critical areas (Figs. 2A, B). A suitable elastomeric impression material is used to obtain a final impression. The die spacer is scraped away easily from the surface of prepared teeth using an excavator (Fig. 3), and the remnants washed away using water jet. The final impression is thoroughly rinsed and dried with compressed air to allow accurate evaluation of all details. Then it is sent to the laboratory for pouring and fabrication of the working casts.

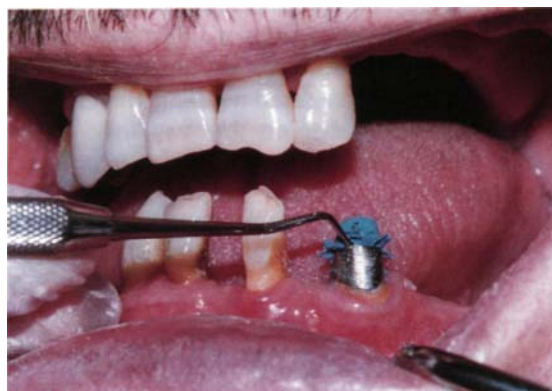


Fig. 3. After impression making, an excavator is used to peel off the die-spacer from the tooth preparation.

Discussion

In the conventional application of die spacer on the stone die, the removal of over-extended spacer from the cervical margin may inadvertently damage the die. Sometimes, remnants of die spacer may adhere to the internal surface of the wax pattern leading to an inaccurate pattern, or the wax pattern may be damaged during its removal.

By advocating the clinical technique where the die spacer is applied directly to the surfaces of prepared teeth in the patient's mouth, direct control can be obtained by the dentist on the amount and location of space created between the preparation and the final restoration. Varying the number of coats, different amounts of relief can be produced on the internal portions of the final impression and subsequently on the resultant castings. Since the thickness of die spacers are not consistent, additional coats of

spacer on axio-occlusal line angle could improve the seating of castings. Painting the die spacer directly on prepared surfaces will block the tooth surface micro-irregularities produced by coarse diamond points during tooth preparation. Such irregularities may add to the difficulties of impression making and waxing procedures.¹⁸ The authors, therefore, recommend the use of this technique whenever accessibility will allow it.

The water based die spacer covers the humid dentinal walls of the prepared tooth surface and this facilitates the adaptation of the hydrophobic impression material. Because the die spacer coating is easily and simply peeled off by the operator and does not leave residual stain on the prepared tooth surface, its application and removal is not complicated (Fig. 4). The effect of the clinical die spacer on the wettability of the tooth surface with respect to the impression material could be the subjects of future research.



Fig. 4. The die spacer is easily peeled off leaving no residual stain on the prepared tooth surface.

Conclusion

Traditional method of using die spacer on the stone dies does not provide control by the dentist on the amount of internal relief provided to the casting by the laboratory technician. The advocated direct die spacer technique described here allows the dentist to obtain full control on the amount of relief applied to the internal surface of the casting. This promotes accuracy by compensating for the slight discrepancy of the rubber impression material which may take place during curing reaction or with time before pouring it with the die stone. The material described is readily available and has no known undesirable side effects. The authors have used

this technique in numerous instances with excellent results of well fitting castings.

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