

IN BRIEF

- Allows dental practitioners to recognise that immersion disinfection may have detrimental effects on the impression materials and gypsum casts poured from them.
- Details what categories of impression materials may be subject to these problems with immersion disinfection.
- Provides a working solution to the problem.

Disinfection of impression materials and casts

Effect of immersion disinfection with Perform-ID on alginate, an alginate alternative, an addition-cured silicone and resultant type III gypsum casts **S. Ahmad,¹ C. J. Tredwin,² M. Nesbit³ and D. R. Moles⁴**

ABSTRACT

Objective

This study investigated the effect of a commonly used immersion disinfectant upon three different impression materials and any subsequent effects on the abrasion resistance, hardness and surface detail reproduction of gypsum casts.

Design

A laboratory study.

Materials and methods

Under standardised conditions a total of 120 impressions were made of a ruled test block using irreversible hydrocolloid (Alginoplast), an 'alginate alternative' addition-cure silicone (Position Penta) and a conventional addition-cure silicone (President). The impressions were examined for surface detail reproduction prior to and after disinfection with Perform-ID. The type III casts were evaluated for surface detail reproduction, surface hardness and abrasion resistance.

Results

(1) None of the disinfected alginate specimens could reproduce the 50 µm line. (2) Casts produced from the disinfected alginate were significantly less hard than from disinfected Position Penta and President ($P < 0.001$). (3) Disinfection significantly affected the abrasion resistance of casts made from Position Penta ($P = 0.029$). (4) Disinfection did not significantly affect President or its subsequent casts ($P > 0.05$).

Conclusion

If disinfecting with Perform-ID, the impression should be made with a conventional addition-cured silicone if good surface detail reproduction of the impression material and a hard and abrasion resistant type III gypsum cast are required.

EDITOR'S SUMMARY

Sometimes it seems that the moment we solve one problem another raises its head. The crucial emphasis on cross-infection control is relatively recent in the field of clinical dental endeavour and as a profession as a whole our perception of its importance has arguably taken longer than it might have to treat the matter seriously enough. Because, no doubt, distance is a significant factor in perception and because our team members in the laboratory are often at that distance the matter of disinfection of impressions was not perhaps top of the list. Now it definitely is, and rightly so. But just as we solve one problem, namely how do we safely disinfect an impression, we create another in potentially affecting the accuracy of the resulting cast and hence the restoration or prosthetic appliance to be constructed and subsequently fitted.

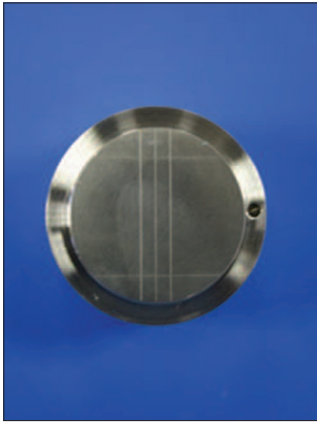
This paper has tackled the matter head-on with a laboratory study measuring the accuracy of three different types of impression materials readily available and used in everyday practice. From the results, alginate was shown to be the least accurate in terms of surface detail reproduction, following immersion disinfection, compared with silicone based materials.

As the authors remark in their answer to the question about their next moves, there is a need to test out these effects in clinical practice. Since the vast majority of practitioners will be using alginate on a regular basis and immersing the impressions in disinfectant without apparent significant detriment to the resulting restorations it may be that the degree of accuracy is still clinically sufficient, although these results suggest that silicone gives greater surface detail under these circumstances.

The full paper can be accessed from the *BDJ* website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 202 issue 1.

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The ISO test die used in the study



Photograph of abrasion device with 50 g weight applied

FULL PAPER DETAILS

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AUTHOR QUESTIONS AND ANSWERS

Why did you undertake this research?

Modern standards of infection control require that impressions are disinfected before sending to the laboratory. When critical accuracy and durability are needed, eg for an opposing cast in fixed prosthodontics, experience suggests that disinfected alginate impressions can yield inadequate casts. Strict adherence to recommended protocols for manipulation of materials does not appear to prevent the problem. Addition-cured silicone materials are better able to withstand disinfection but little is known about the effects on recently developed 'alginate alternative' silicones. This study aimed to clarify present controversy about the possible effects of Perform ID, a proprietary disinfectant solution, on the three types of material and on casts poured from them.

What would you like to do next in this area to follow on from this work?

Deleterious effects were identified with both alginate and 'alginate alternative' materials and further studies are necessary to relate the significance of these laboratory observations to clinical applications.

COMMENT

Having had the unenviable task several years ago of introducing impression disinfection in our Dental Hospital, I have always wondered what effect the disinfectant was having on both the impression and the resulting casts. This *in vitro* study provides some of the answers. The authors test the effects of a commercially available disinfectant, Perform, on an alginate and two addition silicone materials.

Measurements include surface detail reproduction of impressions and resulting casts using an ISO test die. In addition, Wallace hardness and abrasion resistance of the casts were measured, but not dimensional accuracy. The surface detail evaluations are interesting and show clearly that immersion in Perform resulted in none of the alginate impressions being able to pick up detail, but perfect detail reproduction for the two silicone materials. The Wallace hardness measurements need to be read carefully. With most hardness tests a higher number indicates a greater resistance to indentation, but with Wallace hardness it simply indicates a greater penetration into the material. Hence, immersion of the alginate in the disinfectant clearly results in a significant softening of the stone; an effect not seen with the silicone materials, presumably because they absorb less disinfectant. As the authors point out, there is no standard test for abrasion resistance, so it is difficult to know the validity of the test employed.

This excellent study certainly casts doubt on the use of disinfected alginates to produce casts for critical applications. Nevertheless, clinics continue to supply laboratories with disinfected alginate impressions and generally obtain reasonable results. The work of Taylor *et al.*¹ goes some way to explain this paradox. They found alginates soaked in Perform and 1% sodium hypochlorite had a degraded surface, but surprisingly, better dimensional accuracy over soaking for the same time in water. In essence, technicians may be pouring up alginates to give relatively accurate casts, but with a softer, less defined surface. But why take the risk? Perhaps we need to think about using addition silicone materials more often.

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1. Taylor R L, Wright P S, Maryan C. Disinfection procedures: their effect on the dimensional accuracy and surface quality of irreversible hydrocolloid impression materials and gypsum casts. *Dent Mater* 2002; **18**: 103-110.