Other journals in brief

A selection of abstracts of clinically relevant papers from other journals.
The abstracts on this page have been chosen and edited by **Paul Hellyer.**

Milling produces best-fitting denture bases

Helal M A, Abdelrahim R A, Zeidan A A. Comparison of Dimensional Changes Between CAD-CAM Milled Complete Denture Bases and 3D Printed Complete Denture Bases: An In Vitro Study. *J Prosthodont* 2022; DOI: 10.1111/jopr.13538.

3D printing is quicker and more efficient.

The conventional laboratory construction method for complete dentures suffers polymerisation shrinkage of polymethylmethacrylate during processing. With the introduction of computer-aided design and manufacture, subtractive milling and additive 3D printing processes have been developed to overcome the problem of shrinkage.

Using a metal maxillary master cast with three fixed identification points (incisal papilla and left and right first molar region), 30 denture bases were manufactured, 10 by each method of conventional flasking and compression moulding, milling and 3D printing. Measurements showed that milling produced significantly less distortion in both antero-posterior and lateral dimensions. Surface scans of the bases superimposed on an inverted scan of the master model also showed that milled bases were adapted significantly better than either conventional or printed bases.

Milling has the disadvantage of large material losses during processing and the high cost of equipment. While 3D printing is quicker and more clinically efficient, in this study, it had the lowest dimensional accuracy of the three systems tested.

https://doi.org/10.1038/s41415-022-4565-3

Recommendations for patients allergic to PMMA

Hinz S, Bensel T, Bömicke W, Boeckler A F. In Vitro Analysis of the Mechanical Properties of Hypoallergenic Denture Base Resins. *Materials (Basel)* 2022; **15:** 3611.

Some hypoallergenic materials are satisfactory.

Polymethylmethacrylate resin (PMMA) is commonly used as a base for denture construction, because of its ease of use, low cost and repairability. However, PMMA has been known to produce allergic reactions in patients. Hardened PMMA contains traces of unpolymerised MMA and the initiator dibenzoyl peroxide which can cause Type 4 allergic reactions. To make prosthodontic treatment safer for patients, commercially viable hypoallergenic denture base resins have been developed.

In this study, the flexural strength, elastic modulus, compressive strength, macro- and micro-hardness, surface roughness, water absorption and water solubility of four hypoallergenic denture base resins were compared.

None of the test materials matched the properties of PMMA in all aspects, but two materials (one based on polyoxymethylene [TMS Acetal Dental] and one on a modified methyl methacrylate [Polyan Plus]) showed acceptable flexural strength, elastic modulus and compressive strength, and can be recommended for clinical use as denture base materials.

https://doi.org/10.1038/s41415-022-4574-2

3D printed temporary restorations are stronger

Jain S, Sayed M E, Shetty M *et al*. Physical and Mechanical Properties of 3D-Printed Provisional Crowns and Fixed Dental Prosthesis Resins Compared to CAD/CAM Milled and Conventional Provisional Resins: A Systematic Review and Meta-Analysis. *Polymers (Basel)* 2022; **14:** 2691.

Milled temporary restorations have better colour stability.

Well-fitting provisional crowns and bridges are essential for the success of the definitive restoration. These restorations should maintain tooth position, protect the pulp and periodontal tissues, and be functional and aesthetic particularly when temporisation is needed over a long period, such as in full mouth rehabilitation or implant treatment. Conventional PMMA suffer the disadvantage of high polymerisation shrinkage and retaining residual monomer.

This literature review found 25 previous studies which had compared the physical properties of provisional crown and bridge material produced conventionally, by 3D printing and by milling. Fracture and flexural strength, elastic modulus and wear resistance was found to be better for 3D printed restorations than milled.

Fracture strength, flexural strength, peak stress, elastic modulus and wear resistance were found to be better with 3D printed resins when compared to conventional and CAD/CAM milled provisional materials. Conventionally cured PMMA may contain air bubbles and other inclusions, thus negatively effecting strength. 3D printed restorations may have inferior properties with regards to colour stability.

https://doi.org/10.1038/s41415-022-4573-3

Analysis of different workflows for denture construction

Russo L L, Zhurakivska K, Guida L, Chochlidakis K, Troiano G, Ercoli C. Comparative cost-analysis for removable complete dentures fabricated with conventional, partial, and complete digital workflows. *J Prosthet Dent* 2022; DOI: 10.1016/j.prosdent.2022.03.023.

Cost:benefits take some time to develop.

The barriers to introduce digital workflows into general practice may be psychological (unwilling to acquire new expertise), practical (lack of space or time to train) or financial (unwilling to invest). A cost:benefit analysis to compare three workflows – conventional (C), partial digital (M) and fully digital (D) – for the fabrication of complete dentures was undertaken.

Data, collected from ten small private Italian laboratories and practices, included time taken for each procedure, cost of materials and labour, packaging and capital investment in hardware and software. For laboratories, workflows M and D reduced manufacturing time and thus costs compared to C. Transition from C to M involved capital investment of between USD 28,750 to USD 81,075 depending on systems chosen. 3D printing is the most cost-effective method.

https://doi.org/10.1038/s41415-022-4575-1