

Abstract

This study evaluates the efficacy of conventional versus digital splint fabrication across six clinical factors: fit, prevalence of occlusal point of contact in centric relation (CR) position, accuracy of occlusal excursive contact reproduction, intensity of contact among occlusal points, fabrication time, and adjustment time. Ten simulated patients requiring splints received two splints – one fabricated conventionally and one digitally. To minimize provider variability, the same practitioner created both splints for each patient.

Results demonstrated that digital splints outperformed conventional splints in terms of overall fit, CR contact prevalence, excursive accuracy, fabrication time, and adjustment time. Digital splints were also notably more cost-effective, with an average fabrication cost of \$9, compared to \$131 for conventional splints – marking a significant cost difference, with digital splints being approximately ten times less expensive. Despite these advantages, conventional splints provided a higher intensity of occlusal contact among contact points, a factor which could be important for certain clinical applications.

These findings suggest that digital splint fabrication offers substantial benefits in terms of efficiency, cost, and certain aspects of clinical accuracy, making it a promising alternative to conventional methods. However, the reduced intensity of occlusal contact in digital splints suggests a need for further refinement in digital fabrication technology, potentially by addressing issues such as 3D printing shrinkage in software design. Additionally, future studies should investigate the extent of adjustments required across different software systems and materials to optimize clinical outcomes and ensure consistency in occlusal contact accuracy.