

Digitally-Guided Tooth Preparation: A Chair Time Efficient, Controlled and Minimally-Invasive Approach

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BACKGROUND

Precision is often impeded by visual shortfalls, manual imprecision and limitations related to working within a constricted oral cavity. Historically, dental literature has identified principles that help dentists design, assess and modify complete and partial coverage tooth preparations to ensure clinical success for the treatment of a variety of unprepared and previously prepared teeth; however, none have focused on reducing clinical chair time while still being minimally invasive which can be positively influenced through implementing a digital workflow by using a 3D-printed guide for tooth preparation.

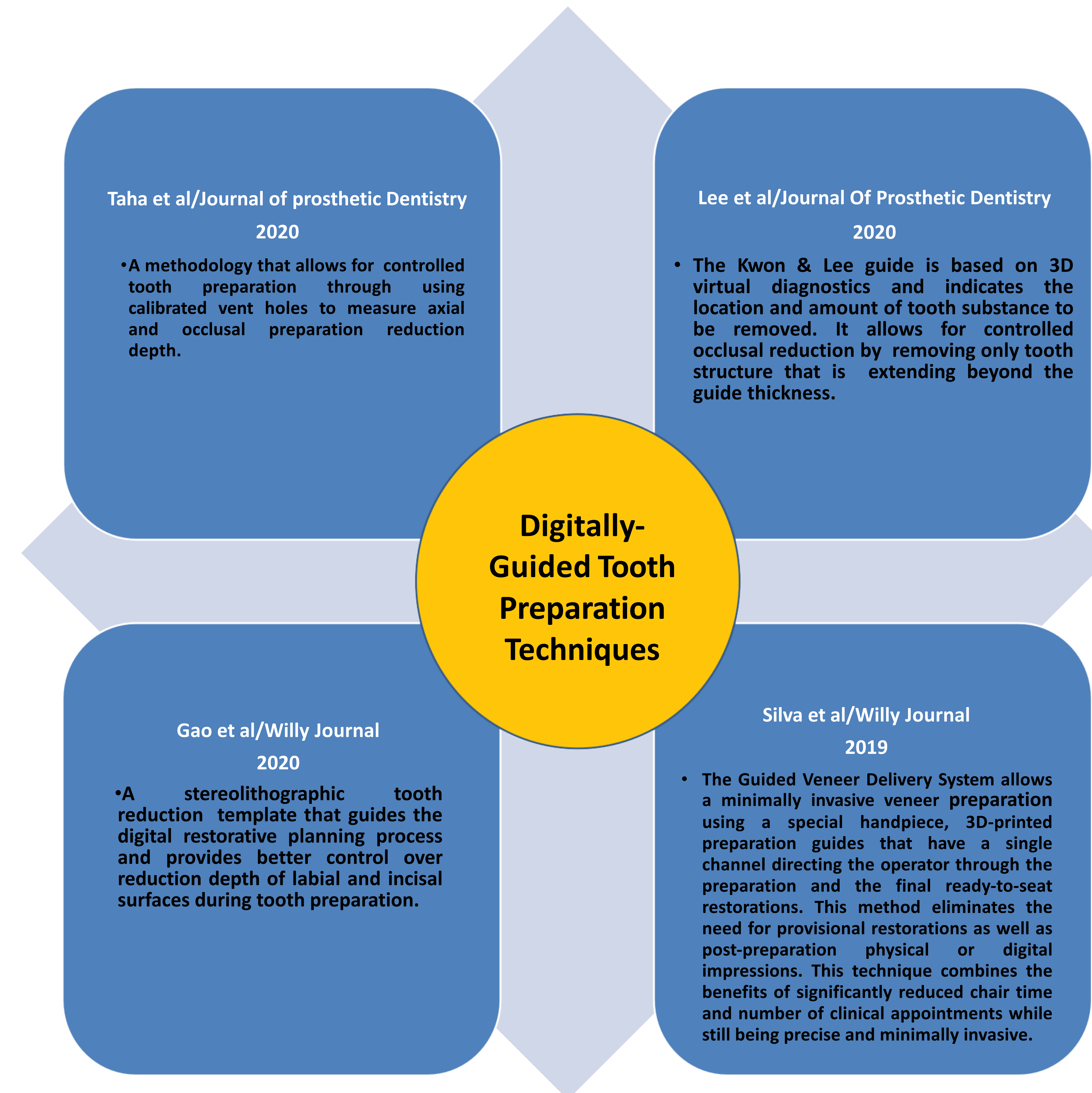
INTRODUCTION

Precise tooth preparation is crucial for the success of any indirect restoration and the preservation of the underlying retaining structure. The vividly evolving digital dental technology has allowed for pre-treatment virtual 3-D diagnostic analysis, virtual treatment planning, digital designing, and fabrication of the final restorations. Digitally-Guided tooth preparation is a cutting-edge approach in achieving a controlled and minimally invasive tooth reduction through a 3D-printed guide based on a virtual diagnostic wax-up. Several techniques that employed the Digitally-Guided preparation concept were illustrated in recent literature. Thus, the purpose of this poster is to gain an understanding of the existing research and methods relevant to the utilization of Digitally-Guided tooth preparation techniques, and to present the knowledge in current literature to evaluate accuracy and limitations of available Digitally-Guided tooth preparation methodology.



The FirstFit Guided Veneers Delivery System

METHODS & RESULTS



DISCUSSION

Magne and Belser initially suggested two tooth preparation techniques for indirect restorations: a non-guided preparation that would employ existing tooth structure as a guide and a second technique that is based on the future restoration final volume. The latter technique adheres to the bio-economic principle (maximum conservation of healthy tooth structure). Leveraging this guided technique has sparked the development of new tooth preparation methods that employ silicone matrices to calibrate tooth preparations based on the initial diagnostic wax-up volume. Although these methods have been advantageous, they are limited to a 2D view and are technique sensitive. Cho et al reported that a surgical template could enable clinicians to control labial depth reduction with a template that could measure a minimum of 0.1 mm reduction. Several techniques that employed the 3D Digitally-Guided preparation concept were illustrated in recent literature. Compared to the conventional methods of tooth preparation, Digitally-Guided techniques allow for accurate abutment preparation, preservation of tooth structure and decreased chair time.

Further studies are required to more accurately evaluate the efficacy of the available different techniques and to overcome limitations such as increased cost of special equipment and 3D printed guides, and inability to fabricate a guide that allows preparing all teeth surfaces.

CONCLUSION

Although Digitally-Guided preparation technique is a promising concept, cost effectiveness is a major limitation. Growing interest in digital dentistry innovation is paving the way to provide exponentially more cost-effective materials, precise and minimally invasive tooth preparation as well as reduced chair time.

REFERENCES

