Received: 23 April 2020 | Revised: 8 August 2020 | Accepted: 16 October 2020
DOI: 10.1111/jerd.12675

RESEARCH ARTICLE

WILEY

Comparison of marginal and internal fit of pressed lithium disilicate veneers fabricated via a manual waxing technique versus a 3D printed technique

Lizeth Guachetá DDS[1] | Clinton D. Stevens DDS[2] | Julián A. Tamayo Cardona MS[1] | Rafael Murgueitio DDS[1]

[1]Institución Universitaria Colegios de Colombia - Sede Santiago de Cali, Santiago de Cali, Colombia

[2]Private Practice, Tulsa, Oklahoma, USA

Correspondence
Clinton D. Stevens, DDS, FAGD, FICOI, 616 S. Boston Ave, Suite 318, Tulsa, OK 74119.
Email: zahnmann@hotmail.com

Abstract

Objective: The purpose of this in vitro study was to compare the marginal and internal fit of pressed lithium disilicate veneers fabricated from a 3D printed castable wax resin versus a manual waxing technique.

Materials and Methods: A typodont model central incisor was prepared for a porcelain veneer. Following stone model fabrication from a polyvinyl siloxane impression, the model was digitized using a laboratory scanner. Group 1 veneers were designed digitally and 3D printed with a castable wax resin, then pressed. Group 2 veneers were fabricated using a manual wax and press approach. Veneers from both groups were bonded to printed dies. Following measurements of marginal adaptation under a stereo microscope, the dies were sectioned and measurements were made for internal adaption. Statistical analysis included a Kolmogorov test and a Mann–Whitney U test.

Results: Average marginal gap (μm) for Group 1 was 40.37 ± 11.75 and 50.63 ± 16.99 for Group 2 (p = 0.51). Average internal gap (μm) for Group 1 was 61.21 ± 18.20 and 68.03 ± 14.07 for Group 2 (p = 0.178).

Conclusion: There was no difference in marginal fit or internal fit between pressed lithium disilicate veneers fabricated with a 3D printed castable resin and those fabricated with a manual waxing technique. The use of digital technologies and 3D printing provide significant advantages in the fabrication of pressed glass ceramic veneers, with marginal and internal adaptation comparable to manual wax and press techniques.

KEYWORDS
CAD/CAM, ceramics, dental materials, digital dentistry, laboratory technology

1 | INTRODUCTION

Conventionally fabricated porcelain veneers, whether pressed or stacked, have an excellent track record of success for the management of esthetic and functional problems in anterior teeth.[1-5] The introduction of digital technology has expanded the number of methods available for the fabrication of porcelain veneers. Today, there are four possible methods to fabricate ceramic veneers: (a) The stacking of feldspathic ceramic on platinum foil-covered refractory dies; (b) Waxing on stone dies and subsequent vacuum pressing using a lost wax technique; (c) Computer-aided design (CAD) followed by milling from a ceramic block via subtractive computer-aided manufacturing

(CAM); and (d) CAD followed by printing or milling a castable resin via an additive or subtractive CAM process, subsequently finished with a pressed technique. In general, ceramic laminate veneers are well documented to exhibit marginal adaptation that meets the generally accepted clinical benchmark of 120 microns or less.[6-8]

When comparing currently available techniques, the nondigital techniques have significant disadvantages, including the lack of an ability to easily reproduce a proposed restoration in the event of a failure during the pressing or firing process, more time needed for design and fabrication, and more variables that require attention.[9-11] CAD/CAM generated restorations give technicians more control over the fabrication process, with fewer variables, more repeatability and require less time to fabricate.[9-11] At the same time, CAD/CAM techniques also present certain disadvantages. Milling thin margins, that is, less than 300 μm thick, on ceramic restorations like those for porcelain veneers can be a challenging process, with the possibility for marginal irregularities or defects that can significantly affect marginal adaptation.[12,13] Another disadvantage is the wasting of material; CAD/CAM milling wastes more material than 3D printing, as left over material from milling processes cannot be reused.

3D printing in dentistry is rapidly gaining utility and acceptance, already being routinely used for the fabrication of surgical guides, orthodontic aligners, bite splints, working models, impression trays, and recently provisional restorations.[14,15] One of the areas in need of further research in 3D printing is that of post-printing processes to ensure that the desired accuracy and mechanical material properties are obtained.[15,16] These properties become increasingly critical as printing technologies are implemented in areas of dentistry requiring high accuracy and precision, such as fixed prosthodontics. It is important to evaluate new methodologies and validate their outcomes as compared to existing gold standards, to ensure best patient outcomes. The purpose of this study is to compare the marginal adaptation of pressed lithium disilicate veneers fabricated from a castable 3D printed resin versus those fabricated from a conventional manual waxing technique. The null hypothesis tested is that there are no differences in marginal or internal fit between the manual wax and press and digitally designed, printed and press fabrication methods for lithium disilicate veneers.

2 | MATERIALS AND METHODS

A typodont (Model PE-ANA002; Nissin Dental Products, Kyoto, Japan) maxillary left central incisor was prepared with a Type I veneer preparation[17] (Figure 1(A)) using rotary diamond instrumentation (Universal Prep Set; Intensive SA, Montagnola, Switzerland). The preparation design included a chamfer finish line 0.5 mm above the cementoenamel junction (CEJ), with 0.5 mm reduction of the facial surface and reduction of the incisal edge of 1 mm. Once the preparation was completed, a one step, dual viscosity (heavy and light body) polyvinyl siloxane (PVS) (Affinis; Coltene/Whaledent GmbH & Co., Langenau, Germany) impression was made, using a glass dappen dish coated with a universal tray adhesive (Zhermack SpA, Ro, Italy) as an impression tray. The die cast was poured in Type IV stone (Leanrock; Whip Mix Corp, Louisville, KY) (Figure 1(B)).

The die of the prepared veneer was then digitalized (Figure 1(C)) using a laboratory scanner (inEos X5; Dentsply Sirona, Bensheim, Germany). The acquired 3D imaged was processed into a surface tessellation language (STL) file (Figure 2(A)) via CAD software (CEREC inLab 16.1, Dentsply Sirona, Bensheim, Germany), and sent to a stereolithography (SLA) 3D printer (Formlabs 2; Formlabs, Boston, MA). Sixty-three dies were printed at a resolution of 25 microns in dental model resin (Formlabs, Boston, MA); 21 dies were used for the conventional wax fabrication method (Group 2) (Figure 2(C)), and the remaining 42 dies were used for the cementation and examination of marginal adaptation of the two veneer groups (Figure 2(F)).

The veneer patterns (n = 42) were fabricated using two different methods. For Group 1 (n = 21), an additive CAD/CAM method was used. A virtual veneer was designed on the digitized veneer preparation (CEREC inLab 16.1; Dentsply Sirona, Bensheim, Germany) with a virtual cement space setting of 30 microns. This virtual cement space setting was chosen after a preliminary pilot study found it to provide

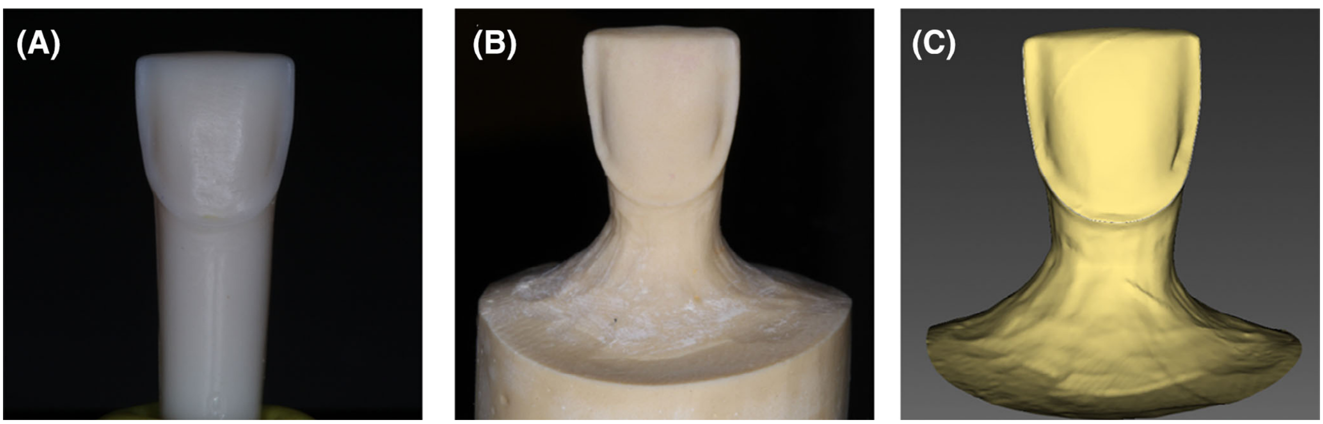

FIGURE 1 Left central incisor typodont tooth with a Type I veneer preparation (A). Type IV stone die (B). Digital die (C)

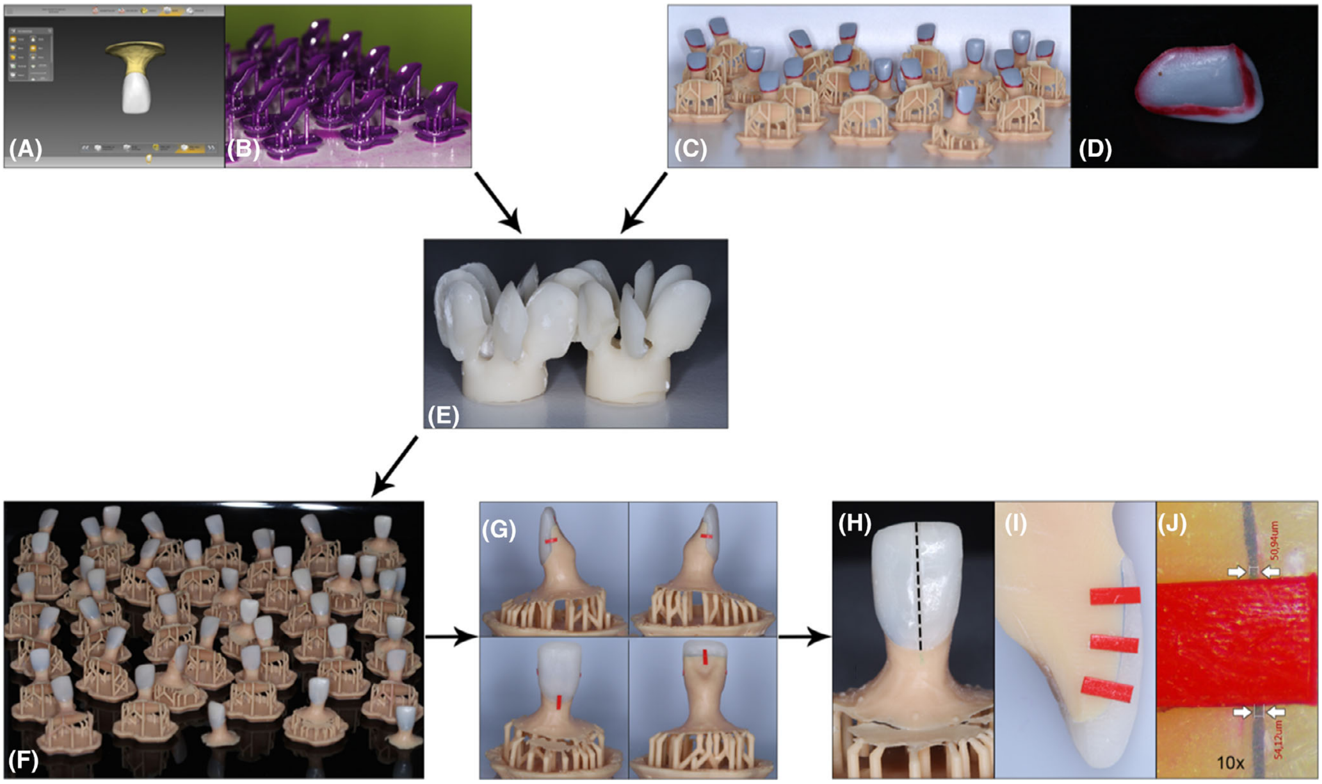

FIGURE 2 Digitally designed die (A). 3D printed castable wax resin veneer patterns (B). Manually waxed veneer patterns (C), (D). Pressed lithium disilicate veneers (E). Printed die with bonded veneer restoration (F). Red adhesive tape 0.5 mm in width was placed on the mesial (A), cervical (B), distal (C), and palatal (D) aspects (G). Sectioning of specimens for internal adaptation measurements (H). Sectioned specimen with 0.5 mm wide red adhesive tape placed in the incisal, midfacial, and cervical areas to facilitate measurement of internal adaptation (I). Marginal and internal gap, easily visualized by using a blue resin for luting, were measured on each side of the adhesive tape under 10× magnification (J)

the best marginal and internal fit for specimens generated by this particular software version and 3D printer combination. The proposal was then exported for 3D printing on a Formlabs 2 printer (Formlabs, Boston, MA). Twenty-one veneers were printed in castable wax resin (Castable Wax Resin; Formlabs, Boston, MA) at a z-axis resolution of 25 microns (Figure 2(B)). Following printing, the veneers were post-processed following manufacturer-recommended protocols. Briefly, they were washed for 20 min in an isopropyl alcohol ultrasonic bath, then dried at room temperature and photo-cured in a curing bed (Form Cure; Formlabs, Boston, MA) for 20 min at 60°C.

For Group 2 (n = 21), veneer wax patterns were completed using the conventional method, completed using an electric spatula (Smartwax Duo; Amann Girrbach, AG, Koblach, Austria) and classic gray modeling wax (Renfert GmbH, Hilzingen, Germany). Dies were first painted with a die relief agent (Die Master Blue 20 Micron; Renfert GmbH, Hilzingen, Germany) to provide an Ivoclar Vivadent-recommended 20 micron cement space for manually waxed e.max Press veneer restorations, stopping 0.5 mm short of the preparation finish line. The peripheral seal of the wax up margins was completed with margin wax (Die Master Red; Renfert GmbH, Hilzingen, Germany) utilizing a 10X magnification stereomicroscope (AmScope Sm-4tz-1440; United Scope LLC, Irvine, CA) (Figure 2(C),(D)).

All wax patterns were invested in phosphate-bonded investment material (IPS PressVEST Premium; Ivoclar Vivadent, Schaan, Liechtenstein) following the manufacturer's directions for use. Heated IPS e.max Press ceramic ingots (Ivoclar Vivadent, Schaan, Liechtenstein) were pressed through a heated tube into the molds using a press furnace (Programat EP 3010; Ivoclar Vivadent, Schaan, Liechtenstein). After being brought to room temperature, restorations were freed from the investment material using 50 micron alumina oxide in a sandblasting unit (Basic Classic; Renfert GmbH, Hilzingen, Germany) (Figure 2(E)). Sprues were removed using fine grit diamond burs at high speed with copious water irrigation. The remaining reactive surface of the pressed veneers was removed in an ultrasonic bath with Invex solution (Ivoclar Vivadent, Schaan, Liechtenstein). Each veneer was then fitted onto its respective resin die model, with needed areas of adjustment identified with fit indicator spray (Occlude; Pascal International, Bellevue, WA) adjusted on the intaglio surface with fine diamond rotary instruments at 5,000 RPMs.

Following silanization of the veneers and 3D printed resin dies with a universal primer (Monobond Plus; Ivoclar Vivadent, Schaan, Liechtenstein), the veneers were cemented to the dies using a flowable blue resin (LC Block-out Resin; Ultradent, South Jordan, UT). A blue resin was chosen to make the subsequent marginal gap evaluation easier to visualize (Figure 2(J)). All veneers were bonded in place by the same operator, using digital pressure until the veneer was fully seated and excess resin flowed out from the margins. After an initial photopolymerization of 5 s (Radii Plus; SDI, Victoria, Australia), the operator removed excess cement from the margins with a #15 scalpel blade. Photopolymerization was then completed by curing each side of the specimen for 40 s.

The dies with their bonded restorations were numbered 1 to 42 on the underside of the die base. Pieces of 0.5 mm-wide red adhesive tape were placed in four zones of each specimen; mesial, cervical, distal and palatal (Figure 2(G)). An operator trained in the use of a stereo microscope (AmScope Sm-4tz-1440; United Scope LLC, Irvine, CA) and measuring software (AmScope 3.7; United Scope LLC, Irvine, CA) measured the marginal gap between the restoration and prepared die on each side of the red tape in each area, for a total of eight measurements per specimen at 10X magnification (Figure 2(J)). Once the measurements for marginal adaptation were completed, the specimens were sectioned in half with a diamond disc running at 15,000 RPM (Figure 2(H)). Three areas were chosen to assess internal fit, with 0.5 mm adhesive tape placed at a cervical, middle, and incisal point (Figure 2(I)). Measurements were again made by the same trained operator in a blinded fashion.

3 | STATISTICAL ANALYSIS

All data was recorded in an Excel spreadsheet and exported to statistical analysis software (SPSS, v.23; IBM, Armonk, NY). A descriptive analysis with measures for central tendencies was carried out, followed by the verification of data distribution with a Kolmogorov test, where data that did not follow a normal distribution was identified (p-value <0.05). A Mann–Whitney U test was applied to detect statistically significant differences in marginal and internal fit between the waxed and printed specimens.

4 | RESULTS

Marginal adaptation was evaluated first, with two measurements taken in each of the following areas: mesial, distal, cervical and palatal, with results as shown in Table 1. When comparing outcomes, there was no significant difference in marginal adaptation between Group 1 and Group 2, except for palatal marginal adaptation, in which Group 1 exhibited significantly better adaptation than Group 2 (p-value = 0.001).

Following sectioning of specimens, two measurements were taken in each of the incisal, middle and cervical thirds of each specimen for a total of six measurements, with the results shown in Table 2. There was no significant difference in any of the measurement areas (all p-values >0.122) or overall mean values (p-value = 0.178) between Group 1 and Group 2 for internal adaptation.

5 | DISCUSSION

The purpose of this study was to compare the marginal and internal fit of digitally designed, 3D printed and pressed lithium disilicate veneers to manually waxed and pressed veneers. The null hypothesis that there would be no difference in adaptation between the groups was confirmed, as the results showed no statistical difference in overall marginal or internal adaption between the manually waxed and 3D printed groups.

A PVS impression and poured stone model were used in this investigation to most closely replicate the clinical workflow still used by a majority of practitioners. Printed dies were chosen to best facilitate a homogenous group of specimens for evaluation. The resin used provided several advantages over stone dies, whose fabrication relies heavily on manual preparation, and which are susceptible to fractures and abrasion during their fabrication. In order to passively deliver a restoration and ensure a uniform space for the chosen luting agent, a certain amount of gap between a restoration and preparation is necessary.[18] To manage this space for the manually waxed group, a single layer of die spacer was used. Because this application is manual and the evaporative components in die spacer liquid are quite volatile leading to differing application thickness over time, the use of die spacer could have affected the results of Group 2. For the 3D printed veneers, a cement gap space of 30 microns was used in the CAD software; different parameters might have yielded different results.

The properties of the luting agent have also been shown to affect the adaptation of glass ceramic veneers. Al-Dwairi et al found significant differences in absolute marginal gap for pressed veneers manually delivered with digital pressure, luted using different resin cements, especially in the incisal area.[8] For luting in the present study, a blue resin was chosen to best facilitate visualization of the marginal gap during evaluation of the specimens. Use of a different resin with different handling properties for cementation could have resulted in different

TABLE 1 Marginal adaptation: mean values± *SD* (μm)

	Group 1 (3D printed)	Group 2 (manually waxed)	*p*-value
Mesial	55.2 ± 34.8	71.5 ± 44.7	0.242
Distal	44.5 ± 21.2	52.4 ± 25.7	0.32
Cervical	38.1 ± 22.8	38.2 ± 19.3	0.97
Palatal	23.7 ± 9.6	40.3 ± 21.3	0.001
Absolute marginal gap	40.37 ± 11.75	50.63 ± 16.99	0.51

TABLE 2 Internal adaptation: mean values ± standard deviation (μm)

	Group 1 (3D printed)	Group 2 (manually waxed)	*p*-value
Cervical	62.2 ± 19.2	69.6 ± 15.8	0.122
Midfacial	62.4 ± 23.0	69.3 ± 18.3	0.379
Incisal	59.0 ± 19.0	65.2 ± 16.7	0.213
Absolute marginal gap	61.21 ± 18.2	68.03 ± 14.07	0.178

values than those obtained in this study. Since different choices in managing the cement gap and luting resin could have led to different results, they should be considered possible limitations of this study.

Research involving marginal adaptation and restoration fit is complicated and heterogeneous due to a combination of factors, including what areas are measured, how many measurements are made, and what method is used for data collection.[18] While some authors measure horizontal and vertical adaptation, others combine all measurements into an absolute marginal gap value.[8] In this study, vertical adaptation was evaluated in the cervical, mesial, distal and incisal areas to best simulate a typical clinical evaluation that a dentist would perform prior to bonding a porcelain veneer. There exist several methods of measuring marginal fit, including microphotography, light or electronic microscopy, digital scanning and subsequent virtual 3D analysis, and the use of micro-CT technology.[18] This investigation used a direct measurement method and an optical stereo microscope, similar to several other studies evaluating the adaptation of dental restorations.[18,19] While the evaluator in this study was trained in the use of a stereo microscope and how to make measurements, they had no previous calibration in measurement taking, which could be considered another limitation of this investigation.

In spite of the possible limitations of this study, the values obtained for marginal and internal adaptation of both groups are similar to other published studies. Tugcu et al[7] reported an average marginal adaptation of cemented pressed lithium disilicate veneers of 47.33 μm, as compared to the range of 40.37 to 50.63 μm in this study. When evaluating internal adaptation, Al-Dwairi et al[8] found mean internal gap values could reach 62.5 μm depending on which resin cement was used, which is very close to the range of 61.21–68.03 μm found in the current study.

Until now there have been relatively few studies evaluating the fit of glass ceramic restorations made from the pressing of 3D printed castable resins. To the authors' knowledge, this is the first to evaluate the use of 3D printed patterns for veneers. Homsy et al have found that for pressed lithium disilicate inlays, those fabricated using a 3D printed technique fit as well[20] or better[21] than conventionally waxed and pressed inlays. This is consistent with the findings of this study, which found no significant differences with veneer restorations. In contrast for onlay restorations, Revilla-León and colleagues[22] found the conventional wax and press technique to provide better adapted restorations than ones fabricated with a castable resin. Eftekhar Ashtiani et al[23] also concluded that for pressed molar onlay restorations that the conventional wax and press method yielded more accurately fitting restorations than the 3D printing method, and that the discrepancy was mainly due to the 3D printer. This is a questionable interpretation of their results, however, as they found no significant difference in absolute marginal discrepancy between the conventional method restorations and restorations fabricated using an intraoral scanner and 3D printed castable resin. The fact that the conventional method and the other group studied using a conventional impression, laboratory scanner and 3D printed specimens did show significant differences in marginal fit is therefore much more likely due to differences in data acquisition and transfer, and the processing of data in different CAD softwares, not because of the 3D printing process.

It is important to note that the heterogeneity across currently available studies in materials and methods and the difficulty in sometimes drawing appropriate conclusions highlights how many variables could influence the final adaptation of a restoration. These include the type of preparation to be restored, the method of data acquisition (physical, digital or a combination), the method of model management if done conventionally, and the scanner, CAD software, printer and castable resin used if done digitally. Further studies are needed to investigate how each of these variables could be optimized to provide ideal marginal and internal fit for pressed glass ceramic restorations.

6 | CONCLUSION

Within the limitations of this study, there was no difference in the marginal fit and internal adaptation of pressed lithium disilicate veneers fabricated by a conventional wax and press method or a 3D printed castable resin method.

ACKNOWLEDGMENTS

A special thanks to Carlos Martinez and Adriana Jaramillo Echeverry, assistant professors, Institución Universitaria Colegios de Colombia, Centro de Investigación Colegio Odontológico - Cali, for statistical support.

CONFLICT OF INTEREST

The authors do not have any financial interest in the companies whose materials are included in this article.

AUTHOR CONTRIBUTIONS

Lizeth Guachetá and Rafael Murgueitio contributed to study conception, design and execution, data acquisition, analysis and interpretation, drafted and critically revised the manuscript. Julián A. Tamayo Cardona contributed to study design, data analysis and interpretation. Clinton D. Stevens contributed to data analysis and interpretation, drafted and critically revised the manuscript. All authors gave final approval of the manuscript and agree to be accountable for all aspects of the work.

DATA AVAILABILITY STATEMENT

The data sets used during the current study are available from the corresponding author on reasonable request.

ORCID

Clinton D. Stevens https://orcid.org/0000-0002-4325-5017

REFERENCES

1. Beier US, Kapferer I, Burtscher D, Dumfahrt H. Clinical performance of porcelain laminate veneers for up to 20 years. *Int J Prosthodont*. 2012;25(1):79-85.
2. Gresnigt MMM, Cune MS, Schuitemaker J, et al. Performance of ceramic laminate veneers with immediate dentine sealing: an 11 year prospective clinical trial. *Dent Mater*. 2019;35(7):1042-1052.
3. Layton DM, Clarke M, Walton TR. A systematic review and meta-analysis of the survival of feldspathic porcelain veneers over 5 and 10 years. *Int J Prosthodont*. 2012;25(6):590-603.
4. Layton DM, Clarke M. A systematic review and meta-analysis of the survival of non-feldspathic porcelain veneers over 5 and 10 years. *Int J Prosthodont*. 2013;26(2):111-124.
5. Morimoto S, Albanesi RB, Sesma N, Agra C, Braga M. Main clinical outcomes of feldspathic porcelain and glass-ceramic laminate veneers: a systematic review and meta-analysis of survival and complication rates. *Int J Prosthodont*. 2016;29(1):38-49.
6. Aboushelib MN, Elmahy WA, Ghazy MH. Internal adaptation, marginal accuracy and microleakage of a pressable versus a machinable ceramic laminate veneers. *J Dent*. 2012;40(8):670-677.
7. Tuğcu E, Vanlioğlu B, Özkan YK, Aslan YU. Marginal adaptation and fracture resistance of lithium Disilicate laminate veneers on teeth with different preparation depths. *Int J Periodontics Restorative Dent*. 2018;38(Suppl):s87–s95.
8. Al-Dwairi ZN, Alkhatatbeh RM, Baba NZ, Goodacre CJ. A comparison of the marginal and internal fit of porcelain laminate veneers fabricated by pressing and CAD-CAM milling and cemented with 2 different resin cements. *J Prosthet Dent*. 2019;121(3):470-476.
9. Fasbinder DJ. Digital dentistry: innovation for restorative treatment. *Compend Contin Educ Dent*. 2010;31:2-11.
10. Van Noort R. The future of dental devices is digital. *Dent Mater*. 2012;28(1):3-12.
11. Joda T, Ferrari M, Gallucci GO, et al. Digital technology in fixed implant prosthodontics. *Periodontol. 2000*. 2016;73(1):178-192.
12. Bosch G, Ender A, Mehl A. A 3-dimensional accuracy analysis of chairside CAD/CAM milling processes. *J Prosthet Dent*. 2014;112(6):1425-1431.
13. Guess PC, Vagopoulou T, Zhang Y, et al. Marginal and internal fit of heat pressed versus CAD/CAM fabricated all-ceramic onlays after exposure to thermo- mechanical fatigue. *J Dent*. 2014;42(2):199-209.
14. Tahayeri A, Morgan M, Fugolin AP, et al. 3D printed versus conventionally cured provisional crown and bridge dental materials. *Dent Mater*. 2018;34(2):192-200.
15. Dawood A, Marti BM, Sauret-Jackson V, Darwood A. 3D printing in dentistry. *Br Dent J*. 2015;219(11):521-529.
16. Alharbi N, Wismeijer D, Osman RB. Additive manufacturing techniques in prosthodontics: where do we currently stand? A critical review. *Int J Prosthodont*. 2017;30(5):474-484.
17. Magne P, Belser U. *Bonded Porcelain Restorations in the Anterior Dentition: A Biomimetic Approach*. 1st ed. Quintessence Pub. Co: Chicago, IL; 2002.
18. Boitelle P, Mawussi B, Tapie L, Fromentin O. A systematic review of CAD/CAM fit restoration evaluations. *J Oral Rehabil*. 2014;41(11):853-874.
19. Afify A, Haney S, Verrett R, Mansueto M, Cray J, Johnson R. Marginal discrepancy of noble metal-ceramic fixed dental prosthesis frameworks fabricated by conventional and digital technologies. *J Prosthet Dent*. 2018;119(2):307.e1–307.e7.
20. Homsy FR, Özcan M, Khoury M, Majzoub ZAK. Marginal and internal fit of pressed lithium disilicate inlays fabricated with milling, 3D printing, and conventional technologies. *J Prosthet Dent*. 2018;119(5):783-790.
21. Homsy FR, Özcan M, Khoury M, Majzoub ZAK. Comparison of fit accuracy of pressed lithium disilicate inlays fabricated from wax or resin patterns with conventional and CAD-CAM technologies. *J Prosthet Dent*. 2018;120(4):530-536.
22. Revilla-León M, Olea-Vielba M, Esteso-Saiz A, Martínez-Klemm I, Özcan M. Marginal and internal gap of handmade, milled and 3D printed additive manufactured patterns for pressed lithium Disilicate Onlay restorations. *Eur J Prosthodont Restor Dent*. 2018;26(1):31-38.
23. Eftekhar Ashtiani R, Nasiri Khanlar L, Mahshid M, Moshaverinia A. Comparison of dimensional accuracy of conventionally and digitally manufactured intracoronal restorations. *J Prosthet Dent*. 2018;119(2):233-238.

How to cite this article: Guachetá L, Stevens CD, Tamayo Cardona JA, Murgueitio R. Comparison of marginal and internal fit of pressed lithium disilicate veneers fabricated via a manual waxing technique versus a 3D printed technique. *J Esthet Restor Dent*. 2020;1–6. https://doi.org/10.1111/jerd.12675