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Review Article

The Comparison between the Traditional and Injection Molding Technique in the Construction of Removable Dentures-Systemic Review

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Abstract

Introduction: Although the high development of the implantology field, the risks of the surgical procedures, possible complications and the high cost of the implant-prosthetic restorations have made that the removable dentures treatment are still an important option treatment for edentulous patients. The aim of our study was to evaluate the existing literature regarding the patient's satisfaction regarding two different types of dentures: dentures constructed with the traditional compression molding technique and dentures constructed with the injection molding technique.

Methodology: A search in PubMed was done first with the following words: injection And molding And denture. 143 results were found. A second search was done with the following key words: Ivoclar And dentures. 54 results were identified. A third search was done with the words: processing And denture And comparison, from which 322 data resulted. The fourth search was done with the key words: denture And satisfaction. 2033 results were found.

Results and Conclusion: Based on the evaluation of the current literature there is no data in the patient satisfaction term related with the two different processing techniques of the removable dentures. Further studies are encouraged to determine the advantages and disadvantages of each method, especially in the patient satisfaction term.

Introduction

Edentulism is still an important and complex problem, especially in the developing countries [1-3]. The prosthetic rehabilitation of edentulous patients is still a challenge, especially considering the risks of the surgical procedures during implant placement and the high cost of the prosthetic restorations and implants [4]. The success of the removable dentures is related to the ability of the patients to adapt to the new dentures, which is closely linked with the denture quality [5]. The most used material for the construction of the removable denture base is heat cured acrylic resin [6]. One of the main disadvantages of Polymethyl methacrylate is the shrinkage process, which occur during and after the polymerization process. The range of resin shrinkage varies from 0.45 - 0.9% [7,8]. The dimensional change that occurs during resin polymerization has consequences on the retention and stability of dentures [9]. The compression molding technique was used around 80 years ago [10]. Different techniques, materials have been used since then to overcome resin shrinkage, including the remounting technique of the casts [11-13]. Vig [14] created a postpalatal extension to reduce the frontal migration of the article teeth in the processing technique. Ristau [15] used the Ristau post dam to reduce the postpalatal separation. One of the techniques used to reduce resin shrinkage was proposed by Pryor, where the resin is injected under pressure by replacing so the empty space created from resin shrinkage [16,17]. Ivoclar developed a resin injection technique in 1970. From then, several companies have developed different injection techniques. Anyway, there is a lack of information regarding the comparison of the two processing techniques in terms of patient satisfaction. This is the reason our review was focused on analyzing the current literature regarding the comparison of the two processing techniques for the construction of removable dentures.

Methodology and Results

A search in PubMed, for the data from 1 January 1990 until January 2023 was done. The first search was done with the following words: injection And molding And denture. 143 results were found. A second search was done with the following key words: Ivoclar And dentures. 54 results were identified. A third search was done with the words: processing And denture And comparison, from which 322 data resulted. The fourth search was done with the key words: denture And satisfaction. 2033 results were found. Abstracts and titles were analyzed and evaluated about the inclusion criteria. The abstracts that were more similar to our search, the respective full articles were analyzed. Each of them was analyzed for the following criteria: in vivo studies, comparison between dentures constructed with the compression molding technique and injection molding technique. The articles that compared dentures constructed with two different processing techniques were evaluated. The inclusion criteria were as follow: in vivo studies, which included patients, articles published between January 1990 and January 2023 were included. Exclusion criteria: all studies in vitro were excluded, the studies that did not include comparison of the processing techniques were excluded, articles published before 1990 were excluded. After the screening of the records, three articles matched with our search. According to Arafa, dentures constructed from chrome cobalt demonstrated higher dimension stability compared to denture bases constructed from acrylic resin with both techniques: compression and injection molding technique [18]. According to Chintalacheruvu, the injection molding technique showed fewer processing mistakes compared to the compression molding technique [19]. While, according to Chalapathi dentures constructed by injection molding method showed higher retention, followed by the anchored technique, and the least retentive was the traditional molding technique [20].

Charter Nr. 1. Flowchart of the data search

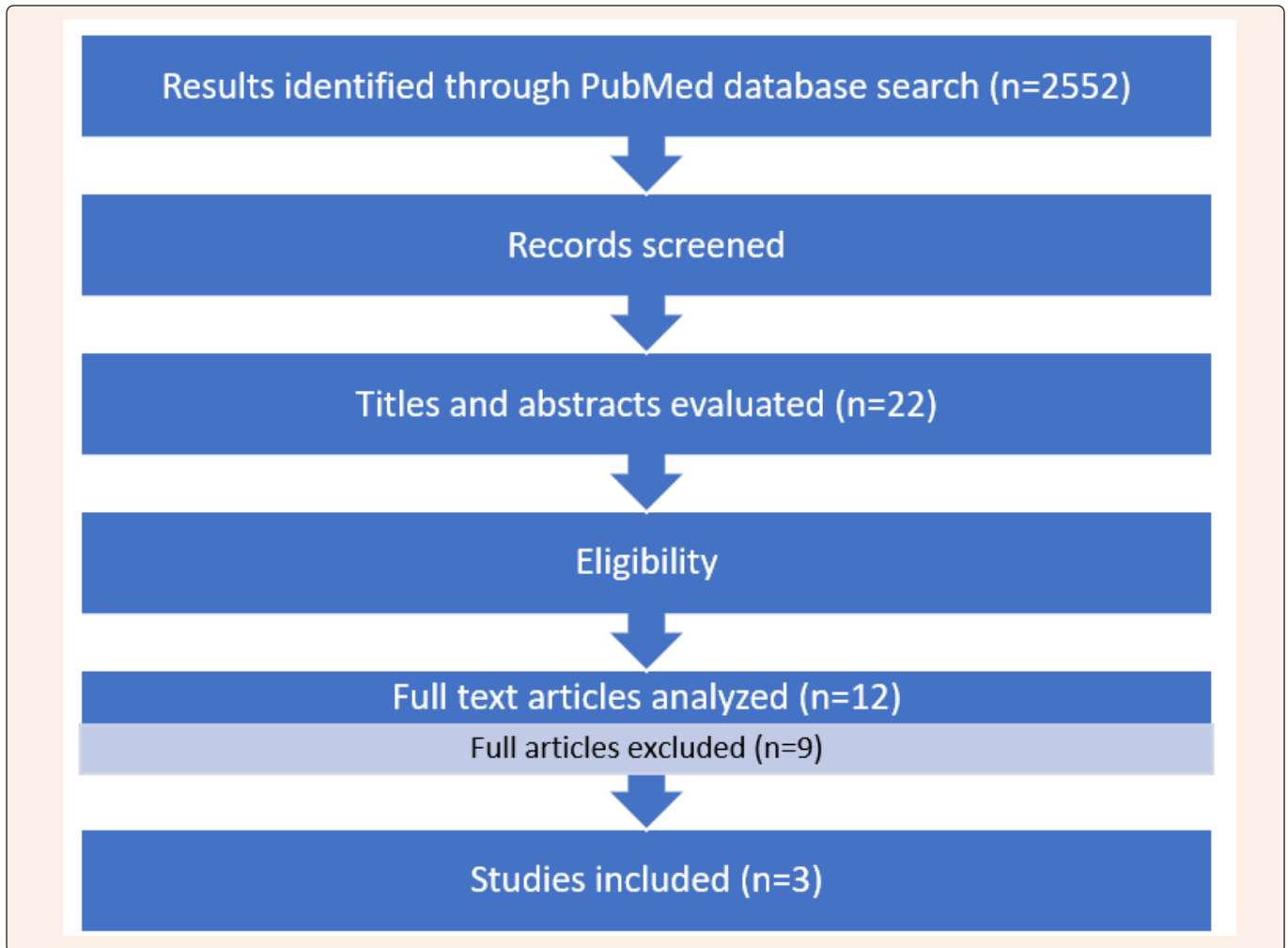


Table 1: The clinical articles that compare dentures constructed with the injection molding technique vs compression molding technique.

Year	Title	Authors	Processing techniques	Studied Characteristics	Conclusions
2016	Effect of Different Denture Base Materials and Changed Mouth Temperature on Dimensional Stability of Complete Dentures.	Arafa KA.	Cobalt chrome metallic base; heat curing acrylic resin constructed by injection molding technique; and denture bases constructed by conventional heat curing acrylic resin. 90 patients.	Dimensional stability	Cobalt chrome metallic denture base demonstrated higher dimension stability compared to denture bases fabricated of acrylic resin but it was more affected by altered mouth temperature.
2017	Evaluation of Three Different Processing Techniques in the Fabrication of Complete Dentures.	Chintalacheruvu VK, Balraj RU, Putchala LS, Pachalla S.	Compression molding and injection molding using pre-polymerized resin and unpolymerized resin. 18 patients.	The accuracy of processing techniques through number of occlusal interferences and increase in vertical dimension after denture processing.	Injection molding techniques showed less processing errors as compared to compression molding technique with statistical significance.
2017	Retention of denture bases fabricated by three different processing techniques - An in vivo study.	Chalapathi Kumar VH, Surapaneni H, Ravikiran V, Chandra BS, Balusu S, Reddy VN.	A=Conventional processing technique, B=Anchored processing technique, C=Injection molding technique. 10 patients	Retention	Denture bases obtained by injection molding polymerization technique exhibited maximum retention, followed by anchored technique, and least retention was seen in conventional molding technique.

OHRQoL have been widely used to evaluate the impact of edentulousness and prosthetic rehabilitation on the life of edentulous individuals [21,22]. Some of these instruments



were used to measure the changes in OHRQoL, and patient satisfaction before and after denture relining [23] or denture replacement [24,25] and there were differences in the findings of these studies regarding the influence of denture replacement on the OHRQoL and patient's satisfaction.

Discussion

The injection molding technique has proved its advantages during the years: precise adaptation of acrylics to master cast, continuous compensation of acrylic shrinkage due to the flow of acrylic resin and pressure during the whole polymerization process, better physical qualities of denture, lower porosity and high homogeneity. Patient's comfort derives by the precise fit of the acrylic dentures as well as minimum level of residual monomer. Quality criteria for the denture success, do not target patient satisfaction on treatment results. Recent studies pay attention on a different focus of the medical success treatment from "need-based to desire-based" [26]. Dentists and patients evaluate in different ways the success of dentures [27]. Sghaireen and Al-Omiri demonstrated that 10 percent of the patients were not satisfied with the dentures apparently constructed in a proper way [28]. As a result, clinical success can be evaluated based on the patient satisfaction. Satisfaction of the patients regarding different parameters of dentures have been positively linked to the oral health related quality of life of the patients (OHRQoL) [28-30]. Oral health related quality of life (OHRQoL) has been used as an appropriate method to evaluate removable dentures success. A questionnaire has been used in several studies in order to rate the satisfaction of the patients [31,32]. Oral Health Impact Profile (OHIP) is the questionnaire which has been successful in determining the prosthodontic restorations success [33]. Original (49-item) OHIP was first used by Locker and Slade. It contained seven parameters: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap [34-36]. Different parameters such as gender, age, and education level do also have an effect on patient satisfaction [37]. Patient satisfaction is a multifactorial concept, as it is the patient's perception of dental treatment [38]. Our study focused on the existing literature over clinical studies that compared the two different processing techniques. There were only three articles found that fulfilled our criteria.

Conclusion

The injection molding technique has several advantages compared to the compression molding technique. Although, there is no sufficient scientific evidence to support the superiority of the technique compared to the traditional molding method in clinical studies related to patient satisfaction. Further research should be done to evaluate the comparison between the two types of denture processing related to patient satisfaction and patient quality of life.

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References

- Polzer I, Schimmel M, Müller F, Biffar R (2010) Edentulism as part of the general health problems of elderly adults. *Int Dent J* 60(3): 143-155.
- Haikola B, Oikarinen K, Söderholm AL, Remes LT, Sipilä K (2008) Prevalence of edentulousness and related factors among elderly Finns. *J Oral Rehabil* 35(11): 827-835.
- Nazziel HE, Hersek N, Ozbek M, Karaagaoglu E (2012) Oral health status in a group of the elderly population residing at home. *Gerodontology* 29(2): e761-e767.
- Pisani MX, Malheiros AL, Albino KL, de Souza RF, Paranhos HF, et al. (2012) Oral health related quality of life of edentulous patients after denture relining with a silicone-based soft liner. *Gerodontology* 29(2): e474-80.
- Farias NA, Carreiro A (2015) Changes in patient satisfaction and masticatory efficiency during adaptation to new dentures. *Compendium of Continuing Education in Dentistry* 36(3): 174-177.
- Parvizi A, Lindquist T, Schneider R, Williamson D, Boyer D, et al. (2004) Comparison of the dimensional accuracy of injection-molded denture base materials to that of conventional pressure-pack acrylic resin. *J Prosthodont* 13(2): 83-89.
- Kawara M, Komiyama O, Kimoto S, Kobayashi N, Kobayashi K, et al. (1998) Distortion behavior of heat-activated acrylic denture-base resin in conventional and long, low-temperature processing methods. *J Dent Res* 77(6): 1446-1453.
- Parvizi A, Lindquist T, Schneider R, Williamson D, Boyer D, et al. (2004) Comparison of the dimensional accuracy of injection-molded denture base materials to that of conventional pressure-pack acrylic resin. *J Prosthodont* 13(2): 83-89.
- Jacob RF (1998) The traditional therapeutic paradigm: complete denture therapy. *J Prosthet Dent* 79(1): 6-13.
- Darvell BW, Clark RK (2000) The physical mechanisms of complete denture retention. *Br Dent J* 189(5): 248-252.
- Jacobson TE, Krol AJ (1983) A contemporary review of the factors involved in complete denture retention, stability, and support. Part I: retention. *J Prosthet Dent* 49(1): 515.
- Stober T, Danner D, Lehmann F, Sech AC, Rammelsberg P, et al. (2012) Association between patient satisfaction with complete dentures and oral health related quality of life: two-year longitudinal assessment. *Clinical Oral Investigations* 16(1): 313-318.
- Huggett R, Zissis A, Harrison A, Dennis A (1992) Dimensional accuracy and stability of acrylic resin denture bases. *J Prosthet Dent* 68(4): 634-640.
- Sghaireen MG, AL-Omiri MK (2016) Relationship between impact of maxillary anterior fixed prosthodontic rehabilitation on daily living, satisfaction, and personality profiles. *Journal of Prosthetic Dentistry* 115(2): 170-176.
- Vig RG (1975) Method of reducing the shifting of teeth in denture processing. *J Prosthet Dent* 33: 80-84.
- Ristau B (1980) Creating the posterior palatal seal. *Quintessence Dent Technol* 4(1): 9-11.
- Pryor WJ (1942) Injection molding of plastics for dentures. *J Am Dent Assoc* 29(11): 1400-1408.
- Arafa KA (2016) Effect of Different Denture Base Materials and Changed Mouth Temperature on Dimensional Stability of Complete Dentures. *Int J Dent* 2016: 7085063.
- Chintalacheruvu VK, Balraj RU, Putchala LS, Pachalla S (2017) Evaluation of Three Different Processing Techniques in the Fabrication of Complete Dentures. *J Int Soc Prev Community Dent* 7(Suppl 1): S18-S23.
- Chalapathi KVH, Surapaneni H, Ravikiran V, Chandra BS, Balusu S, et al. (2016) Retention of denture bases fabricated by three different processing techniques - An in vivo study. *J Int Soc Prev Community Dent* 6(3): 245-250.
- Albaker AM (2013) The oral health-related quality of life in edentulous patients treated with conventional complete dentures. *Gerodontology* 30(1): 61-66.
- Ellis JS, Pelekis ND, Thomason JM (2007) Conventional Rehabilitation of Edentulous Patients: The Impact on Oral Health Related Quality of Life and Patient Satisfaction. *J Prosthodont* 16(1): 37-42.
- Pisani MX, Malheiros SL, Albino KL, de Souza RF, Paranhos Hde F, et al. (2012) Oral health related quality of life of edentulous patients after denture relining with a silicone-based soft liner. *Gerodontology* 29(2): e474-80.
- Bennadi D, Reddy CV (2013) Oral health related quality of life. *J Int Soc Prev Community Dent* 3(1): 1-6.
- Viola AP, Takamiya AS, Monteiro DR, Barbosa DB (2013) Oral health-related quality of life and satisfaction before and after treatment with complete dentures in a Dental School in Brazil. *J Prosthodont Res* 57(1): 36-41.
- Koshino H, Hirai T, Ishijima T, Tsukagoshi H, Ishigami T, et al. (2006) Quality of life and masticatory function in denture wearers. *Journal of Oral Rehabilitation* 33(5): 323-329.
- John MT, Slade GD, Szentpetery A, Setz JM (2004) Oral health-related quality of life in patients treated with fixed, removable, and complete dentures 1 month and 6 to 12 months after treatment. *International Journal of Prosthodontics* 17(5): 503-511.
- Wafaa R (2019) Effect on patient satisfaction of mandibular denture tooth arrangement in the neutral zone. *Journal of Prosthetic Dentistry* 121(3): 440.
- Slade GD, Spencer AJ (1994) Development and evaluation of the oral health impact profile. *Community Dental Health* 11(1): 3-11.



30. Fernandes MJ, Ruta DA, Ogden GR, Pitts NB, Ogston SA (2006) Assessing oral health-related quality of life in general dental practice in Scotland: validation of the OHIP14. *Community Dentistry and Oral Epidemiology* 34(1): 53-62.
31. Kress GC (1988) Patient satisfaction with dental care. *Dent Clin North Am* 32(4): 791-802.
32. Yamalik N (2005) Dentist patient relationship and quality care 1. Introduction. *Int Dent J* 55(2): 110-112.
33. Grieder A (1973) Psychologic aspects of prosthodontics. *J Prosthet Dent* 30(5): 736-744.
34. Sondell K, Söderfeldt B, Palmqvist S (1998) A method for communication analysis in prosthodontics. *Acta Odontol Scand* 56(1): 48-56.
35. Akarslan ZZ, Sadik B, Erten H, Karabulut E (2009) Dental esthetic satisfaction, received and desired dental treatments for improvement of esthetics. *Indian J Dent Res* 20(2): 195-200.
36. Hakestam U, Söderfeldt B, Rydén O, Glantz E, Glantz PO (1997) Dimensions of satisfaction among prosthodontic patients. *Eur J Prosthodont Restor Dent* 5(3):111-117.
37. Fueki K, Yoshida KE, Inamochi Y, Wakabayashi N (2020) Patient satisfaction and preference with thermoplastic resin removable partial dentures: a randomised cross-over trial. *J Prosthodont Res* 64(1): 20-25.
38. Torres SC, Montoya SV, Torres LD, Gutierrez PJJ, Jimenez CE (2018) Satisfaction in complete denture wearers with and without adhesives: A randomized, crossover, double-blind clinical trial. *J Clin Exp Dent* 10: e585-590.

