

# *Traditional versus simplified impression methods for complete dentures: critical appraisal of evidence*

## *Método tradicional versus simplificado en impresiones para prótesis total removible: evaluación crítica de la evidencia*

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### RESUMEN

**Introducción:** Pese a los avances de la odontología, el fenómeno del envejecimiento de la población ha generado que la cantidad de personas desdentadas totales aún represente una cifra significativa. Los artificios protésicos implanto-asistidos constituyen, en la mayoría de los casos, la mejor alternativa rehabilitadora. Sin embargo, la variable económica surge como el principal impedimento para que los pacientes accedan a este recurso, y por este motivo, mantienen la prótesis total removible como una opción terapéutica. Para su confección, el método tradicional indica la necesidad de tomar dos impresiones: una preliminar y una definitiva o funcional. El método simplificado, confecciona la prótesis a partir de la primera impresión, obtenida con cubeta de stock. **Objetivo:** Revisar evidencia científica que compara ambos métodos en cuanto a las variables de: satisfacción del paciente, calidad clínica, rendimiento y capacidad masticatoria. **Resultados:** No se verifican ventajas a favor del método tradicional en relación a las variables estudiadas. **Conclusiones:** En concordancia con la información recabada, los resultados clínicos obtenidos mediante el método tradicional de toma de impresiones para prótesis totales no son significativamente superiores a los del método simplificado en relación a calidad clínica, satisfacción del paciente, rendimiento y capacidad masticatoria.

### PALABRAS CLAVE

Prótesis removible; Prótesis total; Técnica de impresión dental; Satisfacción del paciente; Práctica basada en la evidencia.

### ABSTRACT

**Introduction:** In spite of the great advances in dentistry, aging populations imply that there are still significant numbers of edentulous people worldwide. In most cases, implant-assisted prosthetic rehabilitation is the best solution. However, economic issues constrain access to this therapeutic approach, meaning that conventional removable prosthetics continue to be the most frequent treatment. In the removable denture making process, the so-called traditional method has been widely taught and used. It involves taking two impressions: a preliminary one followed by a definitive one (or functional). The simplified method constructs the prosthesis directly from the first impression obtained with a stock tray, without the need of a second impression. **Purpose:** To review the scientific evidence comparing both methods in terms of patient satisfaction, clinical quality, and masticatory performance and capacity. **Results:** No advantages have been found in favor of the traditional method regarding the four variables selected. **Conclusions:** According to the available information, the traditional method of taking impressions for complete removable dental prostheses does not provide significantly superior clinical results when compared to those obtained using the simplified method in terms of clinical quality, patient satisfaction, performance and masticatory capacity.

### KEYWORDS

Removable denture; complete denture; dental impression technique; patient satisfaction; evidence-based practice.

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## INTRODUCTION

Over the recent decades, there has been an ongoing worldwide trend towards increased life expectancy both at birth and as a percentage increase in the older adult population (Balachandran et al., 2020). Internationally, there are reports that in some Balkan countries complete edentulism can be as high as 78% of the adult population (Petersen et al., 2005). In Chile, the average tooth loss in 65-74 year-old population currently stands at 15.8 teeth per person; with 69.8% of them being partially edentulous and 29.1% being completely edentulous (Chilean Ministry of Health (MINSAL), 2017).

Because financial constraints and systemic conditions faced by some patients contraindicate the use of dental implants (Hwang & Wang, 2006), complete removable dental prostheses continue to be a suitable therapeutic alternative (Carlsson, 2010). A critical step in the construction of these devices is the impression of the edentulous ridges. Several techniques (Rao et al., 2010) have been proposed for this purpose; though there are still a number of controversies in this regard (Petropoulos & Rashedi, 2003). Most dental schools and pertinent texts (Petropoulos & Rashedi, 2003) teach and describe the so-called “traditional method” (Rao et al., 2010), which advises taking a definitive open-mouth impression, using a custom tray made from an initial impression. Additionally, relief in the stress bear-

ing areas should be fashioned, as well as peripheral extensions and border molding (dual impression technique - Boucher technique or its modifications - associated with the selective pressure philosophy) (Petropoulos & Rashedi, 2003; Rao et al., 2010). The above-mentioned method claims that this technique provides better clinical results and greater patient satisfaction as compared to a “simplified method” in which a prosthesis is created from the preliminary impression taken with a stock tray (Heydecke et al., 2008). Its proponents maintain that there is evidence indicating that this technique saves time and cost without affecting clinical results or patient satisfaction (Duncan & Taylor, 2001; Jagger, 2006).

The “patient satisfaction” variable is related to the his/her perception of the treatment, and is measured along a rating scale. The most widely used scales are the subjective Oral Health-related Quality of Life (OHRQoL) (Kawai et al., 2010; Ye Ye & Sun, 2017; Albuquerque et al., 2020) and the Oral Health Impact Profile (OHIP) (Ye Ye & Sun, 2017; Albuquerque et al., 2020; Nuñez et al., 2013) which is based on functional limitations, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Another relevant variable is the “clinical quality”, understood as the dentist’s clinical criteria regarding the prosthesis (Ye Ye & Sun, 2017) and its fulfillment of retention, support and stability requirements. Other variables assessed using question-

naires with binary responses and numerical rating scales (Schott et al., 2010; Cunha et al., 2013) are “masticatory performance,” defined as the objective measurement of the degree of grinding to which food can be subjected in an established number of masticatory cycles (Schott et al., 2010; Cunha et al., 2013); and “masticatory capacity,” a subjective parameter which measures the individual’s assessment of their mastication (Schott et al., 2010).

The purpose of this review is to explore the scientific evidence reported in specialized publications comparing the results of the “traditional” (functional impression) and “simplified” methods used in making complete removable dental prostheses, considering patient satisfaction, clinical quality, performance, and masticatory capacity, among others.

## MATERIALS AND METHODS

MEDLINE databases (MESH criteria) were used to conduct two searches. The first search was conducted using the following combination of keywords and search operators: “impression techniques” OR “dental impression” AND “traditional method” AND “simplified method” and their corresponding terms in Spanish, i.e., “*técnica de impresión*” OR “*impresión dental*” AND “*método tradicional*” AND “*método simplificado*”. The second search employed the combined terms “impression techniques” OR “dental impression” AND “selec-

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tive pressure” AND “mucostatic,” and the corresponding terms in Spanish.

Four criteria were defined for inclusion in this study: (a) that the studies had been published between 2000 and the first quarter of 2020 (date on which the search was conducted); (b) that they were randomized clinical trials, critical reviews, or systematic reviews comparing both methods regarding the impression-taking process for making a complete removable dental prosthesis; (c) that both the abstract and the article were available online; and (d) that they were written in English and/or Spanish.

The lead author, who conducted the searches, selected the articles based on a review of their abstracts using a checklist of inclusion and exclusion criteria. A summary table of the selected articles was generated in chronological order (see Table 1). As neither a statistical analysis of the results of the selected articles nor an exhaustive search of those studies not available online was performed, this paper is classified as a critical appraisal of evidence.

## RESULTS

A total of 23 publications, including critical or systematic reviews and randomized clinical trials, met all of the inclusion criteria (see Table 1). In 16 randomized clinical trials (Duncan & Taylor, 2001; Kawai et al., 2005; Jagger, 2006; Heydecke et al., 2008; Kawai et al., 2010; Galaz et al., 2012; Núñez, 2013; Cunha et al., 2013; Omar et al., 2013; Jo et al., 2015; Mengatto et al., 2017; Ceruti et al., 2017; Kawai et al., 2018; Lira-Oetiker et al., 2018; Tripathi et al., 2019; Albuquerque et al., 2020), involving more than 800 patients, no significant differences were reported in terms of masticatory performance controlled at 3 months

(Cunha et al., 2013; Albuquerque et al., 2020), 6 months (Mengatto et al., 2017; Albuquerque et al., 2020), and 10 years post-treatment (Kawai et al., 2018); masticatory capacity at 3 months (Heydecke et al., 2008; Albuquerque et al., 2020) and 6 months (Mengatto et al., 2017; Albuquerque et al., 2020); the same was true for patient satisfaction assessed at 1 month (Núñez, 2013; Omar et al., 2013; Jo et al., 2015), 3 months (Jagger, 2006; Kawai et al., 2005; Omar et al., 2013; Albuquerque et al., 2020), 6 months (Kawai et al., 2005; Jagger, 2006; Kawai et al., 2010; Núñez, 2013; Lira-Oetiker et al., 2018; Albuquerque et al., 2020) and 10 years (Kawai et al., 2018); and also with respect to clinical quality assessed at 3 months (Kawai et al., 2005; Omar et al., 2013) and 6 months (Kawai et al., 2005; Kawai et al., 2010; Lira-Oetiker et al., 2018) respectively. By comparison, the favorable results for the “simplified method” include the following: fewer clinical sessions required for manufacturing the prosthetic device (Duncan & Taylor, 2001; Ceruti et al., 2017), without undermining retention (Galaz et al., 2012); nor increasing the number of subsequent check-ups (Duncan & Taylor, 2001; Albuquerque et al., 2020); overall satisfaction, stability and aesthetic appearance at 3 months post-installation (Heydecke et al., 2008), and less resorption of the mandibular residual ridge in individuals with decreased bone density, as assessed by CT scan, one year after installation of the prostheses (Tripathi et al., 2019).

One article reported that for the 24 subjects evaluated the patient satisfaction rating was higher for the traditional method (Jo et al., 2015).

The selected critical reviews (Carlsson, 2009; Carlsson, 2010; Carlsson et al., 2013; Uram-Tuculescu & Constantinescu, 2017; Jayara-

man et al., 2018) and systematic reviews (Regis et al., 2016; Ye Ye & Sun, 2017), reported that there is no evidence to support that one impression technique provides better results than the other in the long-term follow-ups (Carlsson, 2009; Jayaraman et al., 2018), nor significant differences between both methods in terms of: performance and masticatory capacity (Regis et al., 2016; Ye Ye & Sun, 2017); patient satisfaction (Carlsson, 2009; Carlsson, 2010; Carlsson et al., 2013; Regis et al., 2016; Ye Ye & Sun, 2017; Uram-Tuculescu & Constantinescu, 2017) and clinical quality (Carlsson, 2009; Carlsson, 2010; Carlsson et al., 2013; Regis et al., 2016; Ye Ye & Sun, 2017; Uram-Tuculescu & Constantinescu, 2017).

## DISCUSSION

The traditional impression method for a complete removable dental prosthesis involves taking two impressions: a preliminary one, generally with irreversible hydrocolloid and a stock impression tray, and following casting creating a model in which an individual tray is made. This tray is then used to record the three-dimensional contours of the denture with a thermoplastic molding compound, followed by a second impression, usually with silicone elastomers or zinquenolic paste (Petropoulos & Rashedi, 2003; Rao et al., 2010; Carlsson et al., 2013; Jo et al., 2015).

However, a so-called simplified method has also been proposed and used, advocating restoring patient functionality and aesthetics, and also optimizing dental care. It postulates the use of the preliminary impression, without need for a second one or assembly in a semi-adjustable articulator (Duncan & Taylor, 2001; Heydecke et al., 2008; Carlsson, 2010; Carlsson et al., 2013; Jo et al., 2015; Ye Ye &

**Table 1: Articles Included**

Author	Year	Type of Study	Methodology	Results
Duncan JP, Taylor TD.	2001	Randomized clinical trial.	Comparison in a randomly divided group of 80 patients, assessing the efficacy of both impression methods.	Simplified method decreased the number of clinical sessions, without increasing the number of subsequent adjustments.
Kawai Y, Murakami H, Shariati B, Klemetti E, Blomfield JV, Billete L.	2005	Randomized clinical trial.	Comparison in a randomly divided group of 122 patients, assessing prosthesis quality, patient satisfaction, comfort, and function between the two methods.	No significant differences were obtained in terms of satisfaction and clinical quality.
Jagger R.	2006	Randomized clinical trial.	Comparison in a randomly divided group of 119 patients, assessing patient satisfaction between the two methods.	No significant differences obtained.
Heydecke G, Vogeler M, Wolkewitz M, Turp JC, Strub JR.	2008	Randomized clinical trial.	Comparison in a group of 20 patients. Each patient received 2 sets of complete removable dental prostheses, each one constructed with a different method, to assess chewing capacity.	Simplified method yields better overall satisfaction, stability, and aesthetic appearance.
Carlsson GE.	2009	Critical Review	Databases used: PubMed, Med-Line. Review of 9 randomized clinical trials.	There is no evidence that one technique or material produces better long-term results than another. No significant differences were obtained in terms of satisfaction and clinical quality.
Carlsson GE.	2010	Critical Review	Databases used: PubMed, Med-Line. 95 articles were included. The text is based on an update of the lecture given at the meeting of the International Association for Dental Research in Barcelona on July 16, 2010.	No significant differences were found between the two methods in terms of prosthesis quality, tissue response and patient satisfaction.
Kawai Y, Murakami H, Takashi Y, Lund JP, Feine JS.	2010	Randomized clinical trial.	Comparison in a randomly divided group of 122 patients, assessing the efficiency (defined as associated costs, patient satisfaction and clinical quality) of both methods in private practice.	No significant differences were obtained in terms of satisfaction and clinical quality.
Galaz S, Miranda F, García O, Acosta H, Carrasco L.	2012	Randomized clinical trial	Comparison in a group of 16 patients, assessing the retention obtained in upper complete removable dental prostheses constructed with alginate and zinquenolic paste impressions.	The impressions taken with alginate had a statistically significant higher retention rate.
Omar R, Al-Tarakemah Y, Akbar J, Al-Awadhi S, Behbehani Y, Lamontagne P.	2013	Randomized clinical trial.	Comparison in a group of 43 patients randomly divided into 4 groups (1: omission of functional impression, 2: omission of functional impression+semi-adjustable articulator use, 3: omission of semi-adjustable articulator use, 4: control group).	No significant differences were obtained in terms of satisfaction and clinical quality.

Cunha TR, Vecchia MP, R. Regis RR, Ribeiro AB, Muglia VA, Mestriner W.	2013	Randomized clinical trial.	Comparison in a group of 39 randomly divided patients, assessing masticatory performance and capacity.	Both groups have similar masticatory behavior.
Carlsson GE, Ortorp A, Omar R.	2013	Critical Review	Databases used: PubMed, Medline, The Cochrane Library. Five relevant randomized clinical trials were included, comparing both methods by assessing clinical quality and patient satisfaction.	No significant differences obtained between both methods.
Nuñez M, Silva D, Barcelos B, Reles C.	2013	Randomized clinical trial.	Comparison in a randomly divided group of 52 patients, assessing quality of life and patient satisfaction.	No significant differences obtained between both methods.
Jo A, Kanazawa M, Sato Y, Iwaki M, Akiba N, Minakuchi S.	2015	Randomized clinical trial.	Comparison in a group of 24 patients randomly divided into 2 groups, assessing patient satisfaction and oral-health-related quality of life.	No significant quality of life difference was obtained. The traditional method was superior in terms of patient satisfaction.
Regis RR, Alves CC, Rocha SS, Negreiros WA, Freitas-Pontes KM.	2016	Sistematic Review.	Databases used: PubMed, MedLine. 16 articles were included.	No significant differences were found in terms of clinical quality, patient satisfaction, and quality of life improvements.
Mengatto CM, Gameiro GH, Brondani M, Owen P, MacEntee MI.	2017	Randomized clinical trial.	Comparison in a group of 20 randomly divided patients, assessing and masticatory performance and capacity.	No significant differences obtained.
Ceruti P, Mobilio N, Bellia E, Borracchini A, Catapano S, Gassino G.	2017	Randomized clinical trial.	Comparison in a randomly divided group of 64 patients, assessing clinical quality and patient satisfaction.	No significant differences obtained between both methods.
Ye Ye, Sun J .	2017	Sistematic Review.	Databases used: MedLine, PubMed, EMBASE. Eleven articles were included, 7 of which were randomized clinical trials.	No significant differences were obtained between the two methods in terms of patient satisfaction, clinical quality and chewing capacity.
Uram-Tuculecu S, Constantinescu M.	2017	Critical Review	Databases used: PubMed, American College of Prosthodontists database and non-indexed sources. Does not specify quantity of items included.	No significant differences were obtained in terms of clinical quality and patient satisfaction.
Kawai Y, Murakami H, Feine JS.	2018	Randomized clinical trial.	Comparison in a randomly divided group of 103 patients, assessing patient satisfaction and masticatory performance at 10 years post-inhalation.	No significant differences obtained between both methods.



Lira-Oetiker M, Seguel-Galdames F, Quero-Vallejos I, Uribe SB.	2018	Randomized clinical trial	Comparison in a randomly divided group of 38 patients, assessing patient satisfaction and clinical quality.	No significant differences obtained between both methods.
Jayaraman S, Singh BP, Ramanathan B, Pazhaniappan P, MacDonald L, Kirubakaran R.	2018	Critical Review	Databases used: Cochrane Library, MedLine, EMBASE. Nine articles were included, 8 of which studied a total of 485 patients.	No significant differences obtained between both methods.
Tripathi A, Singh SV, Aggarwal H, Gupta A.	2019.	Randomized clinical trial.	Comparison of a group of 96 randomly divided patients evaluating bone resorption of the mandibular residual ridge in patients with different bone densities, objectively assessed by means of a CT scan at one year post-installation.	Simplified method generates less bone resorption of the mandibular residual ridge in patients with decreased bone density.
Albuquerque IS, Freitas-Pontes KM, Souza RF, Negreiros WA, Ramos M, Peixoto RF, Regis RR.	2020	Randomized clinical trial.	Comparison in a group of 52 randomly divided patients, assessing mandibular resorption in terms of masticatory performance and capacity, patient satisfaction, and subsequent adjustments.	No significant differences obtained between both methods.

Sun, 2017; Kawai et al., 2018). This procedure offers comparative advantages such as reducing costs, materials, number of clinical sessions and laboratory time, thereby providing access to the treatment for the most disadvantaged population, without sacrificing biofunctional and prosthodontic principles (Duncan & Taylor, 2001; Owen, 2004; Kawai et al., 2005; Cunha et al., 2013; Carlsson et al., 2013). A considerable number of studies report that there are no significant differences between the two methods in terms of patient satisfaction, clinical quality, performance and masticatory capacity, when these variables were controlled for over the short and long term (Duncan & Taylor, 2001; Kawai et al., 2005; Carlsson, 2010; Omar et al., 2013;

Cunha et al., 2013; Ye Ye & Sun, 2017; Mengatto et al., 2107; Ceruti et al., 2017; Kawai et al., 2018; Lira-Oetiker et al., 2018).

Based on the consistency of the evidence presented, the simplified method appears as an acceptable protocol for the manufacturing and quality control of prosthetic devices (Carlsson, 2010; Carlsson & Omar, 2010; Omar et al., 2013; Carlsson et al., 2013).

It seems that the prevailing approach in the literature, undergraduate teaching, and specialized practice as to the need for and the “superiority” of using the traditional method, in detriment of the simplified method, should be reconsidered. While some particu-

lar clinical situations may benefit from the application of the traditional method, the simple and inexpensive one-step procedure - the simplified method - has shown that it fulfills the needs of the vast majority of totally edentulous patients (Petropoulos & Rashedi, 2003; Kawai et al., 2010; Carlsson et al., 2013; Kawai et al., 2018). Regarding the advisability of exclusively teaching the traditional method at the undergraduate level, we suggest to revise the dental curriculum - including the simplified method (Duncan & Taylor, 2001; Kawai et al., 2018; Carlsson et al., 2013), while highlighting the benefits that this change will have providing wider dental coverage, especially for patients from disadvantaged communities.

## CONCLUSIONS

According to the available information, the traditional method of taking impressions for complete removable dental prostheses does not provide significantly superior clinical results when compared to those obtained using the simplified

method in terms of clinical quality, patient satisfaction, performance and masticatory capacity.

Considering the limitations of this study, which arise mainly from the methodology employed, and despite the fact that some special clinical situations may benefit

from other combinations of materials and techniques, the reported scientific evidence supports the appropriateness of the simplified approach in fulfilling the prosthetic needs for the majority of completely edentulous patients. ■■■

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