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Review

A systematic review of studies comparing conventional complete denture and implant retained overdenture

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ABSTRACT

Purpose: Several studies reported better outcomes when restoring edentulous mandible with unsplinted IODs compared to CCDs; however, it is not clear if these outcomes remain when the full literature is considered. The aim of this systematic review is to compare conventional complete dentures (CCDs) to unsplinted implant-retained overdentures (IODs) with regard to efficacy, satisfaction and quality of life.
Study selection: The main question addressed was: How do CCDs compare to unsplinted IODs with regard to efficacy, satisfaction and quality of life? Three databases were electronically searched to identify articles comparing CCD to unsplinted IOD. Twenty-six articles were selected and reviewed in full. Of these selected articles, twenty-five compared CCDs restoring function in both arches to a maxillary CCD opposing a mandibular IOD retained by two unsplinted implants. Only one articles compared a maxillary CCDs to a maxillary IOD.
Results: Outcome measures varied among the studies, including the Oral Health Impact Profile (OHIP), visual analogue scales (VAS), and masticatory performance tests. Overall, IODs were associated with significantly better patient's masticatory performance and quality of life as indicated by Oral Health as Related to Quality of Life (OHRQoL). Mandibular unsplinted IODs were more likely than CCDs to be associated with improved OHRQoL for edentulous patients and were associated with significantly higher ratings of overall satisfaction, comfort, stability, ability to speak and ability to chew.
Conclusions: Results of this systematic review indicate the superiority of IODs retained by two unsplinted mandibular implants when compared to CCDs with regards to efficacy, satisfaction and quality of life.

1. Introduction

Edentulism or complete tooth loss can be due to periodontal disease, abscess formation, trauma, and vertical tooth fracture. Common consequences of tooth loss include progressive alveolar bone resorption and decreased masticatory performance [1]. Edentulism has two major problems disability because it limits a patient's ability to perform two essential tasks in life: speaking and eating, and handicap, because significant changes are needed in order to compensate for the deficiencies [2]. Both disability and handicap have been associated with a negative impact on psychosocial well-being, especially when considering elders [1–3]. Edentulism affects oral and general health in addition to quality of life [3].

Treatment for edentulism includes conventional complete dentures (CCDs), implant-retained overdentures (IODs) and, in some cases, implant supported full arch fixed complete denture prostheses. In the past, the most common treatment for edentulism has been to restore function with complete removable dentures. Due to the fact that, edentulism causes progressive bone

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loss, treatment with CCDs is limited and detrimental changes continue overtime [1–4]. Common problems, especially with mandibular CCDs, include lack of stability and retention, soreness and pain and further loss of function [4].

IODs are an alternative treatment option for edentulism that promises to overcome many of the limitations with CCDs. Studies have compared the use of CCDs to IODs to restore edentulous patients, especially the use of mandibular IODs retained by two unsplinted implants. Indeed, the use of mandibular IODs retained by two unsplinted implants is considered to be the first choice of treatment for edentulous elderly patients who are unsatisfied with CCDs [5]. In general, mandibular IODs may be a preferable option due to several advantages such as; possible decrease resorption of the residual ridges, may improve stability and retention, and possible additional improvement in the patient's quality of life and satisfaction [6–9]. The use of implants has dramatically improved treatment choices for most edentulous patients, but it may not be suitable for all patients particularly in less prosperous countries [10] or for patients who are unable to afford costs associated with this treatment option [11].

Even though the number of studies comparing the two modalities of treatment is extensive, definitive conclusions from these studies are not obvious due to heterogeneous methodological designs and instruments used to assess outcomes. The most commonly documented standardized instrument in the literature was the Oral Health Impact Profile (OHIP) survey [12]. Other methodological approaches were used as ad hoc instruments included; Likert Scale Questionnaire [13], Visual Analogue Scale [13], McGill Patient Satisfaction Questionnaire [14], Denture Satisfaction Questionnaire [15], Denture Complaint Questionnaire [15], and Oral Impacts on Daily Performances [16].

The OHIP questionnaire has acceptability, reliability, and validity pertaining to assessment of Oral Health as Related to Quality of Life (OHRQoL) [12]. Short versions of this instrument with supportive estimates of reliability and validity, such as OHIP-14, OHIP-20 and the OHIP-EDENT, are also considered valuable instruments and present a more succinct battery of questions to evaluate the perceived impact of oral health on subjects' well-being in edentulous patients [17–19]. Most available literature compares the use of CCDs restoring function in both arches to a maxillary CCD opposing a mandibular IOD retained by two implants.

To investigate the available literature evaluating outcomes of CCDs and IODs, a systematic review of literature was conducted to answer a fundamental question: how do CCDs compare to unsplinted IODs with regards to efficacy, satisfaction and quality of life? In this project efficacy was defined as how well the two modalities of treatment impacted (CCDs versus IODs) function [20]. Satisfaction was defined as patient satisfaction with their dentures, and quality of life was defined as a multidimensional variable assessing physical, social and emotional well-being [21]

Systematic reviews are one key element of evidence-based healthcare. Khan et al. describe a step-by-step process for conducting a systematic review, and outlined the quality elements inherent in each step [22]. The first step involves framing questions for a review by identifying the problem "edentulism", intervention "dentures", comparison group "CCDs vs IODs", and outcomes "efficacy, satisfaction, and quality of life." Subsequently, the relevant work was identified in the literature, which was followed by assessing the quality of selected studies based on a priori eligibility criteria. Eligible articles must have compared CCDs with mandibular IODs (overdenture retained by two unsplinted implants), used appropriately rigorous designs (e.g., randomized controlled trials (RCT), prospective cohort studies, retrospective cohort studies, case–control studies, cross-sectional designs, or other clinical trial designs that addressed the main study question). After that, the evidence reported was summarized and interpreted to generate recommendations and conclusions. Based on this methodology, this systematic literature review was conducted to compare CCDs to IODs with regards to efficacy, satisfaction, and quality of life. To our knowledge, this is the first systematic review conducted for unsplinted implant retained overdenture modality of treatment.

2. Material and methods

2.1. Search method and identification of studies

A systematic search of the literature was conducted. Three scientific databases were electronically searched to identify articles comparing CCDs to unsplinted IODs with regards to efficacy, satisfaction and quality of life from the earliest available dates through January, 2017. The search was conducted using PubMed/Medline (NCBI), Dentistry and Oral Science Source (DOSS; EBSCO) and Cochrane Register of Controlled Clinical Trials (EBSCO) with no limits applied to the initial search. Key words included were; "complete dentures" or "conventional dentures" and "overdentures" or "implant retained dentures" or "implant retained overdenture" or "implant supported dentures." This search was followed by hand-searching (checking references of the relevant review articles and eligible studies for additional literature).

This systematic review was conducted following the PRISMA-P guidelines [23]. Ultimately, the search was limited to published peer-reviewed articles only. Duplicate articles were removed along with articles not published in English. Titles of manuscripts were thoroughly scrutinized to exclude articles that clearly were not comparing the two treatment modalities. Whenever articles' titles were not sufficiently informative to judge relevance, study abstracts were also scrutinized. Examples of articles excluded during this step were previous literature reviews, articles describing techniques used for either modalities or comparisons with fixed prostheses. Subsequently, article abstracts were independently analyzed by two investigators (A. K. & R. F.) to determine potentially qualifying articles.

The criteria developed by Dixon-Woods and co-workers [24,25]. were used to assess the quality of studies included in this review. Studies with good quality had to meet the following criteria: clarity of the research questions to be addressed; suitability of quantitative methods in relation to the studies' aims and objectives; appropriate sampling technique in regard to the research questions and data generation. Articles were then reviewed in full independently by two investigators (A. K. & E. B) to determine inclusion in this review based on a quality assessment tool for quantitative studies [26]. This tool assesses the internal and external validity for each study.

The following criteria were rated for selected studies:

1) Selection bias as strong (80–100%), moderate (60–79%), or weak (<60%).
2) Allocation bias (strong: if the study design was RCT, moderate: if the study design was Two-Group Quasi Experimental, Weak: if the study design was Case Control or Before/After study).
3) Confounding is a situation where there were factors (other than the intervention) presented which influence the outcome under investigation.
4) Blinding (detection bias), strong: if Yes, Weak: if No or Not reported.
5) Data collection methods whether the outcomes have been measured with valid and reliable instruments.
6) Withdrawals and dropouts as strong: (80–100%), moderate: (60–79%), or weak: (<60%).
7) Statistical analysis must have a sufficient sample size to have the ability (or power) to detect significant differences between