Immediate implant placement with and without soft tissue graft: A Scoping Review

Abstract

Background: Over the past two decades immediate implant placement (IIP) has gained attention for reducing edentulism periods and treatment time. However, IIP cannot correct changes in soft and hard tissues changes after tooth extraction, and restorative esthetics can be compromised. Soft tissue grafts are often recommended to convert thin gingival biotypes to thick before or at the surgery of placing implants in deficient areas.

Purpose: The purpose of this paper is to compare direct implant placement with and without soft tissue grafting.

Materials and Methods: This paper was designed as a scoping review. The search strategy included online search of biomedical databases using MeSH terms and keywords until December 2023.

Results: Several studies and systematic reviews relevant to our topic were identified. But the results of these conflicted. More specifically, some report that there is no significant difference in the marginal change in bone level between the two treatment modalities, while others report that midfacial bone levels may be more stable after IIP and connective tissue graft (CTG), as CTG enhances soft tissue stability in the midfacial region after IIP.

Conclusions: Even though available data show that simultaneous soft tissue augmentation around delayed or immediately placed implants results in an enhancement of both the quality and quantity of the tissues surrounding an implant, the level of evidence is low, these data should be interpreted with caution and more, well-designed clinical studies should be carried out for robust data and conclusions to be derived from them

Keywords: Immediate implant placement, dental implant, soft tissue, connective tissue graft

Introduction

Over the past two decades immediate implant placement (IIP) has received much attention from researchers (Lee 2024). Clinicians and patients could benefit from reducing the edentulous periods and the number of treatments to be performed (Hartlev et al., 2014; Khzam et al., 2015). However, IIP cannot override the inevitable changes in the soft and hard tissues after tooth extraction (Botticelli et al., 2004; Araujo et al., 2005; Covani et al., 2007; Vignoletti et al., 2009).

Esthetics can be compromised when extracting a single tooth as it can be difficult to achieve a natural-looking restoration and healthy tissues of appropriate contour and color surrounding the implant. Midfacial loss is the predominant consequence of IIP, as documented by Cosyn et al. (2012a), Chen and Buser (2014) and Lin et al. (2014). Furthermore, a comprehensive study conducted in 2014 by Chen and Buser revealed that a significant recession of the midfacial mucosa, measuring at least 1 mm, occurred in 26% of implants placed early. Furthermore, it is imperative to keep in mind that the clinical situation may deteriorate gradually over time despite initial favorable results observed within the year following the procedure (Kan et al., 2011; Cosyn et al., 2016).

In a new prospective 10-year study by Seyssens et al. (2020) 33% of participants reported severe midface recession. It appears that the gingival biotype influences not only the dimensions of the facial bony wall but also the extent of soft tissue collapse and the likelihood of midfacial recession in the immediate vicinity of implants (Bittner et al. 2019, Kinaia et al. 2017, Kan et al. 2017, Evans and Chen 2008).

As thin mucosa is prevalent in the anterior maxilla, soft tissue grafts are frequently suggested to convert a thin gingival biotype to a thicker one prior to implant placement in an area that appears deficient. Several reviews have been published with respect to IIP with additional soft tissue augmentation using connective tissue graft (CTG): Lin et al. (2014), Lee et al. (2016), and Rojo et al. (2016). Nevertheless, during that period, there was a lack of satisfactory controlled clinical studies to directly assess the impact of implants placed immediately whether with or without soft tissue support.

The purpose of this paper is to compare direct implant placement with and without soft tissue grafting in terms of bone and mucosa parameters.

Materials and methods

This study was designed as a scoping review of the existing publications. The search strategy included an electronic literature search of the MEDLINE (Pubmed), Web of Science, Embase, and Cochrane databases in order to find clinical studies that met the specified criteria until December 2023. A combination of appropriate medical subject headings (MeSH) terms and key words was used either simple or multiple conjunctions using boolean operators. A manual search by a second, independent reviewer was also carried out.

Results

Among the retrieved studies, a randomized controlled trial (RCT) conducted to determine whether a connective tissue graft affected volume with immediate placement and provisionalization of implants in the esthetic zone (van Nimwegen et al 2018) offered important conclusions. Theoretically, the utilization of a connective tissue graft should result in increased stability of the soft tissues surrounding the implant. Regarding volume measurements at 12 months, no substantial disparities were observed between the two groups. The test group exhibited a greater degree of stability in midfacial mucosa levels from baseline to 12 months compared to the control group. It is clear from these results that the application of a CTG has no effect on mucosal volume loss. However, it appears that the utilization of a CTG yields more stable tissue levels in mid-facial tissue following a year of observation.

Chappuis et al. (2013) attribute a substantial proportion of the volume reduction observed in both groups to the immediate implantation of implants and subsequent natural bone resorption in the facial bone. The people in the study group might have had a more noticeable drop in mucosal volume. Using the endoscopic envelope method to place the CTG below the mucosa could explain this. By stopping blood flow from the facial tissue to the bone walls, this treatment may speed up bone resorption. Also, it's still not clear how the change in CTG size in this study led to the drop in mucosal volume. An ultrasound a year later showed that the thickness of the mucosa had grown three months after the connective tissue graft (CTG) had been placed (De Bruyckere, Eghbali, Younes, De Bruyn, and Cosyn, 2015). This means that connective tissue grafts (CTGs) probably won't be able to fix the changes that were made to the facial bone wall by placing and immediately provisionalizing implants. Additional research employing cone beam computed tomography (CBCT) data is required to ascertain the alterations

that take place in the facial bone subsequent to the application of a connective tissue graft (CTG) in the presence of mucosal volume loss.

Discussion

This review aimed to assemble all available data regarding the effect of soft tissue graft in immediate implant placement. Despite the presence of several studies regarding this topic the level of available evidence for analysis is low (Aldhorah 2022). However, the available data show that simultaneous soft tissue augmentation around delayed or immediately placed implants results in an enhancement of both the quality and quantity of the tissues surrounding implants.

According to available literature soft tissue augmentation seems to be advantageous in terms of buccal tissue thickness increase, marginal bone loss reduction, thicker mucosal phenotype, midfacial recession prevention, pink esthetic score (PES) and visual analogue score (VAS) (Jiang 2020, Rajan 2021, Guglielmi 2022, Fettouh 2024, Rondone 2024, Zuiderveld 2024). Contemporary data show that this technique should be an option if need for graft material cover or absence of attached gingiva is present. Regarding buccal tissue thickness there is a gain in both immediate and delayed placement cases, but it is bigger in the latter (Aldhorah 2022).

Guided bone regeneration (GBR) is a technique that has been proposed to minimize bone resorption by filling the gap between the implant and the buccal bone wall in cases of immediate implant placement (van Steenberghe 2000). Even though only two trials comparing GBR with connective tissue graft in delayed placement cases are present, their effect is similar in acquired buccal bone thickness and gingival levels (De Bruyckere 2018, D'Elia 2017).

Regardless of novel data fundamental principles must be respected and the importance of gingival biotype should not be overlooked. Several studies have highlighted it as a crucial factor for the final esthetic outcome (Gu 2015). Soft tissue thickness has been connected to less midfacial recession in thick biotypes, thereby playing an important role in maintaining bone levels around the implants (Isler 2019).

This study has certain limitations. It constitutes a scoping review meaning that available evidence has not been systematically reviewed in a methodology that ensures sensitivity and specificity. However, recent studies have highlighted that available data

are of low quality leading to cautious interpretation (Aldhorhah 2022). Consequently, more, well-designed clinical studies, also including some biomaterials (Happe 2022), are needed for robust data and conclusions to be derived from them (De Angelis 2021).

Conclusions

The available data show that simultaneous soft tissue augmentation around delayed or immediately placed implants results in an enhancement of both the quality and quantity of the tissues surrounding implants. However, the level of evidence is low, these data should be interpreted with caution and more, well-designed clinical studies should be carried out for robust data and conclusions to be derived from them.

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