Evaluation of the efficacy of osseodensification in enhancing primary and secondary stability of dental implants

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INTRODUCTION

Restoration of missing teeth using a fixed implant is a reliable option for treatment of partially and fully edentulous patients. The bone quality and quantity, surgical technique (conventional drilling (CD), over- or under-drilling, osteotome, osseodensification (OD), piezosurgery), implant design can influence both primary and secondary stability of dental implants. OD technique improves the local bone quality in poor density alveolar ridges and increases the density of the adjacent bone. Therefore, it was decided to review the efficacy of OD to implant stability.

METHODS

A systematic review was performed according to the PRISMA guidelines. According to PICO, the focus question was: Does the OD technique increase the primary and secondary stability of dental implants compared to CD? Electronic databases used: PubMed Medline, ScienceDirect, The Cochrane Library. Search keywords: “osseodensification”, “dental implant”, “stability”. Inclusion criteria were: clinical trials with humans published less than 10 years ago, written in the English language. Studies involving patients with immediate implantation or augmentation before implantation were excluded as well as animal studies.

CONCLUSIONS

Most studies confirm that the improvement in the primary implant stability is observed using the OD technique compared to the CD technique. The effect on secondary stability remains questionable, as not all studies report a statistically significant enhancement, and there is a lack of studies with longer follow-up periods.

AIM

To evaluate the OD technique for implant site preparation and its effect on enhancing primary and secondary stability of dental implants.

RESULTS

73 publications were found, out of which 5 were included. A total of 240 implants were placed in 111 patients. All 5 studies evaluated implant stability values immediately after implantation (primary stability) (Table 1). Implant stability quotients (ISQ) were used in 4 of 5 articles: from 70.5±1.12 to 76.00±6.41 in the OD group, while in the CD group results were from 56.22±2.21 to 78.88±7.18. However, a statistically significantly higher stability in the OD group was stated in 3 studies ($P<0.001$, $P<0.05$), while one study stated a statistically insignificant difference between groups ($P>0.05$). Selected publications provide a follow-up period for secondary stability from 2 weeks to 6 months. A statistically significant difference of ISQ values between OD and CD groups were observed at 6 weeks ($P<0.05$) and 4 months post-placement ($P<0.001$). The secondary stability was found slightly higher 6 months after surgery in the OD group compared with the CD group, nonetheless, there was no statistically significant difference ($P>0.05$).

Table 1. Comparison between OD and CD groups in primary stablity.

Parameters / Article	Primary stability		
	OD	CD	P value
Ibrahim et al.	74.25±4.95	59.65±5.39	<0.001
Bergamo et al.	73±2.0	62±2.0	<0.001
Kumar et al.	70.5±1.12	56.22±2.21	<0.01
El Khourazaty et al.	76.00±6.41	78.88±7.18	>0.05
*Sultana et al.	65.6±12.36	57.6±5.23	>0.05