

Subperiosteal Implants in Treatment of Total and Partial Edentulism - A Long Term Follow Up

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Abstract: *In 73 cases with advanced alveolar bone loss we placed 93 subperiosteal implants. The implants were observed for 5 to 17 years after placement. The mean period of observation was 7,63 years. The mean survival rate of the implants for the entire observation period is 74.7%. The survival rate of the subperiosteal implants for a 5-year observation period is 94.5% and the complication rate is 22.2%. The survival rate of the subperiosteal implants for the entire period of observation (5-17 years) is 96%.*

Keywords: Subperiosteal implants

1. Introduction

One of the most controversial issues in the modern implantology is undoubtedly the use of subperiosteal implants for treatment of the total and partial edentulism. Intraosseal implants demonstrate extremely high success and survival rate along with good soft tissue and marginal bone stability. This makes them a preferred method for treatment of the tooth loss. On the other hand the treatment with intraosseal implants requires a sufficient bone volume. That's why a number of alveolar bone augmentations are performed, which aim is to prepare the existing bone for implant placement.

2. Literature Survey

Because of their invasiveness and complexity, are considered some alternatives of bone augmentation, such as inferior alveolar nerve lateralization or transposition (1), the implants with reduced diameter, implants with reduced length (2) and the subperiosteal implants. The first patented in 1938 subperiosteal implants were presented in the publication of Gustav Dahl in 1943 (3) and were promoted more widely by publication of Goldberg and Gershkoff in 1949 (4). Golec (5) observed 100 subperiosteal implants and reported 100% survival rate at the end of the fourth year, 96% at the end of the fifth and 92% survival rate at the end of the sixth year. Mercier et al. (6) reported success rate of 60% and failure - 17%. According to Young et al. (7) the survival rate for a period of 5 years is 90% and at the end of the sixth year it is 75%. Bailey et al. (8) reported 86% survival rate of the subperiosteal implants for a period of 14 years. James et al. (9) in a study on 147 subperiosteal implants reported 98% survival rate at the end of the fifth year, 87% for a period of 10 years and 78% survival rate at the end of the thirteenth year. The main disadvantage of the subperiosteal implants is the principle of their retention. Although there are such techniques, the subperiosteal implants are not osseointegratable. They can not prevent the atrophy of the bone in the area, in which they are placed. Thereupon, after a period of time (5 - 30 years) is observed a dehiscence of the metal framework of the implant. The most common complication is the inflammation, which is not difficult to treat, but leads to a progressive bone resorption around the implant. Often

recurrent inflammations around the subperiosteal implants are an indication of its removal (10).

3. Methods

In 73 cases with advanced alveolar bone atrophy were performed 93 subperiosteal implants. 72 of them were placed according to the two-stage method and 21 of them to the one stage method. In the cases of two-stage method in the first visit after the elevation of muco-periosteal flap, an impression was taken with sterile additive silicone material, of the bone in the area, where the subperiosteal implant was planned. The flap is then repositioned and sutured. The subperiosteal implants are made of cobalt-chrom-molybdenum alloy, without nickel and beryllium. Each implant is constructed of metal framework and one or more posts connected to the metal framework through transgingival part. After two weeks, the flap was elevated again, the implant was placed in the appropriate area and the flap was repositioned and sutured. The total subperiosteal implants were placed in cases of total edentulism and the partial implants - in the cases of open-arch defects. The impression for fabricating a bridgework was taken two weeks after the implant placement. The subperiosteal implants were loaded three weeks after their placement. According to the one-stage method a three-dimensional image of the relevant area of the jaw was generated, using CBCT. The three-dimensional image of the bone is used to create its three-dimensional model using 3D printer. The model is duplicated and the subperiosteal implants are model-casted. The implant is polished, and a vent for at least one fixation micro-screw was planned. The implant was sterilized and then was fixed to the bone, after elevation of muco-periosteal flap, which after the fixation is repositioned and sutured.

In patients treated with subperiosteal implants were observed for:

- 1) Presence of intraoperative complications
- 2) Presence or absence of inflammation in the implant area
- 3) Exposure of the framework of the implant
- 4) Presence or absence of bone resorption around the implant, which is visible on radiography
- 5) The survival rate of the implants and the frequency of complications for a period of at least 5 years.

4. Results

87,4% of the subperiosteal implants were partial and 10,5%-total. 50.5% of the implants were made with smooth surface, treated consecutively with mechanical polishing and electropolishing, and 47.4% - with a rough surface. The mean survival rate of the implants for the entire observation period is 74.7%. 18.9% of the implants are failed and the partially removed implants are 4.2%. The survival rate of the implants with smooth surface for the entire period is 96% and of the implants with rough surface - 64%. The survival rate of two-stage implants is 76%, the survival rate of one-stage implants is 95%. The complication rate for the entire period is 48.4%. In 29.5% of the cases bone resorption and / or exposure of the metal framework of the implant is observed, and in 16,8% of cases inflammation with or without bone loss was observed. The complication rate of implants with a smooth surface is 18.6%, while at rough-surface implants it is 75%. The survival rate of the subperiosteal implants for a 5-year observation period is 94.5% and the complication rate is 22.2%.

5. Discussion

The survival rate of the subperiosteal implants for five years is 94,5%. Our result is similar to this written by Bodine(11,12)and Golec(5). The survival rate for the period of observation is 74,4%. The survival rate of the implants with smooth surface is 96% for the entire period of observation (5-17years). Significant difference was observed between the success rate, respectively the complication rate and the survival rate of the subperiosteal implants with smooth and with rough surface. This confirms the results reported by Surovas (13). The survival rate of two-stage implants is 76% and the survival rate of one-stage implants is 95%. It should be noted, that the one-stage method was performed only with subperiosteal implants with smooth surface, which probably influenced the survival rate in these cases. The major disadvantage of the subperiosteal implants is the more sophisticated clinical and lab procedure, which requires special training of the clinical and laboratory staff.

6. Conclusion

The survival rate of the subperiosteal implants for the entire period of observation (5-17 years) is 96%. This outcome confirms that the subperiosteal implants could be reliable alternative of the two-stage method intraosseal implants in combination with major bone augmentation of the alveolar ridge.

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