Rehabilitation of the Edentulous Mandible With an Immediately Loaded Full-Arch Fixed Prosthesis Supported by Three Implants: A 24-Month Retrospective Analysis of Trefoil concept

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The most significant task of dental rehabilitation of elderly is to ensure high quality of life by creating prosthetic reconstructions with high functionality. And that can often be achieved only with the use of implant-supported prostheses of various types. It is of particular importance for the rehabilitation of edentulous mandible. Implant supported treatment with overdentures that are retained on 1-2 implants and 3-4 implants, splinted by a bar, are quite popular. These overdentures have certain disadvantages, which affect chewing efficiency, and limit their longevity. In addition, removable dentures have been shown to have a negative impact on the mental health of elderly patients. The state-of-the-art concept of implant rehabilitation of edentulous mandible is immediate loading on four implants, two of which are tilted at the angle.

There is a clear interest in the P.I. Branemark (1999) concept of implant rehabilitation of the edentulous mandible using three implants and a standard prefabricated bar fixed to them at the day of surgery that also serves as the framework for the definitive prosthesis. The results of implant-supported rehabilitation significantly improved the quality of life of patients. For that period of the development of the dental practice, these were amazing results. The economic situation in the health care of the European countries and Russia requires cheaper methods of dental rehabilitation of edentulous patients while maintaining high rates of implant survival and quality of life for patients.

That is why we are interested in implementing this concept of implant-supported rehabilitation in prosthetic dentistry.

Purpose

To evaluate the clinical and radiographic outcomes of full-arch mandibular rehabilitation with fixed «Trefoil» prostheses supported by three immediately loaded implants after at least 24 month of follow-up.

Materials and methods

Authors performed a clinical and paraclinical examination of 44 patients. The age of the patients ranged from 64 to 88 (average value - 72.35 ± 6.9). We inserted 132 Trefoil Implant CC RP implants, 15 of which were 5*11.5 + 4.5, the rest were 5*13 + 4.5. 24 procedures were performed under general anaesthesia, the rest were performed under local anaesthesia. Patients filled in GOHAI questionnaires about their state of health and quality of life. Patients with one or more anterior teeth present as well as fully edentulous mandibles were included in the study. All patients received three Trefoil implants (Nobel Biocare AB) inserted with a torque of at least 35 Ncm. The Trefoil bar (Nobel Biocare AB) was used as the framework of the Trefoil bioengineering structure The key criterion for inclusion in the study was sufficient volume of bone in the mandible in the area between mental foramen in all directions (at least 7 mm in width, 12 mm in height). The assessment of the mandible was performed using the Nobel Clinician software (Nobel Biocare AB, Göteborg, Sweden), by uploading CBCT data (with the adjusted isovalue after the calibration procedure), obtained with the ProMax 3D-Max unit (Planmeca).

Statistical processing of the results was performed using the SPSS 23 software.

The t-test for dependent samples was used in order to compare the results of GOHAI surveys before and after the operation and the following statistical hypotheses were suggested:

H0 - the results of the GOHAI survey before the operation do not differ from the results of the GOHAI survey after the operation;

H1 - GOHAI pre-op survey results are different from GOHAI post-op survey results. A comparison was made between the GOHAI results before and after surgery in male and female patients using the t-test for independent samples.

Results

The average time of operation (surgical operation, prosthetic stage including dental lab work) the Trefoil technique was 5.59 ± 0.77 hours. The survival rate of restorations was 100%. Implant survival rate was 96.21%. The results of the GOHAI survey after surgery show significant difference from the results of pre-op survey. If we analyze the average values for the sample, it can be argued that the average result for the GOHAI survey before the operation (27.56) is significantly lower than the average one for the GOHAI survey after the operation (53.79). There was no significant difference between the results of the GOHAI survey before and after the operation in patients operated by various surgeons. There was no significant difference between the results of the GOHAI survey before and after the operation in patients with teeth in the maxilla and patients with a full restoration. There was no significant difference between the results of the GOHAI survey before and after the operation in patients with different types of artificial teeth.

In the postoperative period (after 24 months) we measured the distance between the restoration and the soft tissue level. It turned out to be in the range from 2.33 mm to 4.21 mm. Moreover if during the operation teeth in the mandible were removed, then the distance was larger. Assessment of the mucosa condition showed that good keratinized mucosa surrounded the implants.

Conclusion

The immediately loaded three-implant-supported fixed prosthesis protocol «Trefoil» tested in this study proved to be a viable therapeutic strategy for mandibular rehabilitation in elderly edentulous patients, with favourable outcomes after 24 month of clinical and radiographic follow-up. Requires further comprehensive study to obtain data with more patients and over longer follow-up period.