

# DEVELOPMENT OF PATIENT-BASED QUESTIONNAIRE ABOUT AESTHETIC AND FUNCTIONAL DIFFERENCES BETWEEN OVERDENTURES IMPLANT-SUPPORTED AND OVERDENTURES TOOTH-SUPPORTED. STUDY OF 43 PATIENTS WITH A FOLLOW UP OF 1 YEAR

M. GARGARI<sup>1,2</sup>, V. PRETE<sup>2</sup>, M. PUJIA<sup>2</sup>, F. M. CERUSO<sup>1</sup>

<sup>1</sup>Department of Odontostomatological Sciences, University of Rome "Tor Vergata", Rome, Italy

<sup>2</sup>Department of Dentistry "Fra G.B. Orsenigo Ospedale San Pietro F.B.F.", Rome, Italy

## SUMMARY

**Development of patient-based questionnaire about aesthetic and functional differences between overdentures implant-supported and overdentures tooth-supported. Study of 43 patients with a follow up of 1 year.**

*Objective.* The aim of this study is to compare functional efficiency and patients satisfaction between tooth-supported and implant-supported overdenture through a questionnaire that accurately reflects the real concerns of patients with dental prosthesis.

*Methods.* Forty-three patients were selected from the out patient clinic, Department of Dentistry "Fra G.B. Orsenigo Ospedale San Pietro F.B.F.", Rome, Italy. Their age were ranging from 61 to 83 years. Eighteen patients were rehabilitated with overdentures supported by natural teeth and twenty-five with overdentures implant-supported.

*Discussion and Result.* The questionnaire proposed one year after the insertion of the prosthesis has showed that there isn't difference statistically significant in terms of function, phonetics and aesthetics between overdenture implant-supported and tooth-supported.

*Conclusions.* The results of the questionnaire showed that the patients generally had a high level of satisfaction concern to the masticatory function, esthetics and phonetics. In addition, on average, they haven't difficulty in removal and insertion of the denture and in oral hygiene. They haven't in both groups problems related to fractures.

**Key words:** overdenture, prosthetic rehabilitation, questionnaire.

## Introduction

The edentulism is a chronic condition, due to its progressive evolution. Edentulous patients with complete dentures are generally satisfied but up to 30% of the patients have complaints. They suffer from a variety of problems with their dentures, especially with regard to the lower denture, such as insufficient stability, retention and pain during mastication. With

time, the resulting pain and difficulty may increase during oral functions to an extent that proper nutritional intake and the patients' ability to communicate with ease and confidence are jeopardized. Psychosocial problems are the result of diminished attractive facial appearance, difficulties with speech and avoidance of social contacts (1).

The search for a dental support to stabilize the denture back to 1856 when Ledger proposed the use of natural teeth to anchor a removable denture (2).

The use of an anchorage to improve the functional efficiency of prosthetic rehabilitation had a new and decisive impulse with Rehm, Brill and Miller in 1958, when they reintroduced and promoted the method of dentures superimposed on natural teeth remaining (3-5).

In 1969, Morrow et al. suggested to reduce to a few millimeters the length of natural teeth to support dentures, encoding the therapeutic sequences for the construction of an overdenture.

In the '70s dentistry has attached great importance to the preservation of natural teeth, so the overdenture has spread as a simple alternative for the maintenance of the last remaining teeth in compromised dentition (6).

For many years, traditional complete denture designs have been modified to gain additional support and stability from a few retained and suitably prepared natural teeth. Mericske-Stern et al. attested to the effectiveness of such tooth-supported complete dentures or overdentures as alternative to complete dentures. Roots maintained under the denture base preserves the alveolar ridge, provide sensory feedback and improve the stability of the dentures (7).

Recently, Morais et al. reported that overdenture treatment with the use of implants has become popular for edentulous elderly patients who are maladaptive to complete dentures. Although the biologic basis of implants installed in the bone is different from roots surrounded by a periodontal membrane, but the prosthetic concept is similar. Tactile sensation for implant is reduced because of the absence of periodontal receptors. However, oral function with overdentures supported by roots or implants is comparable and does not seem to depend on the presence of a periodontal membrane. They are a preferable alternative to treatment with conventional complete denture, the main advantages are decreased resorption of the residual ridges; psychological benefits for the patients and maintenance of masticatory efficiency (8). Reviewing of the literature had demonstrated a higher tendency for success when overdentures are supported by implants than by roots (1).

The aim of this study is to compare functional efficiency and patients satisfaction between overdenture on natural teeth and implant-supported.

## Methods

Forty-three patients were selected from the out patient clinic, Department of Dentistry "Fra G.B. Orsenigo Ospedale San Pietro F.B.F.", Rome, Italy. Their age were ranging from 61 to 83 years, with the mean age of 75 years. Patients were selected according to the following criteria: no signs and symptoms of TMJ dysfunction, no systemic disease which may affect the muscles, ligaments or bone and Angle's class I maxillo-mandibular relation. They had at least one premolar or molar on each side acting as a bilateral occlusal vertical stoppers, sufficient to maintain vertical dimension of occlusion. The occlusal vertical dimension can be accurately determined and that the remaining natural teeth aid in recording centric relation. Remaining teeth were present with unfavorable conditions needed to be subsequently extracted.

Eighteen patients were rehabilitated with overdentures supported by natural teeth and twenty-five with overdentures implant-supported.

For the overdenture natural teeth supported preliminary impression with irreversible hydrocolloid impressions (Hydrogum 5, Zhermack, 45021, Badia Polesine, Rovigo, Italy) were made and cast was poured with type III dental stone (Kalstone; Kalabhai Industries, Mumbai, India). Casts were mounted on mean value articulator for diagnostic study. Immediate denture was fabricated.

The fabrication of immediate dentures was started by construction of a traditional complete denture that was rebase with Hydrocast to not compress the sites of healing.

An orthopantomograph was advised and endodontic therapy was completed on the patient's teeth appointed to support the overdenture.

The patients were referred to the department of periodontics for therapeutic oral prophylaxis and department of oral surgery for extraction of teeth with unfavorable conditions under local anesthesia. On the same day the clinical crown portion of remaining teeth were reduced and immediate denture was placed. After 21 days the canals in these teeth were prepared for optimum post length. After post space preparation the prefabricated titanium posts with

ball attachment (Rhein 83 srl, Bologna, Italy) were placed.

Nylon caps were placed on top of the ball attachment and additional silicone pick up impression was made (Aquasil Easy Mix Putty, Aquasil Ultra XLV, DENTSPLY Caulk, Milford, USA). Lab posts were placed into the nylon caps and cast was poured.

Overdenture was made and occlusal rims were constructed, jaw relation recorded, try-in done. Titanium posts were cemented with self adhesive resin cement (Relyx Unicem 2 Clicker, 3M ESPE AG, Dental Products, D-82229 Seefeld, Germany, 0049 (0) 8152/700-0) and the denture was inserted. Patient was educated about the care for the denture and fluoride application for abutment teeth.

For implant-supported overdenture preoperative panoramic and periapical radiographs were used for radiographic evaluation of the placement sites to avoid potential complications with important anatomy in these regions.

Even in this case, an impression with irreversible hydrocolloid impressions was made (Hydrogum 5, Zhermack, 45021, Badia Polesine, Rovigo, Italy) to fabricate an immediate dentures.

The implants diameter were ranged between 3.5 mm and 4.3 mm while the lengths were ranged between 10 and 13 mm (Nobel Biocare, Kozakkenberg 4, 5951 DL Belfeld, Netherlands). Locator attachments (Zest Anchors LLC, Escondido, CA, USA) were used for prosthetic anchorage. Under local anaesthesia, the extractions of teeth with unfavourable conditions were made and the immediate dentures was placed. After 2-4 months of healing the implants were placed; a minimal crestal incision (envelope type) was made and the osteotomy was prepared using a standard bone drilling protocol, according to the manufacturer's directions. Initial implant stability was tested manually by hand, and insertion torques  $\geq 35$  Ncm were acceptable. Healing abutments of appropriate length were connected, and the mucosa was adjusted and sutured (4-0 Vicryl, Ethicon, Johnson & Johnson, Brussels, Belgium).

Antibiotic (Augmentin 1 g) and nonsteroidal anti-inflammatory (Ibuprofen 400 mg) medications were given to the patients every 12 hours for 5 days

postoperatively. All patients were limited to a soft diet for 2 days. The patients were instructed in a plaque control protocol at the time of implant placement, and this was reinforced at subsequent reviews.

The healing abutments were replaced by Locator attachments 8 weeks after implant placement. A torque of 35 Ncm was used for tightening the attachments. The height of the attachments was selected according to the height of the gingiva. Preliminary impressions for maxillary and mandibular arches were taken with stock trays using irreversible hydrocolloid (Hydrogum 5, Zhermack, 45021, Badia Polesine, Rovigo, Italy). Secondary impressions were taken with polyvinylsiloxane (Panasil, Putty Soft Type 0 and Initial Contact Light, Kettenbach GmbH & Co. KG, Im Heerfeld 7, 35713 Eschenburg, Germany) through single-step technique and two components with different viscosities.

Record blocks were fabricated on the duplicates of the master models for jaw registration. Teeth try-in and manufacturing of the dentures were carried out using standard prosthetic procedures. The final prostheses were checked in the patient's mouth and the required adjustments were carried out. The denture caps with attached black processing males were connected to the denture using the indirect technique on the master model. The black processing males were removed after polishing the denture, and the appropriate Locator replacement males were inserted according to the retention required. The maxillary complete denture and implant-retained overdenture were delivered to the participants approximately 8 weeks after implant placement.

The objective of this study was to develop and validate a questionnaire that accurately reflected the real concerns of patients with dental prostheses about the aspects of their life related to eating, using detailed information derived from qualitative interviews with patients (Tab. 1).

A questionnaire has been developed with 6 questions. Themes identified were around social, emotional and practical issues about eating. The questionnaire was proposed one year after the insertion of the overdenture.

**Table 1** - A questionnaire has been developed with 6 questions, about overdentures tooth-supported and overdentures implant-supported. Themes identified were around social, emotional and practical issues about eating. The questionnaire was proposed at the same patients one year after the insertion of the overdenture.

<b>OVERDENTURES TOOTH-SUPPORTED</b>	<b>insufficient</b>	<b>enough</b>	<b>not bad</b>	<b>good</b>	<b>excellent</b>
How do you rate the aesthetics of your smile?				11	7
How do you rate the quality of your mastication?			5	9	4
How do you rate the quality of expression and phonetics?			8	3	7
How do you rate the facility of cleaning of the prosthesis?		2	6	5	5
How do you rate the facility of removal and insertion of your denture?		2		6	10
	more than 5 times	3,4 or 5	2	1	never
In the last year how many times did you need to control the prosthesis for trouble, fracture or other problems?*				2	16
<b>OVERDENTURES IMPLANT-SUPPORTED</b>	<b>insufficient</b>	<b>enough</b>	<b>not bad</b>	<b>good</b>	<b>excellent</b>
How do you rate the aesthetics of your smile?			3	12	10
How do you rate the quality of your mastication?			5	11	9
How do you rate the quality of expression and phonetics?		1	7	10	7
How do you rate the facility of cleaning of the prosthesis?		1	3	12	9
How do you rate the facility of removal and insertion of your denture?			3	12	10
	more than 5 times	3,4 or 5	2	1	never
In the last year how many times did you need to control the prosthesis for trouble, fracture or other problems?*				1	24

\*except routine check-ups and oral hygiene

## Discussion and Results

The classical treatment plan for the edentulous patient is the complete removable maxillary and mandibular denture. This treatment is relatively inexpensive in comparison with fixed implant-supported prostheses, but it has several drawbacks. Depending on the shape of the regional ridge, the denture may be unstable or inadequately

retained, leaving the patient dissatisfied with the functional result. The rate of residual ridge resorption in edentulous patients who do not have tooth replacements is highly variable and may be as much as several millimetres per year. This resorption can render the current prosthesis inadequate in terms of both function and esthetics and can lead to the necessity of fabricating a new denture (9).

The overdenture has many advantages and many

options are available for retention of the prosthesis, including magnets, clips, bars and balls. The implant-supported denture has good stability and retention, and patients who have received them have reported improved function and satisfaction (10). Also the remaining teeth can give retention, support and stability to an overdenture and also provide proprioception which would otherwise be lost with a conventional denture.

For this study, were selected forty-three patients that needed total prosthetic rehabilitation.

The adaptation of the overdenture to the patients abutments using tooth shade autopolymerized acrylic resin was done to compensate the differences in arbitrary reduction of the teeth in the cast and intra orally. The adaptation of the overdenture to the abutments has a positive effect on the reduction of the alveolar bone in the period during which the bone reduction is the maximum and helps in preserving the residual ridge from pressure during the period of bone healing.

Two implants were used to support the overdenture in the present study for implant supported overdenture group. The use of implant supported overdentures with two implants placed in the canine region was an efficacious modality for providing an improved chewing function for the completely edentulous patients.

The questionnaire proposed one year after the insertion of the prosthesis has shown that there isn't difference statistically significant in terms of function, phonetics and aesthetics between overdenture implant-supported and tooth-supported overdenture.

Comparison between aesthetic for the two types of overdenture shows a good level of satisfaction, slightly higher in the group treated with tooth-supported overdenture.

Comparison between quality of mastication, phonetics and capacity of expression for tested group was not statistically significant. We haven't found differences even as regards the facility of cleaning of the prosthesis.

Comparison between the facility of removal and insertion of the denture for the two types of overdenture shows a slightly higher easiness in the group of implant-support overdenture, but there isn't statistically significant.

The patients in both groups did not require control to the dentist for trouble, fracture or other problems.

The patients showed a high level of satisfaction in both cases.

## Conclusion

The overdenture is a preferable alternative to treatment with conventional full denture, the main benefits are given by the decreased resorption of residual ridges, psychological benefits for patients and the maintenance of masticatory efficiency.

The use of overdentures supported by implants or natural teeth was an efficacious modality for providing an improved chewing function for the completely edentulous patients.

In this study we haven't found statistically significant differences between tooth-supported and implant-supported overdenture and the patients show a high level of satisfaction for masticatory function, aesthetic and phonetic in both cases.

## References

1. Khalid Shah F, Gebreel A, Elshokouki AH, Habib AA, Porwal A. Comparison of immediate complete denture, tooth and implant-supported overdenture on vertical dimension and muscle activity. *J Adv Prosthodont* 2012; 4: 61-71.
2. Ledger E. On preparing the mouth for the reception of a full set of artificial teeth. *Br J Dent Sci* 1856; 1:90.
3. Rehm H. Über die Möglichkeit der prothetischen Auswertung einzelner frontzähne. *Zahnärztliche Welt* 1952; 6: 115-117.
4. Bril N. Adaption and the hybrid prosthesis. *J Prosthet Dent* 1955; 3:811-824.
5. Miller PA. Complete dentures supported by natural teeth. *J Prosthet Dent* 1958; 8: 924-928.
6. Scotti R, Melilli D, Pizzo G. Overdenture su denti naturali, analisi dei vantaggi clinici. *Minerva Stomatol* 2003; 52: 201-210.

7. Mericske-Stern R, Steinlin Schaffner T, Marti P, Geering AH. Peri-implant mucosal aspects of ITI implants supporting over-dentures. A five-year longitudinal study. *Clin Oral Implants Res* 1994; 5: 9-18.
8. Morais JA, Heydecke G, Pawliuk J, Lund JP, Feine JS. The effects of mandibular two-implant overdentures on nutrition in elderly edentulous individuals. *J Dent Res* 2003; 82: 53-58. Budtz-Jrgensen E. Effectofcontrolled oral hygiene in overdenture wearers: a 3-year study. *Int J Prosthodont* 1991; 4: 226-2031.
9. Doundoulakis JH, Eckert SE, Lindquist CC, Jeffcoat MK. The implant-supported overdenture as an alternative to the complete mandibular denture. *JADA* November 2003; 134: 1455-458.
10. Awad MA, Lund JP, Dufresne E, Feine JS. Comparing the efficacy of mandibular implant-retained overdentures and conventional dentures among middle-aged edentulous patients: satisfaction and functional assessment. *Int J Prosth* 2003; 16: 117-122.

---

*Correspondence to:*

Marco Gargari  
University of Rome "Tor Vergata"  
Department of Dentistry "Fra G.B. Orsenigo  
Ospedale San Pietro F.B.F."  
Via Cassia, 600  
00189 Rome, Italy  
e-mail: marco.gargari@gmail.com