

# Level of Satisfaction in Patients with Maxillary Full-Arch Fixed Prostheses: Zygomatic Versus Conventional Implants

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**Purpose:** To evaluate the satisfaction of patients with maxillary fixed prostheses supported by conventional and/or zygomatic implants. **Materials and Methods:** Patients restored with complete maxillary implant-supported fixed prostheses were included in the study. They were divided into 2 groups: those with at least 1 zygomatic implant (the zygomatic group) and those with no zygomatic implants (the nonzygomatic group). Twelve months after prosthesis delivery, subjects indicated their satisfaction with the new prosthesis on a visual analog scale. Prostheses were rated in terms of general satisfaction, comfort and stability, ability to speak, easy of cleaning, esthetics, self-esteem, and functionality. **Results:** Forty-six patients participated in the study (23 in each group). The mean level of satisfaction was high; the groups differed significantly only in satisfaction with esthetics. Patients in the zygomatic group had a higher average score for esthetics than those in the nonzygomatic group. Those who had previously worn conventional removable prostheses gave a higher score for functionality to the implant-supported fixed prosthesis compared to the removable prosthesis. **Conclusion:** Patient satisfaction with zygomatic implant-supported fixed prostheses was similar to that for fixed prostheses supported by conventional implants. INT J ORAL MAXILLOFAC IMPLANTS 2007;22:769-773

**Key words:** patient satisfaction, zygomatic implants

Zygomatic implants are suitable for the restoration of atrophic maxillae.<sup>1-7</sup> Prostheses supported by zygomatic implants have a special design because of the location and emergence of these implants at a slightly more medial position compared to standard maxillary implants.<sup>7</sup>

The few studies available with complete implant-supported fixed prostheses have shown a high level of satisfaction<sup>8-12</sup>; however, a literature search resulted in only 4 studies that assessed patient satis-

faction with zygomatic restorations. Nakai et al<sup>13</sup> assessed patient opinion by means of questionnaires; patients were asked about speech, easy of cleaning, and chewing. The results revealed that 2 patients complained of speech problems, and 2 others experienced difficulty in cleaning. Hirsch et al<sup>14</sup> evaluated esthetics and functionality with zygomatic restoration; patients were fully satisfied with both in 80% of the treatments. Farzad et al<sup>15</sup> evaluated satisfaction with esthetics, chewing, and speech before and after treatment with zygomatic implant-supported prostheses using a visual analog scale (VAS); they concluded that patients were generally satisfied with the treatment outcome. Only Farzad et al used a VAS, which measures perceptions of subjective phenomena that are difficult to standardize from one person to other.

A study of general satisfaction with the implant-retained prosthesis, including comfort and stability, ease of speaking and cleaning, esthetics, self-esteem, and functionality, is needed. The objective of the present study was to evaluate satisfaction in patients with maxillary implant-supported fixed prostheses for restorations carried out with both conventional and zygomatic implants.

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## MATERIALS AND METHODS

### Study Population

From 1998 to 2004, 51 patients were restored with fixed prostheses supported by maxillary implants. Written informed consent was obtained. Five patients who failed to complete the questionnaire or who did not attend the follow-up examinations were excluded; these patients did not have implant failures, prosthesis difficulties, or other problems that could have influenced the primary outcome. Forty-six patients (26 women and 20 men) with a mean age of 53 years (range, 31 to 77 years) were included in the study. The patients were divided into 2 groups: the zygomatic group (those with at least 1 zygomatic implant) and the nonzygomatic group (those with no zygomatic implants).

All surgery was carried out by the same surgeon (MPD) under local anesthesia (4% articaine with 1:100,000 adrenaline; Inibsa, Lliça of Vall, Barcelona, Spain) and sedation (1% propofol solution), with blood pressure, pulse, and oximetric monitoring by an anesthetist.

Forty-four zygomatic implants (Nobel Biocare, Göteborg, Sweden) were placed in the malar zygoma using the procedure described by Stella and Warner.<sup>5</sup> The conventional implants used were 122 Defcon implants with an Avantblast surface (Impladent; Senmenat, Barcelona, Spain) and 155 ITI implants with an SLActive surface (Straumann, Basel, Switzerland). All the implants remained submerged, and the second surgery was carried out at 2 months.

The zygomatic group comprised 23 patients, 12 women and 11 men, who received at least 1 zygomatic implant (21 patients had 2 zygomatic implants and 2 had one). Six implants were 30 mm long, 9 were 40 mm long, 23 were 35 mm long, and 6 were 42.5 mm. Between 3 and 6 additional implants were placed in the anterior zone, and in 8 patients pterygoid implants were placed, for a total of 144 implants. Screw retention was utilized in 21 patients; cement retention was utilized in 2. The antagonistic dentition was an overdenture in 11 cases, a fixed implant-supported prosthesis in 5 (4 cemented and 1 screwed), natural teeth in 5, a conventional removable partial denture in 1, and a combination of natural dentition and an implant-supported prosthesis in 1.

Four implants failed in 4 patients: 1 pterygoid implant, 2 conventional anterior implants in 2 different patients, and 1 zygomatic implant; the latter was replaced with a pterygoid implant. The only prosthetic complication was several instances of prosthesis decementation in 1 patient.

The nonzygomatic group comprised 23 patients, 14 women and 9 men, restored with maxillary fixed

prostheses on conventional implants. Seventeen patients received 8 implants, 3 patients received 6 implants, 2 received 9 implants, and 1 patient received 7 implants, for a total of 179 implants. Two of these were pterygoid implants; thus, 177 conventional implants were placed. Twenty-one prostheses were cemented, and 2 were screw-retained. The antagonist was natural dentition in 11 cases, fixed implant-supported prostheses in 6 cases (5 cemented and 1 screw-retained), a combination of natural dentition and implant-supported prostheses in 4 cases, an overdenture in 1 case, and a conventional removable denture in 1 case. One implant failed in the postloading period in 1 patient. Prosthetic complications occurred in 3 cases: 2 prosthesis decementations and 1 tooth fracture.

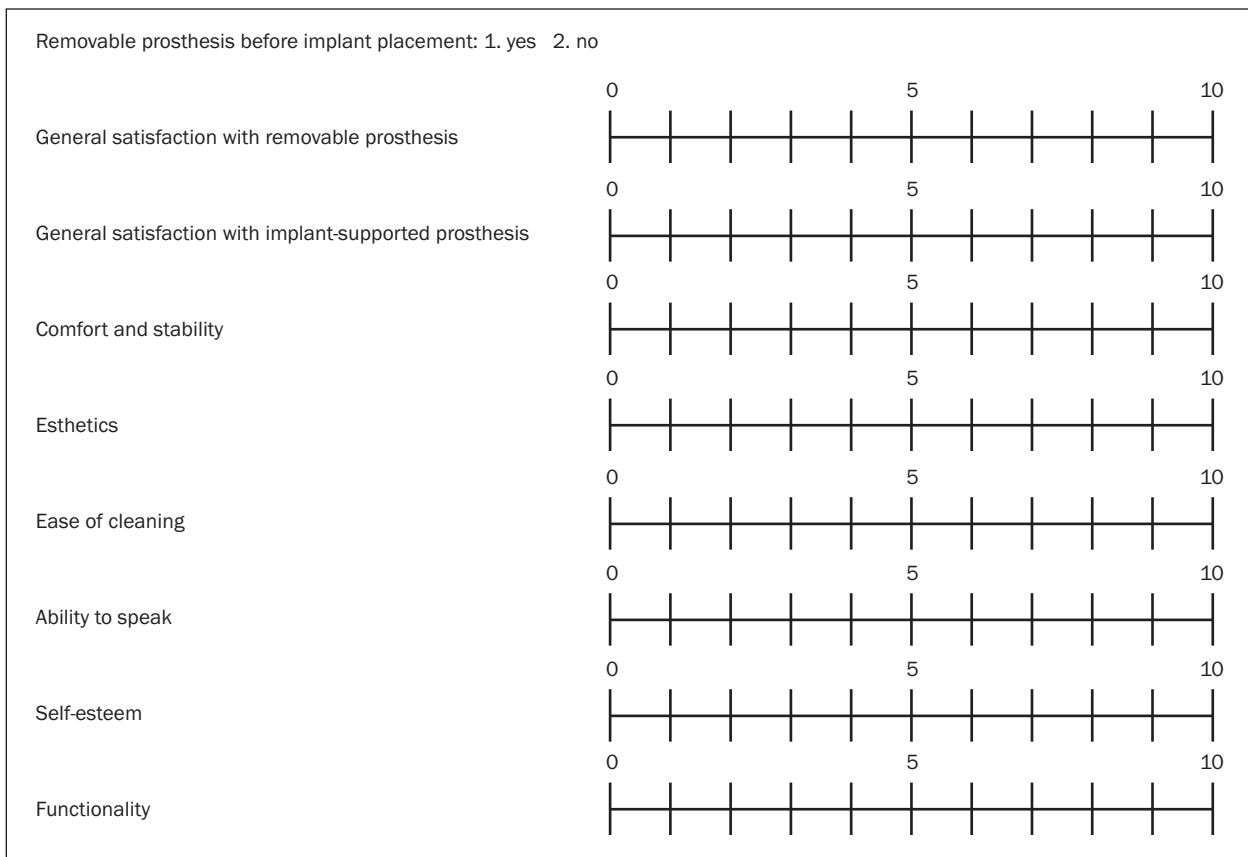
### Patient-Based Measurements

To estimate patient satisfaction with the fixed prosthesis, a 10-cm VAS was given to each patient 12 months after prosthesis delivery. Similar scales have been used in other studies.<sup>11,15-17</sup> The VAS was used to assess general satisfaction with conventional dentures without implants, general satisfaction with the implant-retained prosthesis, comfort and stability, ability to speak, easy of cleaning, esthetics, self-esteem, and functionality. Patients were asked to rate these aspects of their care on a VAS from 0 (totally dissatisfied) to 10 (completely satisfied). The subjects were asked to draw a vertical line at the point on the horizontal line that best represented their response.<sup>11,16,17</sup> Subjects marked the scale independently in the presence of a research assistant who offered explanation or help as needed (Fig 1).

With respect to statistical analysis, the *t* test was used for qualitative variables and the Pearson correlation coefficient for quantitative variables.

## RESULTS

All questionnaires distributed ( $n = 46$ ) were answered. Before implant placement, 20 patients wore a conventional removable partial denture (10 from the zygomatic group and 10 from the nonzygomatic group). The general satisfaction with this prosthesis was 2.2 (range, 0 to 10) for the zygomatic group and 5.11 (range, 0 to 10) for the nonzygomatic group. When previous wearing of removable prostheses was examined as a variable, it was found that the VAS score for functionality of the implant-supported prosthesis was associated with previous use of a prosthesis ( $P < .05$ ). The other parameters were not influenced by this variable (Table 1).



**Fig 1** Questionnaire.

**Table 1** Average VAS Scores According to Whether a Prosthesis Was Previously Worn

	Prosthesis previously worn		t	P
	Yes	No		
General satisfaction	9.50	9.23	-	-
Comfort and stability	9.75	9.50	-	-
Esthetics	9.55	9.19	-	-
Ease of cleaning	9.70	9.65	-	-
Ability to speak	9.35	9.42	-	-
Self-esteem	9.45	9.61	-	-
Functionality	9.90	9.00	2.902	< .05

**Table 2** Level of Satisfaction with Prosthesis

	Zygomatic group	Nonzygomatic group	t	P
General satisfaction	9.65	9.04	-	-
Comfort and stability	9.86	9.34	-	-
Esthetics	9.82	8.86	3.247	< .05
Ease of cleaning	9.78	9.56	-	-
Ability to speak	9.78	9.00	-	-
Self-esteem	9.82	9.26	-	-
Functionality	9.73	9.04	-	-

With respect to general satisfaction, the average VAS score was 9.65 for the zygomatic group and 9.04 for the nonzygomatic group. No significant differences between the 2 groups were observed for any parameter except esthetics. Evaluation of esthetics for the implant-supported prostheses was significantly higher for the zygomatic group than for the nonzygomatic group ( $P < .05$ ; Table 2).

The antagonist for the maxillary implant-supported prostheses was natural dentition in 32.6% of the cases and an overdenture in 26.1%; in the remaining cases, screw-retained or cemented fixed prosthesis, removable prostheses, or a combination of natural dentition and implant-supported prostheses were the antagonist. When considering only overdentures and natural dentition, significant differ-

**Table 3 Relationship Between Evaluation of Implant-Supported Prosthesis and Other Variables**

	VAS score	t	P	r
Sex				
Female	9.65	–	NS	
Male	8.96	–	NS	
Type of prosthesis				
Cemented	9.26	–	NS	
Screw-retained	9.43	–	NS	
Antagonist				
Overdenture	9.83	2.992	< .05	
Natural dentition	8.80			
Prosthetic complications				
Yes	9.75	–	NS	
No	9.30	–	NS	
Implant failure				
Yes	9.75	–	NS	
No	9.30	–	NS	
Age				0.644
Total no. of implants				0.510

r = Pearson correlation coefficient.

ences were observed for the general appraisal of the prosthesis; significantly higher scores were given to the implant-supported prostheses in cases where an overdenture was the antagonist. Neither age, sex, total number of implants, prosthetic type, presence of prosthetic complications, nor implant failure was significantly correlated with patient satisfaction with the implant-supported fixed prosthesis (Table 3).

## DISCUSSION

VASs are typically used to measure perceptions of subjective phenomena that are difficult to standardize from individual to individual.<sup>17</sup> There were reports that some subjects may find the scale confusing because they are not sure how or where to mark the line, or difficult to use because they cannot relate easily to the line as a measure of feelings.<sup>18</sup>

Satisfaction with different aspects of the prostheses has been used to measure the efficiency of treatment.<sup>19</sup> Most studies have demonstrated that mastication and speech are significantly better with implant-supported prostheses than with conventional removable dentures. Furthermore, patients have been significantly more satisfied with the comfort, stability, and esthetics of implant-supported prostheses.<sup>20</sup>

No significant differences between the 2 groups were found in this study except with respect to esthetics; both groups gave very favorable VAS scores for the implant-supported prostheses. These results support the findings of De Bruyn et al,<sup>10</sup> who evaluated patient opinion and treatment outcome of fixed restorations and observed that the great majority of patients were very satisfied with the treatment, comfort with eating, esthetics, and phonetics. De Bruyn et al also found that overall satisfaction improved significantly after delivery of implant-supported prostheses.

Although some studies have shown that patients restored with fixed prostheses frequently incur speech problems with the “s” sounds,<sup>21</sup> the average score for speech for the 2 groups in the present study was  $\geq 9.00$ . Farzad et al<sup>14</sup> did not describe changes in speech after prosthetic restoration of zygomatic implants.

Patients valued prosthesis esthetics with the VAS scale; objective esthetics criteria were not given to the patients. However, some outcomes may have influenced the patients' subjective perception: tooth form and axis, gingival contour, balance of gingival levels, level of the interdental contact, relative tooth dimensions, surface texture, color, incisal edge configuration, lower lip line, and smile symmetry.<sup>22</sup>

A few other studies have been carried out to evaluate the level of satisfaction of patients with prostheses on zygomatic implants. Landes et al<sup>22</sup> assessed the quality of life of patients who had received zygomatic implants to support prosthetic restorations after resection of an oral tumor using the University of Washington Quality-of-Life scale questionnaire. This index evaluates critical issues of oral, head, and neck tumors and their treatment. They found that the restorations had a positive effect on the patients' oral functionality and speech. Hirsch et al<sup>14</sup> evaluated the satisfaction of 76 patients treated with 124 zygomatic implants; patients were fully satisfied with the esthetic and functional outcome in 80% of the treatments both at the time of prosthetic insertion and at the 1-year follow-up. Nakai et al<sup>12</sup> placed 15 zygomatic implants in 9 patients and assessed their opinions by means of a questionnaire 6 months following prosthetic treatment. One patient complained of a speech impediment for 3 months after superstructure fabrication, and 1 complained for 1 or 2 weeks; 2 patients reported difficulty in cleaning around the abutment connected to the zygomatic implant. Farzad et al<sup>14</sup> used a VAS to assess patient response to treatment with zygomatic implants; patients described significant improvement in chewing ability and esthetics but not changes in speech.

## CONCLUSIONS

Patients with maxillary zygomatic implant-supported fixed prostheses presented a level of satisfaction with the prosthesis similar to that held by patients with the same type of prosthesis on conventional implants. However, a higher score for esthetics was given by patients with zygomatic implant-supported prostheses. Patients who had previously worn removable dentures rated the implant-supported dentures more highly with respect to functionality. The general satisfaction score for implant-supported prostheses was lower in patients who had natural dentition as the antagonist than in those with an overdenture.

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