Short Communication

A Prefabricated Precision Attachment: 3 Years of Experience with the Swiss Mini-SG System. A Prospective Clinical Study

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The aim of this prospective long-term clinical trial was to verify the clinical success of prefabricated precision attachments with regard to periodontal condition, wearing comfort, and stability of attachment friction. Twenty-eight patients were fitted with 35 prostheses with Swiss Mini-SG precision attachments. Following clinical investigation and monitoring over a 3-year period, 80% of the prostheses were functioning well. The average pocket depth of the abutment teeth at the buccal sites and the periodontal parameters Approximal Plaque Index and Sulcus Bleeding Index showed statistically significant improvements. The abutment tooth mobility (Periotest measurements) decreased. It is not advisable to support the attachments on single abutment teeth. *Int J Prosthodont 2007;20:432–434*.

A precision attachment system is an alternative to telescopic procedures to anchor partial dentures to the residual dentition. The Mini-SG attachment system (Cendres & Méteaux) appears to be a suitable treatment option for prosthodontic gap closure, as well as for unilateral or bilateral edentulous situations. With the help of an interchangeable plastic insert and adjustment screw, the friction retention forces can be adapted to the individual periodontal situation and abutment teeth (Fig 1).¹ Based on these system parameters, it was hypothesized that prostheses with Mini-SG precision attachments will have a positive effect on periodontal parameters, precision of fit of the pros-

thesis, prosthesis longevity, and patient satisfaction. These clinical and subjective parameters were investigated over a period of 3 years.

Materials and Methods

A total of 28 patients (12 men, 16 women; average age: 64 years) with 30 removable restorations for unilateral or bilateral edentulous and limited tooth gap situations, as well as 5 screw-retained attachment restorations, participated in the study. In Kennedy Class I and Ila situations, splinting of abutment teeth (teeth with the male part) was planned. In Kennedy Class II situations with unilateral partial dentures, the additional use of bracing arms was planned (Table 1). The Mini-SG system is based on different female parts and a single universal male part (Fig 2), which accounts for its suitability for screw-retained prostheses and removable unilateral or bilateral edentulous or gap-closure prostheses. The prostheses are anchored using prefabricated, extracoronal attachments with interchangeable plastic inserts, which can be adjusted with an activation screw to achieve prosthesis retention.

Six months after insertion (baseline) and then once a year over a period of 3 years, the patients underwent examinations in which the periodontal parameters Approximal Plaque Index (API) and Sulcus Bleeding Index (SBI) were determined.

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Fig 1 Mini-SG removable restoration without a prosthesis, with 6 splinted teeth and a visible male part. The inset image shows a detail of the partial denture with the female part.



Fig 2 Enlarged photograph of the Mini-SG attachment—female part with plastic insert and activation screw located on the base of the attachment. The inset image shows a detail of the enlarged male part.

	Class I: Bilateral distal extensions Class II: Unilateral distal extensions Itments Maxilla		Unilateral tensions	Class IIa: Unilateral distal extension and limited tooth gaps		
No. of abutments			Mandible	Maxilla	Mandible	
1	1	1		1		
2	1	3	2	5	3	3
>2	4	2			4	
Total	6	6	2	6	7	3
Splinted abutment teeth vital/nonvital	22/5		9/2		15/3	
Nonsplinted abutment teeth vital/nonvital	2/2		4/0		5/3	
No. of bracing arms	0		7		0	

 Table 1
 Oral Situation According to Kennedy Class, No. and Vitality of Abutments, and Use of Bracing Arms*

*Cases of Kennedy Class III with fixed restorations were not included in the table.

The pocket depths were measured at 6 locations of each tooth. Tooth mobility was determined using Periotest measurements (Siemens). The presence or lack of tooth vitality was determined using cold-spray tests (-50° C). Patient satisfaction was assessed using a questionnaire with possible answers ranging from "extremely satisfied" to "not satisfied at all." The Kolmogorov-Smirnov test, Friedman test for multiple related samples, and, in cases of significant differences ($P \le .05$), the Wilcoxon test for paired data were used.

Results

The results of this study are shown in Table 2. API and SBI showed significant improvements after 36 months, falling from 86% to 48% and 85% to 52%, respectively. After 36 months, significant improvements were found for the pocket depths of all buccal sites measured, with an average reduction in pocket depth of up to 0.5 mm compared with the preoperative situation (Table 2). The results of the Periotest exhibited a general

	Preoperative	Baseline	12 months	24 months	36 months	<i>P</i> *
Pocket depth						
Mesiobuccal	2.9 (0.7)	2.5 (0.6)	2.5 (0.8)	2.7 (0.6)	2.7 (0.8)	.022
Buccal	2.4 (0.6)	2.1 (0.7)	2.1 (0.8)	1.7 (0.7)	1.9 (0.9)	.034
Distobuccal	2.9 (0.7)	2.4 (0.7)	2.4 (0.6)	2.6 (0.6)	2.6 (0.8)	.043
Mesiolingual	2.9 (0.5)	2.6 (0.6)	2.7 (0.7)	3.0 (0.7)	3.0 (1.0)	.052
Lingual	2.4 0.5)	2.2 (0.7)	2.4 (0.7)	2.3 (0.7)	2.3 (0.7)	.066
Distolingual	2.8 (0.9)	2.6 (0.8)	2.5 (0.8)	2.8 (0.7)	2.9 (0.7)	.079
Tooth mobility						
Periotest value	4.8 (6.1)	3.6 (5.5)	4.0 (5.8)	4.0 (7.6)	3.1 (7.0)	.94
Periodontal status						
Approximal Plaque Index	86.1 (18.8)	70.8 (22.4)	70.8 (19.1)	58.6 (17.6)	48.6 (20.8)	.009
Sulcus Bleeding Index	85.0 (19.7)	73.7 (19.6)	73.1 (21.9)	58.2 (15.7)	52.0 (19.1)	.016

 Table 2
 Mean Values (SDs) for Pocket Depth, Tooth Mobility, and Periodontal Status

*Level of significance between the preoperative and 36-month values.

tendency for improvement (1.7 units) but did not reach statistical significance (Table 2).

All primarily vital abutment teeth were still vital after 3 years. The survival rate of the restoration was influenced significantly only by the nonvitality of the abutment teeth in combination with missing splinting.

During the study period, it was necessary to partially replace 3 of the attachment restorations and entirely replace a further 3 restorations. Four of these cases of failure (after 9, 13, 14, and 26 months) were caused by fractures in the nonsplinted, endodontically treated attachment abutments. This is equivalent to 80% of the partial dentures with nonsplinted and nonvital attachment teeth. In 1 unilateral restoration with a Mini-SG latch attachment, the periodontal parameters of the patient's splinted abutments deteriorated continually (after 32 months). In 1 case, the ceramic veneer on the attachment abutment fractured after 8 months. Lining of a denture base was required in another case.

Ninety percent of the patients expressed a high degree of satisfaction with their dentures. Five percent of the patients who were "less than satisfied" were those whose restorations were partially or entirely replaced.

Discussion

According to longitudinal studies,^{2–4} the lack of success of extracoronal attachments can be attributed to biologic and technical factors. The Mini-SG attachments underwent 3 years of clinical investigation and monitoring, which demonstrated that the periodontal parameters of the abutment teeth were stable and the wear properties of the attachments were good. In particular, the fact that friction retention can be adapted to suit the individual abutment tooth and periodontal situation appears to have a positive effect on the long-term status of Mini-SG attachment restorations. By improving the complete oral health over the investigation time (positive changes in API, SBI, and mobility values of all teeth), the mobility of the abutment teeth was reduced. This effect may also be caused by the splinting of the abutment teeth.

In agreement with Altay et al,⁵ for a removable Mini-SG attachment, at least 2 splinted abutment teeth are recommended for attachment. The results of this study should be regarded as an indication that unilateral removable Mini-SG attachments are to be avoided in cases with periodontal damage and the use of nonsplinted, nonvital abutment teeth. Any lack of success with this system was solely the result of the conventional components of the removable prosthesis (ceramic fracturing or crown or pin fracturing in single endodontically treated abutments) and existing periodontal problems.

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