Short Communication

Removable Implant-Supported Maxillary Prostheses Anchored on Milled Bars: A Retrospective Evaluation of Two Concepts

Gerald Krennmair, MD, DMD, PhD[a]/Eva Piehslinger, MD, DMD, PhD[b]

Removable maxillary prostheses (n = 31) rigidly retained on either a one-piece anteriorly located milled bar fixed on four implants located in the anterior maxillary region (group 1, n = 15) or on two bilaterally placed milled bars fixed on six to eight implants located in the posterior maxillary region (group 2, n = 16) were evaluated for prosthodontic maintenance and the calculated bar-generated supporting area. Comparisons of the incidence of prosthodontic maintenance and the supporting area generated by the bars did not differ between groups. Evident advantages were noted for the anterior concept (group 1) with regards to surgical, technical, and prosthodontic aspects, suggesting a preference for this approach versus the more intricate and complex posterior concept (group 2) under particular circumstances and on appropriate indication. *Int J Prosthodont 2009;22:576–578.*

Apart from resilient anchoring systems involving dual implant-tissue support,[1,2] rigid stabilization using milled bars provides an alternative treatment modality for implant-supported maxillary denture stabilization.[3] Recently, clinical implant outcomes, including peri-implant parameters, have been evaluated in detail for two different concepts using milled bars for maxillary denture support. The evaluated findings demonstrated that implants placed for the support of a removable maxillary denture anchored either on an anterior one-piece cross-arch milled bar or placed in support of bilaterally nonconnected milled bars do not differ with respect to survival rate or peri-implant parameters, regardless of placement in augmented or nonaugmented regions.[3]

Comparing the prosthodontic maintenance efforts for removable maxillary implant-supported dentures using the resilient dual nature of support and rigid stabilization by milled bars, a higher incidence of postinsertion aftercare has been reported for the resilient anchoring system.[4] However, considering the wide range of different intraoral locations of milled bars, there is a lack of information regarding the evaluation of maxillary milled bars in various locations and with rigid anchoring for the extent of prosthodontic maintenance.

Thus, the aim of this retrospective study was to compare a one-piece anteriorly placed posteriorly cantilevered milled bar with two nonconnected bilaterally placed milled bars for the bar-generated supporting areas and the incidence and type of prosthodontic postinsertion maintenance for maxillary dentures in function for at least 3 years.

[a]*Professor and Clinical Lecturer, Department of Prosthodontics, Dental School, University of Vienna, Vienna, Austria.*
[b]*Professor and Head, Department of Prosthodontics, Dental School, University of Vienna, Vienna, Austria.*

Correspondence to: *Dr Gerald Krennmair, Trauneggsiedlung 8, 4600 Wels, Austria. Fax:+ 7243 518136. Email: krennmair@aon.at*

Fig 1a Milled anterior one-piece cross-arch bar with posteriorly cantilevered extensions including retention devices and a defined bar-generated supporting area.

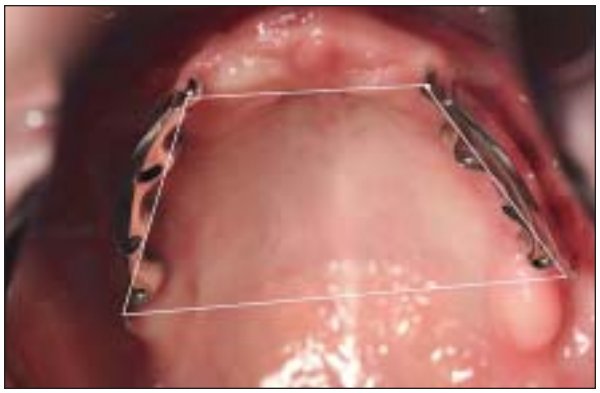
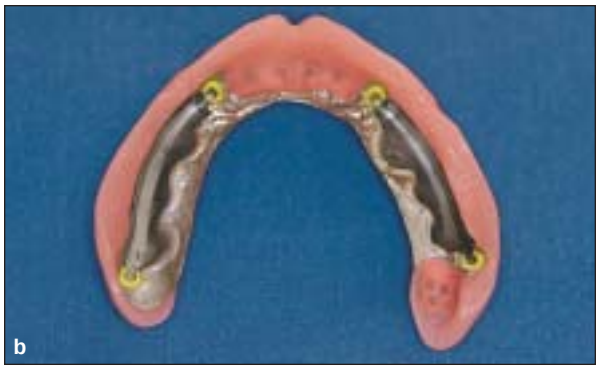


Fig 1b Bilaterally nonconnected milled bars including retention devices with a defined bar-generated supporting area.



Figs 2a and 2b Overdenture base with a metal-reinforced framework for **(a)** the anterior bar and **(b)** both posterior bars.

Materials and Methods

Thirty-one patient-removable prostheses were provided for consecutive patients requiring rehabilitation of the edentulous maxilla. Fifteen prostheses were anchored to an anterior cross-arch milled bar supported by four implants placed anteriorly to the sinuses and incorporating a bilateral posterior cantilever section (group 1, Fig 1a) and 16 prostheses were anchored to bilateral nonconnected milled bars supported by six to eight implants (group 2, Fig 1b). All dentures had to be in situ for at least 3 years (mean: 4.6 ± 1.3 years, range: 3 to 8 years). Appropriate implant placement in group 2 involved bilateral sinus augmentation. The milled bar had a 2- to 4-degree tapered design and prostheses were reinforced by a cast framework consisting of 12 resin teeth (Figs 2a and 2b). In both groups, the milled bars were provided with additional retentive devices (Preci-Vertex, Alphadent), as described in a previous study.[3]

Both concepts were compared for the bar-generated supporting area and for postinsertion prosthodontic maintenance requirements. The bar-generated denture-supporting areas were mathematically calculated by scanning drawn lines from the four most eccentric corners of the bars (Figs 1a and 1b). The evaluated prosthetic complications recorded during the follow-up period were analyzed into two categories: *(1)* implant component maintenance—implant loss or fracture, abutment screw loosening, abutment or bar fracture and *(2)* prosthesis component maintenance—matrix activation or replacement (acryl-preci matrix, variosoft matrix), denture teeth fracture or replacement, denture fracture, denture margin adaptation (reduction or relining), overdenture rebased, and opposing prosthesis maintenance (fracture, rebased, or remade).

Table 1 Type of Prosthodontic Maintenance and Complications for Maxillary Prostheses Rigidly Supported by Either an Anterior One-Piece Bar or Posterior Bilateral Nonconnected Milled Bars

	Group 1 (anterior bar, n = 15)	Group 2 (posterior bars, n = 16)	Total (n = 31)
Implant component maintenance			
Abutment screw loosening	2	4	6
Prosthetic maintenance			
Matrix activation/replacement (acryl)	2	4	6
Denture teeth fracture/replacement	3	3	6
Denture margin adaptation	5	4	9
Overdenture rebased	3	2	5
Opposing denture/teeth fracture renewed	2	2	4
Total	17	19	36
Maintenance/y/patient	0.20	0.22	0.21

Results

The area generated by the anterior cross-arch bar including the distal bar extension was 962 ± 84 mm^2; that of the bilateral nonconnected bars was 1,015 ± 118 mm^2. Table 1 shows the prosthodontic maintenance required for implant-supported prostheses retained by the milled bars of groups 1 and 2. The bar-generated supporting zone as well as the incidence of postinsertion intervention did not differ between the two prosthodontic designs (group 1: 0.20, group 2: 0.22 maintenance episodes per year per patient).

Discussion

Since the parameters evaluated showed no significant differences between the two concepts, neither of the two systems can be considered superior to the other in regards to the extent of prosthodontic maintenance and the supporting area provided by the bars.[3] Both the bilateral nonconnected bars with the majority of implants in sinus-augmented bone and the one-piece bar with distal extensions anchored on anteriorly placed implants in nonaugmented regions provide stable distal support and consequently, rigid denture anchoring.[2–4] This stable denture anchoring mechanism, including the prosthesis design used with a frictional overcasting without prosthesis rotation, accounts for the low incidence of postinsertion maintenance with both concepts used.[2,3]

If the anatomical requirements for the insertion of anterior implants are met but there is still an esthetic or functional need for the use of a removable restoration, the anterior concept shows obvious surgical and technical advantages over the posterior concept. Similar to the all-on-four concept for fixed restorations, the anterior concept described for rigid removable prostheses represents an option for a cost-efficient and economical restoration procedure.[5]

References

1. Mericske-Stern R, Oetterli M, Kiener P, Mericske E. A follow–up study of maxillary implants supporting an overdenture: Clinical and radiographic results. Int J Oral Maxillofac Implants 2002;17: 678–686.
2. Zitzmann NU, Marinello CP. Implant-supported removable overdentures in the edentulous maxilla: Clinical and technical aspects. Int J Prosthodont 1999;12:385–390.
3. Krennmair G, Krainhöfner M, Piehlslinger E. Implant-supported maxillary overdentures retained with milled bars: Maxillary anterior versus maxillary posterior concept—A retrospective study. Int J Oral Maxillofac Implants 2008;23:343–352.
4. Ferrigno N, Laureti M, Fanali S, Grippaudo G. A long-term follow-up study of non-submerged ITI implants in the treatment of totally edentulous jaws. Part I: Ten-year life table analysis of a prospective multicenter study with 1286 implants. Clin Oral Implant Res 2002;13:260–273.
5. Maló P, Rangert B, Nobre M. All-on-4 immediate-function concept with Brånemark system implants for completely edentulous maxillae: A 1-year retrospective clinical study. Clin Implant Dent Relat Res 2005;7(suppl 1):88–94.