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Retention characteristics of semi-precise bar attachments in implant dentistry

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Introduction

Bar attachments have been established in implant dentistry. Only bar attachments realize primary splinting of the implants. For different bar designs various patterns with different crass sections are usable. [1] Contrary to prefabricated or individual fabricated matrices from metal or electroplated gold, semi-precise resin friction inserts are economical and easily replaceable. [2, 3, 4] (Fig. 1). These inserts determine the retention of the prosthesis and are embedded by metal friction patterns (matrices). Manufacturers offer various and colour-coded inserts with different retention forces often specified only as 'smooth', 'normal' and 'strong'. (Tab. 1) Clinical reproducibility of the retention forces of semi-precise bar inserts is not yet investigated.

Objectives

The aim of this in vitro study was to analyze and compare retention characteristics of different prefabricated resin inserts in implant dentistry.

Material and Methods

4 bar systems were tested for retention of the corresponding specific resin inserts. For each system a bar (10mm long) was casted (Heraenium P, Heraeus Kulzer, Hanau, D) using prefabricated acrylic components. Specimen were connected rigidly to a titanium abutment by laser and torqued to an implant (SP-RN, Straumann, Basel, CH). Matrices for the friction inserts were prefabricated (Cendres & Métaux) or casted from a prefabricated resin pattern which burns out without residues (Bredent). All inserts (polyacetal-copolymer resins) were tested as delivered by the respective manufacturers. For each bar system and the respective color-coded retention forces (n=3) 10 resin inserts were tested (n=12x10; Tab. 1) Retention forces of 3 systems were indicated by the manufacturers (4/6/8N). Dolder bar attachment quotes only 'light'/'middle'/'heavy'. In an universal-testing-machine (Zwick, Ulm, D) matrices were removed 10 times from the patrices (v=50mm/min, axial, salivary solution 22°C; Fig. 3). Force-deflection-graphs were made. If possible mean retention forces were compared to manufacturer's data and statistically analyzed ($p < 0,05$).

Fig. 1a-b: Snap bar attachment with friction-snap matrice vsp-fs 'yellow'

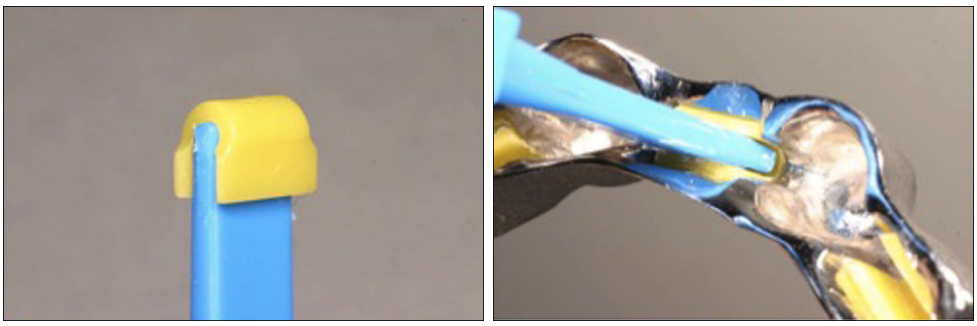


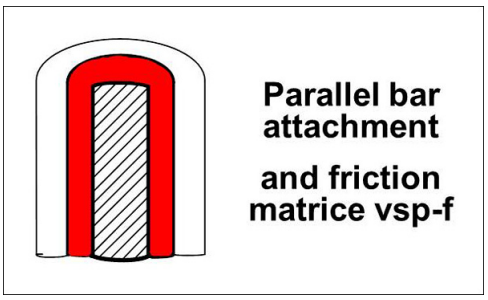
Fig. 1c-d: Snap bar attachment with friction-snap matrice vsp-fs 'yellow'


Fig. 1e-f: Snap bar attachment with friction-snap matrice vsp-fs 'yellow'


Fig. 1g-h: Snap bar attachment with friction-snap matrice vsp-fs 'yellow'

Product	**Friction inserts**	**Color code**	**Retention force Manufacturer's data [N]**	**Manufacturer**
Parallel bar attachment	Friction matrice vsp-f	green	4	Bredent, Senden, D
		yellow	6	
		red	8	
Snap bar attachment	Friction-snap matrice vsp_fs	green	4	Bredent, Senden, D
		yellow	6	
		red	8	
Resilient snap bar attachment	Joint snap-in matrice vsp-gs	green	4	Bredent, Senden, D
		yellow	6	
		red	8	
	Friction matrice	green	not reported	Cendres & Métaux, Biel/Bienne, CH
		yellow	not reported	
		red	not reported	

Tab. 1: Tested bar attachment systems



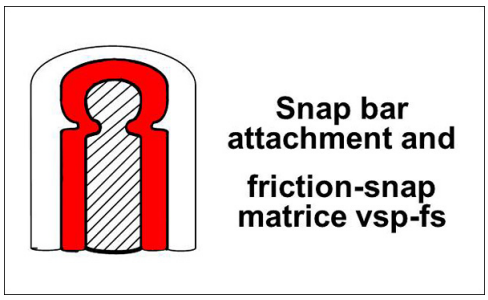
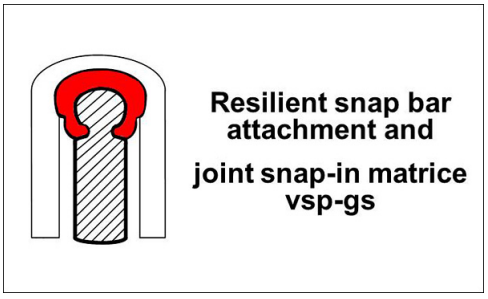


Fig. 2a-b: Construction principles of the tested bar systems



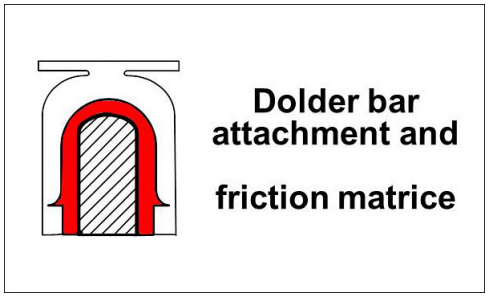


Fig. 2c-d: Construction principles of the tested bar systems

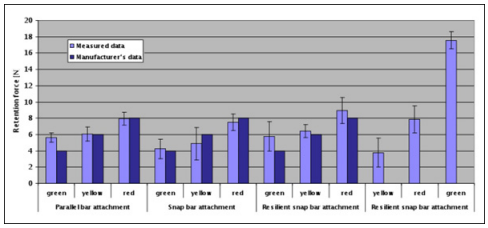


Fig. 3

Fig. 4

Results

Mean retention forces differed within the groups (Welch- und Brown-Forsythe Test, $p < 0,05$, Fig. 4). Differences were not significant for all groups. The graduation in different retention force levels given by the manufacturers could only be proven in one system. However, the system produced retention forces about 100% above the other three tested systems. Retention force information by the manufacturer was not provided. Lowest deviation from manufacturer's inforrnation was found in the red friction inserts of the parallel bar attachment (-0,9%). Highest deviation of 44% was shown by the green friction inserts of the resilient snap bar attachment.
In three groups the inserts with the declared lowest retention force (green) produced comparable higher retention forces.
Owing to the influence on long term success and patients' satisfaction retention force is important for choosing the adequate insert. So, precise labeling by the respective manufacturers is clinically important. All tested inserts offered initially adequate retention forces. The forces of 11 of 12 inserts met the requirements for attachments (4-12N) postulated by Lehmann and Armin [5]. The resulted data are beneath the retention forces of alternative semi-precise single resin attachments (12N to 25N). [7] Reasons for deviation of measured data maybe be found in various insert resin materials, the retentive design and subsequent manipulation of the casted bars. Long term investigations to the retention properties of the tested systems are initiated.

Conclusion

Within some systems differences in retention forces between the color coded friction inserts were small. Retention forces of the inserts of most systems showed significant differences to the manufacturer's information. A purposeful application of some tested inserts according to their guaranteed retention force seems to be clinically doubtful and unpractical.

Literature

1. English CE. Bar patterns in implant prosthodontics. Implant Dent 1994;3:217-229
2. Chung KH, Chung CY, Cagna DR, Cronin RJ. Retention characteristics of attachment systems for implant overdentures. J Prosthodont 2004;13:221-226
3. Michelinakis G, Barclay CW, Smith PW. The influence of interimplant distance and attachment type on the retention characteristics of mandibular overdentures on 2 implants: initial retention values. Int J Prosthodont 2006;19:507-512
4. Svetlize CA, Bodereau EF. Comparative study of retentive anchor systems for overdentures. Quintessence Int 2004;35:443-448
5. Lehmann KM, Arnim F. Studies on the retention forces of snap-on attachments. Quintessence DentTechnol 1978:45-48
6. Stewart BL, Edwards RO. Retention and wear of precision-type attachments. J Prosthet Dent 1983;49:28-34
7. Boeckler AF, Arnold Ch, Rump D, Bierögel Ch, Setz JM. Retention characteristics of Locator attachments on angulated dental implants. J Dent Res (Spec Issue A) 2009;88:2923

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