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Accuracy of full-arch implant frameworks obtained through digital impression.

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Aim

The purpose of this in vitro study is to assess the passive fit of prosthetic metal frameworks obtained through a novel digital impression system, for full-arch rehabilitations on multiple implants.

Materials and methods

5 master casts, reproducing edentulous jaws with 4 tilted implants, were poured (**Figure 1**).

An intraoral scanner system [*True Definition Scanner, 3M ESPE, St. Paul, MN, USA*] was used to perform 5 digital impressions (DI) of each master cast (n=25).
The implant position was detected with 4 special scan bodies [*Toothless, Simbiosi srl, Empoli Firenze, Italy*].

A single DI, presenting mean values compared to the others, was selected from each group in order to fabricate a metal framework with CAD-CAM technology (n=5) (**Figure 2**).

Passive fit was assessed with the Sheffield Test, screwing each framework on the corresponding master cast (**Figure 3**).

A stereomicroscope [*Wild M3Z, Wild Heerbrugg, Heerbrugg, Switzerland*] with a 40x magnification was used to record maximum gap values at the framework-implant analog interface (**Figure 4**).

Results

The findings of the Sheffield Test are in **Table 1**.

All the frameworks showed a mean gap value of < 50µm.

No significant differences were found among the groups (p>0.05).

Conclusions

Within the limits of this study, digital impression represents a reliable method to fabricate full-arch implant frameworks provided with passive fit.

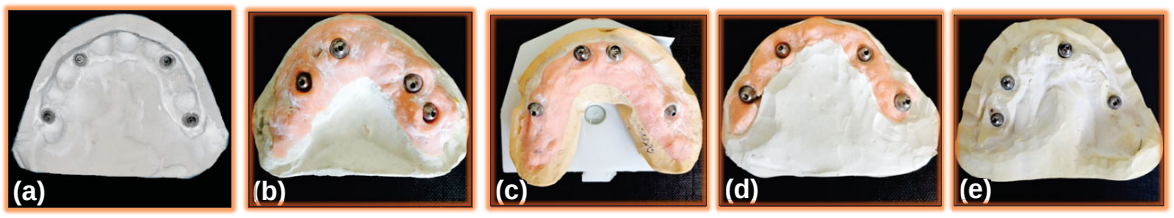

Fig. 1
a. Master cast #1 (MC-1); b. Master cast #2 (MC-2);
c. Master cast #3 (MC-3); d. Master cast #4 (MC-4); e. Master cast #5 (MC-5);

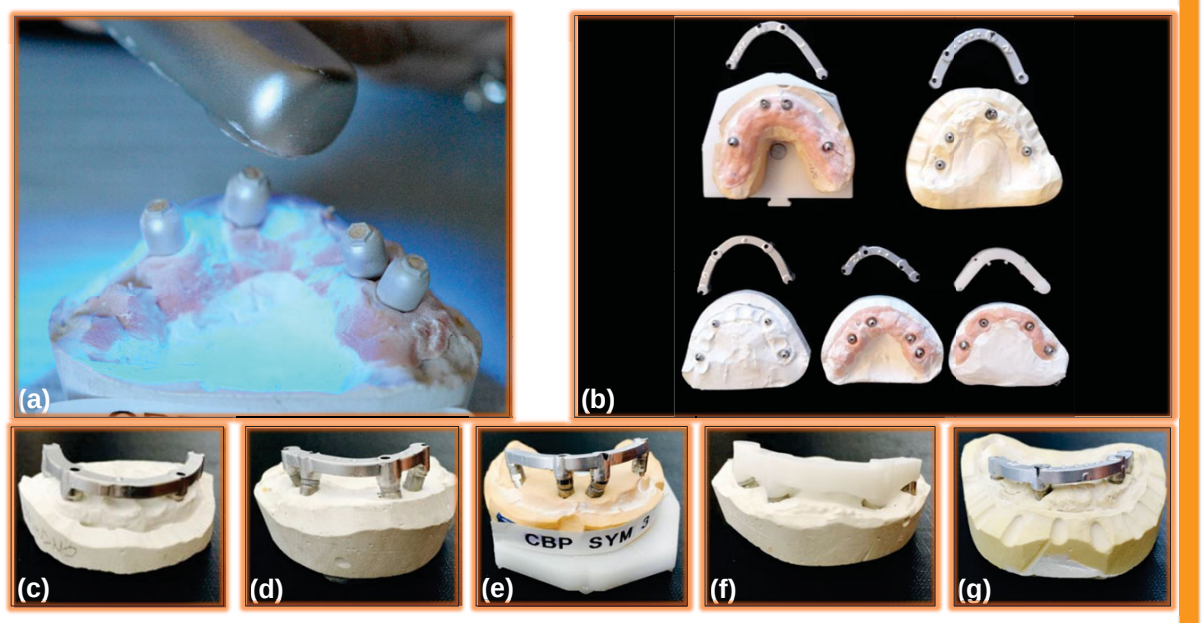

Fig. 2
a. Digital impression; b. Milled prosthetic frameworks and corresponding master casts;
c. Master cast #1 (MC-1); d. Master cast #2 (MC-2); e. Master cast #3 (MC-3);
f. Master cast #4 (MC-4); g. Master cast #5 (MC-5).

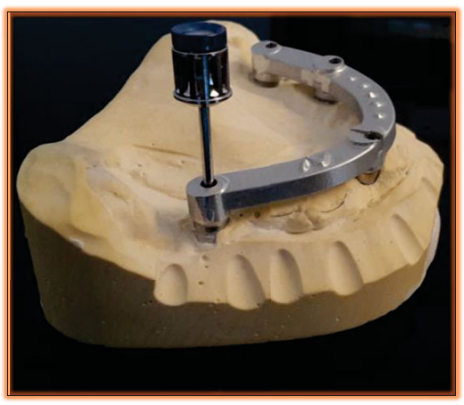

Fig. 3
Sheffield Test: framework screwed on implant analog 2.6.

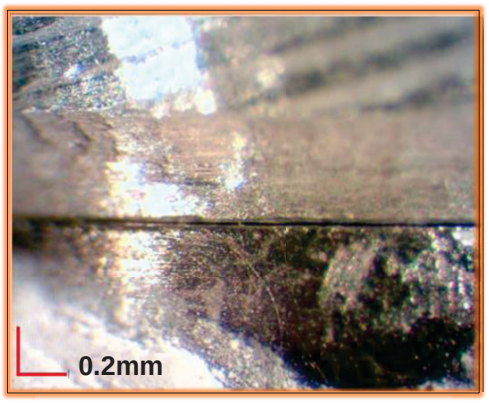

Fig. 4
Framework-implant analog interface (40x magnification).

Table 1. Passive fit evaluation with Sheffield Test.

Sheffield Test			
Framework	**Mean ± SD (mm)**	**min (mm)**	**MAX (mm)**
MC-1	0.024 ± 0.019	0.003	0.044
MC-2	0.022 ± 0.014	0.003	0.047
MC-3	0.027 ± 0.015	0.003	0.045
MC-4	0.021 ± 0.012	0.003	0.037
MC-5	0.021 ± 0.016	0.002	0.046

References

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