Reconstruction accuracy of four different angular-stable mandibular reconstruction plate systems. Results of an in-vitro study.

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Objectives:
For mandibular reconstruction after continuity resection most centers use angular-stable reconstruction plates today. However, a multiplicity of plate systems are available on the market which differ concerning to their angular-stable connection between screw head and plate. The aim of the present study was the investigation of reconstruction accuracy of four widely-used angular-stable mandibular reconstruction plate systems by evaluation of the postoperative change of the position of the mandibular rami and the condyles in comparison to the original position before mandibular continuity resection.

Methods:
Following osteosynthesis systems were compared (Fig.1):
(1) Medartis Modus Reco 2.5 (Medartis®, Basel, Schweiz)
(2) Synthes Compact 2.4 UniLock (DePuy Synthes®, Zuchwil, Schweiz)
(3) Synthes MatrixMANDIBLE Recon 2.4 (DePuy Synthes®, Zuchwil, Schweiz)
(4) Stryker Leibinger Universal Mandible Recon (Stryker®, Kalamazoo, USA)

Per system 10 mandibular models (Phacon®, Leipzig, Germany) were provided. At these models (n= 40) four landmarks were marked with mini-screws on each side of the condyles and mandibular rami (A, B, C, D respectively A’, B’, C’, D’) as reproducible measuring points (Fig.2).

With regard to all four measuring points together, the absolute value of Medartis Modus Reco 2.5 showed with 0.78 mm the largest median deviation from the initial value. The other systems showed nearly identical median deviations (Synthes Compact 2.4 UniLock = 0.48 mm, Synthes MatrixMANDIBLE Recon 2.4 = 0.52 mm) (Fig.5A). The difference between Medartis Modus Reco 2.5 and the three other systems is significant. In between the other systems there are no significant differences (Tab.1).

Discussion and Conclusion:
The tested plate systems are showing differences concerning their reconstruction accuracy, which are getting partially statistically significant in our investigation. While the absolute values can act as an indicator for reconstruction accuracy of the different systems, the signed values are rather indicating, whether the plates were by tendency more bended on compression or more on extension along the mandibular model. The authors believe that the algebraic sign seems to be rather random and independent from the system, whereas the scatter range of the values can be interpreted as system dependent again.

With median deviations below one millimeter, it can be assumed in general, that all investigated systems have high reconstruction accuracy. No relevant differences can be expected concerning the clinical outcome in between the investigated systems with a high probability.

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