



The impact of cone beam CT imaging when placing dental implants in the anterior edentulous mandible A before-after study

Poster #
0719



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Aims

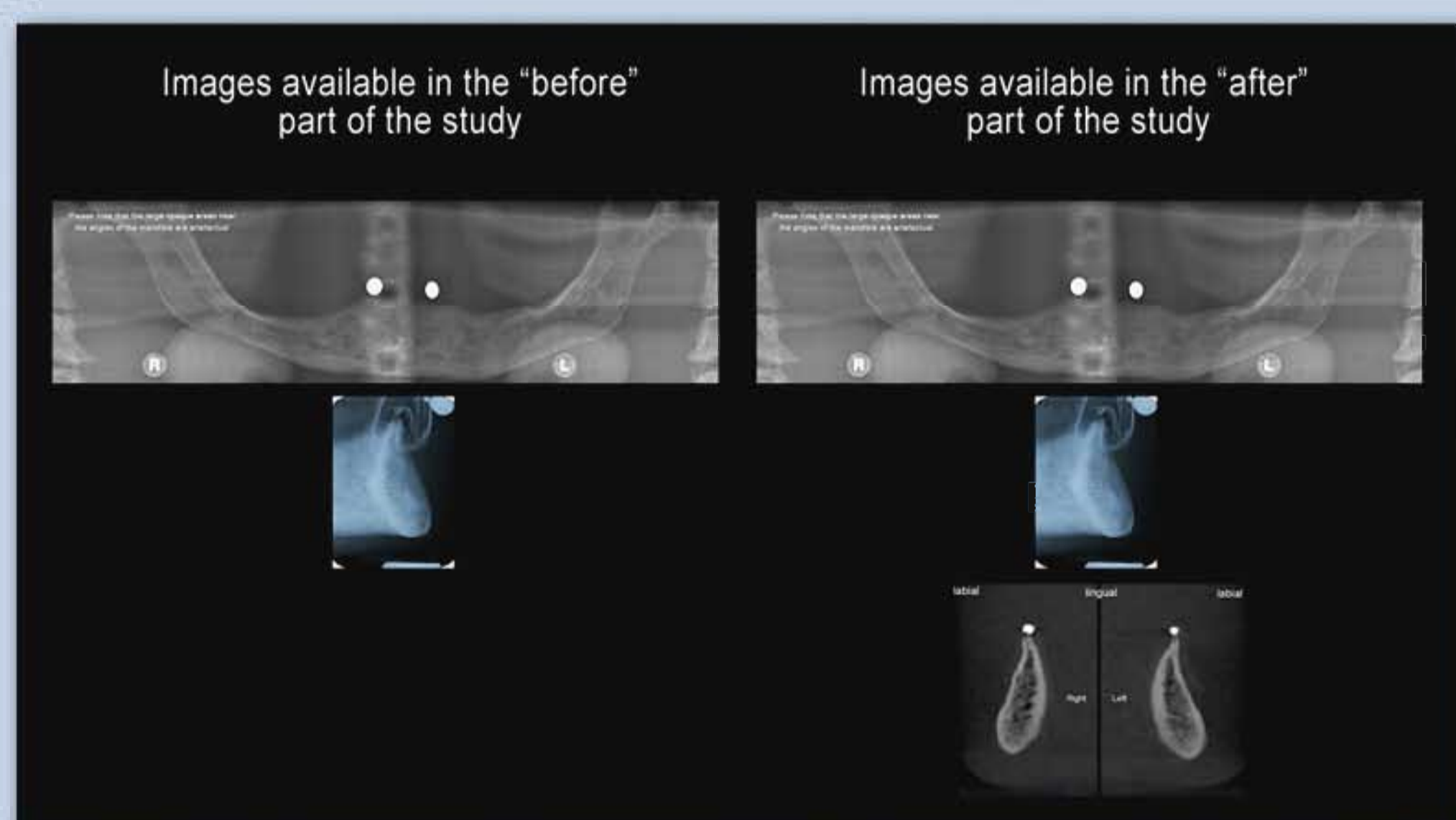
A three dimensional appreciation of the form of the anterior mandible is required to place dental implants safely in the region. The aim of this study was to evaluate the impact of CBCT imaging when placing dental implants in the anterior edentulous mandible, using a "before-after" study design.

Development of the Dental Simulation

The objective was to develop a reproducible, lifelike dental simulation which presents drillable models of edentulous mandibles with corresponding images. Images of four edentulous mandible specimens were prepared using an anatomical water phantom. Impressions of the volume of the anterior mandibles were cast in a bone-like polymer. These drillable models were enclosed in a silicone base, which represented soft tissue, and presented in a dental phantom head. A preliminary evaluation suggested that this simulation is as close a representation of implant surgery as realistically possible.



The four mandibles included in the study and imaging in the water phantom (transymphyseal view)



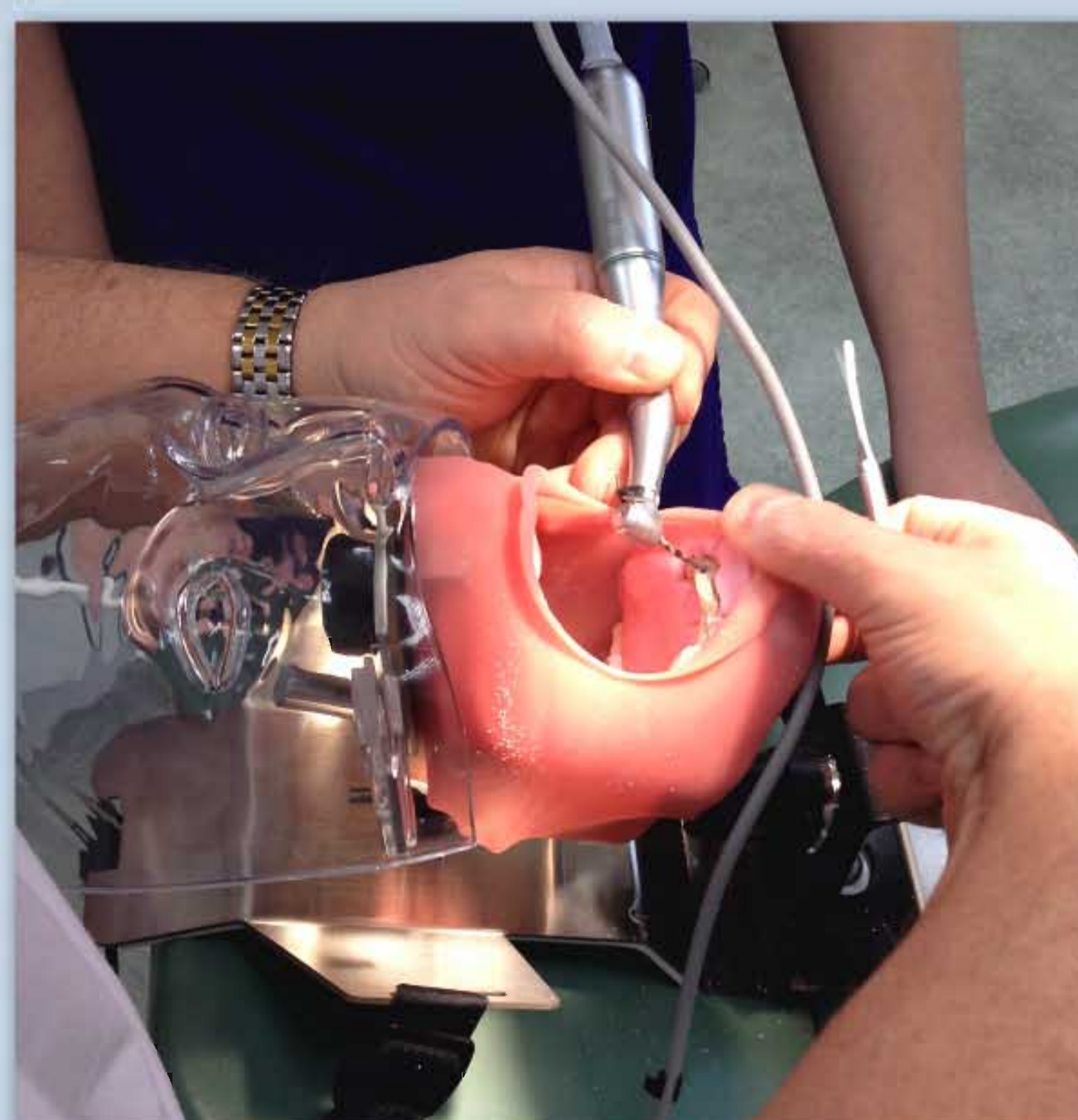
Panoramic, trans-symphyseal and CBCT images available in the "before" and "after" parts of the study



Pouring of silicone soft tissue analogue around a cast of a mandible and resulting hard and soft tissue model

Materials and Methods

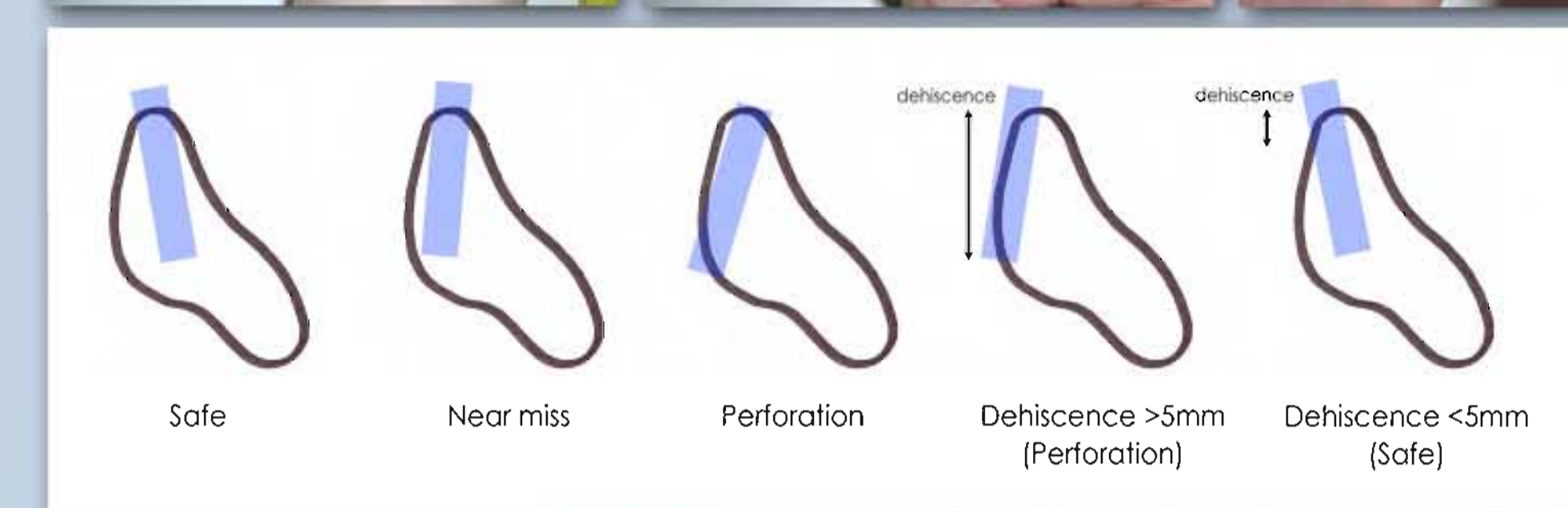
Eight dental practitioners, who regularly place dental implants in independent dental practice in the North West of England, were presented with realistic simulations of four edentulous cases. The simulations were made up from radiographs of mandible specimens in a water phantom and casts of the mandibles in a bone analogue material. The casts were presented in a phantom head with silicone representing soft tissue. The practitioners were asked to assess case difficulty, select implants and then drill osteotomies in preparation for dental implants in the lower canine regions to support a complete overdenture. In the "before" part of the study, a panoramic and a trans-symphyseal view were available. In the "after" part of the study, a CBCT image was added. Perception of case difficulty, implant selection and the incidence of perforations or "near miss perforations" of the lingual cortical plate were recorded. Two cases were regarded as "regular" and two as "challenging"



A participant prepares osteotomies on the dental simulation

Results

In "challenging" cases, the availability of CBCT led practitioners to select narrower implants and to assess cases as more difficult. In the "challenging" cases only, there were fewer perforations of the lingual cortical plate after the availability of CBCT, but this difference was not statistically significant. There were no perforations in the "regular" cases either before or after the availability of CBCT.



Removal of the mandible casts from the simulation and assessment for perforations and near misses

| | | | |
|---|--|---------------------------|---------|
| Perforations and near miss perforations before and after | Perforations and near misses all cases | McNemar test | P=0.21 |
| | Perforations only all cases | McNemar test | P=0.18 |
| | Perforations and near misses challenging cases alone | McNemar test | P=0.302 |
| | Perforations only challenging cases alone | McNemar test | P=0.18 |
| Implant selection before and after | Decrease in implant width selected. Preoperative selection all cases | Wilcoxon signed-rank test | P=0.053 |
| | Decrease in implant width selected. Preoperative selection challenging cases | Wilcoxon signed-rank test | P=0.007 |
| | Decrease in implant width selected. Final selection all cases | Wilcoxon signed-rank test | P=0.131 |
| | Decrease in implant width selected. Final selection challenging cases | Wilcoxon signed-rank test | P=0.021 |
| Preoperative assessment of case difficulty before and after | Mean preoperative assessment of case difficulty all cases | Paired sample t test | P=0.062 |
| | Mean preoperative assessment of case difficulty challenging cases | Paired sample t test | P=0.006 |

Summary of statistical analyses

Conclusions

Perception of case difficulty and implant selection are of importance only if they change the outcome for the patient. This study provided only weak evidence that CBCT is helpful in avoiding perforations in "challenging" cases. The availability of CBCT had no impact in "regular" cases.

Clinical Implications

These results suggest that there is no case for routine prescription of CBCT for the pre-operative assessment of all implant cases. Nevertheless, it would be premature to suggest that CBCT has no place in the assessment of the anterior edentulous mandible when planning dental implant placement.



Impression of a mandible and pouring a cast in the bone-like polymer

Sectioned cast

