



SMART DENTAL UPDATES

Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you “**SMART DENTAL UPDATES**” which contains latest and interesting news in the field of Dentistry.

This issue contains

- Bacteriologic status of non-cavitated proximal enamel caries lesions. A histologic and histobacteriologic study
 - Three-dimensional accuracy of bone contouring surgery for zygomaticomaxillary fibrous dysplasia using virtual planning and surgical navigation
 - Influence of High-Pressure Polymerization on Mechanical Properties of Denture Base Resins
- Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,
Medical Team, Micro Labs Limited

Bacteriologic status of non-cavitated proximal enamel caries lesions. A histologic and histobacteriologic study

This histologic and histobacteriologic study evaluated non-cavitated interproximal white spot lesions in human teeth for the 1) presence and morphology of bacterial aggregations at the enamel-dentinal junction (EDJ), and 2) reactions in the subjacent pulp tissue.

The material comprised 16 third molars diagnosed with early interproximal caries lesions obtained consecutively in a single clinical practice. Four third molars with clinically intact proximal surfaces served as controls. Caries activity was categorized as active or arrested. Teeth were prepared for histologic and histobacteriologic analyses.

In non-cavitated, active or arrested, enamel caries lesions, bacteria traverse the enamel and may establish structured biofilms at the enamel-dentinal junction, causing early pulp changes.

Control teeth exhibited normal tissue conditions with no bacteria. Macroscopic discoloration of the superficial dentin occurred in 14/16 teeth with early caries lesions. Bacterial aggregations resembling biofilms were observed in 10/16 teeth (six with active and four with arrested lesions). Bacterial cells were observed superficially in some of the underlying dentinal tubules, while in a few cases a deeper penetration was evident. Pathologic changes of varying degrees were observed in the pulps of all 16 teeth, regardless of the caries activity (active or arrested). Pulp reactions varied from disruption of the odontoblast layer, with loss of odontoblasts, to formation of tertiary dentin.

Bacterial biofilms associated with white-spot caries lesions may traverse the enamel and reach the underlying dentin in both active and arrested lesions. In all teeth with early lesions, the pulps showed changes in response to the very superficial biofilm challenge.



In non-cavitated, active or arrested, enamel caries lesions, bacteria traverse the enamel and may establish structured biofilms at the enamel-dentinal junction, causing early pulp changes. These new findings may stimulate clinicians to rethink the rationale for treatment methods that are based on the assumption that bacteria are absent in white-spot lesions.

Source: Ricucci D et al. J Dentistry. 2020 Sept. 100(1); 103422 [epub ahead of print].
<https://doi.org/10.1016/j.jdent.2020.103422>

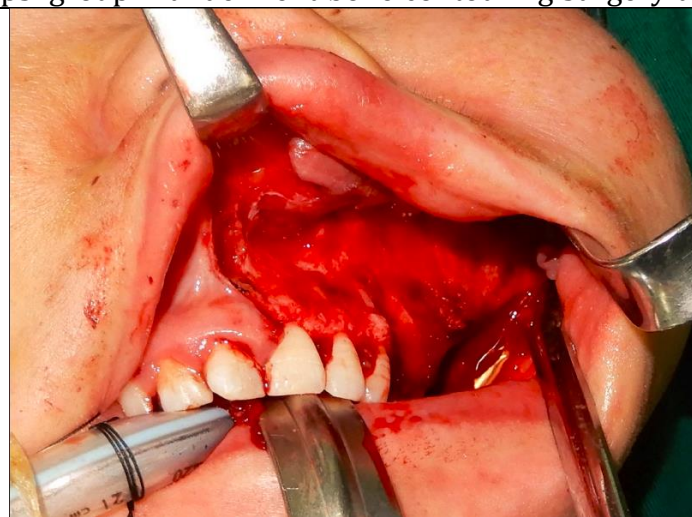
Three-dimensional accuracy of bone contouring surgery for zygomaticomaxillary fibrous dysplasia using virtual planning and surgical navigation

Fibrous dysplasia (FD) is a benign condition in which normal cancellous bone is replaced by immature woven bone and fibrous tissue. The present study aimed to estimate and compare the three-dimensional (3D) accuracy of bone contouring surgery for zygomaticomaxillary fibrous dysplasia (FD) performed using virtual planning and surgical navigation versus using surgeon's intraoperative assessment.

This is a retrospective cross-sectional study. Patients with zygomaticomaxillary FD who underwent bone contouring surgery between 2012 and 2019 were reviewed.

Virtual planning and surgical navigation can significantly improve the 3D accuracy and patient satisfaction.

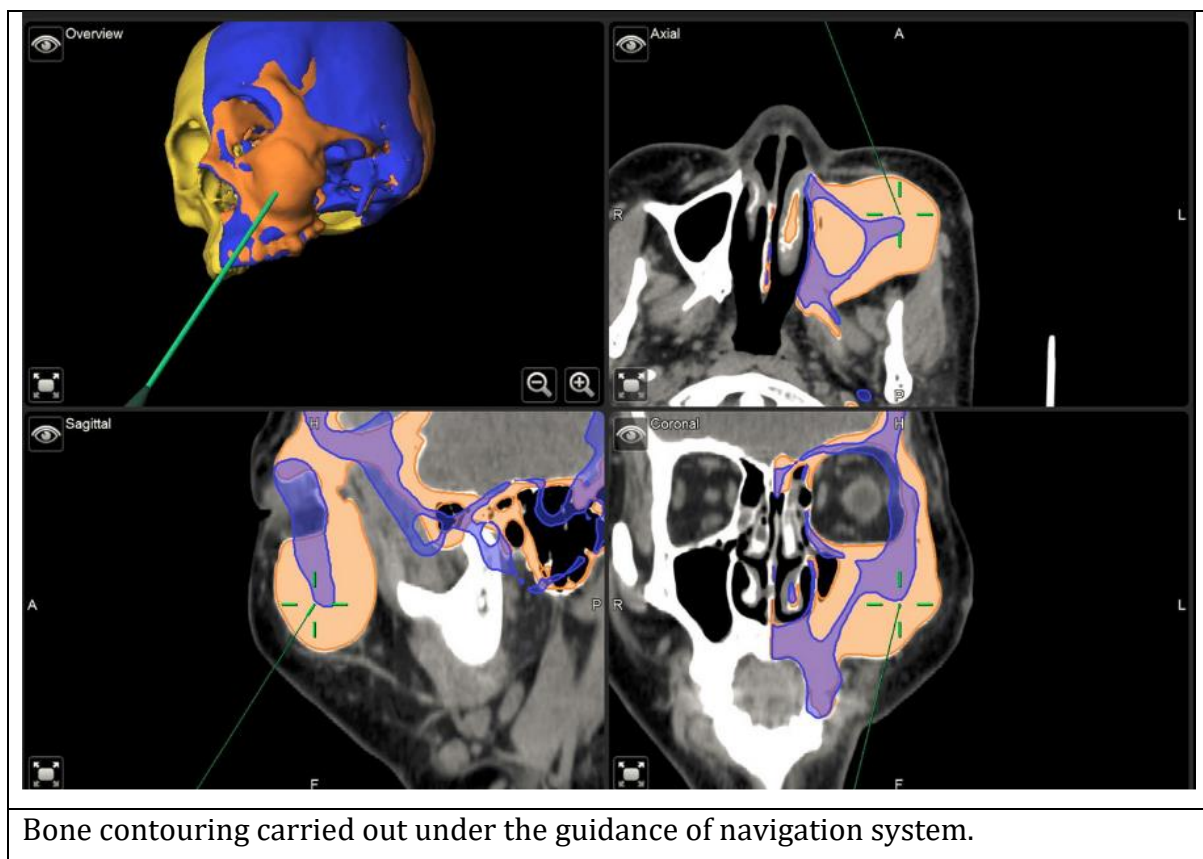
They were divided into two groups: group A underwent bone contouring surgery using virtual planning and surgical navigation, group B underwent bone contouring surgery by surgeon's intraoperative assessment. The predictor variable was surgical technique. The other variables were gender, age and operative region. The primary outcome variable was 3D accuracy,



The lesion has been exposed using an oral vestibular approach.

which was indicated by root mean square (RMS), calculated as a measure of the deviation of the postoperative computed tomography from the preoperative virtual plan. The other outcome variables were patient satisfaction with the outcome by self-evaluation score and operative times. Correlation analysis between the predictor variables and outcome variables was performed.

The sample was composed of 24 patients (17 males and 7 females, mean age, 25.7 ± 10.45 years), 13 patients in group A and 11 patients in group B. The mean RMS was significantly lower in group A than in group B ($P = 0.007$). Patient satisfaction with facial symmetry was significantly better in group A ($P = 0.015$). Mean operative time was comparable between the two groups ($P = 0.918$). Surgical technique ($P = 0.011$) and operative region ($P = 0.01$) were significant influence factors in 3D accuracy of surgery.



Virtual planning and surgical navigation can significantly improve the 3D accuracy and patient satisfaction of bone contouring surgery for zygomaticomaxillary FD, without prolonging operative time.

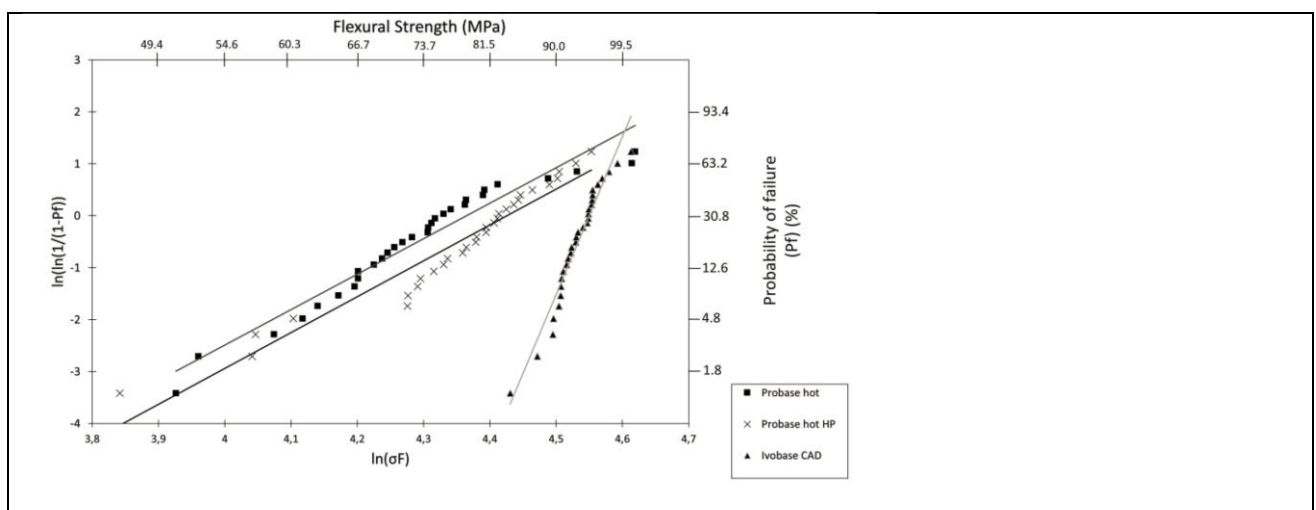
Source: Liu S et al. J Oral Maxillo Surg. 2020 July. Online ahead of print
<https://doi.org/10.1016/j.joms.2020.07.208>

Influence of High-Pressure Polymerization on Mechanical Properties of Denture Base Resins

Fracture is a frequent cause of failure of acrylic resin removable complete dentures, affecting around 30% of complete dentures as well as 9 to 15 % of implant overdentures. Many approaches have been undertaken to improve the mechanical properties of materials used for removable complete dentures. The purpose of this study was to study the influence of high-pressure (HP) polymerization on the mechanical properties of denture base PMMA resins compared with conventional thermo-polymerization and PMMA discs for digital dentures.

HP polymerization does not significantly increase the mechanical properties of denture base resins.

Three groups of blocks were prepared: Probase Hot (Ivoclar Vivadent, Lichtenstein) conventionally heat polymerized at 100°C, Probase Hot heat polymerized at 100°C under HP (200 MPa) and Ivobase CAD (Ivoclar Vivadent, Lichtenstein). Samples for mechanical/physical ($n = 30$) and samples for viscoelastic ($n = 10$) characterizations were cut from the blocks. Flexural strength (σ_f), elastic modulus (E_f), hardness, density (ρ), flexural deformation at maximal flexural stress, flexural load energy (U_r) and viscoelastic properties (E' , E'' , $\tan\delta$, T_g) were analyzed using one-way ANOVA ($\alpha = 0.05$), Scheffé multiple means comparisons ($\alpha = 0.05$) and Weibull statistics (for σ_f). SEM images of the fractured surfaces were obtained.



Weibull plots of the flexural strength (σ_f) results

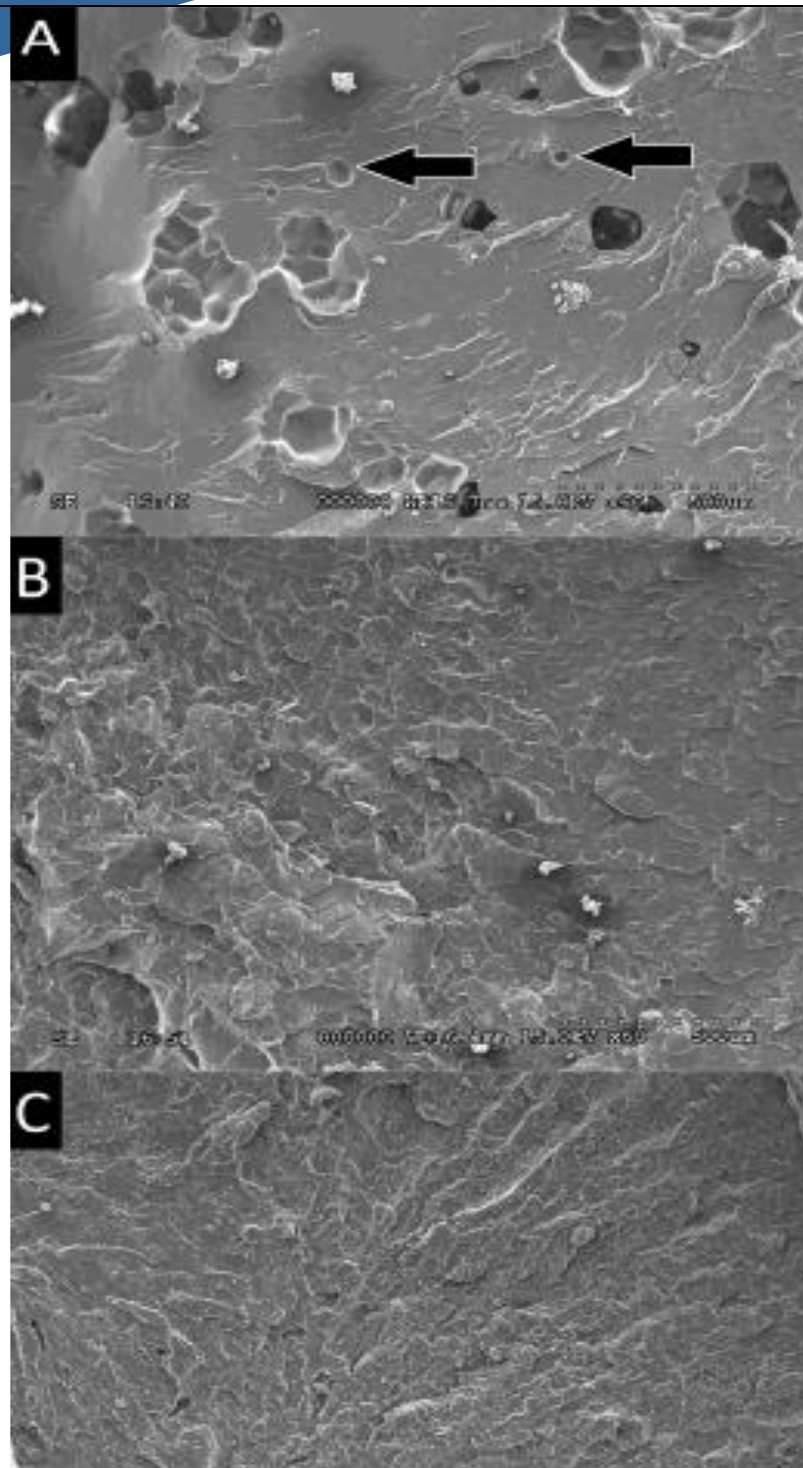


Figure 1 SEM micrographs of the fractured surfaces (60 x) – (A) Probase Hot conventional heat polymerized Probase Hot (black arrows: voids) – (B) High pressure polymerized Probase Hot (at 100°C, 200 MPa) – (C) Ivobase CAD. Conventional heat polymerized Probase Hot shows significantly more voids than HP polymerized Probase Hot and Ivobase CAD, which are more homogeneous

E_f , E' , E'' and density of HP polymerized Probace hot were significantly higher than conventional heat polymerized Probace Hot, whereas T_g was significantly lower and σ_f , $\tan\delta$, hardness, flexural deformation at maximal flexural stress, U_r were not significantly different. The highest values for σ_f , flexural deformation at maximal flexural stress, U_r and Weibull modulus were obtained with Ivobase CAD. HP polymerization does not significantly increase the mechanical properties of denture base resins.

HP polymerization at 200 MPa did not significantly improve the mechanical properties of PMMA denture base resins compared to conventional heat polymerization, these properties being inferior to CAD/CAM PMMA (Ivobase, Ivoclar). However, viscoelastic properties and density were significantly increased. Studies are necessary to understand and potentially optimize the PMMA HP polymerization. Ivobase CAD/CAM material constitutes a significant improvement in terms of mechanical resistance compared to conventional heat polymerized materials and should be recommended in the context of new digital protocols.

Source: Becerra J et al. J Prosthodontics. 2020 Aug. [Online ahead of print].
<https://doi.org/10.1111/jopr.13231>



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