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ABSTRACT BOOK

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Keywords: Augmented Reality, AR, Osteotomies, Orthognathic Surgery
Objectives: To compare the accuracy of standard free-hand technique versus augmented reality (AR)-guided technique in performing maxillary interradicular and segmental osteotomies.
Materials and Methods: A total of 84 interradicular maxillary osteotomies were performed on 12 phantom models by three equally skilled surgeons.
Four patients with a high dental irregularity index (Little's index >8) were randomly selected from a pre-operative orthognathic surgery database. Their maxillae were digitally reconstructed and 3D-printed in PLA material, with each model replicated three times, yielding twelve phantoms in total.
Each surgeon performed maxillary osteotomies on all patient models: half of the phantoms were operated on using the conventional free-hand technique, while the remaining half were operated on under AR guidance using a MagicLeap2 headset (MagicLeap Inc., Plantation, FL, USA). The AR system employed a QR-code registration approach to overlay pre-planned ideal cutting planes onto the surgical field, as programmed in Materialise Mimics 3-Matic (Leuven, Belgium). Phantom allocation was randomized with respect to both surgical technique and execution order to minimize training bias. Seven interradicular cuts were performed on each maxilla, between the roots of the six anterior dental elements.
All phantoms were subsequently scanned using a CT scanner (Philips Incisive), and DICOM data was used to reconstruct the 84 executed cutting planes. For each plane, the barycentre and normal vector were calculated. Translational deviation of the barycentres and angular deviation of the normal vectors were measured against the pre-planned cutting planes for both groups.
Non-inferiority statistical analysis was performed to compare AR-guided and free-hand techniques.
Additionally, a qualitative assessment of accidental dental damage was conducted for each phantom.
Results: AR-guided osteotomies demonstrated significantly higher accuracy compared to the free-hand group ($p < 0.05$), with a concomitant reduction in the incidence of accidental tooth damage.
Conclusion: Augmented reality shows considerable promise as a surgical aid, particularly in procedures carrying a substantial risk of injury to non-visible structures such as dental roots. While these preliminary results are encouraging, further investigation in real clinical settings is needed to fully understand the potential impact of AR-guided surgery.

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#968
Pathology / Benign lesions of the facial bones / Salivary glands
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Sialoendoscopy for treatment of juvenile recurrent parotitis: a two decade follow up

Ido Vaknin [1], Alex Abramson [1], Yve Weinberg [1], Itai Zilberman [1], Oded Nahlieli [2]
[1] *Barzilai medical center, Ashkelon, Israel;* [2] *Galilee medical center, Nahariyya, Israel*

Keywords: Juvenile Recurrent Parotitis, Sialoendoscopy, Minimally Invasive Therapy,
Objectives: Juvenile Recurrent Parotitis (JRP) is a chronic inflammatory condition of the parotid glands in children, characterized by a recurrent, painful swelling. Sialendoscopy has emerged as a minimally invasive therapy with a dual mechanism of action, aiming to interrupt the underlying inflammatory cycle and prevent progressive pathological damage, such as acinar atrophy and fibrosis. This study evaluates the long-term (two-decade) efficacy of a standardized sialendoscopy based treatment protocol for JRP.
Materials and Methods: We performed a retrospective analysis of the long-term outcomes of children previously diagnosed with JRP and treated at Barzilai Medical Center under a standardized surgical protocol in the years 2005-2026. The intervention consisted of bilateral diagnostic and therapeutic sialendoscopy, lavage with 60 ml of saline per gland, intraglandular injection of 100 mg hydrocortisone via the duct and a postoperative antibiotic regimen of amoxicillin/clavulanate. Treatment success was defined as the complete cessation of symptoms or a maximum of a single isolated recurrence during the follow-up period.
Results: Long-term follow-up data, with a mean post-intervention period of 196 months (approximately 16.3 years), were evaluated for 43 patients. The overall long-term success rate was exceptionally high at 90.7% (39 out of 43 patients). Among the successfully treated individuals, 66.7% (26/39) achieved durable remission after a single sialendoscopic intervention, while 33.3% (13/39) required a second procedure to establish sustained symptoms control. The high success rate was robust and independent of pre treatment characteristics, including patient gender and medical comorbidities. Crucially, all 39 successfully treated patients reported a complete cessation of symptoms and showed no clinical evidence of disease progression to symptomatic Chronic Recurrent Parotitis (CRP) during their transition into early adulthood.
Conclusion: Sialendoscopy, combined with saline irrigation and intraductal hydrocortisone, is a highly safe, durable, and effective definitive first-line intervention for JRP. The two-decade follow-up demonstrates that this standardized protocol maintains an excellent success rate exceeding 90% and successfully prevents the long-term progression of JRP to chronic glandular disease in adulthood. Early endoscopic treatment should be considered to preserve glandular function and reduce the need for more invasive procedures later in life. This two decade follow up represent the longest to date, offering a longitudinal perspective on the procedure's sustained benefits.

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#969
Skull base surgery
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Peek psi immediate reconstruction for spheno-orbital meningiomas through combined antero-lateral approach: orbital validation study

Benedetta Mattei [1,2], Robert Bentley [2]
[1] *University of Modena and Reggio-Emilia, Modena, Italy;* [2] *King's College Hospital NHS, London, United Kingdom*

Keywords: Single-Stage Reconstruction, Cranioplasty, PEEK, Orbit, Meningioma
Objectives: Spheno-orbital meningiomas (SOM) often result in complex cranio-orbital defects following resection. Precise, patient-specific reconstruction is crucial to restore orbital volume, maintain aesthetics, and prevent functional sequelae. While patient-specific implants (PSIs) have gained popularity, objective validation of reconstruction accuracy remains limited. This study aims to validate the accuracy of orbital reconstruction using 3D-printed computer-designed polyetheretherketone (PEEK) PSIs following SOM resection via a combined anterolateral approach.
Materials and Methods: A retrospective cohort of 10 patients with SOMs treated between 2017 and 2024 at King's College Hospital, London, was analyzed. All patients underwent SOM resection via combined antero-lateral approach and simultaneous orbital reconstruction using custom 3D-printed PEEK PSIs. Volumetric analysis was conducted using CT-based 3D modeling software (Mimics and 3-matic). Orbital volumes of the reconstructed orbit were compared to preoperative values and the native contralateral orbit to assess restoration accuracy.
Results: All patients underwent single-stage resection and PSI-based reconstruction without implant-related complications during follow-up (range: 19–74 months). Orbital volumetry revealed a mean absolute volume difference of 1.33 mm^3 and a mean percentage deviation of 5.7% (range: –0.2% to 8.5%) between reconstructed and contralateral orbits. Proptosis resolved in all cases; only one patient experienced mild persistent diplopia, and one showed incomplete visual recovery.
Conclusion: This study quantitatively validates the accuracy of immediate orbital reconstruction with PEEK PSIs following SOM resection. The use of orbital volumetry as an objective metric demonstrates reproducible restoration of orbital anatomy within clinically acceptable thresholds and supports the integration of computer-assisted planning in complex cranio-orbital resections.

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#971
Regeneration / Tissue engineering / Cell therapy
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Morphological evaluation of the effectiveness of using the hydroxyapatite and β-tricalcium phosphate containing osteotropic material and electrical stimulation in the treatment of experimental bone tissue defects of the mandible

Agil Huseynov [1], Mykhailo S. Myroshnychenko [2], Tarawneh Shaker Jamil [2]
[1] *Bogomolets National Medical University, Kyiv, Ukraine;* [2] *Kharkiv National Medical University, Kharkiv, Ukraine*

Keywords: Hydroxyapatite, ß-Tricalcium Phosphate, Osteotropic Material,

Electrical Stimulation, Mandible, Morphology, Experiment.

Objectives: To conduct a morphological evaluation of the effectiveness of using the hydroxyapatite and β-tricalcium phosphate containing osteotropic material and electrical stimulation in the treatment of experimental bone tissue defects of the mandible.

Materials and Methods: An experiment was conducted on 24 mature male rats. Two groups were formed. Group 1 (G1) included 12 rats with a perforated defect cavity (DC) of the mandible. Group 2 (G2) included 12 rats with a similar to G1 defect, the cavity of which was filled with osteotropic material containing hydroxyapatite, β-tricalcium phosphate. Microdevice for electrical stimulation in G2 was implanted subcutaneously in the neck area on the side of the bone DC. The animals were removed from the experiment on days 7, 14, 28. The study material was a fragment of bone tissue mandible from the DC. Histological (hematoxylin and eosin staining), immunohistochemical (reaction with a rabbit anti-human special AT-rich sequence-binding protein 2 (SATB2) monoclonal antibody), morphometric, statistical methods were used.

Results: On days 7, the DC in G1 was filled with blood and altered tissues, immature granulation, connective, osteogenic fibroreticular tissues, among which blood, altered tissues prevailed. In G2 mature granulation, connective and osteogenic fibroreticular tissues were observed with the latter prevailing. The number of osteogenic cells from the regenerate expressing monoclonal antibody to SATB2 was greater ($p<0.05$) in G2 (35.83 ± 0.65) compared to G1 (16.67 ± 1.54). On day 14, compared to day 7, in G1 the content of blood, altered tissues decreased, the content of granulation, connective, osteogenic fibroreticular tissues increased, lamellar bone tissue appeared, among which granulation tissue prevailed. In G2 the content of osteogenic fibroreticular tissue decreased, lamellar bone tissue appeared which was prevalent. The number of SATB2 +-cells increased ($p<0.05$) and was greater ($p<0.05$) in G2 (42.67 ± 0.80) compared to G1 (24.17 ± 1.49). On day 28, in G1 the content of granulation tissue decreased, the content of connective, osteogenic fibroreticular and lamellar bone tissue increased. In G2, the content of lamellar bone tissue increased. The number of SATB2+-cells increased ($p<0.05$) and was greater ($p<0.05$) in G2 (52.83 ± 1.08) compared to G1 (32.67 ± 0.88).

Conclusion: Under the conditions of using the hydroxyapatite, β-tricalcium phosphate containing osteotropic material and electrical stimulation the activation of reparative osteogenesis in mandible is noted, as evidenced by the rapid cleansing of the defect cavity from blood, altered tissues, active maturation of granulation tissue and its transformation into connective tissue, activation of osteogenic cells with rapid formation of osteogenic fibroreticular, lamellar bone tissues.

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#975
Surgical oncology and reconstruction
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Analysis of osteotomy distance and other predictors of osseous union following mandibular reconstruction with fibula free flap

Maged Ali Hasan Al-Aroomi
Xiangya Hospital, Changsha, China

Keywords: Mandibular Reconstruction, Bony Union, Osteotomy Distance, Fibula, CBCT

Objectives: Optimal contouring of fibula free flaps (FFF) for mandibulectomy often requires osteotomies. This study aimed to define criteria for initial gap width by evaluating whether postoperative gap size and other factors influence long-term osseous union on CBCT, and to identify key determinants of bone healing.

Materials and Methods: This retrospective study included 75 patients who underwent segmental mandibulectomy with FFF reconstruction from 2017 to 2024. Initial osteotomy gaps were measured at four points on postoperative CBCT scans. Osseous union was assessed using a callus scale. Demographic, anatomical, and surgical variables—including 3D-assisted planning, fibula morphology, osteotomy location, systemic comorbidities, and segment number—were analyzed using uni- and multivariate regression models.

Results: A total of 202 osteotomy sites were evaluated. The mean initial gap was 1.68 ± 0.97 mm, and gap size did not significantly predict long-term union. Complete union occurred in 50.0% of sites, partial union in 36.6%, and nonunion in 13.4%. Fibula–fibula interfaces showed significantly better healing than fibula–mandible interfaces ($p < 0.001$). Symphyseal osteotomies demonstrated superior union compared with body and angle regions. Systemic vascular comorbidities were strong negative predictors of union, whereas reconstructions using more than two segments showed improved outcomes ($p < 0.001$). Alcohol consumption negatively affected both initial gap formation and union.

Conclusion: Osseous union in fibular mandibular reconstruction is determined by a complex interplay of systemic, anatomical, and technical factors. Initial gap width did not predict long-term bony union, whereas vascular health, osteotomy location, fibular morphology, and the precision of 3D assisted surgical planning seem to be more relevant factors in the impact bone union. Larger, long-term prospective studies integrating biomechanical modeling with patient-reported functional outcomes are needed to more accurately assess the reliability and clinical significance of radiological evaluations.

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#976
Surgical oncology and reconstruction
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Infectious complications in maxillomandibular reconstructive material

Eduardo Rodríguez Mariño, José Luis Fernández Maya, Carlos Nieto Orihuela, Celia Del Mar Vilar Jareño, Helena Piñas Hormeño, Pilar Fernández De Córdoba Botia, Pablo De Todos Los Santos Vivas Arjona, Alejandra Gómez Foulatier, Yolanda Aguilar Lizarralde
Regional University Malaga Hospital, Málaga, Spain

Keywords: Osteosynthesis, Reconstruction, Oral Cavity

Objectives: Osteosynthesis and reconstruction materials are essential in complex maxillomandibular surgery; however, infectious complications significantly increase morbidity and healthcare costs. Global infection rates vary between 1% and 25%, influenced by surgical duration, oral flora exposure, and patient comorbidities. This study describes the clinical and microbiological experience of infectious complications related to reconstructive materials over a five-year period in a referral hospital.

Materials and Methods: A retrospective observational study was conducted on 110 patients who underwent reconstructive procedures involving the maxilla or mandible between 2021 and 2025. Complex trauma, oncological reconstructions, and osteonecrosis cases were included, while simple fractures and orthognathic surgeries were excluded. Variables analyzed included demographics, comorbidities, timing of infection (immediate vs. late), microbiology, antibiotic susceptibility, and the necessity for surgical debridement or hardware removal.

Results: Complications occurred in 28 patients (25.4%). Immediate infections (n=18) appeared at a mean of 9.28 days, significantly extending hospital stays from 12.8 to 31.4 days, with Prevotella spp. and E. coli being the most frequent isolates. Late infections (n=13) occurred at a mean of 36.9 weeks, often associated with chronic osteomyelitis. Hardware removal was required in 55.6% of immediate and 70% of late cases. Risk factors for reconstructive failure included age over 50, oncological history with radiotherapy, and immunosuppression.

Conclusion: Infections associated with maxillomandibular reconstructive material represent a severe complication with high hardware removal rates. Immediate infections drastically prolong hospitalization, while late infections are linked to persistent exposure and chronic bone loss. Prevention should focus on meticulous surgical closure, optimized perioperative nutrition, and strict adherence to prophylactic protocols. Future research into antibacterial biomaterials and standardized management guidelines is essential to improve long-term reconstructive success.

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#977
Cancer biology and epidemiology
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Prognostic biomarkers in oral squamous cell carcinoma, insights in cancer pathways

Pepijn Van Der Aa, Frederike Bult, Max Witjes, Ed Schuuring, Koos Boeve, Bert Van Der Vegt, Sebastiaan De Visscher
University Medical Center Groningen, Groningen, The Netherlands

Keywords: Biomarkers, OSCC, Prognosis, Hallmarks Of Cancer

Objectives: Reliable prognostic biomarkers are essential for individualized treatment in oral squamous cell carcinoma (OSCC). We conducted a comprehensive systematic review and meta-analysis, supported by machine-learning–assisted screening and pathway mapping, to identify biomarkers with