

# Reconstruction of Marginal Mandibular Defects Utilizing Bone Marrow Aspirate Concentrate (BMAC) from the Anterior Iliac Crest: A Less Morbid Osteogenic Option

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## Introduction

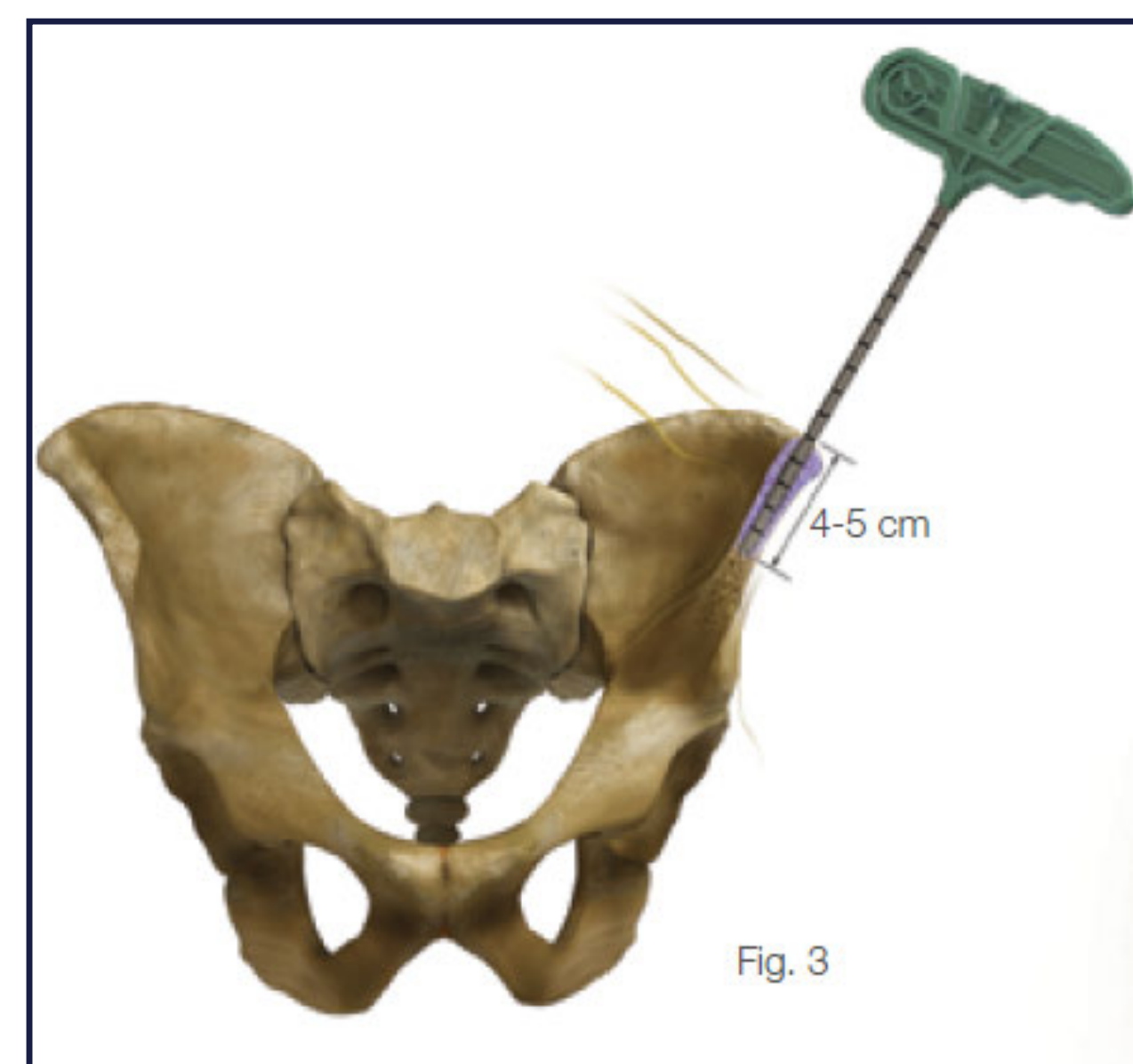
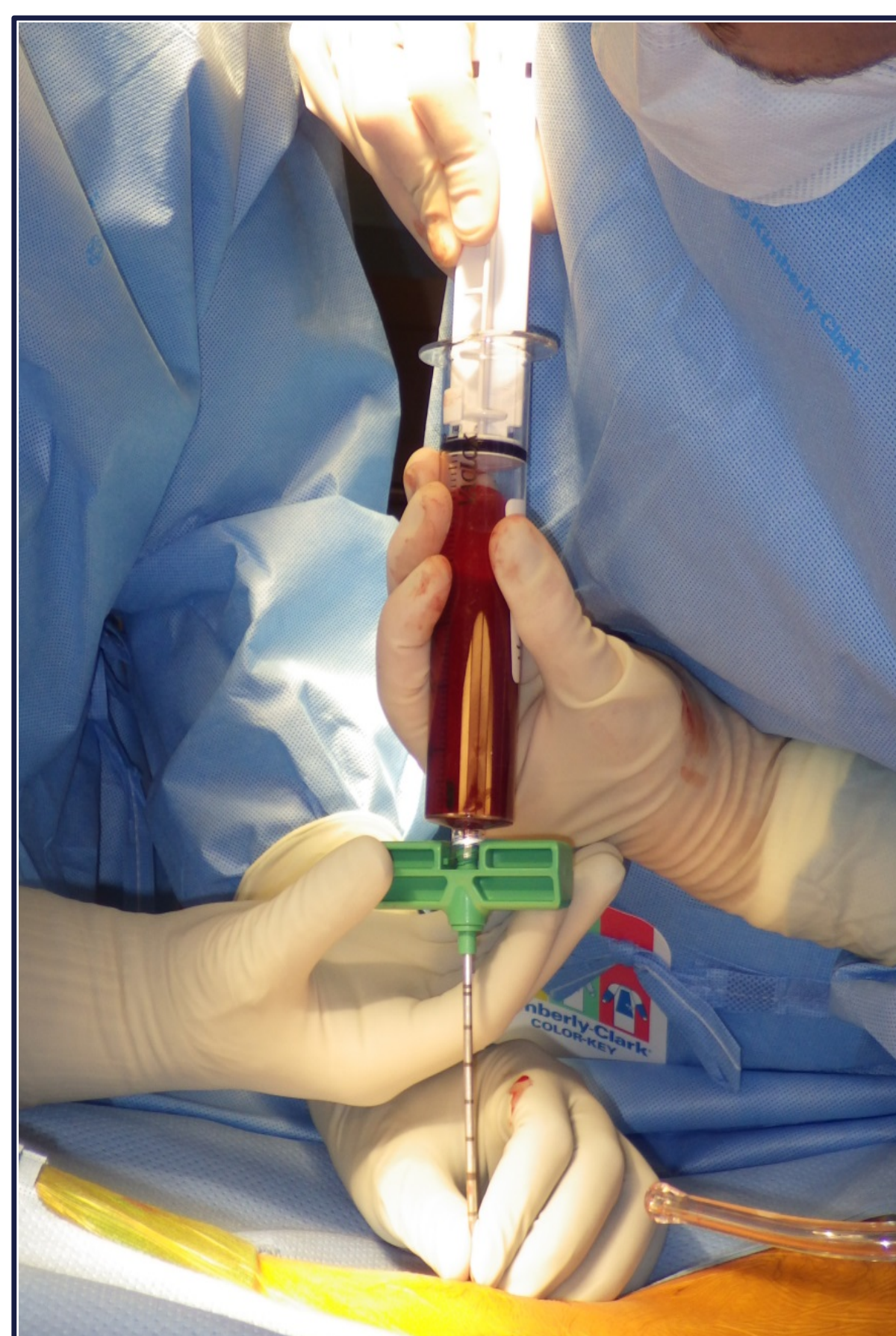
The aim of this case series, is to describe our surgical technique for reconstructing benign mandibular neoplasms using BMAC – a less invasive approach than traditional iliac crest bone graft harvest.

BMAC was used in combination with mineralized freeze-dried allograft, platelet rich plasma (PRP) & bone morphogenic protein (rhBMP-2) to reconstruct the hard tissue lost secondary to the ablative tumor resection.

- 10 patients included in the retrospective case series were treated between 2014 and 2017 by 3 surgeons.
- Mean age - 44 years (range - 19 to 77 years). BMAC was obtained from the anterior iliac crest (AIC).
- When appropriate, a custom milled mandibular reconstruction plate was placed.
- Maxillofacial pathology included benign neoplasms such as Ameloblastoma, Cavernous Hemangioma, Central Giant Cell Granuloma (CGCG), Dentigerous Cyst & Keratocystic Odontogenic Tumor (KOT).

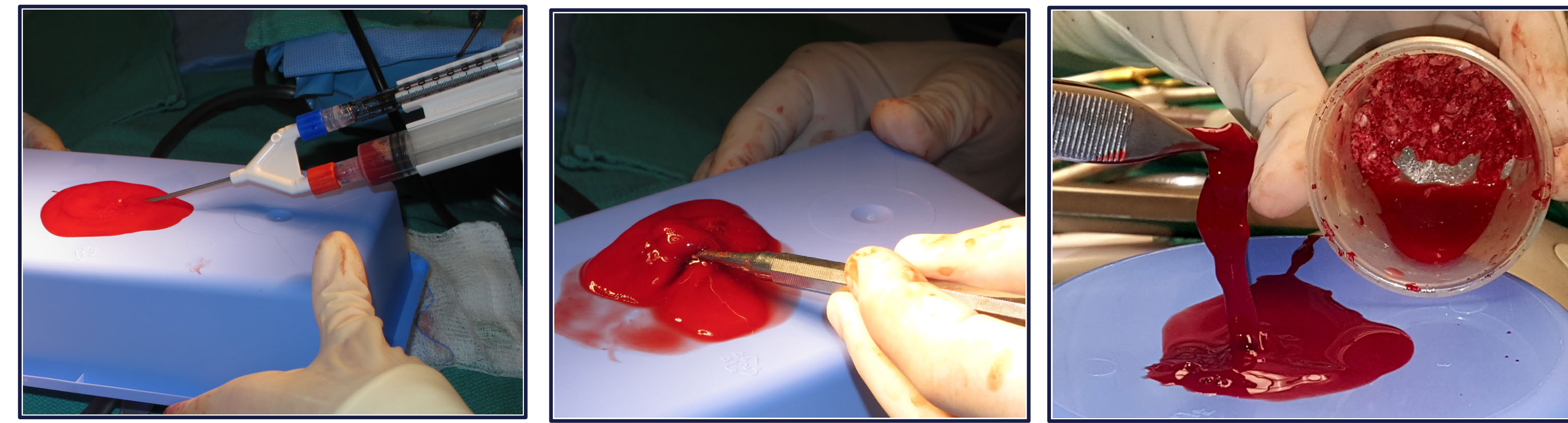
## Surgical Technique

- In this case series only anterior approach was used.
- Bone marrow aspirate was obtained from the anterior iliac crest.
- Identification of bony landmarks – anterior superior iliac spine (ASIS), Iliac Tubercle & Iliac Crest.
- Skin stab incision is made 5cm posterolateral to the ASIS.
- The needle is introduced at a 40 degree angle with a slight posterior trajectory at the iliac tubercle to enter the medullary canal.
- The needle is advanced with the use of a mallet to proceed through cortical bone and enter medullary space.
- The stylet is removed and the 60cc vaclock syringe with heparin anticoagulant is attached.
- Negative pressure is applied to extract 50ml of aspirate.
- The BMAC is prepared using the Emcyte concentrating technique.. The product is centrifuged for 10-12 minutes at 3400 to 3600 RPM.
- 6 mL of bone marrow aspirate concentrate is obtained.
- BMAC mixed with an appropriate amount of allograft depending on size of the defect (ranging from 4-8 ml).
- rhBMP-2 & PRP is added based on reconstruction requirements.



The EmCyte Bone Marrow Aspiration Kit - 11G multi-port aspiration needle, a serrated stylet, a 60 ml Vaclock syringe with 10mL of Heparin 1000units/mL for anticoagulation.

## Methodology

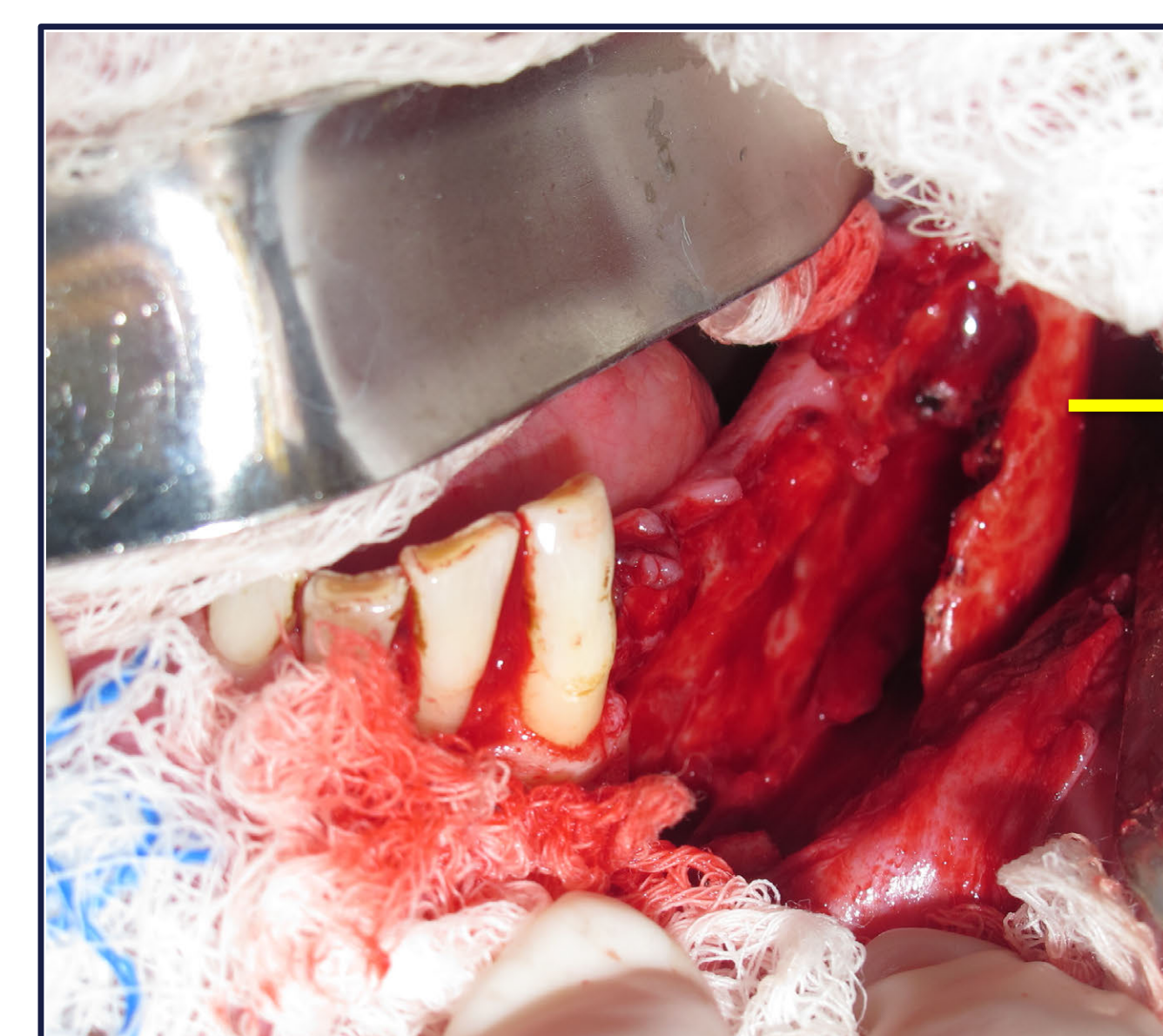


- \* Bone marrow aspirate is often not sufficient for clinical efficacy – **in the absence of concentration.**
- \* *Hernigou et al. established the importance of achieving a concentration of >1500 progenitor cells/mL for successful consolidation of non-unions.*

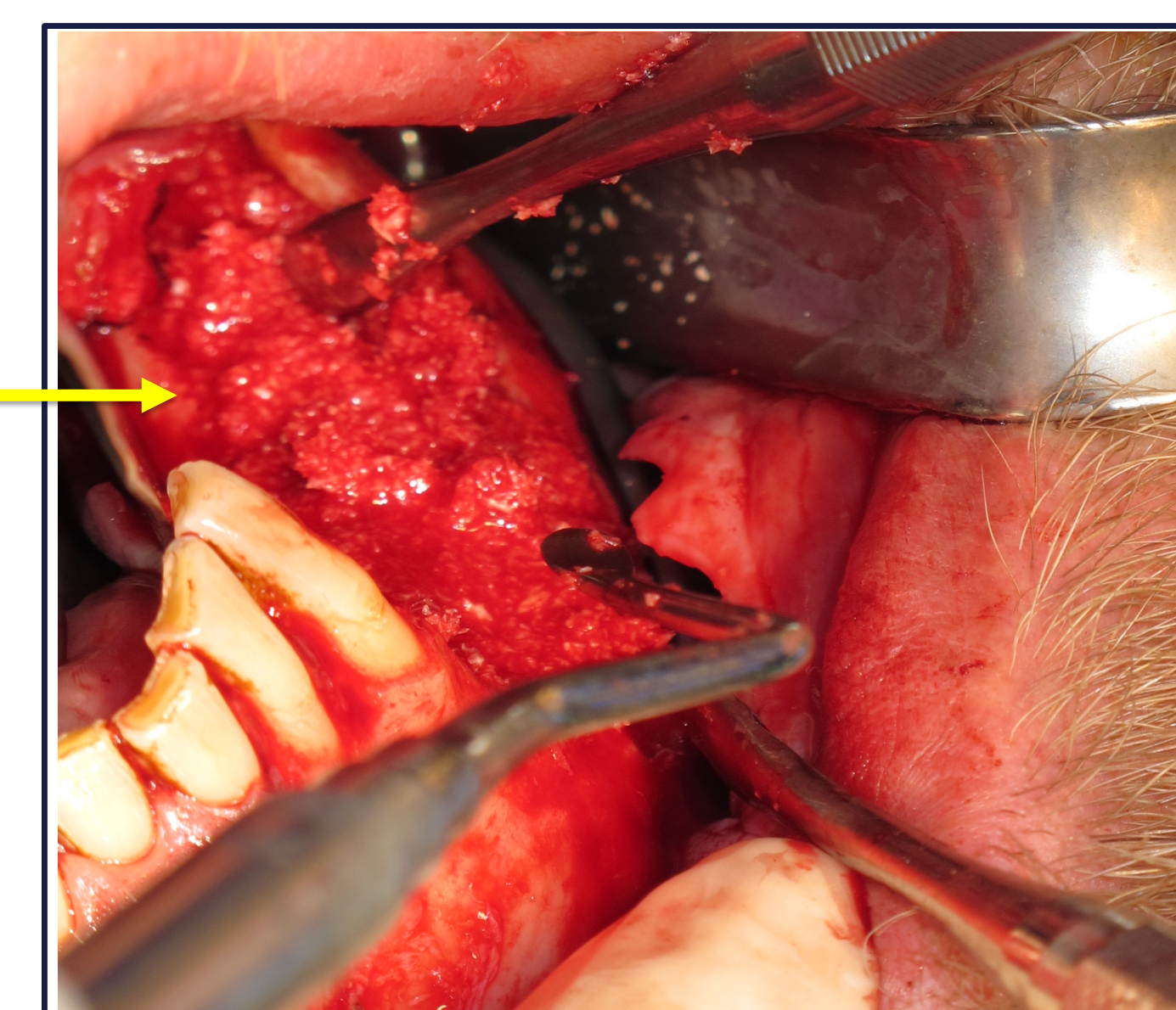
## Results

1. Ability to regenerate mandibular osseous contour & restore function.
2. Morbidity: Reduction in post operative pain.
  - \* BMAC harvest - PO pain regimen.
  - \* Iliac Crest harvest - ON-Q Pump - 48 h post-op to achieve optimal donor site pain control. Morbidity reported for AIC harvest– 23%.
3. Operating time: Reduction in the total surgical time by 67%.
  - \* Average time to harvest BMAC - 15 minutes.
  - \* Average time to harvest bone from iliac crest - 45 minutes.
4. Length of stay: Shorter hospital stay by at least 13 hours.
  - \* Average LOS – after BMAC is 23 hours.
  - \* Average LOS - after an iliac crest bone graft - 36 hours.
5. No risk of intolerance or allergies – BMAC is autologous.
6. We had no post-operative complications associated with the donor site. 10 times lower risk of complications compared to traditional grafting.
7. Less time under GA in the OR + Lower pain requirements + Lower hospital stay = An overall reduction in surgical costs.

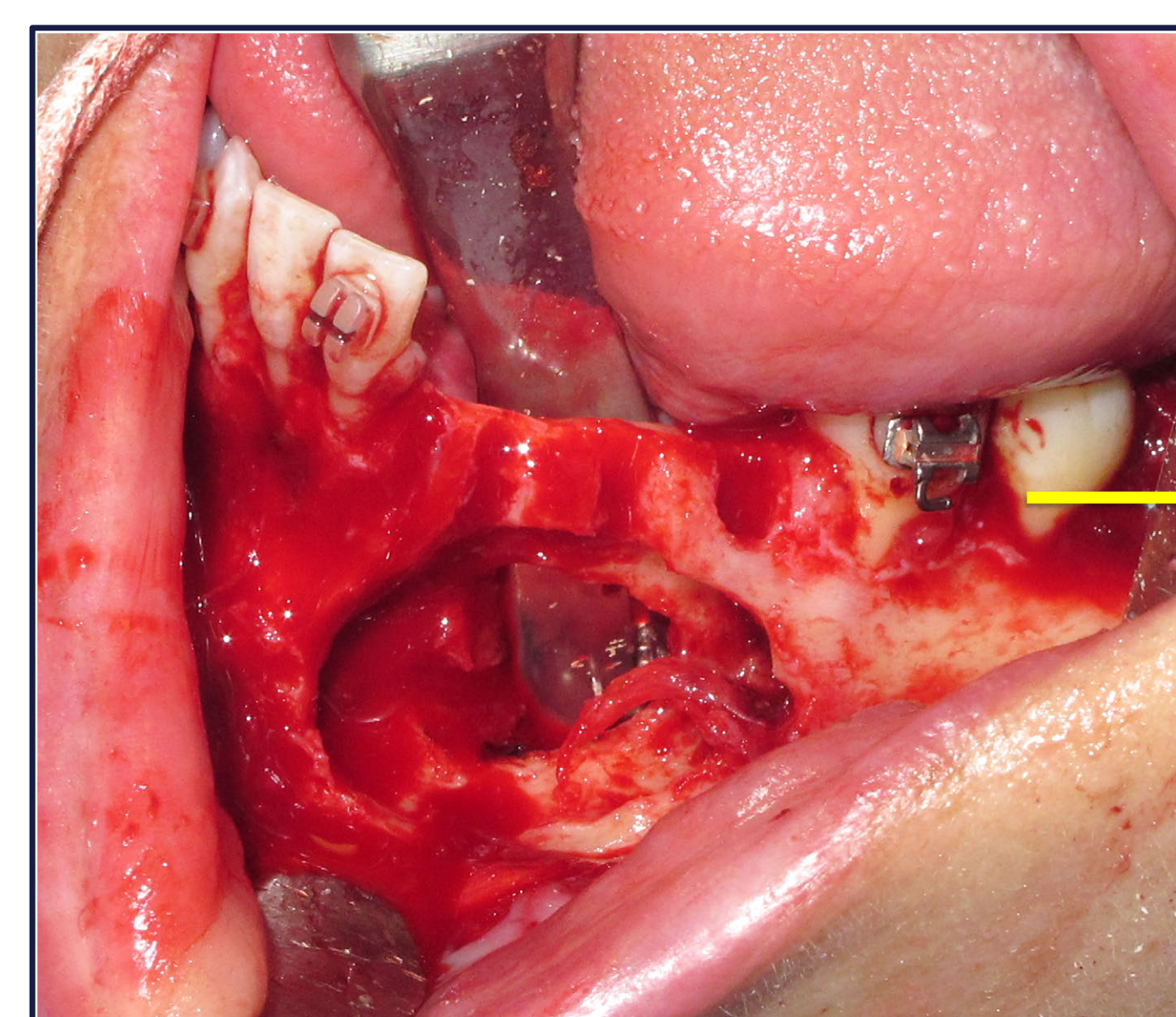
## Benign Mandibular Neoplasms – Clinical Pictures



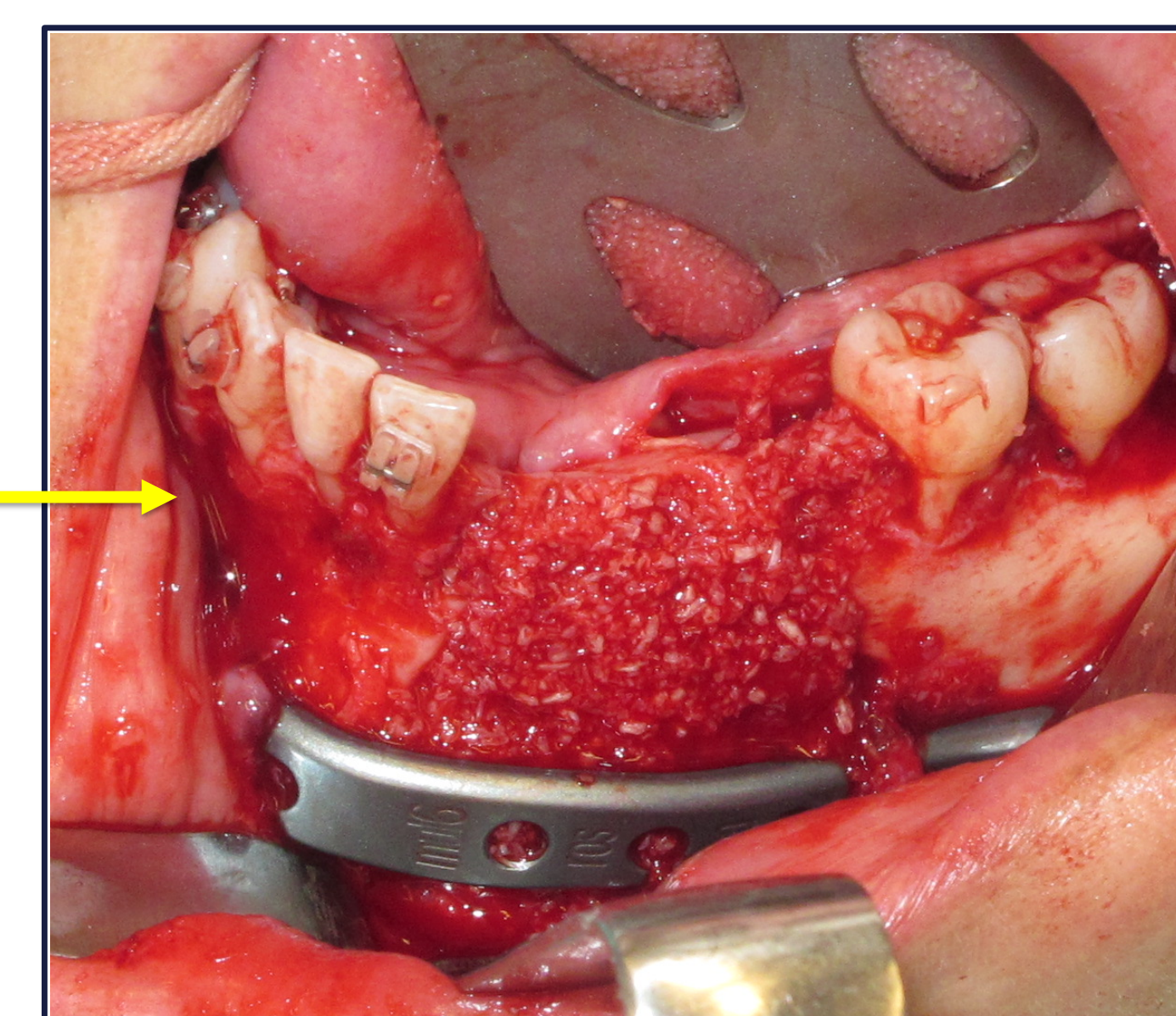
Keratocystic Odontogenic Tumor



BMAC+ Allograft + BMP+ PRP

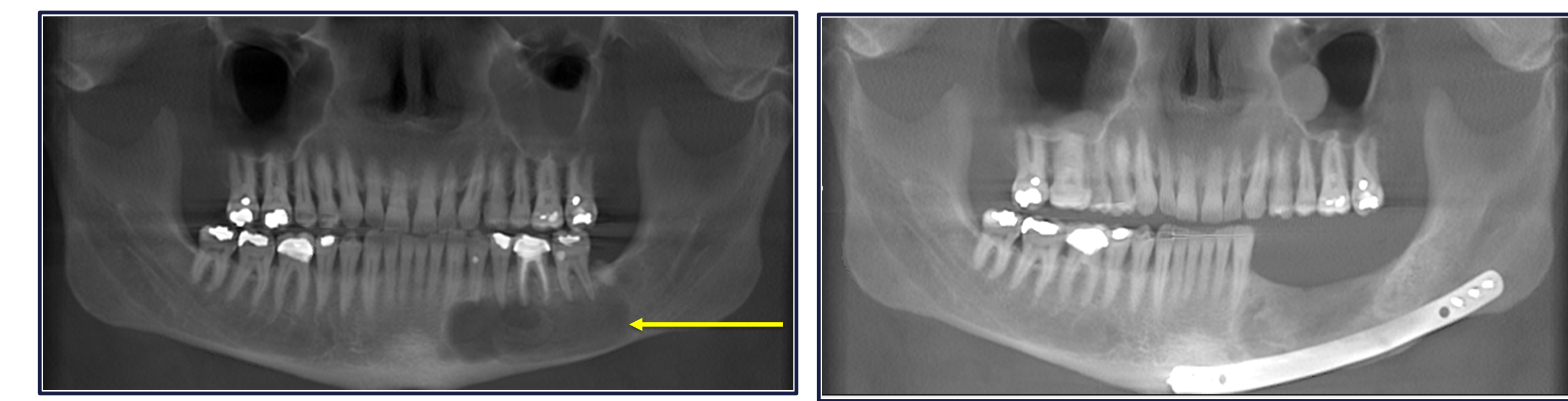


Central Giant Cell Granuloma



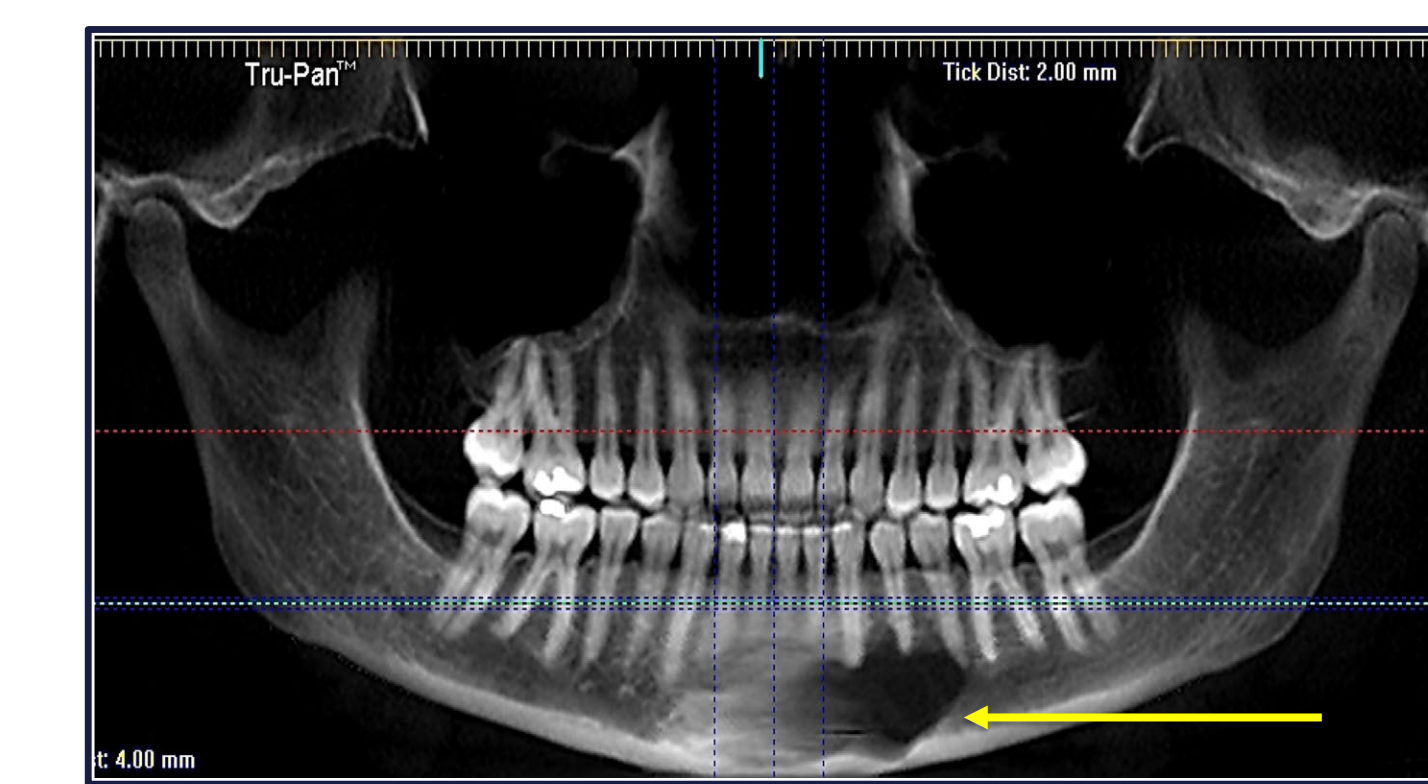
BMAC+ Allograft + BMP+ PRP + Milled Ti Plate

## Results – Radiographs



Keratocystic Odontogenic Tumor

Post Reconstruction

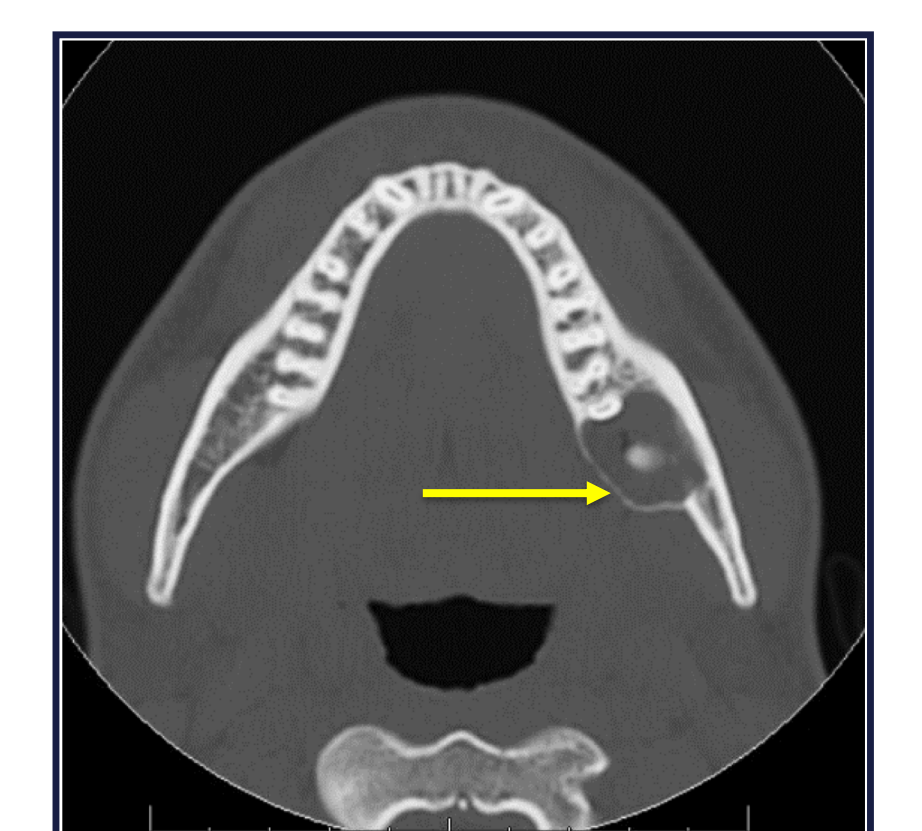


Central Giant Cell Granuloma

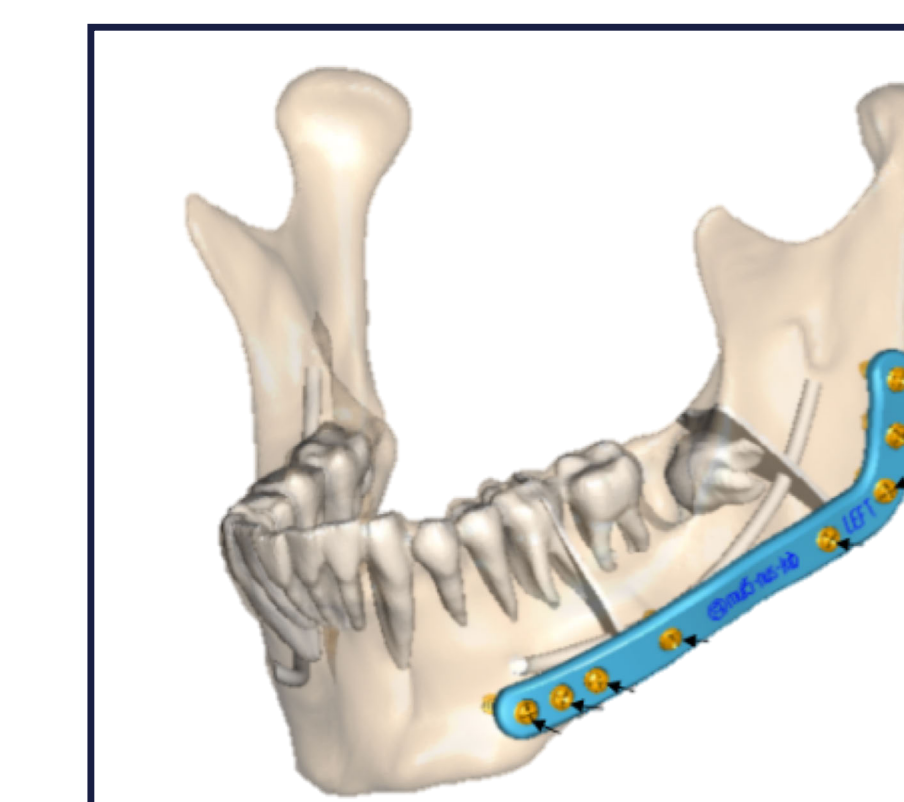
Post Reconstruction



Unicystic Ameloblastoma – Left Mandible



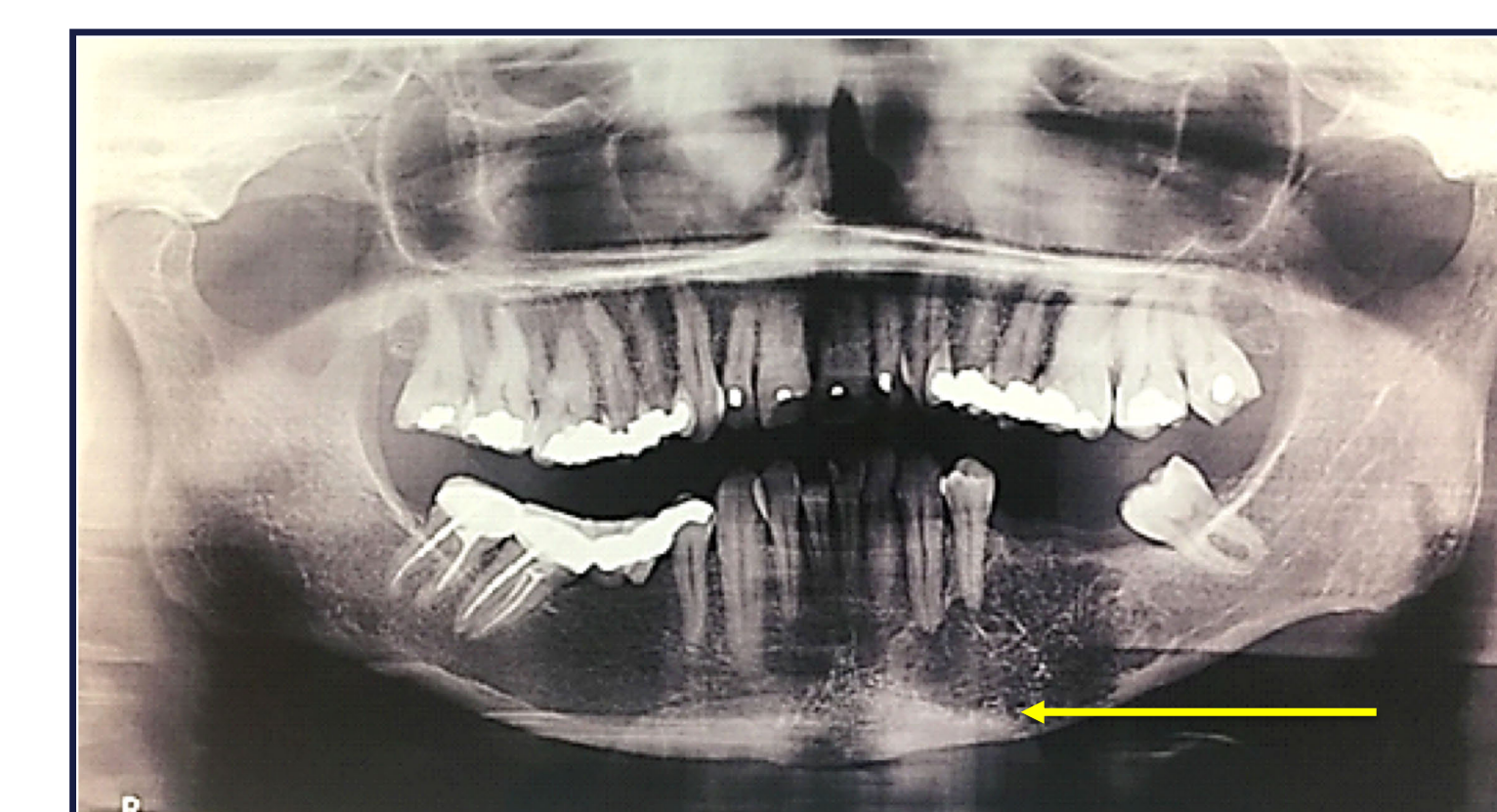
Lingual expansion



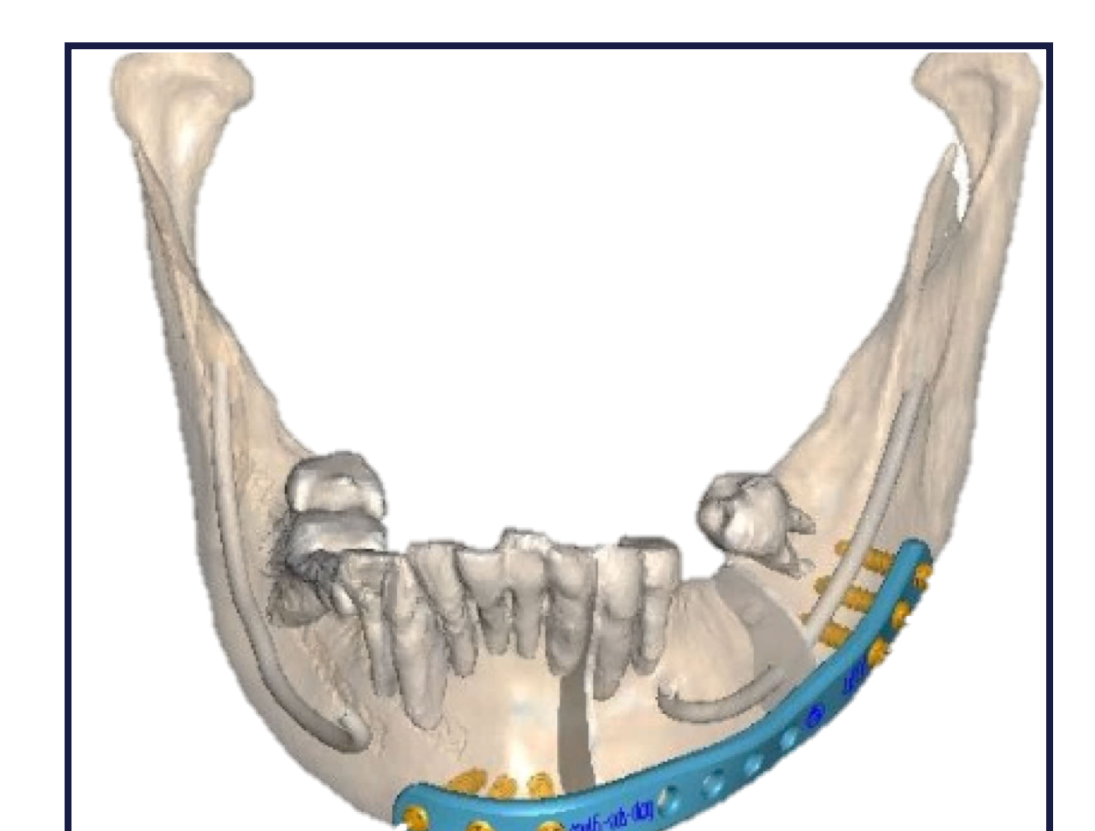
Tumor margins w Custom Milled Ti Plate



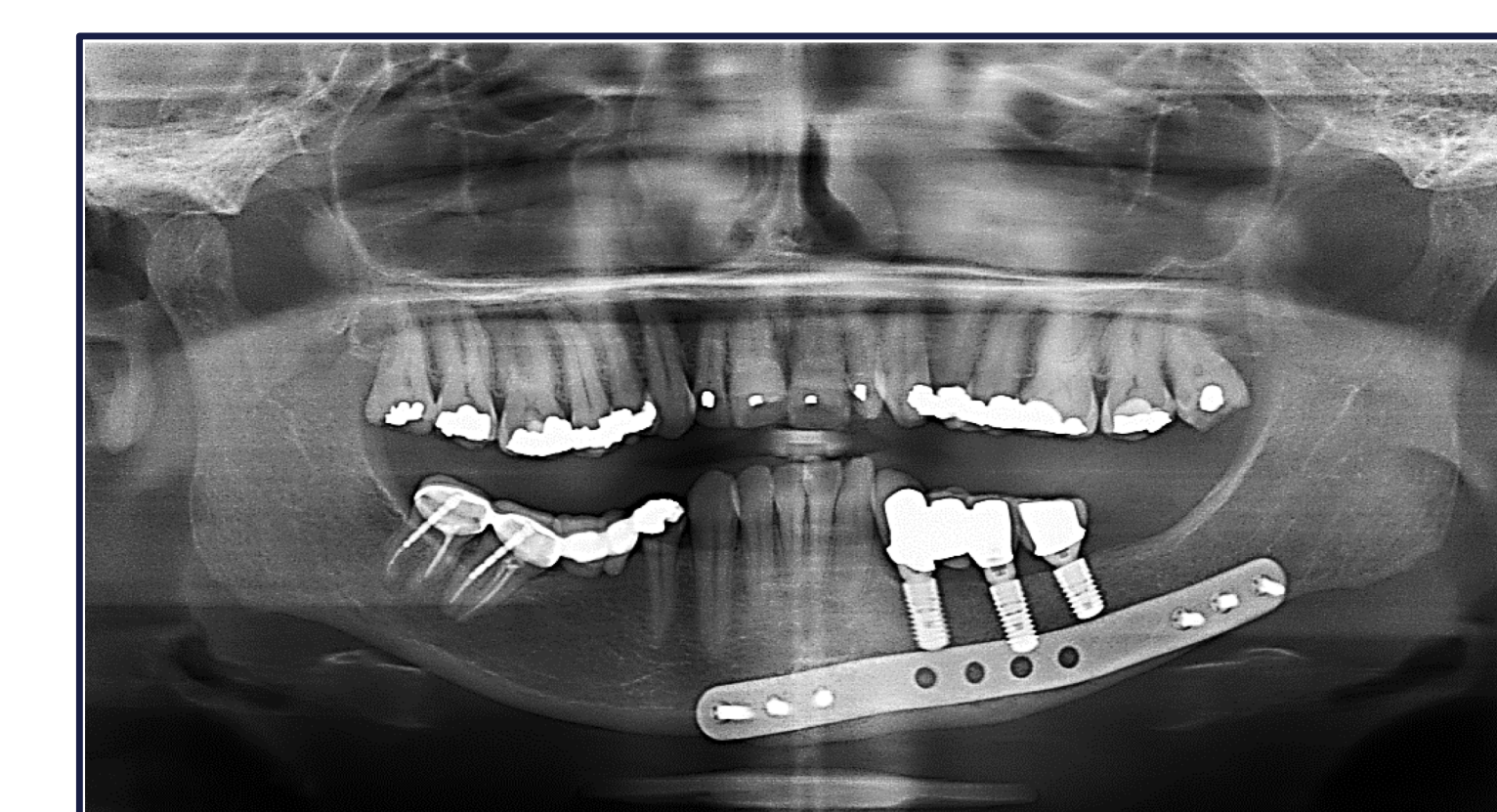
Post Reconstruction



Cavernous Hemangioma – Left Mandible



Tumor Margins + Milled Titanium Plate



Post Reconstruction & Rehabilitation

## Citations

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