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 was 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.

Methodology

- 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.
- Bone marrow aspirate was obtained from the anterior iliac crest (AIC).
- Negative pressure is applied to extract 50ml of aspirate.
- The product is centrifuged for 10-12 minutes at 3400 to 3600 RPM.
- 6 mL of bone marrow aspirate concentrate is obtained.
- 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. The stylet is removed and the 60 cc vaclock syringe with heparin anticoagulant is attached. 

Results

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

1. Ability to regenerate mandibular osseous contour & restore function.
   * 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.
7. Less time under GA in the OR + Lower pain requirements + Lower hospital stay = An overall reduction in surgical costs.

Citations

- J Cancer Res. 2011 Mar; 23(1): 43–48