Efficacy of Autografts: Do Harvest Sites Matter?
Bone Grafting Symposium, Orthopaedic Trauma Association Basic Science Focus Forum 2013

TYPES OF AUTOGRAFT

- Autogenous Cancellous Bone
  - Iliac Crest (anterior or posterior)
  - Others (distal femur, proximal tibia, distalibia, proximal humerus, distal radius)
- Autogenous Cortical Bone
- Autogenous Bone Marrow
- Intramedullary Reamings (RIA)
- Vascularized Grafts (fibula, iliac crest, rib)

CRITERIA FOR EVALUATING A BONE GRAFT

- Critical Components of Fracture Healing
  - Osteoconduction
  - Osteoinduction
  - Osteogenesis
  - Vascularity
- Volume of graft obtainable
- Structural support
- Clinical Results
- Morbidity/Complications associated with Harvest
- Cost

‘THE GOLD STANDARD’: AUTOGENOUS ILIAC CREST BONE GRAFT (AICBG)

- Contains all three of the critical components of fracture healing (osteconduction, osteoinduction, and osteogenesis)
- Emerging evidence suggesting it also contains factors and cells that stimulate angiogenesis/vascularity (EPCs, VEGF, HIF1α)¹²
- In terms of volume of graft, the crest is superior to other conventional sites of harvest

‘THE NEW STANDARD’: REAMER-IRRIGATOR ASPIRATOR ® (RIA)

- A novel system for harvesting intramedullary reamings from the canal of the femur or tibia
- Emerging basic science evidence suggests that RIA possesses equivalent osteoconduction and angiogenic properties to AICBG with potentially superior osteoinductive and osteogenic properties¹³
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- The clinical evidence to date suggests the RIA harvest can produce larger volumes of graft with potentially less harvest site morbidity and, in particular, pain when compared to AICBG4-7.
- The clinical evidence regarding RIA is currently limited to level IV studies and a single retrospective comparative study, suggesting that more investigation is needed.
- The implant costs associated with RIA are an issue.

**RIA VERSUS AIBG**

<table>
<thead>
<tr>
<th></th>
<th>RIA</th>
<th>AICBG</th>
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<tbody>
<tr>
<td>Osteoconduction</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Osteoinduction</td>
<td>↑ BMPs, TGF, total protein</td>
<td>↓</td>
</tr>
<tr>
<td>Osteogenesis</td>
<td>↑ MSCs and osteogenic potential</td>
<td>↓</td>
</tr>
<tr>
<td>Angiogenesis</td>
<td>↑ EPCs</td>
<td>↑ VEGF and HIF1α</td>
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<tr>
<td>Volume</td>
<td>58 cc’s (range 40.3-68)</td>
<td>30 cc’s (range 5-72)</td>
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<tr>
<td>Major Complication</td>
<td>3.4%</td>
<td>4%</td>
</tr>
<tr>
<td>Minor Complications</td>
<td>2.6%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Harvest Site Pain</td>
<td>Lower</td>
<td>Higher</td>
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<tr>
<td></td>
<td>Acute/Int/Chronic</td>
<td>Acute/Int/Chronic</td>
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<tr>
<td>Clinical Results</td>
<td>85-90% success</td>
<td>75-98% success</td>
</tr>
<tr>
<td>Implant Costs</td>
<td>~1100 (CAD)</td>
<td>~30 (CAD)</td>
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**CONCLUSIONS**
- With regard to conventional grafting sites, the Iliac Crest remains the preferred source.
- There is mounting clinical and basic science evidence suggesting that RIA is an effective alternative to AICBG.
- Prospective comparison of RIA and AICBG (including economic evaluation) is warranted.
REFERENCES


2. Sagi HC, Young ML, Gerstenfeld L, Einhorn TA, Tornetta P. Qualitative and quantitative differences between bone graft obtained from the medullary canal (with a Reamer/Irrigator/Aspirator) and the iliac crest of the same patient. J Bone Joint Surg Am. Dec 5 2012;94(23):2128-2135.


