A new perspective on fracture management

Clinical Results

- 24 patients treated with a mean age of 64 years (range, 27-83 years) for displaced unstable fractures using the AEQUALIS™ IM Nail

- Patient follow-up averaged 9 months (range 6-18 months)

- All fractures healed and all patients recovered enough motion to perform daily activities independently

- No patient required further surgical intervention

Advantages of IM Nailing

- Less extensive soft tissue dissection maximizes periosteal blood supply while preserving vital surrounding structures.

- Improved construct stability even in the case of comminuted fractures and osteopenic bone while still maintaining desired elasticity.

- Fracture solutions, such as plating, are believed by some to be too rigid.

- Efficient procedure, especially when using a percutaneous approach.
Wright delivers another design philosophy

The **AEQUALIS™ IM Nail** was created from extensive proximal humerus dimension and geometry studies. Additionally, the basic pathophysiology of displaced unstable 2, 3 and 4-part fractures was revisited, resulting in the 5 design principles:

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| **1** | **Humeral Head Support**  
The nail must act as a mechanical strut to support humeral head fragments under compressive forces thereby resisting valgus/varus subsidence. |
| **2** | **Tuberosity Based Screw Pattern**  
Proximal screw orientation must be tuberosity based (Postero-Anterior) and not humeral head based (Latero-Medial) to be perpendicular to the main fracture line splitting the tuberosities and to resist the horizontal pull forces of the rotator cuff muscles. |
| **3** | **Nail Based vs. Bone Based Screw Fixation**  
Proximal holes must capture screws to provide improved tuberosity fixation regardless of bone quality to prevent loss of tuberosity reduction, screw loosening and/or screw backout. |
| **4** | **Nail Centering and Stabilization**  
Nail must be centered inside the medullary canal to support head fragments and avoid toggling through diverging distal screws. |
| **5** | **Anatomic Stabilization**  
Instrumentation must position the humeral head toward the glenoid when the forearm is placed in neutral rotation. |
The AEQUALIS™ IM Nail: fix the tuberosities, support the head

### Optimal Nail Design

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<thead>
<tr>
<th>AEQUALIS™ Advances</th>
<th>Older Design Issues</th>
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<tbody>
<tr>
<td><strong>Straight</strong> design avoids rotator cuff insertion and eliminates potential for varus mal-reduction</td>
<td>Rotator cuff tear, greater tuberosity fracture extension and pain due to curved design with lateralized entry point</td>
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<tr>
<td><strong>Short</strong> design (130 mm) prevents premature distal locking and low profile tip ensures ease of insertion</td>
<td>Acromial impingement and surgical neck non-union due to excessive length (150 mm) and bulky distal tip</td>
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<td><strong>Titanium construction</strong> for maximum support while maintaining desired elasticity characteristics</td>
<td>NA</td>
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<tr>
<td><strong>Cannulated</strong> to allow minimally invasive percutaneous technique</td>
<td>Loss of reduction between reaming and nail introduction</td>
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### Secure Proximal Screw Fixation

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<td><strong>Polyethylene bushings</strong> are proven to improve support and minimize screw back out to achieve nail based screw fixation</td>
<td>Proximal screw loosening and backout resulting in poor healing due to bone based screw fixation</td>
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### Optimal Proximal Screw Orientation

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<td><strong>Tuberosity based screw pattern</strong> that avoids the articulation surface, allows independent fixation of the greater and lesser tuberosity and counteracts pulling forces. Additionally, flat back screws maintain a low profile while maximizing surface contact to act like a washer.</td>
<td>Poor healing, loss of tuberosity reduction/fixation and excessive glenoid damage due to inappropriate (humeral head based) screw pattern and screw penetration. The standard conical shape of current screws was not designed for poor quality cancellous bone.</td>
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*Example of screw pattern that misses important reductions and enters fracture lines*
Optimal Screw Design

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<td><strong>20° divergent distal screws</strong> promote self centering in the medullary canal, provides stability and prevents nail toggle</td>
<td>Nail toggle resulting in migration and/or fracture misalignment due to aligned (non-divergent) distal screws</td>
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Instrumentation for Predictable, Reproducible Results

- Designed to avoid anatomic structures (axillary nerve, long head of the biceps, etc)
- Radiolucent jig allows intraoperative visualization of screw and nail position
- Unique ability to lock jig sleeves into the desired position to avoid sleeve pistoning
- Visible markings on the jig to help determine optimal nail height on X-Ray
- Ability to control rotation of both nail and fractured fragments
- 100 mm distance between the jig and nail maximizes working distance, especially when dealing with larger patients
- Jig holes color coded to implant (green and blue) for ease of use
References