Pectoralis major tendon as reference to restore humeral length in case of hemiarthroplasty for fracture: CT scan study

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No Conflict of interest
Introduction

Functional results following hemiarthroplasty for fracture are strongly correlated with bone healing of tuberosities and height of the implant.

We analysed the distance between the top of the humeral head and the upper part of Pectoralis Major (PM) on 137 shoulder scans so as to carry out a wide ranging study on the measurements reported in anatomical studies.
Material & Methods

200 consecutive shoulder CT scans of adult patients without post-traumatic lesions were analysed retrospectively. 88 women & 112 men, mean age 49.79 years (18-93)

All of the examinations were read by the same multiplane reconstruction technician on a PACS post treatment console.

For each of the 200 scans (64 slice CT device, 140KeV, 350mAs, rotation time 1s, slice thickness 1mm, obtaining 64 slices/0.6, pitch 0.8)

Only 137 were able to show a definitive analysis of the sternal head of the pectoralis major. There was a very
Material & Methods

Distance between GP & …

1. Change in curvature
2. Great tuberosity
3. Top of the humeral head
4. Inferior bord of the humeral head

Upper part of pectoralis major
Results

There was a very significant difference in this distance due to gender … an average of 7.8mm more for the men \( (p<0.001) \)
<table>
<thead>
<tr>
<th>Study</th>
<th>N cadavers or patients N shoulders</th>
<th>M/F</th>
<th>Age/ height</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murachovsky JSES 2006</td>
<td>20/40</td>
<td>11 M, 9F</td>
<td>?</td>
<td>5.6 cm (5.0-7.0 cm; SD, 0.5 cm)</td>
</tr>
<tr>
<td>Torrens C JSES 2008</td>
<td>20/40</td>
<td>12 M, 8F</td>
<td>68 y (54-96)</td>
<td>5.64 cm (5.29-5.99)</td>
</tr>
<tr>
<td>Hasan Orthopedics 2009</td>
<td>31/38</td>
<td>?</td>
<td>?</td>
<td>HP =0.2323xPL</td>
</tr>
<tr>
<td>Greiner SH JSES 2008</td>
<td>Clinical study N=30</td>
<td>73 y</td>
<td></td>
<td>5,1 à 5,4 cm</td>
</tr>
<tr>
<td>Rouchy Trucs et Astuces 2010</td>
<td>Clinical study N = 9</td>
<td>3M, 6F</td>
<td>1.68 m (1.55-1.78) H :1,76 F :1,64</td>
<td>5,46 cm (5-6)</td>
</tr>
<tr>
<td>Lascar T OTSR 12</td>
<td>Clinical study 11/22</td>
<td>?</td>
<td>?</td>
<td>5,5 cm (5-6)</td>
</tr>
<tr>
<td>Ponce BA JSES 12</td>
<td>Cadaver &amp; Clinical study N=41 /82 + 107 patients</td>
<td>?</td>
<td>?</td>
<td>5,89 cm men and 5,52 cm in women</td>
</tr>
</tbody>
</table>
Conclusion

With the reported anatomical studies and this first CT scan analysis …

Right distance between humeral head & Pectoralis Major can be defined as 6 cm … but with differences depending on the gender:

- 67,606 mm (DS : 9,988mm)
- 57,825 mm (DS : 10,317mm)
- 34,146 mm (DS : 9,697mm)
- 28,701 mm (DS : 9,029mm)