Brachial Biceps Tendon Injuries in Young Female High-Level Tennis Players

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Aim. To evaluate brachial biceps tendon lesions in four young female tennis players who complained about anterior shoulder pain on their dominant side.

Methods. Medical and sport’s activity history, palpation of the painful zone, Ghilchrist (palm-up) test, and brachial biceps contraction against resistance were performed.

Results. The two girls who suffered from mild tenderness in the bicipital groove and over the anterior aspect of the upper arm and the shoulder joint, had tendinitis of the long biceps head. The two girls who suffered from severe tenderness just under the groove, had a partial tear in the long head of the biceps. Ghilchrist test was positive in all girls.

Conclusion. Tennis players can have shoulder pain without clear history of trauma. Pain occurred probably as a result of technical errors or use of inadequate equipment.

Key words: brachial plexus; tendinitis; tendon injuries; tennis; thoracic outlet syndrome; shoulder impingement syndrome

Inflammation of the long head of the brachial biceps is a relatively common cause of shoulder pain. The diagnosis is often associated with impingement or subtle instability, or both. The cause can be irritation, accompanying abnormal motion of the humerus on the glenoid (1). The pain, localized to the anterior face of the shoulder, is exacerbated especially by anterior elevation and external rotation (2). Partial tear of the long tendon of the biceps muscle is relatively unusual in young athletes (3) and may follow a long history of painful shoulder or appear spontaneously after a violent movement. The pain is immediate, but the functional capacity is moderate and the injured athlete is able to carefully move the shoulder in all directions (2). The injury occurs in tennis, badminton, squash and volleyball players, weight lifters, canoeists, swimmers, javelin throwers, fencers, wrestlers and golfers (1,3).

Methods

Out of six girls belonging to the team and playing tennis at the national level, four (age range 12-15 years) suffered from anterior shoulder pain on their dominant side. They had been playing tennis between 4 to 7 years, 5-7 times a week, 2 hours a day; all were “base-line players”, used a light-weight racquet with a large head, and none of them had changed their racquet during the year prior to the injury (Table 1). In two of them the pain appeared progressively during the exercise, and in the other two suddenly, after “smashing” during a training game. All four players underwent local examination of the painful tendon, and were submitted to Ghilchrist (palm-up) test (Fig. 1) and to brachial biceps contraction against manual resistance (2,4).

Results

The two girls with mild tenderness along the bicipital groove in elbow flexion, were diagnosed as suffering from biceps long head tendinitis. The other two girls, who had severe localized tenderness with local swelling just under the bicipital groove, had a partial tear in the biceps tendon. All the four players had positive Ghilchrist test and pain over the anterior aspect of the shoulder when they moved the forearms into supination and the elbows in flexion against resistance.

The two players suffering from biceps tendinitis stopped training for 4 to 6 weeks. The two with a partial tendon tear stopped training for 3-5 months. All but one of the four players underwent physiotherapy. After recovery, they all returned to their previous high-level performance (Table 1). One year later, three of the four girls were playing competitive tennis and were pain-free, whilst the fourth player stopped playing for personal, non medical, reasons.

Discussion

The long biceps tendon glides over the articular head of the humerus in a special deep groove. Friction of the tendon in the groove may be caused

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by the transverse ligament and this can lead to
tenosynovitis (3).

Brachial biceps tendon inflammation or rupture are considered “throwing injuries”. In tennis, throwing movements are smashing, volleying, and serve. The throwing mechanism can be divided into three stages: cocking stage, acceleration stage, and follow-through stage (5). During cocking in smashing, the shoulder is hyper-extended, externally rotated and abducted, and the elbow is flexed to an angle of about 45°. At this stage, the anterior structures of the shoulder are under tension and therefore stressed. Lesions may then occur, most frequently in the anterior capsular structures and the long tendon of the biceps. During forearm stroke and serve, the arm is cocked in maximal external rotation (3,6,7), while the long head of the biceps is extended and hence stressed. It should be kept in mind that the distance between the insertions of the biceps is greater when the arm is elevated than when it is suspended.

Differential diagnosis includes anterior humeral capsulitis (3). During the “cocking phase”, the anterior structures of the shoulder are under tension and hence increase the likelihood of a lesion to the anterior capsule and the biceps tendon.

Knowing that none of our athletes changed racquet or had previous shoulder pain, trauma, or instability, we suppose that their injuries came from technical errors when cocking from the base-line in smashing or serve.

It is known that overhead athletes frequently present with shoulder pain, without a clear history of trauma. Pain occurs during a specific phase of shoulder motion, as a result of technical errors or inadequate equipment. The main goal for the treating physician is to recognize the mechanism of the injury, in order to be able to explain the player all the measures that have to be taken into consideration before returning to active training.

References


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Table 1. Characteristics and treatment of 4 young female tennis players with brachial biceps tendon injuries

<table>
<thead>
<tr>
<th>Playera</th>
<th>Age</th>
<th>Play type</th>
<th>Years of activity</th>
<th>Hours a day</th>
<th>Times a week</th>
<th>Racquet usedb</th>
<th>Treatmentc</th>
<th>Rest</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.H.</td>
<td>13</td>
<td>base-line</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>lw - 1 h PT x 14 (US, massage)</td>
<td>6 weeks</td>
<td>recovered</td>
<td></td>
</tr>
<tr>
<td>A.A.</td>
<td>15</td>
<td>base-line</td>
<td>7</td>
<td>2</td>
<td>6</td>
<td>lw - 1 h none</td>
<td>4 weeks</td>
<td>recovered</td>
<td></td>
</tr>
<tr>
<td>R.B.</td>
<td>12</td>
<td>base-line</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>lw - 1 h PT x 17 (US, massage)</td>
<td>3 months</td>
<td>recovered</td>
<td></td>
</tr>
<tr>
<td>S.P.</td>
<td>13</td>
<td>base-line</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>lw - 1 h PT&gt;30 (US, massage, pulleytherapy)</td>
<td>5 months</td>
<td>recovered</td>
<td></td>
</tr>
</tbody>
</table>

aH.H. and A.A. suffered from biceps tendinitis and R.B. and S.P. suffered from a partial tear in the muscle.
blw – light weight.
dFor non-medical reasons.

Figure 1. Palm-up test: elevation of the arms against the examiner’s opposition while the palms are in supination (2).