A Total Arm Strength Isokinetic Profile of Highly Skilled Tennis Players

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This research was funded by the USTA Sport Science and Medicine Research Grant (1989)

INTRODUCTION

• Tennis players frequently practice the strokes of the game for countless hours over the course of many years to achieve a high level of skill. Ericsson estimated that it takes 10 years or 10,000 hours of training at a high performance level to attain the skills of an elite level player (Ericsson 1993).

• The role of the upper extremities in producing tennis strokes leads to repetitive overuse and high levels of mechanical and physiological stress that often result in injury. Previous research has found that 37% of the top eighty-four professional players had major elbow problems and 31% of 2633 recreational players experienced elbow pain at some point in their playing careers (Priest, 1974, 1980).

• Additional research of the top eighty-four professional players also discovered significant differences in the dominant tennis playing arm grip strength, bone hypertrophy and arm girth, a phenomenon also observed in baseball players and javelin throwers (Gore 1980).

• The prevalence of upper extremity injuries experienced by tennis players highlights the significance of obtaining a total arm strength profile with details on the relationship between the dominant and non-dominant arms. This profile will be instrumental in the preparation of rehabilitation plans for injured tennis players by physical therapists and athletic trainers.

• All 22 of the highly skilled male tennis players had significantly greater isokinetic strength in the dominant upper extremity.

• The motions of internal rotation, shoulder flexion and extension, wrist flexion and extension, and forearm pronation were greater in the dominant arm.

• There were significant differences between dominant and non-dominant extremities in the two shoulder motions but not in the wrist and forearm motions.

• No significant relationship existed between the overall isokinetic strength profile of the players and their ability to serve at a maximum speed as measured by radar and video methods.

• A statistically significant relationship existed between the two methods of measuring serve speed, radar and video digitizing, was observed however:

• The ball velocity of the serve as measured by the Speed Gun One radar and Peak Performance Technologies video methods differed significantly with the speeds from Performance Technologies reported speeds approximately 10 miles per hour faster for both peak and average of 5 fastest serves.

• Considering the findings of this study with respect to the differences in strength of internal and external rotation, it is extremely important that the muscles of the external rotators specifically, the infraspinatus and teres minor are targeted for strength training in highly skilled male tennis players to avoid overuse injuries such as rotator cuff tendinitis and impingement.

• The lack of a statistically significant relationship between isokinetic strength and the speed of serve suggest that the service motion is a complex neuromuscular task that is comprised of many factors. Upper extremity strength of internal and external rotation although important in withstanding the stress of the serve are only part of the equation in serve performance.

• Additional research in this area is needed to provide a greater understanding of the relationship between strength, flexibility and biomechanics of the serve to provide a framework for improvement of physical and skill development in tennis.

• The technologies of a radar gun and video digitizing used in this study to measure the speed were statistically related but the video method consistently reported scores at an average of 10 miles per hour faster than the radar method.

REFERENCES / RESOURCES


