

A Unique Case of Supraspinatus Tendonitis after Tennis Forehand Repetitive Motions

by

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A unique case of a professional tennis player who sustained a traumatic supraspinatus tendonitis while playing Forehand was presented. This case shows how science fields could and should cooperate in the future since this appears to be the first report of high inflammatory of supraspinatus tendon during Forehand motions. Instead of aggressive treatment in the form of surgery, a team of experts decided for new treatment that brought exceptional results.

Key words: 3D biomechanical analysis, chiropractics, massage, video simulation, tennis

Introduction

Tendons are dense, fibrous tissue responsible for transmitting force generated by muscles to bones, thereby producing joint movement (Kadi 2003). Repetitive activities as well as muscle-tendon complex overuse can injure tendons leading to pain and reducing function (Wilson & Best 2005). Tendonitis is the inflammation of a muscle tendon and it has varying levels of pain (Schmitt et al. 2001). Conservative treatment is usually successful in up to 90% of patients during a period of six month (Lam et al. 2006). This expert team settled a problem without surgery, although after seven months of conservative treatment surgery of tendon are frequent and recommended.

Case report

History

A twenty-one year old, right handed male professional tennis player came to our Institution complaining of right arm pain. The athlete specified that the pain was only appearing during forehand motions and that discomfort had started seven months earlier. At that time he was diagnosed with supraspinatus tendonitis and was required to discontinue all physical activities and undergo rehabilitation. During that period the athlete was subjected to four different non-operative treatments and the results were mostly satisfactory (table1).

Unfortunately, within two weeks of all conservative treatments post period, the athlete

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Table 1

<i>Rates Non-operative treatments before NEW treatment</i>		
Patient Treatment trough seven months (Before new treatment)	A1 Positive response	A2 No response
Physical Therapy and Exercise with NSAIDs	√	
Shock wave therapy	√	
Laser therapy	√	
Acupuncture		√

started to feel same symptoms after returning to the court and using the Forehand stroke. The pain was so intense that the athlete was no longer able to participate in his sport and surgery was recommended.

New treatment

After detailed physical, radiographic and MR examinations the patient was diagnosed with high inflammatory of supraspinatus tendon. After seven months of not playing professional tennis it was suggested to the player, to discontinue all physical activities and undergo new treatment.

Treatment included combination of rest, visual simulations, massage and chiropractics accompanied by expert biomechanical analysis for the purposes of designing a new forehand stroke model for the athlete. Firstly, a set of 23 anthropometric variables recommended by the IBP - International Biological Program were used on morphological dimension assessment to be calculated in a new recommended 3D kinematics Forehand MODEL.

Secondly, before the initial phase, 1718 old Forehand motion sequences were elaborated in an attempt to create a new movement that will be adjusted to player's anthropometric status (fig 1). Trough kinematics – graphic display, micro trauma chronology of the afore-mentioned movement is crystal clear. The patient wasn't holding up the racquet after 148° with his left hand. This movement

has two-side functions. First of all, putting a smaller demand on the right arm in sense of racquet weight and secondly, upper body movement around longitudinal axis brings body in ideal rotated position. Beside hand-shoulder problem, the patient was diagnosed with a obtuse angle problem between lower (fibula –tibia) and upper leg (femur). During certain game phases initial open-stance forehand position almost starts from straight angle between lower and upper leg what clearly results with upper body compensation. After detailed analysis a new forehand model was suggested, in which the racket was supported with the left hand, upper body rotation around longitudinal axis for 32 °, and obtuse angle reduction between lower and upper leg for 33° approximately (fig 2).

These corrections were made after expert data processing to achieve harmonized kinetic chain and to reduce pressure on rotator cuff area from where the first motion recently was starting.

When all preliminary actions were done, the expert team started with 12 weeks of new treatment.

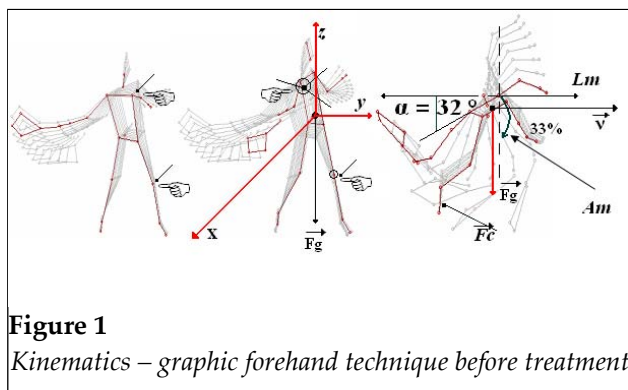
New type of treatment went trough following phases (table 2).

During the initial phase, the patient was subjected only to new forehand model 3D video simulation 20 minutes per session, seven times per week. After visual absorption of the new model, the expert team proceeded with above treatment and started with phase I which included

- Chiropractics treatment 25-30 minutes per

Table 2

<i>Rates Non-operative treatments before NEW treatment</i>				
Patient new Treatment	Initial phase Weeks 1-2	Phase I Weeks 3-6	Phase II Weeks 7-10	Phase III Weeks 11- 12
Biomechanical treatment				
Adjusted Forehand movement – 3D video simulation	7 °	12 °	12 °	12 °
Adjusted Forehand movement – on court practice	Rest	7 °	10 °	12 °
Chiropractics	Rest	3 °	1 °	1 °
Massages	Rest	10 °	5 °	3 °



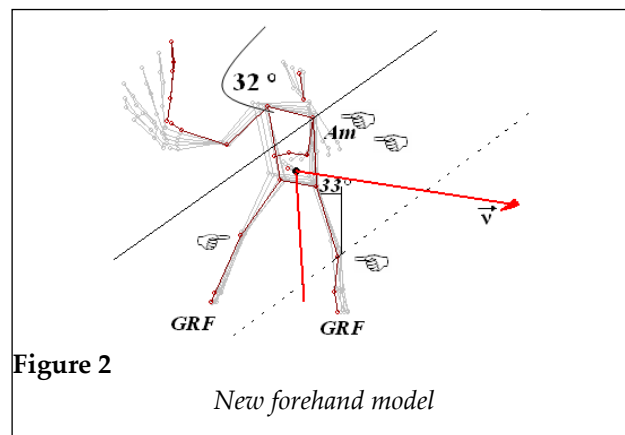
session

- Massage treatment 60 minutes per session
- New forehand playing on court treatment 50 minutes per session

During the following phases, only on-court time treatment changed from 50 to 70 minutes per session. During the 12 week period, the patient was subjected to 45 hours of 3D video simulation, 98 hours of on-court treatment, 9 hours of chiropractic treatment, and 66 hours of massage treatment. Three months after the new treatment the patient reported being completely asymptomatic after joining two competitions. The future evaluations should be performed repeatedly every 6 months. Patient reported awareness losing his ranking but perseveres with the combination which made him painless and preserved from surgery.

Discussion

Forehand stroke is a technique that integrates a full shoulder turn, good balance, kinetic chain from lower to upper body and extremely racquet-head speed which make this motion a tennis no.1 weapon (Bahamonde & Knudson 2003). During a six months period, conservative treatments are usually successful in 90% of patients (Lam et al. 2006). EMG analysis of shoulder function during forehand motions are showing muscle activity trough subscapularis, pectoralis major and serratus anterior area so this kind of injuries are only registered during repetitive service motion because primary function of supraspinatus tendon is abduction (Ryu 1988, Malanga 1996, Kibler 2007). Although EMG studies are showing that tendons (supraspinatus and infraspinatus) are most active during backhand and service, authors reported opposite situation since in this report poor technique caused a delusion. Computer simulations are an exceptional matter in future injury preventions (Riek et al 1999). The



utmost importance of upper arm internal rotation during the service has been well elaborated in large number of studies (Elliot et al. 2004, Elliot 2006, Hopper et al. 1995, Hopper 1995). Apart from non-efficient performance, poor technique has in a long term a negative manifestation on physical status which causes micro-traumas (Elliot et al. 2004, Elliot 2006, Hopper et al. 1995)

In this case, racket grip size certainly is not causing any kind of traumas (Hatch 1977). Apart from technique change with an expert biomechanical approach, during massage therapy accent was put on shoulder "critical zone" (Ling et al 1990, Levy et al. 2007). Large numbers of studies are suggesting that to consider all options of non-operative treatments regardless whether it is traditional or alternative medicine; the reason why our patient started chiropractic with massage therapy is because acupuncture didn't gave any result (Ling 1990). It seems logical and justified, that all others non-operative methods should be considered, before surgery treatment (Gao 2009). Cooperation between several scientific fields should bring further progress in the future (Riek et al. 1999, Elliot et al. 2004, Hatch et al. 2006, Regan et al. 1991, Blackwell & Cole 1994, Reid et al. 2007, Wittek et al. 2007). In order to achieve these goals, Model characteristics of all elementary techniques should be performed (Djurovic et al. 2008).

What is already known in the topic?

- Supraspinatus tendonitis has appeared after repetitive tennis SERVE motion
- After seven months of conservative treatment operation of tendon is frequent

What this study adds?

- This is the First report of a supraspinatus tendonitis in a tennis player after repetitive Forehand motion
- Cooperation between several scientific fields

Conclusion

This is the first case of supraspinatus tendonitis after repetitive Forehand motions, what makes this study the first link in the chain of evidence, but other steps do not necessarily have to follow it. By describing the rehabilitation program together with technique changes, we hope to provide all sports professional's a possible way to threat and successfully rehabilitate elite players who are having same or similar pain. Sometimes it is better to consider all options of non-operative treatment regardless whether it is traditional or alternative

medicine. These kinds of injuries are only reported during Service motions since primary function of supraspinatus tendon is abduction. Although our expert team presumes that cooperation between scientific fields is *conditio sine qua non*, the validity and general applicability of these findings are limited in several ways. This report cannot indicate if the experience described is typical; only statistical analysis of a larger treatment group, compared to a clearly defined control group, can do that. Based on this research, our expert team recommends examining all conservative treatments separately before deciding on surgery.

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