# 35 - THE PREVALENCE OF BACKBONE LESIONS IN TENNIS PLAYERS: CAUSES, DIAGNOSTIC AND PREVENTION

[1, 2]OSVALDO ANDRÉ FURLANETO RODRIGUES; [1, 3]MATEUS ROSSATO;
[1,3]ANTÔNIO RENATO PEREIRA MORO, Dr. (orientador)
[1] Mestrado em Educação Física Universidade Federal de Santa Catarina Brasil
2 Núcleo de Estudos em Tênis de Campo (NETEC) Universidade Federal de Santa Catarina (UFSC) - Brasil
[3] Laboratório de Biomecânica Universidade Federal de Santa Catarina Brasil
E-MAIL PARA CONTATO: andrenalina14@yahoo.com.br

## INTRODUCTION

When Gustavo Kuerten won the game against the Spanish player Sergi Bruguera and was the winner of Roland Garros in June 1997, he most probably was not aware that at that moment he changed the tennis history in the country. Added to his other victory in the Davis Cup realized in the Federal University of Santa Catarina in 2000, the sport became more popular and several Brazilian people, adults and children, created an identity with tennis and tennis courts received a lot of new adepts. Tennis may be the sport that has gained more adepts in recent years in Brazil, especially because of the great insertion of our professional tennis players in the media. This increase in the number of players has transformed many people that played tennis in a recreational basis in dedicated players. This fact has also increased the number of lesions in tennis practice.

As it occurs with some other competitive sports, that have as one of their characteristics the incessant search for a better performance, the practice of tennis has also conducted its adepts to become the subject of several cases of muscle-skeletal lesions, which are decisive to the premature discontinuance in the sport practice.

In most of the cases, such lesions may be attributed to a series of factors. In this article we emphasize the physiological and technical factors that are involved in the lesions of tennis players.

### Physiological Factors

Concerning the physical demand that the sport requires, Vretaros (1996) affirms that tennis is a sport that is characterized by presenting a great request of the members, especially in what concerns the bone-ligament aspect.

The lesions that appear in the practice of tennis are varied in what concerns the localization, predominant in the anatomic structures, especially in the backbone, however most of them are derived from repetitive micro-traumatisms originated by competitions and training sessions, associated to an inadequate recuperation. All these “ingredients” form what sportive medicine calls “overuse” excess of use.

Parkkari *et all* (2000), agrees with the considerations of Vretaros (1996) and adds that the mains causes of lesions due to overload are principally due to the inadequate structures of training sessions in relation to the type, frequency, intensity, and duration of the sessions. Beyond these factors, previously mentioned, the time of involvement with the practice has also been shown as a decisive factor in the development of lesions in tennis players. Parier (1994), affirms that the aging process increases the risks, mainly in the backbone and in the hipbone articulation, which according to the author suffers a drastic diminution in the amplitude of the movement, mainly the extension movement, changing from 18º in the age of 30 to 0º in the age of 65.

Still according to Parier (1994), the lack of adequate physical training also offers complications, mainly to the backbone, once poor physical training, many times, is compensated by several torsions and flexions of the backbone, added to the fact that the retraction of the femur-ischiatic and the ilium-psoas muscles limit the movements of the anterior flexion which are indispensable at the moment of the stroke. According to the author this is the cause of the overload directed to the lumbar-sacral regions of the backbone.

Bollinger (19998) affirms that the bad functioning of some muscle or articular segments may cause excessive overload to the backbone once tennis regular practice requires a harmonic mechanic functioning of the skeleton as a whole, where just one weak link, could harm the whole muscle chain.

As an example we could mention the case of an articulation that presents sequels after a surgery, becoming rigid for certain movements, as in the case of rigid shoulders, that, due to the restriction, requires from the tennis player an accentuated curvature of the backbone, used to compensate the loss of the external rotation at the moment of an efficient service.

### Technical Factors

Beyond the physiologic factors related to lesions presented by tennis players, Parrier (1994) affirms that the lack of technique is responsible for the most of the lesions, especially the ones of the backbone.

Parrier (1994) affirms that during a tennis game, the player makes exaggerated movements several times, aiming to surpass himself in the improvement of the gestures. An example is the situations in which the player tries to reach the ball far from his body needing to exaggerate in the torsion of the lumbar region. During competitions, such attempts are more visible than during the regular training sessions, aggravating the situation.

Brevskvar (1991) agrees with Parrier (1994) and adds that these lesions indicate that a stretching over the one supported by the muscle has been done.

All these movements, most of the times complicated movements, are naturally produced during right and left strokes, service strokes or when a smash is received. It happens to compensate the positions in which the player is in a disadvantaged position in relation to the ball, reactions or even lower running speed, Brevskvar (1991).

In the study done by Parrier (1994), based on the several strokes performed during a game, it was seen that in the different steps of the game, aggressions to the backbone are potentially produced. One of the examples mentioned by the author is the forehand with top spin, where the search for a better potency in the stroke, leads the player to produce a torsion in the backbone, overloading it considerably.

It happens because the pelvic waist is kept facing the net while the scapular waist rotates in a bigger or smaller degree. Such torsion has as a result a higher potency; however the backbone suffers a great overload, especially in the lumbar region.

In order to understand the mechanisms required during a game that are responsible for the production of lesions in tennis players, technicians, biomechanics and sports doctors have dedicated their studies to the analysis of movements.

In this perspective, a better attention has been directed to the service technique analysis, once it seems to be the one responsible for the greater risks (Elliott, 2002 and Parrier 1994).

Parrier (1994) affirms that the service is the main cause of backaches in tennis players as for performing it, one needs a perfect coordination since a shoot done in the posterior or lateral level implicates in an extension or inclination of the backbone with a considerable pressure in the lumbar and sacral disks. Other authors also point out these problems (Brevskyar, 1991, Parrier, 1994 and Eitner 1989). Brevskyar (1991), affirms that such regions of the backbone, as well as the

pelvis and the shoulders are the most sensible regions to the imposed overload, originated by exaggerated rotations and torsions.

However, it is not only the accentuated lordosis that affect tennis players, also the scoliosis are rather common in the tennis world. Scoliosis are lateral deformations of the backbone, modifying or accentuating its curvature (Caillet, 1979).

The fact that tennis is a unilateral sport favors the occurrence of such postural deviations, Hüllemann (1978). The author adds that although the unilateral request that is a characteristic of sports such as gymnastic, shooting, tennis and others, may be considered essential for the formation of scoliosis before the end of whole formation of the body, further investigations are necessary.

It is necessary to mention, though, that beyond the fact that tennis is a unilateral sport is not possible to forget the importance of the non-dominant arm once it helps in many strokes, as for example, the toss, considering, of course, its reduced function when compared to the dominant arm (Sampedro, 1982).

Many studies have been done in order to investigate the influence of asymmetry in sports and its relation with postural deviations (Watson, 1983, Oseid, 1994, Stepnica, 1986).

Watson (1983) observed that 43% of the pitchers belonging to the professional league of baseball in the USA presented scoliosis. Oseid (1994) verified that 43% of the Russian gymnasts presented severe structural scoliosis; Stepnica (1986), in his study with important athletes of several sports of the Czech Republic, verified that the highest incidence of scoliosis is found in sports with a great request of the superior members.

Such exaggerated request of the members leads to a shortening of the muscles, favoring the appearance of postural deviation in the backbone. These symptoms are common, especially in tennis players who are still in formation age and athletes with several years of activities. Such problem was mentioned by Aparício (1998) who affirmed that the hypertrophy of the dominant arm is accompanied by a hypertrophy of the muscles of the trunk, offering asymmetric torsions to the backbone that ends up in performing curvatures that are beyond the physiological rational limits, thus producing the frightening backbone lesions.

**LESION DIAGNOSTIC**

Concerning the diagnostic matters, it is important to understand the lesion processes that affect tennis players as well as to recognize the forms to diagnose a possible problem before it may become severe and jeopardize the competitive life of the athlete. Mellion (1997) suggests that an episode of pain is the main hint to a lesion in the backbone, however, as to really detect a lesion, the patient must be submitted to a complete anamnesis test. It is also suggested by the author that the positions in which the athlete suffers the pain must be investigated too.

Frugolli (1996) says that even before traumatic symptoms are detectable, athletes must realize frequent postural evaluations, in order to control the level of deviation in the backbone region, avoiding possible problems. Press and Young (1997) recommend some physical tests as to obtain information of possible lesions in the backbone, as for example, a complete neurological test, including sensibility, the muscle expansion reflex (particularly the symmetry of the answers, and not only its presence or absence) and the manual test of the muscles (many times repetitive tests, as for example, lifting and lowering the toes, as to make evident the weakness of the S1 roots of the related muscles).

Lasegue apud Mellion (1997), suggests that the test of extended leg elevation is very important, once it makes possible the visualization of any kind of irritation in the lumbar-sacral backbone in the dura mater level and in some of the roots of the inferior members, particularly, L5 and S1, once when the leg is elevated from the supine position with the knee in extension, tension is applied to the dura mater, at approximately 30º of flexion. If the nerve roots of L5 and S1 are irritated, the patient is going to refer pain in the inferior part of the leg in the distribution of the involved specific nerve.

Parrier (1992) affirms that all the diagnostic tests are to be done when there are doubts and a specific test may supply important information. The author believes that when information about the etiology of the pain is obtained, the result of the tests may change the treatment considerably and diminish the time of inactivity of the athlete, but points out that the diagnostic that has been proved to be the most effective is the one done by the physical instructor of the athlete during the daily training sessions.

**PREVENTION MECHANISMS**

According to the medical view, the precocity of the diagnostic is the main factor of success in any type of treatment. However, according to the point of view of tennis professionals, more important than the knowledge of the lesion and the treatment it requires, the ample prevention of the health of the athlete is linked to the previous knowledge of the factors to avoid future problems. On the other hand, if they happen, the establishment of procedures to avoid them to reappear, or at least diminish the potential risk of having them. Thus, prevention is closely related to the technical and physiological factors of tennis games in competitive levels.

Bollinger (1992) reminds that lesion prevention becomes more important when the harms caused by them are evidenced in the player's competitive life, once it brings immobilization in a higher or lower level. The danger is related to muscle atrophies, destruction of articulations, aerobic and anaerobic capacity diminution, severe worry syndrome, loss of technique and coordination.

It is a consensus among authors that well executed physical prevention is the main factor of contribution to prevent lesions in the backbone. In this context, Vretaros (2002) reinforces the idea that the behavior of the physical instructor and technical commission must be directed to obtain information on the causes of the lesions that affect the athletes, aiming strategies to avoid them.

A fact that is many times not taken into consideration by many athletes is their involvement with other sports modalities, used to compensate the muscle groups not totally involved in the tennis practice. Bollinger (1992) points out the importance of such strategy, once the physical compensation obtained through the regular practice of other sport is necessary to exercise those muscles not worked on the tennis practice, relax and alleviate physical and mental tension and principally prevent lesions.

Another author that recommends the compensatory practice is Weineck (1999). He affirms that compensatory exercises avoid the problem of scoliosis and that daily exercises for abdominal muscles prevent postural problems of the pelvis. Aparício (1998) emphasizes the importance of muscle strengthening in tennis practice, saying that the player must have a sufficiently muscled body and a good base preparation before starting to compete. Concretely, it is very important to have a sufficiently and symmetrically muscled body. The lack of symmetry pertinent to the sport conjugated with the lack of compensatory exercises will in the future, surely bring, muscle and articulations lesions in the backbone of tennis players.

Thus, it is logical to conclude for what has been exposed above that tennis is a sport that due to the level of physical and technical demand, transforms athletes' backbones into the most vulnerable region of the body to suffer lesions that may interfere in the competitive their lives. Thus, physical training is a factor that is both related to the causes, in cases of excessive work, and prevention, when well elaborated.

Among the physical qualities that shall be worked by a tennis player, strengthen training and flexibility shall be well planed and executed, as to create a physical base capacity, avoiding overload and lesion risks.

The asymmetry of tennis may be diminished through compensatory exercises and sports. The central worry is the

backbone since lesions in this region impede the athletes to compete during long periods.

Impacts derived from strokes (torsions, and exaggerated rotations) in the backbone may become not relevant through the technical quality of the training sessions, as well as through the professional help and attention of the physical instructor.

Postural and anthropometric evaluations must be regularly done as to control the level of backbone deviation and members' asymmetry, especially when referred to players that are still in body formation age.

The biomechanical analysis of the technical gestures, still relatively not used by many athletes, must be implemented, becoming an essential tool in the prevention of backbone lesions.

**REFERENCES**

APARÍCIO, J. A. **Preparación Física en el Tenis : La Clave del Exito**. Madrid-ES: Gymnos, 1998.
APPLEWHAITE, C. y MOSS, B. **Tenis Completo**. Barcelona-ESP: Editorial Hispano Europea,1992.
BRESKUAR, B. **Tenis con Boris Becker**. Barcelona-ES: Hispano europea, 1991.
BRUSTOLIN, M. **Tênis no Brasil História, Ensino e Idéias**. Rio de Janeiro-RJ: Sprint, 1995.
CAILLET, R. **Escoliose diagnóstico e tratamento**. São Paulo: Manole, 1979.
COUSTEAU, J. P. **Medicina del Tenis**. Barcelona-ESP: Masson, 1984.
CRESPO, M. e MILLEY, D. **Manual para treinadores avançados**. Revisado por Daniel Rosenbaum e traduzido por Élson Longo. Londres: ITF, 1999.
DEUTSCHER TENNIS BUND. **Tênis : Golpes Básicos**. Tradução de Mark G. Sharp. Rio de Janeiro-RJ : Ao Livro Técnico, 1979.
FRUGOLI, A. C. **Incidência de Problemas Posturais a Nível de Coluna Vertebral em Tenistas de 12 a 17 anos na cidade de Florianópolis**. Florianópolis.111 f. Monografia (Especialização Latu Sensu em Fisiologia do Exercício) Centro de Educação Física e Desportos, Universidade do Estado de Santa Catarina, 1996.
GALLIETI, R. **Tênis- Metodologia do ensino**. Rio de JaneiroRJ: Sprint, 1996.
GIL, A. C. **Como é elaborar projetos de pesquisa**. 3 ed. São Paulo: Atlas, 1991.
HOFFMAN, S. J. e HARRIS, J. C. **Cinesiologia o estudo da atividade física**. Porto Alegre: ARTMED, 2002.
KNOPLICH, J. **Viva bem com a coluna que você tem: dores nas costas, tratamento e prevenção**. São Paulo: IBRASA, 1982.
LAPIERRE, A. **Reeducação Física**. 2. São Paulo: Manole, 1987.
MELION, M. B. et al. **Segredos em medicina desportiva**. Porto Alegre: Artes Medicas, 1994.
NEVES, L. **Centro Esportivo Virtual** Disponível em: www.cev.org/cevtenis-l Acesso em: nov e dez de 2002.
PARIER, J. **Lesiones del tenista**. Barcelona-ESP : Ciba-Geigy, 1993.
ROBERTS, W. **A coluna vertebral no esporte**. Disponível em: www.personalfit.com.br/artigos. Acesso em: 21 set 2002.
RUIZ, J. A. **Metodologia Cientifica**: **guia para eficiência nos estudos**. São Paulo: Atlas, 1991.
SALVADOR, A. D. **Métodos e técnicas de pesquisa bibliográfica**. 11 ed. Porto Alegre: Sulina, 1986.
SALVADOR, A. D. **Métodos e técnicas de pesquisa bibliográfica: elaboração e relatório de estudos científicos**. Porto Alegre: Sulina, 1996.
SAMPEDRO, R. M. F. The Anthropometric Somatotype Diferences Between Male and Female Tennis Players, 10 to 14 of age in the State of Tenesse. Tese de Doutorado. Tenesse: Vanderbilt University, 1982
SANTOS, L. **Saiba como jogar solto**. Tênis, 103 (66), 42-44, 1996.
SCHÖNBORN, R. **Entrenamiento tenistico de la condicion física.** Anais do Congresso da Federação Européia e Internacional de Tênis. (56-64) Marbella: RFET, 1984.
VRETAROS, A. **O papel do Preparador físico no retorno à pratica esportiva competitiva após reabilitação músculo-esquelética: uma abordagem no tênis de campo.** Disponível em: www.efdeportes.com/efd50/pf.htm . Acesso em: 21 set 2002.

ENDEREÇO: Núcleo de Estudos em Tênis de Campo NETEC
Caixa Postal 5023 Agência Cidade Universitária
Trindade CEP 88040-970
Florianópolis Santa Catarina Brasil
E-MAIL PARA CONTATO: andrenalina14@yahoo.com.br
TELEFONES: 55 (48) 3331-9695 e 55 (48) 8803-5065

**THE PREVALENCE OF BACKBONE LESIONS IN TENNIS PLAYERS: CAUSES, DIAGNOSTIC AND PREVENTION**

**ABSTRACT -** This study aimed to reunite information concerning backbone lesions in tennis players, pointing out main aspects, such as, causes, types of lesions, diagnostic and prevention. Methods and techniques of bibliographic research were used in its realization based on articles published in scientific journals, magazines, books, congresses records, Internet articles and thesis texts. The main causes of lesions caused by tennis overload are due to inadequate training structure in relation to type, frequency, intensity and duration of the sessions. The service is considered to be the main cause of backaches in tennis players due to the high physical demand used during the stroke. The backbone, as well as the pelvis and the shoulders are the most sensible regions affected by the overload originated from exaggerated rotations and torsions. Postural and anthropometric evaluations need to be regularly done as to control the level of deviation in the backbone and the members' asymmetry, especially in young tennis players still in body formation age. The biomechanical analysis of technical gestures, still little used by professionals, may be implemented, becoming an essential tool in prevention of backbone lesions.

**KEY-WORDS**: field tennis; backbone; sportive lesions.

**LÉSIONS DANS LA COLONNE VERTÉBRALE CHEZ LE TENNISMAN: CAUSES, DIAGNOSTIC ET PRÉVENTION**

**RÉSUMÉ -** Cette étude à cherché à réunir des informations sur les blessures concernant la colonne vertébrale chez. Les joueurs de tennis, montrant les principaux aspects marquants, comme les causes, les principales lésions, le diagnostic et la prévention.Le tennis sur court, dû à sa particulière caractéristique asymétrique, soumet ses athlètes à des efforts constants sur la colonne vertébrale, faisant de cette région une des parties du corps les plus affectées par des blessures “musculo-squelettiques”, compromettant ainsi la carrière du sportif. Pour sa réalisation (de l'étude), on a utilisé des méthodes et des techniques de la recherche bibliographique. Des documents publiés par d'autres auteurs, comme par exemple des livres, des magazines, des articles trouvés sur Internet, des annales et autres archives de différents congrès, des thèses et des monographies. Les principales causes de lésions dû au surentraînement naissent principalement de l'inadéquate Préparation des entraînements en relation au type, fréquence, intensité et durée des séances. Le service est la principale cause de lombalgies chez les tennismen, cet acte demande une parfaite coordination, où un lancé de balle mal

effectué occasionne une forte pression sur les disques lombaires et dans la région du sacrum. Ces zones de la colonne vertébrale, ainsi comme le pelvis et l'épaule, sont les régions les plus sensibles Aux surcharges causées par les rotations et les distorsions imposées. Non seulement, on peut affirmer que l'action de la lordose “affecte” les tennismen, mais aussi les scolioses qui sont très courantes dans le monde du tennis. L'évaluation de la posture anthropométrique doit être réalisée régulièrement, contrôlant le niveau d'anomalies dans la colonne vertébrale et l'asymétrie des membres, principalement chez les jeunes débutants. L'analyse biomécanique des gestes techniques, relativement peu utilisée doit être implantée, devenant un élément fondamental dans la prévention de lésions dans la colonne vertébrale.

**MOTS-CLÉS**: tennis sur court- colonne vertébrale- lésions(ou blessures) chez les tennismen.

**LA PREVALENCIA DE LESIONES EN LA COLUMNA DEL TENISTA: CAUSAS, DIAGNÓSTICO Y PREVENCIÓN**

**RESUMEN -** El presente estudio tuvo como objetivo reunir informaciones acerca de las lesiones en la columna vertebral en jugadores de tenis, evidenciando los principales aspectos relevantes como las causas, tipos de lesiones, diagnóstico y prevención. Para su realización se ha utilizado los métodos y técnicas de la investigación bibliográfica, tomando como base artículos publicados en periódicos científicos, revistas, libros, actas de congreso, artículos de Internet, tesis y monografías de postgrado. Las principales causas de lesión por sobrecarga en el tenis son debidas principalmente a la estructuración inadecuada de los entrenamientos con relación al tipo, frecuencia, intensidad y duración de las sesiones. El servicio es considerado como la causa principal de las lumbalgias en los tenistas, en función de su alta exigencia física empleada en el golpe. La columna vertebral, así como la pelvis y el hombro son las regiones más sensibles a las sobrecargas impuestas, originadas por rotaciones y esguinces exagerados. La evaluación postural y antropométrica necesita ser realizada regularmente, controlando el nivel de desviaciones en la columna y la asimetría de miembros, principalmente en tenistas en formación. El análisis biomecánico de los gestos técnicos, aunque relativamente poco utilizados por los profesionales, debe ser implementado, tornándose como elemento fundamental en la prevención de lesiones en la columna vertebral.

**PALABRASCLAVE**: tenis; columna vertebral; lesiones deportivas.

**A PREVALÊNCIA DE LESÕES NA COLUNA DO TENISTA: CAUSAS, DIAGNÓSTICO E PREVENÇÃO**

**RESUMO -** O presente trabalho teve como objetivo reunir informações acerca das lesões na coluna vertebral em tenistas, evidenciando os principais aspectos relevantes como as causas, tipos de lesões, diagnóstico e prevenção. Para sua realização utilizou-se os métodos e técnicas da pesquisa bibliográfica, tomando como base artigos publicados em periódicos científicos, revistas livros, anais de congresso, artigos da internet, teses e monografias e pós-graduação. As principais causas de lesão por sobrecarga no tênis são devidas principalmente a estruturação inadequada dos treinamentos em relação ao tipo, freqüência, intensidade e duração das sessões. O saque é tido como a causa principal das lombalgias nos tenistas, em função de sua alta exigência física empregada no golpe. A coluna vertebral, assim como a pélvis e o ombro são as regiões mais sensíveis às sobrecargas impostas, originadas de rotações e torções exageradas. A avaliação postural e antropométrica precisa ser realizada regularmente, controlando o nível de desvios na coluna e a assimetria de membros, principalmente em tenistas em formação. A análise biomecânica dos gestos técnicos, ainda relativamente pouco utilizados pelos profissionais, deve ser implementada, tornando-se elemento fundamental na prevenção de lesões na coluna vertebral.

**PALAVRASCHAVE**: tênis de campo; coluna vertebral; lesões esportivas.