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TENNIS ELBOW: INCIDENCE IN LOCAL LEAGUE PLAYERS

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ABSTRACT

Seventy-four local league tennis players were surveyed through a questionnaire and interview to establish the incidence of tennis elbow, the perceived causes, preventive measures taken and their perceived effectiveness. Of these 35% suffered from tennis elbow, 77% of those critically. The tennis racquet used, technique and timing and the condition of the court were perceived as the main causes, whilst playing tennis frequently was seen as the main contributory factor. The effectiveness of both medical treatment and non-medical measures are noted, but only 5 cases of complete recovery from the injury are reported. Medical help was not sought in almost 50% of the cases, and lack of faith in the GP's interest or advice was noted. Information about tennis elbow did not appear to be easily accessible. More sports injury clinics and wider dissemination of information are suggested. The American research is reviewed.

Key Words: Tennis Elbow, Tennis Players

INTRODUCTION

Whilst playing in local league tennis, I was impressed by the number of men who suffered from tennis elbow. Some showed visible signs of their injury by wearing strapping, and for many, tennis elbow was frequently a topic of conversation in and around the clubhouse. There was clearly a great deal of concern about the discomfort which tennis elbow brought, the effect on their game, and what to do about it. It appeared that either club tennis players did not have access to information on this injury or that they did not know where to find it. A search for information revealed that there appeared to be little research in this country into the incidence and aetiology of tennis elbow, and therefore it was decided to investigate this topic with club players.

REVIEW OF THE LITERATURE

There has been a certain amount of literature and research into tennis elbow in America. However findings are often in conflict with each other, and there is no consensus of opinion on causative factors and preventive measures, particularly in the non-medical sphere. Two papers usefully cover much of the subject in general. The Physician and Sports medicine brought together a panel of experts on the subject and published their discussion and attempted to provide practical guidelines, (Allman et al, 1975), although there is not complete agreement amongst the experts, whilst Sanderson (1981) provides a comprehensive survey of the research.

In general discussion, tennis elbow often covers a multitude of injuries at or around the elbow joint, but the clinical literature locates it as conditions which cause pain at the lateral epicondyle. Some of the research reviewed includes pain on the medial epicondyle (often referred to in some quarters as "golfers elbow") as well as the lateral in the term tennis elbow (e.g. Priest, 1976 and Nirschl, 1975), whilst, in other studies, the injury

had not been medically diagnosed and the cases of tennis elbow reported through self report questionnaires may well have included a variety of elbow complaints (e.g. Gruchow and Pelletier, 1979).

Bernhang et al's and Nirschl's discussion in the Journal of Sports Medicine (1974 and 75) are useful for understanding the structural and mechanical aspects of tennis elbow. To generalise, it is a mechanical problem involving structural features such as tissues, strength and flexibility interacting with overload and repetition and factors such as equipment and the skill and technique of the player. Movements of pronation, rotation and extension are contributory. A more detailed analysis opens up a debate, e.g. Nirschl's suggestion of "pronation with power" and the differences between top class and average tennis players is refuted by both Bernhang (1974) and Minkoff (1975). Claims by Nirschl do not always appear to be substantiated through his research whilst Bernhang's 'leading elbow' hypothesis (i.e. elbow leading causes the injury) is confusing.

All the studies show a high incidence of tennis elbow amongst players. A summary of the incidence rates in major studies is shown in Table I. There seems to be agreement that age is a dominant factor, and that the incidence rate was much higher for the over 35 age group. Gruchow suggests that it is a "degenerative disease".

It has been suggested that there is less likely to be a problem of technique in top class players, that the service is implicated for symptoms on the medial epicondyle and the backhand for symptoms on the lateral epicondyle, though two handed backhand players do not appear to suffer (Nirschl, 1977; Priest, 1976; Bernhang, 1975; Allman et al, 1975). It also appears that tennis elbow is related to frequency of play (Priest, 1976, 1980; Gruchow, 1979). There is very much less agreement about other interacting factors such as the type, weight, size of grip, and string tension of the racquet. Whilst Nirschl (1977) suggests that the injury is related to heavy and tightly strung racquets, Priest (1976) found that there was no significant differences with the factors of racquet weight, grip size or string tension, though the composition of the racquet was important. Priest showed that whilst 50% of his sample used a wood racquet, 75% of those suffering from tennis elbow used a wood racquet at the time. However, Gruchow reports that there was no significant difference in racquet composition, but there was a higher incidence of tennis elbow with larger grip sizes. Steiner (1976) states that he has found that "neither the size of handle nor type of racquet is a significant factor" and that "no consistent findings suggest that one type is better than another". It may be that grip tightness, impact and vibrations as Hatze (1976) suggests should be taken into consideration.

TABLE II

The causes of tennis elbow as perceived by the respondents

Cause	Nos.	%
Racquet	6	23
Technique/Timing	6	23
Court	4	15
Other sports/activities	3	12
Unsure	7	26

There are two distinct courses of action a tennis elbow sufferer can follow. The first is to take preventive measures in the non-medical sphere, and the second is

TABLE I

Incidences of tennis elbow reported from selected research studies

Author	Sample	Incidence of Tennis Elbow	Other Points
Nirschl, 1975	23 world class t.p.	35%	Higher incidence on medial condyle
	117 club t.p.	52%	Not one of the 11 players under age 30 45% currently
	81 ordinary patients (not t.p.)	30%	30% not caused through tennis
Nirschl, 1977	200 club t.p.	50%	All 50% over age 30
Priest, 1976	231 club t.p.	47%	28% currently 75% on lateral condyle
Priest et al, 1977	84 world class t.p.	45%	37% major symptoms
Priest et al, 1980	2,633 average t.p.	31%	Age, frequency of play related
Gruchow et al, 1979	500 club t.p.	40%	54% self diagnosed more women (36%) than men (24%) had it seriously

to obtain medical treatment. As one might expect after reading the research findings, there is more agreement on appropriate medical treatment than on non-medical preventive measures. Of course it is not easy to give advice when there are so many interacting factors, for example, the racquet factor alone involves composition, grip size, weight, balance, string tension, and the findings in relation to these are inconsistent. Allman et al (1975) usefully discuss these issues but there are no firm conclusions. After summarising the findings, Sanderson (1981) suggests that it is best to adopt as large a grip as is comfortable, but it may be difficult to find the optimum size without more specific guidelines. Nirschl (1977) proposes that there is a reliable method of determining the correct handle size, which is "the circumference of the racquet handle equalling the distance from the proximal palmar crease along the radial border of the ring finger to the top of the ring finger."

Gruchow's (1979) and Priest (1980) studies (through a self report questionnaire) are the only ones which give details of the effectiveness of the measures taken. Gruchow shows that changes of racquet and changes of stroke technique were the most successful for both mild and severe cases of tennis elbow, but details of the changes are lacking so the usefulness of this information is limited. Priest (1980) does not deal with racquets or changes of racquet in his paper, but shows that alteration of strokes was effective in reducing the symptoms in 30 cases (100%). No further details of the technique and changes are given, but this would suggest that elbow sufferers might look to this factor and if necessary go to a coach for advice. In 1976 Priest suggested that a change of racquet can be effective and shows that 85% (i.e. 22 out of 26) who changed from wood to steel reported an improvement in their symptom. As a recommendation, this would be at odds with Nirschl and Others in the Allman discussion (1975). However, Priest's table shows that other changes of racquet are too small to usefully compare, for example, 3 people changed from metal racquets and 2 of these reported improved symptoms. Another table shows the other simultaneous parameters of change such as grip size and weight, and Priest concludes these have not been important in reducing the symptoms. Unfortunately, the table does not show the parameters related to type of racquet so this conclusion is misleading. Hatze (1976) suggests that the "most advantageous grip tightness" is different for top class and average performers, and recommends a lighter grip for beginners and moderate players.

An exercise programme is recommended by Nirschl (1977) and Steiner (1976), the latter stressing joint flexibility. Both give details of programmes. Priest et al (1980) show that exercises improve the tennis elbow in 17 out of 19 players, but details of the exercises are lacking. A programme for those afflicted is therefore indicated, possibly under the guidance of a physiotherapist. Allman et al recommend an adequate warm-up before playing.

On the medical side most of the articles and books recommend one or all of the following; physiotherapy with ultrasound, injections into the area of tenderness (usually hydrocortisone), a brace worn on the forearm, and surgery for the most persistent cases. Apparently all of these have been effective in certain cases, but details of the effectiveness rate appears to be lacking. Priest et al (1980) give the most detailed information of the perceived effectiveness. The most effective medical treatment was the brace (84% improvement in 131 cases), Asprin (84% improvement in 38 instances), Cortisone injection (75% in 130 cases), and heat treatment 74% in 50 players). Ultrasound improved in only 52% of the 21 cases. Gruchow (1979) reports that the forearm brace was the least effective of measures taken by his sample, whilst medication was slightly more successful particularly in mild cases. Priest (1980) reports that there were 5 successful cases of surgery (100%), whilst 3 people had received surgery in Gruchow's study and 1 had a recurrence of the symptoms. Allman's discussion suggests the brace can be effective, but it appears to be little used in this country. Nirschl (1977) states that high voltage galvanic stimulation has often replaced ultrasound with some success, and reports the use of certain drugs. To what extent these treatments are used in this country is difficult to say, but I have not come across their prescription in my study.

METHODS OF THE INQUIRY

A questionnaire was constructed after discussion with players who had suffered from tennis elbow. Men's teams in two tennis leagues (Division 1 and 2) in a large conurbation were surveyed. One league team consisted of 4 players, in the other they consisted of six. The questionnaire was administered through an interview conducted after a league match in the clubhouse, so that more detailed discussion and follow-up of the answers could take place. Although this meant that, players not playing for whatever reason, could not be surveyed and numbers were inevitably smaller, it was felt that this method was preferable to posting questionnaires to all club members. The total number of players surveyed was 74 of which 26 reported that they suffered or had suffered from tennis elbow.

The survey collected the following information from all the players: occupation, age group, number of years they had been playing tennis, how often they played tennis in summer and winter, type, size and weight of tennis racquet, and whether they had ever had tennis elbow. Those who reported that they suffered from tennis elbow were asked: when it started, what they thought the causes were, what factors contributed to it, how often they played when it first occurred, type and

size of racquet, whether they continued playing and the effect on the tennis elbow, what steps they have taken and the results, details of medical treatment (if any) and the results.

RESULTS AND DISCUSSION

Seventy-four tennis players completed the questionnaire, 26 (35%) of whom suffered from tennis elbow. Just less than half of the 26 tennis elbow sufferers were self diagnosed. When asked where the pain was located, all the players pointed to the lateral condyle, though several reported pain on the medial side and elsewhere. All 26 tried to continue playing when they felt the symptoms, and 24 (92%) of these said it went worse. When the injury and pain was at its worst, 10 (38%) could not play at all, another 10 could only play with extreme difficulty and pain, whilst the remainder (23%) could only play with discomfort and it affected their game in some way. Therefore for 77% tennis elbow could be regarded as a critical injury and for the remainder very serious.

There were a great variety of occupations represented in the sample. The majority belonged to the professions, semi-professions, clerical and white collar jobs. Team tennis appears to be biased in favour of the first 3 classes in the registrar general's classification. There appeared to be no differences between occupational groups in the incidence of tennis elbow, and no one attributed tennis elbow to his occupation.

The sample consisted of players in the 17-54 age groups. This was divided into 5 age groups. Only 5% were under 20 years of age and 8% between 21-25. There were only 2 incidences of tennis elbow in these 2 groups. Division of the incidence of the injury according to age groups would not appear to be useful however, as the majority of those reporting the injury had first suffered from it a number of years before. It appeared that the majority of tennis elbow sufferers first encountered the symptoms in their 20's and 30's after a number of years playing, although there were 2 instances of players reporting that they first felt the injury before they were 20 years of age. Of tennis elbow sufferers 92% had played for 10 years or more but this was no different from the rest of the sample. All 74 players played at least 2 or 3 times a week in season, and 60% of them played 4 times or more a week. There was no difference between the tennis elbow group and the others on this count. This does raise the question of whether tennis elbow is more likely to occur with age or playing experience, and if so, why, after a number of years of trouble free playing, do players get tennis elbow? Of course, some players can point to some specific occasion which appeared to trigger off the symptoms, e.g. a change of racquet, but for the majority the effects appeared to be cumulative, (causes discussed below). This study tends to support the American research in respect of age, frequency and number of years playing.

Wood racquets were used by approximately three-quarters of the players, whilst steel and more modern materials accounted for the remainder. Of the sample 75% used medium weight, but there was more variety in grip sizes, 20 used size 3, 30 size 4, 30 size 5, 15 size 6, 5 size 7+. There appeared to be no relation between the incidence of tennis elbow and the make, type, grip size and weight of racquet. However some players do report that their racquet has contributed to their tennis elbow, and there are incidences of racquet changes both contributing to and alleviating the injury (discussed below).

Respondents who had suffered from tennis elbow were asked, firstly, what they thought caused the injury in the first place, and secondly, if they thought any of the factors in Table III contributed to its symptoms, and then, to elaborate on the answers given. The causes of tennis elbow were attributed to the factors in Table II, whilst Table III shows the factors which were perceived as contributory.

TABLE III

Factors which contributed to tennis elbow as perceived by the respondents

	Yes		No		Not Sure	
Factor	Nos.	%	Nos.	%	Nos.	%
Playing tennis a lot	20	77	6	23		
Racquet	10	38	10	38	6	23
D.I.Y. Jobs	4	15	22	85		
Technique/Timing	10	38	12	46	4	15
Other Sports	4	15	20	77	2	8
Other (poor courts) main response	6	23	18	69	2	8

Although over one quarter of those interviewed were not sure of the actual cause of their injury, only two people could not give any factors which contributed to the symptoms. The most significant contributory factor, i.e. playing tennis frequently (77%), was not seen as a cause at all. Players therefore do not seem to appreciate that constant repetition, overload and the cumulative effects of playing can be a major cause as well as contributing once the injury has been sustained. The racquet was implicated as the cause in 6 cases, and as a major contributory factor in 38% of the sample. In both groups, two-thirds blamed a heavy, large sized grip racquet, and changed to smaller grips. The remainder either changed to larger sized grip racquets or the type of racquet used. Discussion of the effectiveness of these

changes follows below. Poor technique was perceived as a cause and contributory factor in the same number of cases as the racquet. Perhaps many people would not like to admit to having poor technique even if they knew their technique was not good. It was not practical to observe the players in action and in any case this would have brought in the subjective judgement of the researcher. However, of those who did indicate this cause or factor, the backhand shots and service action were implicated most often, and the symptoms were attributed mainly to poor timing and hitting at end of the racquet rather than the technique of the stroke itself. In some cases this may be linked to poor courts which was given as both cause and contributory factor in a few cases. The condition of the courts was blamed, because it resulted in bad bounces and flicking, which affected timing and technique. This is a factor which was not mentioned in the American research and may be applicable to certain leagues in this country only. In other sports and activities, badminton, squash and in 1 case bar wrestling were mentioned.

Table IV shows the measures taken to alleviate tennis elbow and their perceived effectiveness. The players were asked to rate the effectiveness of the steps taken on a scale – cured completely, no pain for a time and no relief from pain. Several people said a certain measure had cured them completely as shown in Table IV. However, in answer to another question, "have you still got tennis elbow or do you ever get the symptom", some of these same players answered, "Yes". In effect, they had really meant that the treatment had been effective for some time, but the symptoms had returned at a later date. The actual number of players who had completely recovered from the injury was in fact only 5 (19%). Of these, 3 attributed the cure to rest, 1 to change of racquet and 1 to surgery. Periods of rest varied from a few weeks to several months. The 3 cases of change of racquet which were reported to have caused the injury in Table IV are interesting, because all 3 were changes to more modern materials. However, the only completely successful change was from a fibreglass model to a Slazenger graphite (cost retail well over £100), the other two cases allowed the player to continue without much of a problem. One of these however changed to a very light composite Head racquet from a wood "racquet" and the other changed to a Yonex fibreglass with a smaller grip. Other players changed to lighter and smaller grip racquets which brought temporary relief. One player may have had the answer, because he states that as he got older he decided to play less exacting tennis so putting less strain on his arm, and he claims this has prevented a recurrence of the symptoms.

The various types of self help medical treatment which were tried included wearing strappings (elastic bandages usually), rubbing on liniments, and using ice packs, all of which gave relief for a short time in half of the cases. In spite of the perceived seriousness of the effects on their tennis, it is perhaps surprising that only just over half of the sufferers (14) sought medical attention, mainly from their own GP's, but some did go for physiotherapy and 1 to an osteopath. The reason why the others did not seek medical help was that they thought that their doctor would not be interested in

TABLE IV

Measures taken to alleviate tennis elbow and their reported effectiveness

Measures taken (Some people reported more than one measure and these are included)	Effectiveness			Total	
	*Cured Completely	No pain for a time	No Relief	Nos.	%
Rest from tennis	10	6	1	17	64
Change racquets	3	8	3	14	53
Change technique		2		2	8
Medical Self Help		9	9	18	69
GP		4	4	8	31
Physiotherapist		3	4	7	27
Medical Osteopath			1	1	4
Surgery	1			1	4
Total	14	32	22	68	

*Cured completely as reported. It turned out that this did not always mean permanently cured. (See discussion below.)

an injury which only prevented them from playing tennis and gave them pain when playing, but at the same time did not prevent them doing their job. Some said it would have been a waste of time, and understood that doctors had many more urgent cases. Others felt there was probably little the doctor could do anyway, and the doctor would probably just tell them to rest, which was the last thing they wanted to hear. This possibly points to the need for more sports injury clinics. In the end, receiving medical attention was no more effective than self help medical treatments, except in the one case of surgery. No one had used a brace and most had not even heard of such a measure, which appears to be a much more common form of treatment in America.

CONCLUSION

The size of the sample in this study precludes any definitive conclusions. However, the area of study has been little researched in this country and the findings point to factors worth pursuing in further investigations.

The incidence rate is high, and the severity of the injury is a serious problem to local league tennis players. There does not appear to be easy access to information or good advice on the injury. Many players receive conflicting advice from fellow players and other people such as sports shop assistants. Moreover there seems to be a reluctance on the part of many to seek medical attention from their GP's. Whether this is justified at the level of, either, receiving the personal attention and advice which is required, or, the right type of treatment is difficult to say. What it does appear to point to is the need for more specialist sports injury clinics, and the dissemination of information from the American research and literature and from case studies in this country. Of the findings in this study, the incidence rate, age and cumulative effects tend to support the American work. The effects of playing on poor courts, and changes of racquet are worth looking at further. There are few cases in this study which have shown that preventive measures are completely successful, but several measures do bring relief in some instances, and allow players to continue to enjoy their tennis. A more careful monitoring of such cases is required and the information made available. It becomes apparent that there are possibly a number of factors causing and contributing to tennis elbow. The interaction of factors is complex and therefore it is difficult to pinpoint one factor and one preventive measure. What will work in one case may not do so in another. At present, if this study is anything to go by, club tennis players do not know what will possibly work, and appear to be in need of sound advice.

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BOOK REVIEW

Title: **ISCHAEMIC HEART DISEASE AND EXERCISE**
Author: Roy J. Shephard
Publisher: Croom Helm, London, 1981
Price: £19.95 428 pages

"Runners will die" was one of the newspaper headlines before the London Marathon. The Sports Medicine doctors who made these gloomy and unsubstantiated predictions should all be made to read Roy Shephard's book, which will I am sure become the definitive text for anyone wishing to know the risks of exercise in an unscreened coronary disease prone population.

Although a relatively small volume (300 pages of text) there are 1300 references from Abamov to Zwillinger, covering anatomy, physiology, pathology, psychology, sociology, epidemiology, sexology, economics and pharmacology of exercise and ischaemic heart disease.

The book naturally progresses through a description of the disease, the physiology of exercise and then the epidemiological studies of primary, secondary and tertiary prevention of ischaemic heart disease, although the use of these terms is rather different from that understood by cardiologists on this side of the Atlantic.

There is a mine of information for everyone involved in this field.

Roy Shephard as a physiologist has a great deal to teach the clinician about the physiology of exercise, of which many clinicians are woefully ignorant. Equally the exercise physiologist or physiotherapist wanting a monograph which describes coronary artery disease without a great deal of irrelevant material will find this book invaluable.

My only criticisms are that in his desire to précis a vast amount of published material, much of it from the Toronto Rehabilitation Centre where he works, Roy Shephard has left some of the text difficult to read because of the occasional ambiguity and on one or two occasions when dealing with clinical cardiology frankly misleading. It is difficult to describe heart failure to a non-medical readership but statements such as "A non-fatal episode of myocardial infarction is usually followed by an acute failure of the cardiac pump. About a third of the patients show shock within six hours, and a half within 24 hours and two-thirds by 36 hours", must be the result of overenthusiastic condensation of the source material.

The section on exercise prescription is excellent and will be relevant to a large proportion of the readership of this journal.

Although Roy Shephard has been involved with exercise as a major component of cardiac rehabilitation and is part of the team at the Toronto Rehabilitation Centre that has achieved world renowned results in converting potential cardiac cripples into marathon runners, he manages to approach his subject with scientific detachment and pursues a very analytic approach to the published data on the benefits of exercise.

The message appears to be that exercise is a natural activity for which the vast majority of middle-aged people can improve their sense of well being and may improve their life expectancy. He endorses the views of Åstrand and Rodahl that while physical activity carries some small risks, there is as much evidence that a careful medical examination is even more necessary for the person who plans to take no further exercise.

D. Tunstall-Pedoe