



wheelchair tennis coaches review



Issue 9 September 2003

Welcome to Issue 9 of the ITF Wheelchair Tennis Coaches Review. The main article in this issue is taken from a new book *ITF Strength & Conditioning for Tennis* edited by Machar Reid, Ann Quinn and Miguel Crespo. This is further evidence of the integration of wheelchair tennis into the coach education programmes of the ITF and its member nations. Wheelchair tennis is also included in another ITF book *Tennis Medicine for Tennis Coaches*.

The second article has been put together by the IWTA Coaches Commission and gives some guidelines to ITF Member Nations on wheelchair users taking coaching qualifications. There are many examples of disabled athletes becoming top class coaches. In the Netherlands a Gert Jan Van Der Linden, a double amputee, is coaching an able bodied women's basketball team in the Dutch first division. He is also the assistant coach of the women's national team.

The ITF is investigating aspects of the sport where research is required. As part of this process the ITF is gathering information on research projects that are currently taking place. In this issue is an article requesting information on research that is taking place.

There is also a useful article by former ITF World Champion Randy Snow on the set up of the tennis wheelchair and an introduction to long term planning for the wheelchair tennis player by Tennis Canada's Wheelchair Tennis Manager Janet Petras.

The Silver Fund project is providing opportunities for coaches to work in less developed tennis nations. In future issues of the Review coaches will share their experiences of coaching. Updates on the project can be found on the ITF website: www.itfwheelchairtennis.com

I would like to thank all the contributors to this issue of the ITF Wheelchair Tennis Coaches Review and would like to encourage others to contribute articles for future issues. If you have any ideas on how to improve this publication please let me know. If you would like any information on coaching wheelchair tennis please do not hesitate to contact me.

Kind regards,

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In this issue

- 2 Wheelchair Tennis And Physical Conditioning**
Mark Bullock (ITF) and Babette Pluim (NED)
- 11 Guidelines for wheelchair tennis players taking coaching qualifications**
IWTA Coaches Commission
- 15 Research into wheelchair tennis**
ITF Wheelchair Tennis Medical Commission
- 16 Chair Set Up**
Randy Snow (USA)
- 18 Long term planning made simple**
Janet Petras (CAN)
- 19 Other resources**



Randy Snow (USA) coaching at the ITF International Junior Camp in 2003

Wheelchair Tennis And Physical Conditioning

Mark Bullock (ITF) and Babette Pluim (NED)

Babette is sports physician and Medical Director of the Royal Netherlands Lawn Tennis Association. She is the current President of the Society for Tennis Medicine and Science (STMS). She is the team physician for the Dutch Davis Cup and Fed Cup teams, and tournament doctor at the ATP and WTA tournaments in 's Hertogenbosch, Amersfoort and Rotterdam.

This article has been re-printed from *ITF Strength & Conditioning for Tennis* with the permission of the ITF. This book is available from the ITF. Please click on the this link for the publications order form: <http://www.itftennis.com/html/big/framesetcw2000.htm>

Introduction

Physical conditioning is as important for wheelchair tennis players as it is for able-bodied players, but only recently have wheelchair tennis players started to pay increasing attention to their fitness. In prescribing programs for wheelchair players, exactly the same principles as those outlined in Chapter 4 by Jeff Chandler of *Strength and Conditioning for Tennis Players* to be used with able-bodied athletes, apply in terms of developing strength, speed, power, endurance, co-ordination and agility. Along with this increased awareness among wheelchair players of the need to optimise their physical condition has come a large increase in the number of competitive wheelchair athletes; a factor that has contributed to many gyms now being fitted with accessible training equipment. For the tennis playing wheelchair population however, much of the physical training can be performed without expensive equipment or access to a gym. This article first highlights some of the most important training considerations in working with wheelchair players, and then outlines some exercises, specific to the physiological demands of wheelchair tennis, for performance enhancement.

Important training considerations

Individuality

Wheelchair tennis players have many different types of disabilities, which will impact on the nature of the training players can perform and the level of fitness that they can achieve. It therefore becomes a priority for trainers to develop an understanding of the different types of spinal cord injuries (SCI), and thus an appreciation of how these injuries influence one's physical performance capacity.

The effects of SCI depend on the level of the injury and whether the SCI is classified as complete or incomplete. A complete injury means that there is no function below the level of the injury: no sensation and no voluntary movement. Both sides of the body are equally affected. In an incomplete injury, on the other hand, there is some functioning below the primary level of the injury. A person with an incomplete injury may be able to move one limb more than another, may be able to feel parts of the body that cannot be moved, or may have more functioning on one side of the body than the other. With the advances in acute treatment of SCI, incomplete injuries are becoming more common.

The level of injury is very helpful in predicting what parts of the body might be affected by paralysis and loss of function (Figure 1). Remember however, that with incomplete injuries there will be some variation in these prognoses.

Cervical (C; neck) injuries usually result in quadriplegia

- Injuries above the C-4 level may require a ventilator for the person to breathe.
- C-5 injuries often result in shoulder and biceps control, but no control at the wrist or hand.
- C-6 injuries generally yield wrist control, but no hand function.
- Individuals with C-7 and T-1 injuries can straighten their arms but still may have dexterity problems with the hand and fingers.

Injuries at the thoracic (T) level and below result in paraplegia, with the hands not affected.

- At T-1 to T-8 there is most often control of the hands, but poor trunk control as the result of lack of abdominal muscle control.
- Individuals with lower T-injuries (T-9 to T-12) exhibit good trunk and abdominal muscle control. Balance in a seated position is very good.

Lumbar (L) and sacral (S) injuries yield decreasing control of the hip flexors and legs.

Besides a loss of sensation or motor function, individuals with SCI also experience other changes. For example, they may experience dysfunction of the bowel and bladder. Sexual function is frequently affected and men with SCI may have their fertility compromised. The fertility of females, on the other hand, tends not to be affected. Other effects of SCI may include low blood pressure, inability to regulate blood pressure effectively, reduced control of body temperature, inability to sweat below the level of injury, and chronic pain (Figoni et al., 2002).

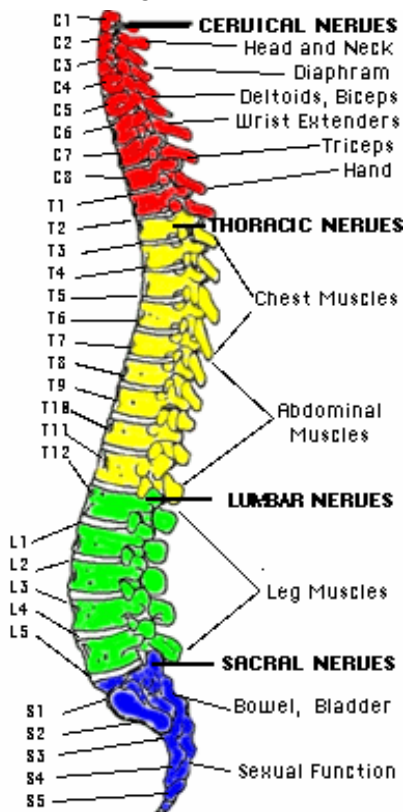


Figure 1: Segmental representation of spine and outline of body parts that may be affected depending on the level of the spinal cord injury (SCI).

The level of injury is defined as the lowest level of the spinal cord that exhibits intact motor and sensory function.

The spine is commonly divided into four parts: cervical (C), thoracic (T), lumbar (L) or sacral (S). These letters are followed by a number that describes the exact segment of the spinal cord involved. Each level corresponds to specific areas of muscle function, sensation and autonomic nervous system function.

With respect to the impact of SCI on one's physical performance capacity, it can be stated that players with high-level spinal injuries (T5 and higher) cannot attain the same physiological level of fitness as those with lower-level injuries (T6 and below) as there may be disturbed innervation of the heart (Schmid, 1998). Players with high-level injuries are therefore likely to tire more quickly. Similarly, depending on the nature of their disability some wheelchair tennis players will be able to strengthen their trunk and abdominal muscles such that this positively influences their movement and stroke play. These players can perform sit-ups in combination with other exercises that challenge the trunk's ability to effectively stabilise itself during movement. If stomach muscle control is poor, strapping may be useful to fix the trunk towards the back of the wheelchair.

Specificity

As is emphasised consistently throughout the book in relation to the athletic preparation of able-bodied players, the training to be performed should be specific to the metabolic and movement demands of the game. It is no different when working with wheelchair tennis athletes, where drills or exercises that develop a player's ability to perform short sprints, turns, and pulls explosively should all feature prominently in the training program.



David Hall (AUS)

An analysis of three men's singles matches from the 2000 Paralympic Games in Sydney gives coaches and trainers an insight into the work rest ratios involved in elite level wheelchair tennis (Table 1). Evidently more in-depth examination is needed to account for differences that would likely arise due to variations in the court surface and the sex and game styles of the players. Nonetheless, this first, small research effort provides a foundation upon which it is hoped more extensive investigations into the dynamics of wheelchair tennis can be based.

Table 1 **Analysis of Matchplay: 2000 Paralympic Games Sydney**

Match	Total number of rallies analysed	Average number of balls played per rally	Length of time ball was in play (sec.)
Steve Welch (USA) v Martin Legner (AUT)	141	5.01	11.75
David Hall (AUS) v Kai Schrameyer (GER)	117	3.2	6.02
David Hall (AUS) v Steve Welch (USA)	191	5.3	10.32
<i>Average (n = 3)</i>	150	4.67	9.65

Injury prevention



Steve Evans (GBR)

Wheelchair tennis players commonly suffer from overuse injuries of the rotator cuff. As with able-bodied players, the prevention of muscle imbalances about the shoulder may help reduce the incidence of such injuries. Paraplegics with shoulder problems tend to have weaker adduction, internal and external rotation strength than those without shoulder problems (Burnham, 1993). Also, abduction:adduction and abduction:internal rotation strength ratio are higher in those athletes with an impingement syndrome than in those without an impingement syndrome (Burnham, 1993). This may indicate that shoulder muscle imbalance, with comparative weakness of the humeral head depressors (internal and external rotators and adductors) may be a causative and perpetuating factor with respect to rotator cuff injury in

wheelchair athletes and should be prevented. Effective exercises in this regard involve the strengthening and stretching of the rotator cuff muscle group and the shoulder blade stabilizers, with special emphasis on external and internal rotation and adduction. Readers should refer to Chapter 12 in the ITF Strength and Conditioning book by Ryan Kendrick and Chapter 9 by Mark Verstegen for additional examples of shoulder exercises that may comprise a component of an effective injury prevention program.

Weight Training

Wheelchair tennis players typically perform the same upper body exercises in the gym as able-bodied players. Amputees and sufferers of disorders such as poliomyelitis and arthrosis may also perform lower body resistance training, which will again reflect that which is performed by able-bodied players. For example, a single amputee can do everything with his or her healthy leg, while a sufferer of polio may be able to perform certain exercises. As aforementioned, the underlying principles of exercise prescription and training do not cease to apply or change when coaches or trainers commence work with wheelchair players. Again, readers should refer to Chapter 9 for examples of strength training exercises that can be performed for the upper and lower body.

Aerobic Endurance

As discussed earlier the level of fitness that can be achieved will be dependant on the disability of the player. Amputees or those having had poliomyelitis or severe arthrosis are able to reach the same training-induced cardiac hypertrophy and aerobic power in relation to body mass as observed in non-handicapped persons (Hoffman, 1986). However, cardiovascular capacity in wheelchair players with SCI is compromised and cardiac dimensions do not exceed those of untrained non-handicapped persons, although they are larger than those of untrained spinal cord-injured subjects. This is due to the lack of sympathetic vasoconstriction and the lack of muscle pump function below the level of the lesion, leading to inadequate distribution of the blood and a lower stroke volume. Furthermore, wheelchair athletes with low thoracic lesions have a better capacity for adaptation to exercise than those with a high thoracic lesion, because of the loss of cardiac sympathetic innervation of the heart, resulting in a maximum cardiac frequency of around

130 beats per minute (Bernard et al., 2000; Schmid, 1998).

Players should develop a sound aerobic fitness base and maintain this throughout the playing season. This can be accomplished by distance pushing three-five times per week for 45-60 minutes. Once players have acquired a good aerobic basis, interval programs aimed at enhancing the immediate anaerobic energy system should be increasingly emphasised. Interval drills involving short work periods (less than 15 seconds) and longer recovery periods (45-60 seconds) should be introduced and as aerobic capacity improves, recovery periods can be shortened.

Variety - Cross Training



Jayant Mistry
(GBR) using a
hand cycle

Playing basketball is a great way to develop fitness for tennis as it involves short sprints, turns and also involves co-ordination. With the development of hand cycles more and more players are using this as a means to improve their aerobic fitness and muscular endurance. Alternatively, players can push in their tennis wheelchairs.

Recovery

Recovery is as important for wheelchair players as it is for able-bodied players. Beyond the most obvious recovery technique of sleep, players will typically use, much like the able-bodied players, techniques such as: massage, yoga, spas and whirlpools and muscle relaxation methods. The authors refer readers onto Angela Calder's Chapter 15 in the ITF Strength and Conditioning book on Recovery for a comprehensive account of the recovery techniques most applicable for tennis players.

Training during tournament play

Many of the top players in the modern wheelchair game continue to train whilst travelling. They make use of gyms at tournament venues or in hotels, or train in their rooms with the aid of dyna bands or by performing some body weight exercises (i.e. sit ups, push ups and chin ups (where possible), etc.) The intention of continuing to train in this way is to maintain a high level of fitness such that peak performance can be achieved or sustained during specific weeks of tournament play.

Testing

Some countries are fitness testing their elite wheelchair tennis players. This is a relatively new trend and at present there is minimal data available. The authors however encourage coaches and players to develop tennis-specific tests for wheelchair players by following the recommendations (relating to reliability and validity) outlined in Chapter 2 of the ITF Strength and Conditioning Book with respect to fitness test design. Coaches should also refer to the article in Issue 7 of the ITF Wheelchair Tennis Coaches Review by Dr. Horst Guentzel.

Wheelchair Tennis Fitness Workout

The following exercises are given as a guide to help tennis coaches improve their players' fitness and wheelchair skills. It is recommended that all the exercises are performed with a racket in the playing hand to simulate pushing during play. It is not a definitive list of exercises and the work rest ratios should be set to suit the individual level of fitness and the greater goal of the session (i.e. developing aerobic endurance, speed, ...).

1. 'Musical Push'

Players push up and down a court to music. When the music stops the players have to come to a complete stop. When the music starts again the players push off as powerfully as possible.

Purpose: to develop the first two pushes.

Focus points: hand speed, an explosive first push, ability to come to a complete stop.

2. 'Power Push-Pull'

A metal bar or pipe is placed on a flat surface. The player places the small caster wheel(s) of the tennis wheelchair over the bar and the pushes and pulls the chair over the bar for a given period of time (see photograph below). This exercise should be performed with a racket in the players hand. Caution should be used placing the bar on the court surface as damage could result. For this reason, it is best to do this exercise on a hard surface off the court.



Laurie Zalmanowitz (CAN) doing the 'power push pull'

Purpose: to develop the first push and pull.

Focus point: balanced push and pull to ensure that the player pushes/pulls both wheels over the bar at the same time.

3. Power start & stop

Each player has a partner with both individuals in wheelchairs. One player lines up on the doubles sideline. The second player holds on to the back of the first player's wheelchair. The first player begins by taking two maximal pushes and then immediately comes to a complete stop. The first person repeats this across two tennis courts. The person behind holds onto the wheelchair the entire time. The person holding on behind should be careful of contact with the first player when they lean back to stop. The second player should also keep his/her arms straight to prevent contact between chairs when the first player stops. The players switch and repeat the exercise coming back.

Purpose: to develop the first two pushes

Focus points: hand speed, an explosive first push and ability to come to a complete stop.

4. Tow

Each player has a partner with both individuals in wheelchairs positioned on the doubles sideline. One partner is in front of the other with the person behind holding onto the back of the first person's tennis wheelchair. The first person begins to push as quickly as they can across one tennis court. At this point the person who is holding onto the wheelchair releases while the first person continues to push as hard as they can across the second tennis court, concentrating on maintaining hand speed.

Purpose: to develop speed

Focus points: accelerate to top speed as quickly as possible and maintain high hand speed.

5. Backward partner pulls

Each player has a partner. One individual pushes themselves backwards with the second person holding onto the front of the first person's wheelchair. The partners switch positions once a lap of the court is complete.

Purpose: to develop overall pushing ability and prevent the development of a muscular imbalance

Focus points: maintain high speed.

6. Forward hill sprints

The player starts at the bottom of a hill and sprints up the hill as quickly as possible (the gradient can vary depending on the player's level of fitness). When the player reaches the top he turns round and coasts to the bottom. Repeat.

Purpose: to develop pushing power and efficiency of technique.

Focus points: maintain high speed and explode into each push

7. Backward hill sprints



As above with the player now pushing up the hill backwards as fast as he can.

Purpose: to develop pulling power, efficiency of technique and muscle balance.

Focus points: maintenance of quick hand speed.

Players and coach doing backward hills at the
2003 ITF International Junior Camp in Texas,
USA

8. U turns

The player places an empty chair or wheelchair on the service line of the court. The player begins with their wheelchair on the right hand side of the chair facing in the same direction as the chair. The player then pulls back, ensuring that his tennis wheelchair clears the chair. He then pushes his chair to the right, moving behind the empty chair, and performs a 360°

turn in the process. In completing the turn, he pushes forward so that he now has his tennis wheelchair on the left hand side of the chair. This is repeated for the left side so that the player begins by pulling back and clearing the wheel, before pushing to the left and turning 360° and then pushing forward. The player should end up where he originally started. This exercise should be repeated as quickly as possible for a designated time: for example, if the main aim is to train explosive power, players should perform this exercise for a maximum of 20 seconds, with a work: rest ratio of at least 1:6.

Purpose: to develop wheelchair control and the fast pull required to deal with emergency situations i.e. when the ball is directed straight at the player.

Focus points: explosive pull and effective and efficient control/positioning of the chair

9. Tug 'o' war

Two players face each other and tie the front of their wheelchairs together with strapping/rope. The players then attempt to pull each other backwards. This can be done until one player pulls their partner over a line or it can be done for a given time period with appropriate rest.

Purpose: to develop the strength required for an explosive pull

Focus points: explosive pull

Conclusion

In prescribing training for wheelchair tennis players, coaches and physical trainers will respect the same principles of training as those used when planning physical conditioning programs for able-bodied players. Clearly, there are some additional considerations that need to be taken into account such as the nature of the player's disability, yet through player and coach discussions the goals of the training process as well as the exercises that the player can perform can be quickly resolved. Physical conditioning is becoming increasingly important in wheelchair tennis and in ensuing years further research and information will become available to facilitate the wheelchair tennis player's preparation process.

Note: The authors would like to thank the contribution of Miles Thompson, Assistant Athletic Director at the Lakeshore Foundation, Alabama, USA.

References

Armstrong, L. E., Maresh, C. M., Riebe, D., Kenefick, R. W., Castellani, J. W., & Senk, J. M. (1995). Local cooling in wheelchair athletes during exercise-heat stress. *Medicine and Science in Sports and Exercise*, 27, 211-216.

Bernard, P. L., Marcier, J., Varray, A., & Prefaut, C. (2000). Influence of lesion level on the cardioventilatory adaptations in paraplegic wheelchair athletes during muscular exercise. *Spinal Cord*, 38, 16-25.

Burnham, R. S., May, L., Nelson, W., Steadward, R., & Reid, D. C. (1993). Shoulder pain in wheelchair athletes; the role of muscle imbalance. *The American Journal of Sports Medicine*, 21, 238-242.

Curtis, K.A. (1996). Strategies and solutions for wheelchair athletes: Health Smarts. Part 1. *Sports 'n Spokes*, January/February, 25-30.

- Curtis, K.A. (1996). Strategies and solutions for wheelchair athletes: Health Smarts. Part 2. *Sports 'n Spokes, March/April*, 13-19.
- Dingerkus, M. L., Radebol, A., Rückgauer, M., & Bernett, P. (1994). Verletzungen und Überlastungssyndrome im Rollstuhltennis. *Praktische Sport-Traumatologie und Sportmedizin*, 2, 46-51.
- Estenne, M., Pinet, C., & De Troyer, A. (2000). Abdominal muscle strength in patients with tetraplegia. *American Journal of Respiratory and Critical Care Medicine*, 161, 707-712.
- Ferrara, M. S., Palutsis, G. R., Snouse, S., & Davis, R.W. (2000). A longitudinal study of injuries to athletes with disabilities. *International Journal of Sports Medicine*, 21, 221-224.
- Figoni, S. F., Kiratli, J., & Sasaki, R. (2002). Spinal Cord Dysfunction. In J. N. Myers, W. G. Herbert, & R. Humphrey (Eds.), *ACSM's Resources for Clinical Exercise Physiology*. Philadelphia: Williams & Wilkins.
- Groah, S. L. & Lanig, I. S. (2000). Neuromusculoskeletal syndromes in wheelchair athlete. *Seminars in Neurology*, 20, 201-208.
- Hoffman, M. D. (1986). Cardiorespiratory fitness and training in quadriplegics and paraplegics. *Sports Medicine*, 3, 312-30
- Hopman, M. T. E., Oeseburg, B., & Binkhorst, R.A. (1993). Cardiovascular responses in persons with paraplegia to prolonged arm exercise and thermal stress. *Medicine and Science in Sports and Exercise*, 25, 577-583.
- Lai, A. M., Stanish, W. D., & Stanish, H. I. (2000). The young athlete with physical challenges. *Clinics in Sports Medicine*, 19, 793-819.
- Mayer, F., Axmann, D., Horstmann, T., Martini, F., Fritz, J., & Dickhuth, H. H. (2001). Reciprocal strength ratio in shoulder abduction/adduction in sports and daily living. *Medicine and Science in Sports and Exercise*, 33, 1765-1769.
- Miyahara, M., Sleivert, G. G., & Gerrard, D. F. (1998). The relationship of strength and muscle balance to shoulder pain and impingement syndrome in elite quadriplegic wheelchair rugby players. *International Journal of Sports Medicine*, 19, 210-214.
- Polic, M. (2000). ITF Wheelchair Tennis Coaches Manual. London: ITF.
- Schmid, A., Huonker, M., Barturen, J.-M., Stahl, F., Schmidt-Trucksäss, A., König, D., Grathwohl, D., Lehmann, M., & Keul, J. (1998). Catecholamines, heart rate, and oxygen uptake during exercise in persons with spinal cord injury. *Journal of Applied Physiology*, 85, 635-641.
- Shephard, R. J. (1988). Sports medicine and the wheelchair athlete. *Sports Medicine*, 4, 226-247.

Guidelines for wheelchair tennis players taking coaching qualifications

IWTA Wheelchair Tennis Coaches Commission

The IWTA Wheelchair Tennis Coaches Commission was established to promote issues relating to coaches and coaching in wheelchair tennis. The current members are:

Mark Bullock (ITF)
Fabrice Chargelegue (FRA)
Greg Crump (AUS)
Dan James (USA)
Kunhiro Kuge (JPN)
Martin McElhatton (IWTA)
Dawn Newbery (GBR)
David Sanz (ESP)
Randy Snow (USA)
Severine Tamborero(CAN)

Introduction

There are many wheelchair tennis users who hold coaching qualifications throughout the world. Some choose to coach predominantly wheelchair tennis players but others coach the running game too.

The main concern is that a wheelchair tennis player will not be able to demonstrate some of the techniques etc. There are always ways to present information in different ways e.g. use of video, or use a player from the group.

Promotional Material

Promotional material for coach education courses should ideally include images of wheelchair users coaching.

Access at venue

Lecture Room

The room should have adequate space for the wheelchair user to access a desk/table. The doors should be wide enough to allow access (90 cm). Access to toilets and bathrooms need to be considered. Ideally there should be no steps into the lecture room. A ramp may need to be installed.

If in doubt ask the candidate to check out the venue and they can recommend what is required. Some wheelchair tennis players can walk e.g. single amputees, so ramps are not so important in this situation.

Tennis Courts

Wheelchair tennis can be played on all court surfaces. Exhibitions have been held on the grass courts at Wimbledon since the year 2000.

Ramps may be required to the courts. A tennis wheelchair can be around 100cm in width so where possible gates should be wide enough. If this is not possible the player can remove a wheel from their tennis chair very easily.



Playing Standard

The wheelchair user should meet the playing standard required for the course. If they are required to rally with a club player then they should meet this criteria. Consideration should be given for the two bounce rule when assessing the candidate in a wheelchair.

Randy Snow (USA) coaching the serve

At higher playing levels there may be wheelchair tennis players who have the coaching knowledge but are unable to

rally due to the logistics of being in a chair. Creativity should be allowed here and the wheelchair user could make use of a hitter.

Course Content

All coach education courses should include some reference to wheelchair tennis.

Coaching Ability

The wheelchair user coaching skills can be judged on the same criteria as all the other candidates: E.g. Communication skills, tennis knowledge, class organisation etc.

Quotes from Wheelchair Tennis players who hold coaching qualifications

'I have coached both able-bodied and wheelchair players, from beginners to intermediate and advanced standards. When I am coaching people on their feet, I do not find it a problem explaining about such things like footwork, as I get another pupil (or assistant coach), to demonstrate what I am explaining. Also I find that children are very responsive, as I am at eye-level with them.'

Jayant Mistry (GBR)



I have found it very satisfying and rewarding to pass on the skills and knowledge that I have learnt in my playing career. I hope to carry on coaching when I retire from playing.'

*Jayant Mistry (GBR), World No. 9
LTA Elementary Coach Award*

'Decide what level of coach you want to act as, if its local and more rehab/recreation based that's fine. I choose to work with a collegiate level, so I talked to college coaches, worked with local coaches and studied their practices and training programs so I could adapt that to my wheelchair players. If you want to work at an elite national level, study what your able bodied coaches do at that level for professional players, take that information and adapt it to a wheelchair program.'

*Mike Cottingham (USA)
USPTR
USTA High Performance Wheelchair Tennis Coach*

Quotes from Wheelchair Tennis Players who are active in coaching

'I basically just run through a lot of games, drills and more games depending on how good they can hit a ball. I basically have just learnt of my coach. I love to coach. They love when I bring the sport chairs as they get to play wheelchair basketball and it just breaks a term up with some fun.'

Anthony Bonocursso (AUS), World No 20



***Miles Thompson (USA) coaching at
the ITF International Junior
Wheelchair Tennis Camp***

'Coaching able-bodied players.....I really stress proper technique. Getting to 1 early (back swing), point of contact---keeping the racket on its edge, and finishing the swing with reference points like butt of racket, and belly button pointed at target.

I also like to move myself and basket of balls around court and use myself as a target (crosscourt/down the line). Kids get a kick out of trying to pound me, but more importantly they're learning the value of contact points.

I'm a big believer in volume hitting and do a lot of double feeding. This is key when instructing from the chair. When conducting clinics with adults it's key the group hits a lot of balls while working on

strategy. This gives them value for their money and legitimacies me as an instructor.'

*Miles Thompson (USA)
USPTA -P1
USPTR-Professional*



Jamie Robison (GBR)

'When coaching able bodied players from a wheelchair you have to use your imagination to create the image in their mind's eye of your player. The biggest thing is to be not afraid to trial and error. We learn more from our mistakes than our successes.'

The tutor should assess the wheelchair player on the same criteria as an able bodied candidate.'

When I did the DCA course I was treated no differently from the other candidates, aside from the facility to make use of a hitter should it be required.'

Jamie Robison (GBR)

LTA DCA Award

Head Coach & Manager of the junior programme at the Garons Tennis Academy (LTA Performance Accredited) based at Southend Indoor Tennis Centre, UK

The Academy has more than 700 juniors, 90 of which are in county recognized development/performance squads.

'Being certified and having the opportunity to take the instructor course has really been great for the quality of teaching I can now give to my 12 juniors. Before every course I give, I take the time to plan the two hours of the course. That wasn't the case before, so I went in "winging it".

It has also taught me to learn how to observe my students' movements and to correct them, to see the little details I didn't see before. It has also allowed me to teach my courses with much more spirit than before and to correct the loopholes in my method of teaching tennis. In short, since I took my instructor course, I feel privileged to be able to give instructive and more interesting courses to my kids.'

André Boutet (CAN)

Quotes from course tutors

'Having a wheelchair player on the course made it very interesting from both a tutoring and a fellow candidate point of view.

The only amendment to the course was to include the two-bounce rule for Jayant Mistry when either feeding or playing against pupils or indeed during drills and practices when playing against fellow candidates.

The criteria on which the candidates were judged (e.g. quality of communication, quality of demonstrations, quality and progressions during lessons etc. etc.) remained the same for all candidates throughout.

Jayant brought an interesting perspective for all other candidates. Apart from an appreciation of the skill in controlling a wheelchair around the court, they also had to learn how to integrate and accommodate a wheelchair player into the drills and

practices they used. This certainly got them scratching their heads during the early part of the course, but was much appreciated by all by the end of the course.

For able-bodied strokes, Jayant had to select and use pupils other players to demonstrate for him, however thereafter further technical, tactical, and mental advice could be given as normal.'

*Peter Whitehead (GBR)
ECA Course Tutor to Jayant Mistry.*

'The coach education courses that I have tutored and assessed which have had disabled or wheelchair participants, have only been enriched by their presence.

Not only does it demonstrate that tennis is genuinely a sport for everyone, but that in the process of learning the pupil will often counterbalance the relative weakness in one area by strengthening others. For example a lack of mobility is covered by increasing the sharpness of reception skills, or the inability to hear with clarity leads to enhanced visual sensitivity.

These examples show how we can all learn from each other.

Personally I look forward to having as large and wide a range of candidates as possible.'

*Keith Reynolds (GBR)
ITF level II Tutor*

Research into wheelchair tennis



Your assistance is requested!

***Have you done any research into wheelchair tennis?
Do you know of any research that is taking place?***

The ITF Wheelchair Tennis Medical Commission plans to summarize current and previously published peer-reviewed medical and technical research in the area of wheelchair tennis.

This document will serve as an important step to

- a) summarize the knowledge on wheelchair tennis worldwide to date
- b) draw researchers, players, teaching professionals and other interested parties within the tennis and sports community together
- c) provide justification for new research studies.

While journal searches and online databases will lead us to the majority of previously published work, it may not lead us to investigators currently working on new studies or studies awaiting publication. If you are or have conducted research in to wheelchair tennis (or know someone who has) please contact Jani Macari Pallis, Ph.D. (deke@cislunar.com) or Babette Pluim, M.D., Ph.D. (BPluim@euronet.nl) in order that the research can be included in a bibliography.

Tennis Chair Set Up

Randy Snow (USA)



Randy is a ten times US Open champion, Paralympic Gold Medallist (1992) and NEC Masters Champion (1994). He was also the first ITF Wheelchair Tennis World Champion. He now devotes much of his time to passing on his wealth of knowledge to coaches and players alike. He is the co-author of Wheelchair Tennis: Myth to Reality and has written a biography: Pushing Forward. He is a member of the ITF Wheelchair Tennis Medical Commission and the IWTA Wheelchair Tennis Coaches Commission. He was recently headed up the ITF International Junior Camp in Texas, USA and has undertaken development visits for the ITF including Thailand and El Salvador.

I recently went through the process of setting up a new tennis chair and thought I might share the order of priority and why. A common myth when it comes to your chair is that you must have the lightest chair out there. While weight is important, I believe that continuous movement during points and perfect position are paramount!

1. Rear seat height: a must consideration for proper access to the wheels. If the seat height is too high, my top end speed (needed for larger court coverage) isn't accessible. If its too low, my first gear (needed for bursting speed), is hindered. This selection is also affected by arm length. The best is to try variable heights before selecting a final position.
2. Front seat height: this position should compliment the rear seat height and provide trunk stability, however, not limit the forward push. I recommend the front seat be set to pull the athlete into the push. Athletes today vary their chairs from -1" to +5", depending on functional level.

3. Footrest height: this should be high enough to provide support yet not too high that the legs sway laterally, and especially during turns. The cushion is key here and should be light, supportive, have breath-ability and durability. The players legs should be supported by the cushion.
4. Centre of gravity- this is very important: when I sit comfortably with my hands to my side, I am in the middle of the balance point with equal weight distribution forward and rear. The contemporary sitting style leans towards a tippy wheelchair. This means in a standard sitting position, weight distribution should be equal on both anterior and posterior wheels.
5. Footrest position: used more for stability and comfort than for centre of gravity, the footrest can be moved forward or reverse but it should only be used as a secondary centre of gravity tool. Remember that planter (toes down) or dorsi (heel down) flexion can affect knee height and minimize spasticity.
6. Back upholstery: with a 1" wider upholstery, a concave back is afforded which helps with stability when turning. When ordering or adjusting a chair, the upholstery is a instrument that can provide lumbar support, centre of gravity position, stability during specialty shots such as serves and emergency shots, and of course reduction of pain. When available, access sports adjustable upholstery.
7. Back height: old school was all about lower backs but today the back is used much more, especially since the chair goes much faster and the wider footprint of today's chairs is provides more stability, resulting in more reach. Set the posts at a height that will not impede reach or stroke production but provide a stable push-point, used by leaning into the back while turning and shot execution.
8. Back angle: complimenting the front and rear seat height, this is a frequently disregarded yet very important adjustment. If possible, angle the backrest more forward if a feeling of inertia (not being able to push resulting in stagnation) exists.
9. Side guards: a unique option as these can be set for different chair widths. I lowered them because of weight but many players use them for support. Side guards contribute to the melding of player and chair.
10. Tow in tow out: many of today's chairs claim they have eliminated this adjustment, however, I recommend checking it anyway. Make sure the wheels are of equal distance or parallel. If you are playing with uneven wheels, you might as well be dragging a small rock. With unparalleled wheels, there can be a great deal of resistance, which results in physiological drain as well as expense for worn out tyres. This is a controllable performance facilitator.
11. Rear wheel width: the wider the wheel base the better the turn-ability of the chair. Look at the stability of top ten player Steve Welch (USA); strive for 20 degrees of camber.

12. Casters: make sure there are no grab points within the bearings of the casters and caster housing bearings. Your casters should float and roll flutter free.
13. Posterior wheel or anti-tip tube: this innovation is where most players are missing a significant area of improvement. With a long anti-tip tube, or tail as I call it, a player can now really lean into shots, move backwards, which we never did to hit overheads, and release the free hand to incorporate more power during a ground stroke. I highly recommend getting a long tail and setting the chair up to maximize this device (i.e., current ITF Wheelchair Tennis World Champions Esther Vergeer (NED) and David Hall (AUS)).
14. Strapping or artificial muscle: the less functional the person is, physically, the more support is recommended. Start with straps across the femur. Second, strap at the hip. If necessary the third strap at the waste and possibly, for a higher-level injury, a strap may be used at the chest. Chairs today are designed with orthotic supports of all kinds and these can only help the performance of the player. Centrifugal force and paralysed limbs do not agree. Secure the body!

With anything mechanical or technological, the key is a scientific approach. Avoid contentment. Measure small areas of performance, make changes, then measure the same task or improvement. I recommend continuous small adjustments to provide the possibility of maximum performance. There are so many areas of tennis that cannot be controlled; however this area, to a certain extent, can be governed. Never stop tweaking your chair, just like your game. The value will be worth it!

Long Term Planning Made Simple

Janet Petras (CAN)



Janet Petras is the Wheelchair Tennis Manager and a Touring Coach for Tennis Canada. She is a member of the IWTA Committee of Management and is the coach of the Canadian Quad team.

To effectively coach an athlete a long term plan is essential. Otherwise you will be an instructor helping your athlete improve in a less directed and comprehensive fashion. Long term planning means creating of an annual (or longer) training and competitive plan.

The process of developing a long-term plan does not need to be time consuming or difficult. Keep it simple so that it works well for you and your athlete. Here are 11 simple steps that may assist you:

- 1) Determine the **length** of the plan. Will it be for one year, two years or longer?

2) Determine the **end goal**. How does your athlete want to play by the end of the plan? For example, the goal could be “to become an all court player” or “to develop a more attacking game style.”

3) Create or obtain a **calendar** for the length of the plan. Be sure to have enough space for each day’s notes.

4) Plot the **competitions** in which the athlete intends to compete.

5) Determine the most important competitions and therefore when the athlete wants to **peak**. Mark these in a different colour.

6) Plot the **pre-competitive periods**. These are the 1-2 weeks prior to each competition or series of competitions. Training during these periods usually has a highly competitive and extremely low technical focus.

7) Plot the **training or preparatory phases**. These are 3-8 week periods between competitions. It is important to have at least 1 or 2 training phases each year. For a younger or developing player the number of training periods may be even more important. This is the time to learn and incorporate new skills, develop new tactics and build the athlete’s game.

8) Plan each week by dividing the training into **four categories**. This will ensure you are covering all areas, and simplifying the planning process. The categories are:

- **Technical**

- determine the technical priorities (i.e.-better racket preparation)

- **Tactical**

- determine the tactical priorities. These may include learning patterns or plays (i.e.- hitting a high and deep topspin shot to your opponent’s backhand and then looking to finish the point).

- **Physical**

- determine the on and off court physical training that your athlete requires. The off court training may include the use of weights, cardio work, or flexibility training. You may want the assistance of a sport specialist in this area.

- **Psychological**

- determine the on and off court psychological training for your athlete. This may include developing on court emotional control, visualization, or relaxation techniques. You may want to access the services of a sport psychologist.

9) Build **intermediate or stepping stone goals** into the plan. These will provide periodic checks and reinforcements.

10) **Evaluate** the plan on a regular basis. The plan will change as the athlete develops and competes. Priorities and goals will need to be altered and modified.

11) **Create the plan with your athlete**. Determine the priorities and timelines, and agree to the entire process together.

You will now have a clear road map for the coming months. Your daily training sessions will come to life as you and your athlete work the plan together.

Other Resources

French Coaching Manual



Pierre Fusade has written a wheelchair tennis coaches manual in French. This excellent publication will prove a valuable resource in French-speaking countries and is definitely worth a read.

To order copies of this publication please contact Pierre Fusade on: Fusadeplm@aol.com

For a list of wheelchair tennis publications please refer to the first four editions of the *ITF Wheelchair Tennis Coaches Review*. They are available on the ITF website: www.itfwheelchairtennis.com.

More information

If you would like information on organising wheelchair tennis programmes or coaching wheelchair tennis do not hesitate to call the ITF Wheelchair Tennis Department on ++44 (0)20 8392 4788.

If you know of other coaches who would like to receive wheelchair tennis coaching information please ask them to send their name, address, email and an outline of their coaching experience to mark.bullock@itftennis.com or fax ++ 44 (0)20 8392 4741.

For coaches wanting more information on the NEC Tour, world rankings, player profiles, head to head results please visit the ITF website: www.itfwheelchairtennis.com.

If you want to visit an NEC Tour event please refer to the website, www.itfwheelchairtennis.com for the tournament schedule

The articles in the ITF Wheelchair Tennis Coaches Review are written by a variety of contributors and the opinions expressed are not necessarily those of the ITF.