

Suggest Approach for Rehabilitation Program for Ankle Sprain Injury among Players

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Abstract:

The study in the reestablishing new thoughts where medicinal measures which are suitable to ankle sprain injury. This is to give an entire, current techniques which are utilized as verification for rehabilitation of the ankle, and to depict a functional return somebody to a decent, healthy program that advances from basic to advanced. Imperative contemplations in the rehabilitation of ankle injuries incorporate controlling the intense inflammatory process, recovering from full ankle scope of movement, by improving the proprioceptive capabilities, muscle strength and power. These objectives can be accomplished through different modalities, adaptability activities, and dynamic quality and adjust preparing works out. In this article, we examine the injurious impacts of ankle injury on ankle-joint proprioception and strong quality and how these factors can be quantifiably measured to finish advance a rehabilitation program. Proof to help the adequacy of applying orthotics and ankle props amid the intense and subacute periods of ankle rehabilitation is given, alongside proposals for functional return to healthy programs of ankle injuries, with a very good movement of exercises.

Keywords :Ankle Injury, tibia, fibula, musculoskeletal, syndesmosis,

Introduction

Ankle Strain:

Ankle injuries are characterized by the sort of tissue - bone, tendon, or ligament - that is

harmed or damaged. The tibia and fibula of your lower leg with the bone of your foot is the point where all of them meet. These bones are braced together at the ankle joint by tendons, which are strong flexible groups with tissues connectivity that keep the bones intact and make it possible for the movement of ankle. Ligaments connect muscles to the issues that remains to be worked out crafted by influencing the ankle and foot to move, and help keep the joints stable. A fracture depicts a break in at least one of the bones. A sprain is the term that depicts harm to tendons when they are extended past their typical scope of movement. A tendon sprain can run from numerous minuscule tears in the filaments that contain the tendon to an entire tear or crack. A strain alludes to harm to muscles and ligaments because of being pulled or extended too far.

Muscle and tendon strains are more typical in the legs and lower back. In the ankle, there are two tendons that are regularly stressed. These are the individual tendons, and they settle and secure the ankle. They can end up plainly excited because of abuse or injury. Intense tendon tears result from a sudden injury or power. The aggravation of a tendon is called tendinitis. Minute tendon tears that gather after some time, on account of being more than once finished extended, and don't recuperate legitimately prompt a condition called tendinosis. There is the rupture of the Tendons. Tendons where it slips from the place is referred as Subluxation.

This is most common place where always injury occurs and it is set to be a very complicated. For the majority of our development, human with a spine and skeleton (vertebrates, for example, individuals, have strolled on four legs. At the point when humankind developed to stroll on only two legs the ankle was given a considerable amount of additional work to do, both in weight bearing and in adjust. It's maybe not astonishing, at that point, that the ankle is inclined to strains, sprains and fractures. A strain alludes to a difficult state of the ankle joint realized by aggravation, abuse or basically clumsy (or unequal) utilize. The muscle and tendons cause a grave irritation for example, the back of foot area at Achilles tendon.

A strain may be brought about by a localized physical condition in which part of the body becomes reddened, swollen, overuse or simply awkward (or unbalanced) use. Due to which there is tearing of muscle fibres and overstretching. Beyond limit the revelant part has been stretched due to which strains occurs, or to strongly it has been forced to pull (contract). The severity of a muscle strain is graded into:

- First-degree strain - a gentle strain when just a couple of muscle filaments are extended or torn. The harmed muscle is delicate and agonizing, however has typical quality.
- Second-degree strain - a direct strain with a more prominent number of harmed strands. There is more extreme muscle agony and delicacy. There is likewise mellow swelling, some loss of quality, and a wound may create.
- Third-degree strain - The combination of different element loss of muscle work where the strain completely tears the muscle

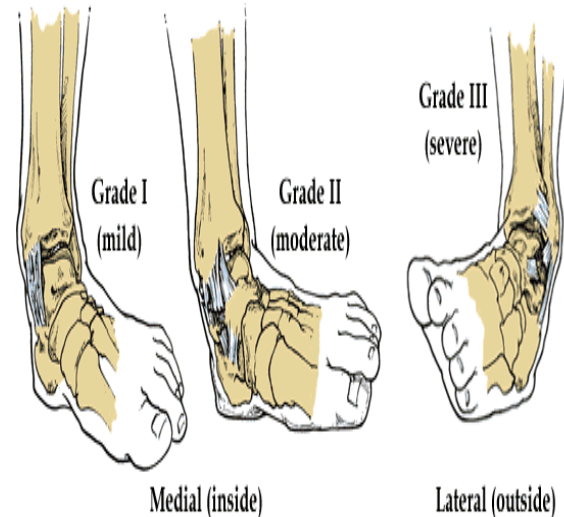


Figure 1: Ankle injury grading

1.1. Preventing Ankle Strains:

The ankle is the most usually sprained joint as it faces awesome difficulties for weight bearing and adjust, especially while moving quick finished uneven ground. You can anticipate ankle sprains by wearing boots that give ankle bolster as opposed to shoes when climbing crosswise over nation or meandering over slopes and uneven ground. Exercises to develop the muscles around the ankle and to enhance proprioception (depicted prior under 'Different medicines') help to avert ankle sprains.

A physiotherapist can prompt on these exercises. In the wake of having an ankle sprain, it is best to develop the muscles around the joint with exercises. A physiotherapist can demonstrate to you which the best exercises to do are. This is on account of the more grounded the encompassing muscles, the more improbable a sprain will happen once more (repeat). Likewise, a few exercises are intended to enhance proprioception.

This is the capacity of your cerebrum to detect development and position of your body parts and joints, for example, the ankle. Along these lines, for instance, great proprioception encourages

you when walking over uneven ground so as to influence quick and oblivious minor changes in accordance with the route you to walk. This makes you to keep away from overstretching the ligaments and causing sprains.

Participants:

The exploration has gathered an example of 12 patients who has ankle strain. Ankle Strain tears are predominant musculoskeletal injuries among football dynamic people and are most every now and again found in the populace matured 15– 25 years. Ankle Strain remaking is the standard agent technique used to keep the advance of undesirable musculoskeletal difficulties. There are many join choices, obsession strategies, and postoperative rehabilitation programs for the treatment of Ankle Strain. Arthroscopically helped Ankle Strain reproduction with the utilization of autograft or allograft tissue is by and large favored in surgery. Rehabilitation strategies constitute an essential piece of the treatment expecting to diminish torment and joint emission, enhance the range of movement (ROM) of the Ankle strain, and increment quadriceps quality after Ankle Strain recreation.

Endorsement for a detailed examination was allowed by the Osmania college and educated assent was gotten from all the investigation members. From the underlying 15 back to back patients admitted to the outpatient facility, 10 were arbitrarily designated into 2 bunches by the fixed envelope technique. Following a nitty gritty physical examination, a standard assessment frame was finished for every patient. Statistic data including sex, age, weight, tallness, weight list, occupation, instruction level, torment power and influenced side were recorded. Preoperative and post-treatment tests were connected for 4 factors of torment force, thigh outline distinction, Ankle strain flexion, and Lysholm score. The nearness of Ankle Strain

tear was affirmed by physical examination and attractive reverberation imaging at the underlying visit. All subjects were required to be more seasoned than 17 years of age and experienced arthroscopically helped Ankle Strain remaking surgery.

Design Of The Study:

The essential objective of the intense period of rehabilitation is to secure the recuperating joint while limiting torment, irritation, muscle shortcoming, and loss of joint movement. Security is given by confining joint development in bearings that may strain mending ligaments and by adjusting weightbearing. An orthosis that gives strength to the syndesmosis joint is normally recommended to help accomplish this objective. The headings of movement confinement and degree of immobilization rely upon the physical exam and introduction. Restricting outside turn is typically the essential concern.

Most orthoses give some restriction to outside pivot minutes. Throws, strolling boots, and custom orthoses intended to constrain outside pivot give the best assurance, though ankle stirrups, athletic tape, and trim up ankle props give less syndesmosis adjustment. The choice on which orthosis to utilize is typically made by the going to doctor. This custom fitted approach is favored over an institutionalized convention including complete immobilization and limited weight bearing. Most orthoses give some restriction to outer pivot minutes. Throws, strolling boots, and custom orthoses intended to confine outside pivot give the best assurance, while ankle stirrups, athletic tape, and trim up ankle supports give less syndesmosis adjustment. The choice on which orthosis to utilize is generally made by the going to doctor. This custom-made approach is favored over an

institutionalized convention including complete immobilization and confined weight bearing.

Great many people who encounter syndesmotric ankle Strains can't hold up under their full weight amid stride and subsequently require the utilization of an assistive gadget, for example, braces. Weightbearing rules depend on a patient's indications and the general picture gave by the injury occasion, physical examination, and imaging. A few people with generally minor grumblings can ambulate with full weightbearing, however most utilize props with weightbearing as endured. People with more extreme injuries are frequently treated with a brief time of more limited weightbearing (1 to 2 weeks). Weightbearing is advanced toward full weightbearing in view of the patient's side effects and exam. Full weightbearing is energized when patients can ambulate on different surfaces and rise/plunge stairs with insignificant distress.

Methods/Materials:

The strategies for ensuring the joint depicted above guide in restricting torment and aggravation. A few different treatments can be recommended to address agony and aggravation . Tissue pressure, cryotherapy, and height are normally connected together. Cryotherapy is utilized to lessen torment, though pressure and height are utilized to constrain edema and radiation, which may additionally help with torment control.

Frequently recommended are Psychological Treatment and mitigating medicines. Different medicines utilized all the more specifically to treat manually and incorporate transcutaneous electric nerve incitement, delicate tissue rub coordinated at foot and ankle to drain edema. A few competitors discover elective treatments, for

example, pressure point massage and needle therapy to be useful in calming torment too.

Resistance exercise is recommended ahead of schedule in the recuperation time frame to limit muscle decay and shortcoming. In spite of the fact that muscles exhibiting shortcoming or actuation disappointment are the essential concentration (for the most part, the triceps surae or peroneal musculature), each significant gathering about the ankle joint is routed to keep up muscle quality. Reinforcing might be performed utilizing an assortment of exercise approaches, including versatile resistance groups or lines, ankle weights, or foot rear area raise exercises.

Versatile resistance groups are particularly appropriate for home utilize. At the point when strict immobilization or nonweightbearing ambulation is endorsed, isometric reinforcing and neuromuscular electrical incitement are prescribed to help limit muscle decay and shortcoming.

Exercise is performed as per the beforehand depicted joint insurance rules given that advancement of mending is the essential objective of this period of treatment. Development into outside turn and endrange dorsiflexion is generally abstained from amid rehabilitation in this stage. Exercise measurements are endorsed in a way that is particular to every patient. Patients are advanced to the subacute period of treatment when they cease utilization of assistive gadgets in ambulation.

Procedure:

The objective of the subacute stage is to standardize scope of movement, quality, stride, and capacity in the patient's exercises of every day living. Dynamic assembly and fortifying in the torment unfenced of movement are the signs of this stage. Strong outside pivot and

dorsiflexion keep on being stayed away from; be that as it may, patients ought to travel through the full scope of movement before the finish of this stage. Joint portability is encouraged with the utilization of flexible resistance groups or lines, towels, and the controlled utilization of body weight. A cycle ergometer is a compelling methods for giving preparation while expanding tissue perfusion and actuating the musculature of the area. Low-load, long-term stretching that tenderly advances tissue crawl and joint preparation is powerful when solidness is available. Manual joint preparation ought to be performed in a way that applies little strain to the recuperating syndesmotomic connective tissues. The most patients feel it the most helpful and wonderful on the off chance that amphibian treatment or a whirlpool is accessible, oceanic exercise can be utilized to activate the ankle joint in a protected situation.

The utilization of versatile resistance or ankle weights keeps on being the essential type of reinforcing right on time in this stage. Later in the subacute stage, reinforcing is proficient utilizing heel raises, forward and horizontal venturing exercises, and calf squeezes utilizing isotonic weight machines or isokinetic gadgets. Exercise is dosed with bring down weight and higher reiterations right on time in the stage thus advances to higher-force, low-redundancy sets coordinated at expanding quality and muscle estimate. Neuromuscular preparing is performed through adjust exercises on precarious surfaces, for example, air pads, wobble sheets, rocker sheets, and air-filled vaults.

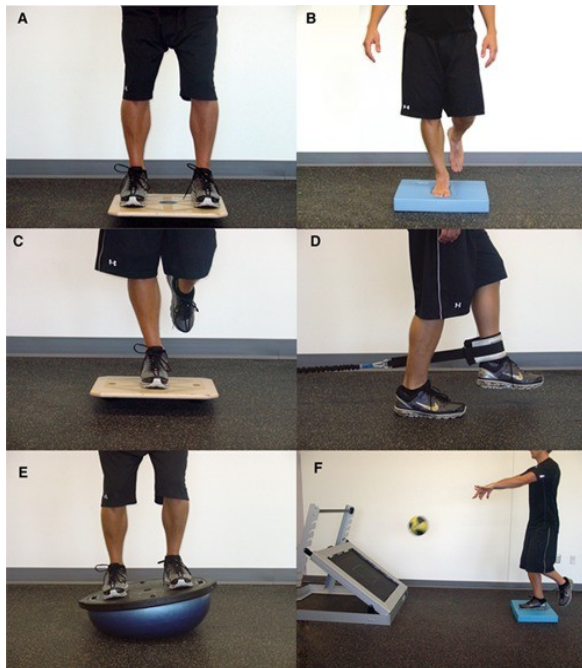
Exercises:

Ahead of schedule in the stage, these exercises are performed in double-leg position. The patient advances to single-leg position when control is illustrated. These adjust preparing exercises are performed with the Ankle strain expanded or

almost broadened so the prevailing parity procedure is focused about the ankle. Bolster surfaces progress from exceedingly stable to less steady as the patient's quality, perseverance, and control increments. Having the patient perform exercise with the eyes shut and requiring the patient to put consideration on different undertakings, for example, checking in reverse or finding/spilling a ball additionally challenges the neuromuscular framework.

Neuromuscular preparing exercises, for example, those depicted above are utilized rather than conventional fortifying exercises in patients who have little confirmation of muscle decay or shortcoming. Be that as it may, in those with clear proof of decay and shortcoming, a joined approach is suggested, including high-force fortifying and dynamic neuromuscular preparing.

The outside revolution push test and the adjustment test can be utilized to evaluate recuperating and the patient's availability for further developed exercise, for example, running and bouncing. Cautious checking and clear correspondence with respect to the nearness of agony, postexercise edema, or impression of insecurity are critical in exercise medicine and deciding availability for movement. Patients are advanced to the advanced preparing stage when they can run and play out a progression of jumps without torment.



1.1.1. Figure 2: An example movement of neuromuscular preparing exercises in the subacute period of rehabilitation: A, double-leg adjust on an adjust board; B, single-leg adjust on an air pad; C, single-leg adjust on an adjust board; D, single-leg resistive string exercises in which annoyance is connected by means of resisted development of the contrary leg; E, double-leg weight moves on an adjust vault; F, tossing a weighted ball against a rebounder while adjusting on one leg on an air pad.

1.1.2. Advanced Training Phase

The objective of the advanced preparing stage is to set up the patient for come back to full movement in games or exercises of decision. Further developed neuromuscular preparing, spryness penetrates, and don particular undertakings are the focal segments of this stage. Exercises usually utilized amid this period of rehabilitation incorporate annoyance of help surfaces, bouncing rope, jumping (forward, in reverse, and along the side), running, rearranging, and nimbleness drills, for example, carioca or running examples.

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created neuromuscular getting ready, spryness enters, and wear specific endeavors are the central portions of this stage. Exercises generally used in the midst of this time of rehabilitation consolidate disturbance of assistance surfaces, bobbing rope, bouncing (forward, backward, and at the edge), running, revising, and deftness drills, for instance, carioca or running cases.

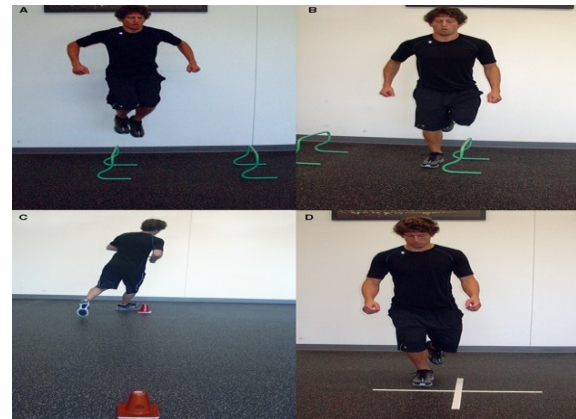


Figure 3: A case movement of functional/dexterity preparing exercises in the advanced preparing period of rehabilitation: A, bouncing over obstacles; B, jumping over obstacles; C, coordinated figure-8 running; and D, planned 4-square jump test.

Exercises: Following an ankle Strain the joint frequently turns out to be stiff and the scope of movement at the joint is lessened impressively. Portability exercises for the ankle can begin ahead of schedule in the rehabilitation procedure from day 2 in mellow to direct Strains. Sidelong developments ought to be maintained a strategic distance from in the beginning times so as not to put any pressure whatsoever on the harmed ligaments. Later when torment permits exercises with horizontal developments including sideways movement should be possible.

1.1.3. Wobble board mobility

In the beginning times of rehabilitation, a wobble board can be utilized to build the scope of motion at the ankle. Sit on a seat with the feet laying on a wobble board or rocker board. Move the feet advances and in reverse to mobilize the

ankle. Keep away from sideways or horizontal developments at an early stage or in the event that it is difficult as this will pressure the harmed sidelong ankle ligaments. Later in the rehabilitation stage as agony permits sideways developments and developments in a roundabout motion can be performed [56].



Figure 4: Wobble board mobility

1.1.4. flexion and dorsi flexion for active plantar

1.1.5. To keep the ankle to seizing this exercise should be possible in the beginning periods. The exercise is pulling your foot to the fullest extent it can reach(dorsiflexion), and keeping the foot for a few seconds and after which pointing the foot far from you (plantarflexion) and hold once more. A decent strategy to begin with is to perform 2 sets of 20 reps while the ankle is frosted and hoisted. The upside of this exercise is that the harmed ligaments won't be worried by sideways development, the calf and shin muscles keep up quality and the pumping motion diminishes swelling.

1.1.6. Active inversion and eversion

This exercise will mobilize the ankle 'sideways' thus begins to pressure the harmed ligaments. It should just be begun when torment permits and mending is built up. Basically turn the feet so the bottoms point outwards and afterward inwards. The development ought to be slow and inside the breaking points of agony. Circumnavigating the ankle will likewise move the joint into these positions.



Figure 5: Active inversion and eversion

1.1.7. Gastrocnemius stretch

1.1.8. Place the leg to be extended behind and lean forward, guaranteeing the foot sole area is stayed in touch with the floor constantly. Hold the extend for 20 to 30 seconds and rehash 3 times. This can be rehashed a few times each day and ought not be excruciating. An extend ought to be felt at the back of the lower leg. If not then move the back leg additionally back. A further developed rendition of a calf extend is to utilize a stage and drop the foot sole area down off it [56].

1.1.9. Soleus stretch

To extend the soleus muscle the back leg ought to be bowed. Place the leg to be extended behind and incline toward a divider holding the foot sole area down. An extend ought to be felt let down closer the ankle at the back of the leg. On the off chance that this extend isn't felt then a further developed variant is to put the forefoot of the front leg against the divider with the rear area on the floor and push the from Ankle strain towards the divider.

which include sideways developments at the ankle you ought to evaded.

1.2.2. Results:

The recuperation time frame after syndesmotoc ankle strains is exceedingly factor. A baffling aspect concerning this injury is that a few people who at first seem to have generally minor injuries have extended recuperation periods,

	Group I n=10	Group II n=10
Age (years)	27.4 ± 10.4	28.1 ± 11.9
Sex (male)	4	4
BMI (kg/m ²)	26.9 ± 1.8	24.6 ± 1.9
Duration of diagnosis (months)	3.9 ± 1.4	4.1 ± 1.6
Affected side (right/left)	14/16	10/18
Education (years)	9.6 ± 4.2	8.4 ± 3.2



Figure 6: Soleus stretch

1.2. Strengthening exercises

1.2.1. As soon as the pain little deminishes strengthening the Ankle exercises can start. In the beginning periods of build up any exercises

though others that seem to have more serious injuries advance quickly. This recommends current appraisal techniques are constrained in their affectability as for injury seriousness. By and large, people who manage syndesmotoc ankle strains ordinarily encounter any longer recuperation periods than do the individuals who support parallel ankle strains

Baseline characteristics of the football injured player

This reality and the fluctuation in recuperation periods are critical issues to examine with people who support syndesmosis injuries.

Table 1: Pattern attributes of the football player who was injured

BMI stands for body mass index. mean ± SD in which Values are presented
In the two groups these are similar one is baseline values of VAS, thigh circumference difference, Lysholm score and knee flexion. In 3 to 6 months in the VAS scores there is considerable decrease in the post surgery. And it has been found that VAS score has decreased more in the Group 1 rather than Group-II. In

both the groups in 3 to 6 months there is a major increase in Knee flexion. In Group-I the values are greater compared to Group-II.

The comparison of the groups' clinical findings

	Group I N=10	Group II N=10
VAS 100 (mm)		
Baseline	72.3 ± 11.4	64.6 ± 12.6
3 months	41.4 ± 12.9 *	48.6 ± 11.4 *
6 months	22.1 ± 10.4 *	27.2 ± 9.9 *
Thigh circumference difference (cm)		
Baseline	1.1 ± 0.8	1.2 ± 0.9
3 months	3.2 ± 1.8 *	4.1 ± 2.1 *
6 months	1.3 ± 1.4	1.6 ± 1.4
Knee flexion (°)		
Baseline	40.8 ± 17.6	44.4 ± 16.7
3 months	124.6 ± 27.1 *	110.9 ± 24.1 *
6 months	134.1 ± 16.1 *	128.4 ± 18.1 *
Lysholm scores		
Baseline	66.3 ± 12.4	64.2 ± 10.1
3 months	80.8 ± 19.1	78.4 ± 14.4
6 months	94.1 ± 8.4 *	84.3 ± 9.1 *

GROUP-I GROUP-II: open kinetic chain; VAS: Visual Analog Scale.

The intragroup examination uncovered critical upgrades after treatment when contrasted and pattern ($p < 0.05$). Qualities are introduced as mean ± SD.

Huge changes in the Lysholm score were found at a half year post-surgery in the two gatherings (both $p > 0.05$), and the change was more noteworthy in the GROUP-I aggregate than in the GROUP-II gathering. There were increments in thigh outline contrast at the 3 and half year appraisals and the increments were noteworthy in the two gatherings at 3 months post-surgery (Table 4.3).

Hopkinson and associates revealed that people with syndesmotoc ankle strains required a normal of 55 days to come back to full movement, which was twice the length of those with grade III horizontal ankle strains. Syndesmotoc ankle strains in handball players bolsters this length of recuperation; players in their examination found the middle value of 45

days to come back to diversion play (run, 6 to 137 days). Boytim and colleague's report of syndesmotoc ankle strains in National Handball League players gives a to some degree more hopeful picture, given that players in their examination missed just 6.3 practices (extend, 2 to 21) in contrast with a normal of 1.1 (territory, 0 to 12) for those with horizontal ankle strains.

Be that as it may, players with high ankle strains required around 3 times the number of medications as those with horizontal strains. Incessant ankle brokenness (agony, shakiness, and functional impediments) is basic after this injury. Gerber et al announced that paying little respect to introductory review of injury seriousness, people who managed syndesmosis strains had a high occurrence (over 60%) of ceaseless ankle torment, shakiness, and confinements in jumping when assessed a half year after injury. Be that as it may, all came back to sports cooperation in spite of their reports of ceaseless ankle handicap.

Conclusion

Syndesmotic ankle strains represent 11% to 17% of all ankle strains in athletic populaces. The vast majority of these injuries happen in crash games, for example, American handball, ice hockey, rugby, lacrosse, and wrestling. Scarcely any people who support syndesmosis strains without fractures have radiographic proof of tibiofibular syndesmosis unsteadiness. Thusly, most syndesmotic ankle strains are dealt with nonsurgically with a rehabilitation program. There are as of now no randomized clinical trials or case control concentrates to manage rehabilitation.

The most liked approach includes a 3-stage program. The primary stage is coordinated at advancing mending by securing the joint while limiting agony, irritation, muscle shortcoming, and loss of motion. Patients change from this intense stage to the subacute period of rehabilitation when they can ambulate in full weightbearing with insignificant uneasiness. The subacute period of rehabilitation is coordinated at normalizing scope of motion, quality, walk, and essential capacity in the patient's exercises of every day living. Patients advance to the advanced preparing stage when they can run and bounce without agony or shakiness. The advanced preparing stage concentrates on setting up the patient to come back to sports interest or his or her exercises of decision. Competitors are permitted to come back to wear when they can play out their game particular assignments at amusement speed with great development quality and no noteworthy grumblings of agony or insecurity.

Reference:

1. Andersen, T. E., Floerenes, T. W., Arnason, A., & Bahr, R. (2004). Video analysis of the mechanisms for ankle injuries in football. *The American Journal of Sports Medicine*, 32(1 suppl), 69S-79S.
2. Woods, C., Hawkins, R., Hulse, M., & Hodson, A. (2003). The Football Association Medical Research Programme: an audit of injuries in professional football: an analysis of ankle sprains. *British Journal of Sports Medicine*, 37(3), 233-238.
3. Hägglund, M., Waldén, M., & Ekstrand, J. (2006). Previous injury as a risk factor for injury in elite football: a prospective study over two consecutive seasons. *British journal of sports medicine*, 40(9), 767-772.
4. Nelson, A. J., Collins, C. L., Yard, E. E., Fields, S. K., & Comstock, R. D. (2007). Ankle injuries among United States high school sports athletes, 2005–2006. *Journal of athletic training*, 42(3), 381.
5. Larsen, E., Jensen, P. K., and Jensen, P. R. (1999). Long- term result of knee and lower leg wounds in tip top football. *Scandinavian diary of solution and science in sports*, 9(5), 285-289.
6. Tyler, T. F., McHugh, M. P., Mirabella, M. R., Mullaney, M. J., & Nicholas, S. J. (2006). Risk factors for noncontact ankle sprains in high school football players the role of previous ankle sprains and body mass index. *The American journal of sports medicine*, 34(3), 471-475.
7. McHugh, M. P., Tyler, T. F., Mirabella, M. R., Mullaney, M. J., & Nicholas, S. J. (2007). The effectiveness of a balance training intervention in reducing the incidence of noncontact ankle sprains in high school football players. *The American journal of sports medicine*, 35(8), 1289-1294.
8. Fong, D. T. P., Hong, Y., Chan, L. K., Yung, P. S. H., & Chan, K. M. (2007). A systematic

- review on ankle injury and ankle sprain in sports. *Sports medicine*, 37(1), 73-94.
9. Chomiak, J., Junge, A., Peterson, L., & Dvorak, J. (2000). Severe injuries in football players influencing factors. *The American Journal of Sports Medicine*, 28(suppl 5), S-58.
 10. Arnason, A., Sigurdsson, S. B., Gudmundsson, A., Holme, I., Engebretsen, L., & Bahr, R. (2004). Risk factors for injuries in football. *The American Journal of Sports Medicine*, 32(1 suppl), 5S-16S.
 11. Nicholas, J. A. (1970). Injuries to knee ligaments: relationship to looseness and tightness in football players. *Jama*, 212(13), 2236-2239.
 12. Hawkins, R. D., Hulse, M. A., Wilkinson, C., Hodson, A., & Gibson, M. (2001). The association football medical research programme: an audit of injuries in professional football. *British Journal of Sports Medicine*, 35(1), 43-47.
 13. Dvorak, J., Junge, A., Chomiak, J., Graf-Baumann, T., Peterson, L., Rösch, D., & Hodgson, R. (2000). Risk factor analysis for injuries in football players possibilities for a prevention program. *The American Journal of Sports Medicine*, 28(suppl 5), S-69.
 14. Yeung, M. S., Chan, K. M., So, C. H., & Yuan, W. Y. (1994). An epidemiological survey on ankle sprain. *British journal of sports medicine*, 28(2), 112-116.
 15. Fong, D. T. P., Hong, Y., Chan, L. K., Yung, P. S. H., & Chan, K. M. (2007). A systematic review on ankle injury and ankle sprain in sports. *Sports medicine*, 37(1), 73-94.