Common mechanical injuries to the ankle that result from sports-related activities include lateral ankle-ligament sprains and associated pathologies such as osteochondral fractures of the talus, distal fractures of the tibia, peroneal brevis tendon tears, and superficial peroneal nerve injury. The therapeutic management of these injuries is critical to the long-term success of efforts to optimize ankle function. Beginning immediately after swelling is reduced and ankle range of motion and strength are reestablished, incorporation of functional activities is imperative to the athlete’s safe return to sport participation. Improper care or delay in treatment might cause additional pain, swelling, and damage to healthy tissues.

Treatment Methods

The available research regarding functional rehabilitation after ankle injury shows that there is considerable variation in methods of treatment. van Os et al. performed a systematic literature review on treatment of acute lateral ankle sprains from 1966 to 2004 and compared the effectiveness of conventional treatment complemented by supervised rehabilitation training with that of conventional treatment alone. The retrieved data failed to demonstrate a superior treatment approach, although there is some support for supervised exercise. Whatever the approach used, the ankle-rehabilitation program must be individualized and progressively structured to meet the physical activity requirements of the athlete’s sport.

Several authors have reported that initial treatment consisting of short-term immobilization and early weight bearing is critical for the prompt return to preinjury status after ankle sprain. We have observed that patients with severe ankle sprains benefit from a short period of cast immobilization after acute lateral-ligament sprain. Patients who meet the following criteria are placed in weight-bearing casts:
• Inability to place any weight on the injured extremity because of pain
• Significant ankle swelling such that in the judgment of the physician the patient would derive greater benefit from cast immobilization than early ankle range-of-motion and modality treatment
• Significant ecchymosis around the ankle as a consequence of the injury

Beginning on the initial treatment day, the athlete is prescribed a 48-hr course of ketoprotolac (10 mg by mouth every 6 hr), given crutches, and instructed to bear weight as tolerated in the cast. After 3–5 days, the athlete’s status is reevaluated. In most cases, the cast is then removed and replaced by a functional ankle brace, and conventional treatment is initiated. In our experience, this regimen has been highly effective in diminishing swelling and pain and allows for a rapid return to functional activities (unpublished observations).

**Therapeutic Interventions**

Therapeutic modalities and exercise as components of ankle rehabilitation are intended to promote healing and joint function.9 The progression of activity during

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### Common Components of Functional Ankle Rehabilitation

#### Initial Treatment

- **Immobilization:** boots, strapping; functional ankle brace; casting
- **Early non-weight-bearing exercise**
  - Active range of motion, ankle alphabet
  - Strength exercises: seated toe curls, four-plane elastic-tubing exercises

#### Early weight-bearing exercise

- Partial- to full-weight-bearing position: BAPS-board training with increasing levels of range-of-motion difficulty
- Pool therapy, stationary cycling

#### Strengthening

- Open and closed kinetic chain exercises
  - Therabands, free weights, manual resistance, isokinetic machines
  - Heel raises, toe raises, calf presses, tubing lunge steps
  - ProFitter or slide board, StairMaster

#### Balance and Proprioception

- Performed on variety of surfaces
  - Firm; foam; tilt board; wobble board, half disc; uneven walkway; minitrampoline; BAPS board
  - 15- to 45-s work bouts for a total of 10–15 min
- Static to dynamic progressions: stork stand progressing to stork stand with complex activity

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rehabilitation must be dictated by the specific injury, individualized to the athlete, and accomplished without significant pain. The athlete should be encouraged to report problems, because untreated musculoskeletal symptoms might worsen or predispose the athlete to future exercise-related injury. Throughout the therapeutic program, activities should progress such that the athlete builds on previous improvement in order to proceed to more advanced activities and sport skills.\(^9\) For example, strength training of the various ankle-muscle groups is traditionally viewed as an integral component of the rehabilitation process and is often initiated as soon as pain-free range of motion is achieved and resistive forces can be tolerated.\(^10\) Longitudinal studies of muscle strength loss with disuse in healthy subjects indicate that the extent of muscle atrophy is muscle specific; some muscles demonstrate greater rates of atrophy than others. Stevens et al.\(^11\) found after patients were immobilized with the ankle in a neutral position using a short-leg cast for 6-8 weeks after unilateral malleolar fracture that inversion and eversion muscle strength returned to normal, but plantar-flexor strength did not despite 10 weeks of strength and endurance training. On the other hand, normal eversion and dorsiflexion strength in patients with unilateral functional ankle instability have been reported after just 6 weeks of progressive-resistive training.\(^12\) Regardless of the type or severity of ankle injury, the goal of any exercise program should be to limit strength deterioration and provide early functional rehabilitation to prevent residual ankle symptoms.

**Functional Rehabilitation**

For an ankle-rehabilitation program to be successful, the sports-medicine specialist must know the injured athlete’s specific sport requirements and how to incorporate those requirements into the rehabilitation program. Deficiencies in ankle proprioception and standing balance in basketball players with multiple ankle sprains highlight the need for the functional rehabilitation program to include proprioceptive and balance training.\(^13\) Nonetheless, findings from a recent study that investigated whether a 5.5-week balance-training program leads to increased postural control indicated that balance training did not reduce the center-of-pressure excursion in a population consisting of noninjured and previously injured subjects.\(^14\)

Despite such contradictory findings, balance training is widely used in rehabilitation after ankle injury and is thought to have beneficial effects on postural stability, coordination, and proprioception.\(^2,4,9\)

Functional activities must be emphasized as the athlete nears reentry into full sport participation. Common components of ankle functional rehabilitation are presented in the sidebar.\(^2-4,6\) Functional activities should follow a logical progression from simple to complex skills, slow to fast speeds, short to longer distances or duration, and light to heavy resistance. Activities should include drills that replicate functional movement patterns associated with the athlete’s sport. Exercises should initially be performed in controlled patterns and then gradually progressed to more demanding activities. This can be accomplished through various means such as increasing activity speed, varying the stability of the surface on which the athlete stands, and progressing from double-leg to single-leg activities.\(^2,4,9\) Athletes should be monitored for their ability to perform the skill correctly without increased joint pain or swelling.

**Conclusion**

The functional demands imposed on the ankle by different sports vary greatly, but most sports require some amount of running and jumping, and all sports require postural balance. The final criteria for determining readiness to return to sport should include demonstration of sport-specific skill performance without limitations.\(\)\(\)

**References**


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