14.5 Ankle Joint

(Articulatio talocruralis)

14.5.1 Anatomy

Joint type:	ginglymus (= hinge joint), modified sellar joint
Distal joint surface:	convex
Resting position:	10° plantar flexion
Close packed position:	maximum dorsiflexion
Capsular sign:	plantar flexion > dorsiflexion

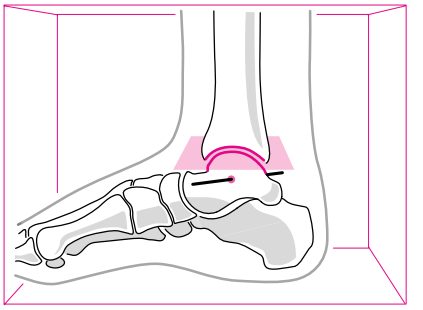

Fig. 14.53

14.5.2 Rotatory Tests

Active movements, Comparing Sides

The patient moves both feet in maximum plantar flexion and dorsiflexion.

Fig. 14.54

Fig. 14.55

Specific Active and Passive Movement Testing (Quantity and Quality)

a) **Plantar flexion** from the zero position:

- The therapist fixates the lower leg against the bench and asks the patient to actively point the foot (plantar flexion) downward as far as possible.
- Then from dorsal, the therapist grasps the collum tali and tests whether the movement continues passively.

Fig. 14.56

Fig. 14.57

- Finally, the therapist moves the talus passively out of the neutral position through the entire range of motion and tests the end-feel.

Physiological end-feel:
firm and elastic

b) **Dorsiflexion** from the zero position:

- The therapist fixates the lower leg against the bench and asks the patient to actively flex the foot (dorsiflexion).
- Then from plantar, the therapist places his hand on the sustentaculum tali and the plantar talonavicular ligament, pressing the caput tali dorsally and thereby testing whether the movement continues passively. The therapist may rest his elbow against his pelvis in order to achieve more strength.
- Finally, the therapist moves the talus passively out of the zero position and through the entire range of motion and tests the end-feel.

Physiological end-feel:
firm and elastic

Fig. 14.58

Fig. 14.59

Stability tests in the Zero Position

The therapist fixates the lower leg against the bench and with the second metacarpal head of the distal hand grasps the caput tali from tibial or fibular in order to passively gap the joint on the tibial or fibular side. The end-feel is also assessed.

! Stability tests may be performed with the joint in any position. They provide information in particular about the stability of the ankle mortise formed by the lateral and medial malleoli into which the talus fits. See also the stability tests for the distal tibiofibular syndesmosis in the section on the lower leg (see p. 96).

Physiological end-feel:
very firm and elastic

Fig. 14.60

Fig. 14.61

14.5.3 Translatoric movement tests

a) **Traction** from the resting position:

The therapist fixates the lower leg against the bench with his lateral hand. Then, he places his medial hand on the foot, grasping the collum tali from dorsal with the little finger. The thumb of the medial hand rests on the sole of the foot and holds the ankle joint in the resting position. The forearm of the medial hand forms the extension of the lower leg axis and pulls the talus at a right angle away from the treatment plane. The index finger of the lateral hand can palpate the movement between the tibial malleolus and the medial tubercle of the posterior talar process.

Physiological end-feel:
firm and elastic

Fig. 14.62

b) **Compression** in the resting position:

The therapist fixates the lower leg against the bench and applies pressure to the calcaneus at a right angle to the treatment plane.

! In this technique, the subtalar joint is simultaneously compressed. This test should be performed with the patient lying down if standing produces symptoms.

Physiological end-feel: hard

Fig. 14.63

14.5.4 Translatoric movement testing of the Intertarsal Joints

The hindfoot forms a functional unit consisting of the ankle joint, the subtalar joint, and the intertarsal joints. Together with the joints of the midfoot, the subtalar joint and the intertarsal joints form the three arches of the foot: the longitudinal medial and lateral arches, and the transversal anterior arch. It is essential for the intertarsal joints to be stable in order to allow for functioning of the hindfoot and the arches of the foot (especially the medial arch). Rotatory tests of the intertarsal joints are done along with the movements of the hindfoot and midfoot. Translatoric traction does not allow for an adequate evaluation of mobility, because technically specific traction is nearly impossible. So too are specific compression tests. Tests of translatoric gliding, however, do allow a quite specific evaluation of the mobility of the intertarsal joints. Their treatment plane is roughly perpendicular to the dorsum of the foot. The proximal bone is fixated and the distal one is moved. The order may be chosen as the therapist wishes, but the use of a system, such as the one suggested here, is recommended so as not to neglect an important test and to keep one's head clear for sensing the movements. Given that the intertarsal joints should be mainly stable, only the tests for mobility are shown here. If there is only minimal movement, the intertarsal joint is probably stable rather than hypomobile. Mobilization is rarely indicated and hence is not shown here. If there is a high degree of mobility, the joint may be hypermobile. The patient should be advised to use stabilizing measures such as wearing sole inlays and stable shoes.

a) **Gliding between the talus and navicular bone in the resting position** (Test 1):

The therapist stands next to the patient and supports the lateral margin of the foot against his own thigh. With his proximal hand, he grasps the neck of the talus with his thumb and the calcaneus with his fingers. The thumb and index finger of his distal hand wrap around the navicular bone and move it dorsally and plantarly, parallel to the treatment plane which is roughly at a right angle to the dorsum of the foot.

Physiological end-feel:
firm and elastic

Fig. 14.64

Alternative grip:

If the therapist's hand is small and the patient's foot is large, the foot may be placed on the head piece of the bench while the therapist uses his arm to stabilize the lower leg against his own body. His proximal hand presses the neck of the talus against the calcaneus plantarly against the bench, thereby fixating the talus. His proximal hand and forearm should ensure that the patient's foot and lower leg are stable; this may be tested by using the distal hand to loosely move the forefoot back and forth. This should be possible without tension. Next, the therapist wraps the thumb and index finger of his distal hand around the navicular bone which he moves dorsally and plantarly, parallel to the treatment plane.

Fig. 14.65

b) **Gliding between the navicular and first to third cuneiform bones in the resting position** (Test 2).

The therapist stands as in the previous example and fixates the navicular bone with the thumb and index finger of his proximal hand. The thumb and index finger of his distal hand grasp the first cuneiform (then the second and the third or all three together) and moves it (or them) dorsally and plantarly, parallel to the treatment plane.

Physiological end-feel:
firm and elastic

c) **Gliding between the first to third cuneiforms and the corresponding metatarsals in the resting position** (Tests 3 to 5).

With the same grip as before, but 1 to 2 cm further distally, the therapist's proximal hand fixates the first, second, or third cuneiform and his distal hand moves the base of the opposing metatarsal bone dorsally and plantarly, parallel to the treatment plane (see **Fig. 14.66** for tests 2 to 5).

Physiological end-feel:
firm and elasti

Fig. 14.66

d) **Gliding between the cuboid and fourth and fifth metatarsals in the resting position** (Test 6).

The therapist kneels on one knee at the distal end of the bench. The patient's leg is positioned so that there is slight hip adduction. The index and middle fingers of the therapist's proximal hand grasp the dorsal surface of the cuboid from the fibular side of the patient's leg while his thumb grasps it from plantar and fixates it. The index and middle fingers of his distal hand grasp the dorsal aspect of the fourth and fifth metatarsal bones from the fibular side. His thumb is placed on the plantar surface around the bases of the fourth and fifth metatarsals (or around each individual one) and moves them dorsally and plantarly, parallel to the treatment plane.

Physiological end-feel:
firm and elastic

Fig. 14.67

e) **Gliding between the cuboid, and navicular and cuneiform bones in the resting position** (Test 7):

Still kneeling on one knee at the distal end of the bench, the therapist now has the patient's leg positioned with slight hip abduction. The index and middle fingers of his tibial hand grasp the dorsal aspect of the navicular and cuneiform bones from the tibial side while his thumb is placed on plantar aspect of the navicular and cuneiform bones to fixate them. As before, the index and middle fingers of his fibular hand grasp the dorsal aspect of the cuboid bone and his thumb grasps the plantar aspect, moving it dorsally and plantarly, parallel to the treatment plane.

Physiological end-feel:
firm and elastic

Fig. 14.68

f) **Gliding between the cuboid and calcaneus in the resting position** (Test 8):

Still kneeling on one knee at the distal end of the bench, the therapist continues to fixate the patient's leg in a position of slight hip abduction. From the tibial side of the patient's leg, his tibial hand is wrapped flat around the calcaneus and fixates it. Pulling it slightly distally makes fixation easier. As before, he uses the index and middle fingers of his fibular hand to grasp the dorsal surface of the cuboid from the fibular side, while his thumb wraps around the cuboid on the plantar aspect and moves it dorsally and plantarly, parallel to the treatment plane.

Physiological end-feel:
firm and elastic

Including the tests of the subtalar joint (Test 9) and the ankle joint (Test 10), there are a total of 10 Translatoric movement tests with which the entire hindfoot may be examined.

Fig. 14.69

14.5.5 Treatment of Capsuloligamentous Hypomobility

The lower leg of the patient is fixed to the head of the bench with a belt. The therapist grasps the foot with the medial hand as in the traction test and places the lateral hand on top of it for support. The forearms are parallel to one another and form the prolongation of the lower leg axis, moving the talus at a right angle away from the treatment plane.

Alternatively, a belt may be placed around the collum tali and around the pelvis of the therapist. By leaning backward, the therapist can increase the force of traction.

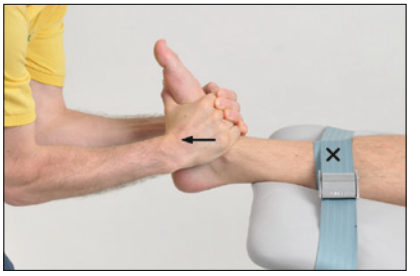

Fig. 14.70

! Pain-relieving traction may also be performed using the test version.

Fig. 14.71

! The ankle joint is closely connected to the tibiofibular syndesmosis. Restricted mobility in the ankle joint can lead to hypermobility in the syndesmosis, especially with mobilization in end-range rotation, which therefore should be avoided.

Documentation template: Practice Scheme

Ankle joint						
Symptoms						
Symptom-altering direction						
Contraindications?	Nervous system: Other:					
Symptom-altering joint						
General assessment of adjacent joints						
Active movements, comparing sides						
Specific rotatory tests	**Active**	**Continues passively?**	**Passive**	**End-feel**	**Symptoms/ pain**	**Comments**
▪ Plantar flexion						
▪ Dorsiflexion						
Stability tests	**Quantity**	**Quality**	**End-feel**	**Symptoms/pain**	**Comments**	
▪ Fibular gaping						
▪ Tibial gaping						
Translatoric movement tests	**Quantity**	**Quality**	**End-feel**	**Symptoms/pain**	**Comments**	
▪ Traction						
▪ Compression						
Summary Formulation aid: ▪ Symptoms ▪ Direction ▪ Contraindications ▪ Site (joint) ▪ Restricted mobility, hypermobility, or physiological mobility ▪ Structure: muscle, joint, etc.	*Text:*					
Trial treatment						
Physical therapy diagnosis						
Treatment plan with treatment goal and prognosis						
Treatment progress						
Final examination						

Documentation: Practice Example

Ankle joint (Pes equinus in a bed-ridden patient)						
Symptoms	*Difficulty standing and walking related to pain in the feet*					
Symptom-altering direction	*Dorsiflexion*					
Contraindications?	Nervous system: *No findings* Other: *No findings*					
Symptom-altering joint	*Ankle joints, both sides*					
General assessment of adjacent joints	*All joints of the lower extremities begin with the limitations typically seen in bed-ridden patients (flexion contractures).*					
Active movements, comparing sides	*Dorsiflexion limited by ca. – 10° on both sides*					
Specific rotatory tests	**Active**	**Continues passively?**	**Passive**	**End-feel**	**Symptoms/ pain**	**Comments**
▪ Plantar flexion	*40°*	*ca. 10°*	*No findings*	*Firm and elastic*		
▪ Dorsiflexion	*– 10°*	*< 5°*	*Increased resistance to movement*	*Initial soft resistance, then very firm and elastic*	*Pain at maximum end-rage*	*Knee slightly bent during testing*
Stability tests	**Quantity**	**Quality**	**End-feel**	**Symptoms/pain**	**Comments**	
▪ Fibular gaping	*No findings*	*No findings*	*Firm and elastic*	*No findings*		
▪ Tibial gaping	*No findings*	*No findings*	*Firm and elastic*	*No findings*		
Translatoric movement tests	**Quantity**	**Quality**	**End-feel**	**Symptoms/pain**	**Comments**	
▪ Traction	*Hypo 2*	*Firm resistance to movement*	*Very firm and elastic*	*No findings*	*Tested in actual resting position ca. 20°*	
▪ Compression	*No findings*	*No findings*	*Hard*	*No findings*		
Summary Formulation aid: ▪ Symptoms ▪ Direction ▪ Contraindications ▪ Site (joint) ▪ Restricted mobility, hypermobility, or physiological mobility ▪ Structure: muscle, joint, etc.	*Text:* ▪ *Difficulty standing and walking* ▪ *with dorsiflexion of both feet.* ▪ *No contraindications today to further movement testing.* ▪ *Symptoms are localized in both ankle joints* ▪ *and are correlated to restricted mobility,* ▪ *caused by shortening of the plantar flexors (the initial soft and elastic end-feel) and shrinkage of the capsuloligamentous unit (then very firm and less elastic end-feel).*					
Trial treatment	*Mobilizing grade III traction of the ankle joint. After ca. 5-minute-long trial treatment, the end-feel seems to be slightly less firm.*					
Physical therapy diagnosis	*See above*					

Continued ▶

Documentation: Practice Example *(Continued)*

Ankle joint (Pes equinus in a bed-ridden patient)	
Treatment plan with treatment goal and prognosis	▪ *Continue grade III mobilizing traction of the ankle joint followed by relaxation and stretching of the plantar flexors.* ▪ *Treatment goal: pain-free physiological mobility* ***(Further information on examination and treatment techniques may be obtained through further education.)***
Treatment progress	
Final examination	

14.6 Lower Leg

(Syndesmosis tibiofibularis distalis and articulatio tibiofibularis proximalis)

14.6.1 Anatomy

Joint type: syndesmosis tibiofibularis: syndesmosis, unmodified sellar joint
- Joint surface: the fibular malleolus is concave.

Articulatio tibiofibularis: amphiarthrosis
- Joint surface: anatomical variants are common; in manual therapy the head of the fibula is considered concave.

Resting position: 10° plantar flexion of the ankle joint

Close packed position: maximum dorsiflexion of the ankle joint

Capsular sign: not described.

! Lower leg joints with little motion are considered stable. They usually do not restrict movement of the knee and ankle joints. Stretching grade III mobilizations to increase the range of motion are rarely indicated.

Note
An axis of rotation lies horizontally between the lower third and the upper two thirds of the fibula. During dorsiflexion of the ankle joint, the fibular malleolus moves slightly posteriorly and the head of the fibula slightly anteriorly (Lazannec et al., 1994).

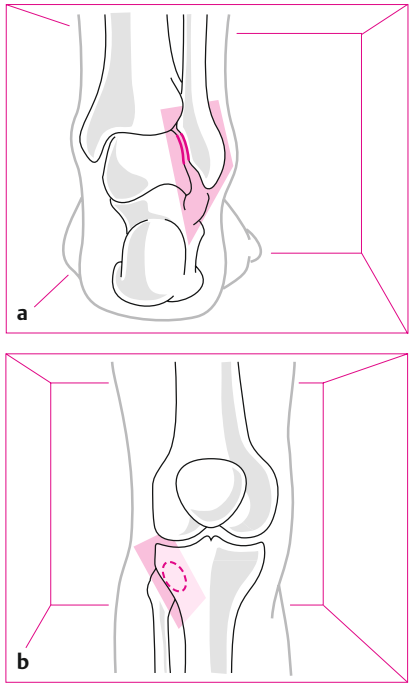

Fig. 14.72 a, b