

## Proximal Tibiofibular Joint Dysfunction

Manuel Duarte, DC, DABCO, DACBSP, CSCS

Patients who complain of lower extremity pain and dysfunction are commonly seen in chiropractic practice. General diagnoses of the lower extremity often fall into general categories of either traumatic or overuse etiologies. Traumatic injuries have a clear mechanism of injury, leaving the doctor to decide type and degree of tissue damage based on clinical history and examination. Overuse injuries often involve a mechanism of repetitive activities, which have the effect of stressing the involved tissues to the point at which breakdown occurs faster than the body can repair.

### Mechanism of Overuse Injuries

In the overuse mechanism, there is often an underlying deficit in the body structure or function leading to an overload situation. Forces can accumulate, not be properly dissipated or be misdirected into areas not intended to handle the load. Injury may occur secondary to the structure not being able to meet the demands placed upon it. For example, a runner with knee pain may be engaged in too much activity too early in training. (A general rule for runners is to not increase mileage more than 10 percent per week.) The patient could cut down on overall mileage and give the body enough rest and nutrition to recover before the next training session.

Overuse combined with biomechanical faults will almost certainly [create an overuse injury](#).<sup>5</sup> During running, each leg repeatedly absorbs loads equaling 1.5 to 5 times body weight. It has been suggested that repetitive loading of this type and the associated impact shocks cause microtrauma to the underlying tissues and may eventually cause enough damage to impair function. The use of cushioned or shock-absorbing insoles has been suggested to [reduce the impact forces](#) associated with running.<sup>4</sup>

Common overuse injuries related to this repeated microtrauma include conditions such as plantar fasciitis, medial tibial stress syndrome and metatarsalgia. As such, part of a reasonable treatment plan could involve decreasing mileage and offering the patient a custom-made, shock-absorbing orthotic to decrease impact forces.

### Involvement of the PTF Joint

The posterolateral surface of the tibia and the head of the fibula form an arthroal articulation known as the proximal tibiofibular (PTF) joint. The capsule surrounding the PTF joint, although reinforced by anterior and posterior ligaments, is thicker anteriorly. The popliteus tendon helps to reinforce the posterior aspect of the capsule as it crosses the joint. At the biceps femoris insertion, the proximal fibula is integral in providing lateral stability of the knee.

There are three distinct movements that occur between the proximal tibia and the fibular head: anteroposterior glide, superoinferior motion and rotation. The ability of the PTF joint to withstand longitudinal or axial stresses is a direct function of its anatomy. The proximal aspect of the fibula seems best able to undergo tensile and torsional stresses. Compressive forces appear best managed distally, where the interosseous membrane ensures lower leg function by actively

involving the fibula in load transference. The fibula has been shown to bear one-sixth of axial loading on the leg, with a key role in dissipating torsional stresses produced by ankle motion.

The PTF joint acts primarily to reduce torsional stress at the ankle, minimize lateral bending of the tibia and decrease weight-bearing torsion.<sup>1</sup> Abnormal force accumulation and altered biomechanics or trauma frequently affect a joint that, when injured, can contribute to chronic pain and considerable disability. It is my opinion that the PTF joint is an underappreciated and infrequently diagnosed cause of chronic leg and foot pain.

Disruption of the PTF joint has been considered a rare injury. Usually it is an isolated injury, although certain underlying pathological conditions may predispose the [proximal end of the fibula to dislocate](#) in a small number of patients.<sup>2</sup> Although dislocation of the tibiofibular joint is considered rare, subluxations and biomechanical faults at this joint are common enough to be considered in every clinical case of lateral knee pain and neurological findings of numbness and tingling in the lateral leg and dorsum of the foot. It has been my experience that this is especially common in active individuals, particularly athletes.

There are two basic types of tibiofibular joints: horizontal and oblique. Horizontal joints have a fibular articular surface that is usually circular and planar (or slightly concave in some cases) and that articulates with a similar planar-circular surface on the tibia. These articular surfaces are under and behind a projection of the lateral edge of the tibia, which provides some stability by preventing forward displacement of the fibula.

The second type of tibiofibular joint is oblique. In general, the more oblique joints have the least area of articular surface. Because this type of joint is less able to rotate to accommodate torsional stresses than a horizontal joint, it may subluxate and dislocate more frequently.

Anterolateral subluxation is the most common subluxation of the PTF joint that occurs during athletic activity, especially actions involving violent twisting motion. This subluxation is best discerned by clinical examination, which will reveal a prominent mass over the lower anterolateral knee joint.

When a patient complains of pain and tenderness of the proximal part of the fibula, there may be associated symptoms in the lateral popliteal fossa along the stretched biceps tendon. In this case, pain can be accentuated by dorsiflexing and everting the foot. There may also be transient paresthesias along the distribution of the peroneal nerve. Movement of the knee is usually painless, with a deficit in range a few degrees short of full extension. The biceps tendon may be in a muscular spasm or may be palpated as hypertonic. Upon observation, the fibular head will appear as a prominent lateral mass. A typical mechanism of anterolateral subluxation may be the following:

- inversion and plantarflexion of the foot that causes tension in the peroneal muscle group, extensor digitorum longus and extensor hallucis longus, resulting in a forward-subluxating force of the proximal end of the fibula;
- simultaneous flexion of the knee, relaxing the biceps tendon and fibular collateral ligament;
- [concomitant twisting of the body](#), transmitting the twist along the femur to the tibia, causing a relative external rotatory torque of the tibia on the foot, which is already fixed in inversion.<sup>6</sup>

The combination of points two and three above springs the proximal end of the fibula out laterally, at which point the violently contracting muscles (point 1) pull the fibula forward.

Tibiofibular subluxations occur under traumatic conditions such as twisting athletic injuries, a slipping injury in which the patient lands with their knee flexed under their body, or parachute landings. Anterolateral subluxations can be sustained from a wide variety of sports activities such as football, soccer, rugby, wrestling, gymnastics, judo, broad jumping and skiing. Posterolateral subluxations are usually associated with violent trauma to the knee, with the proximal part of the fibula being pushed posteriorly and medially.

Severe disruption of the anterior and posterior capsular ligaments of the tibiofibular joint, probably with a significant tear of part of the fibular collateral ligament, allows the biceps to draw the unsupported proximal part of the fibula posteriorly. This type of dislocation is invariably associated with a fracture of the tibial shaft. The literature describes a variety of proximal fibula subluxations. I have provided a complete list of them with a description of the extra vertebral adjustment for each as follows:

### Superior Fibula Subluxation

*Subluxation:* A superior fibula subluxation often allows eversion sprain of the ankle. Typical features include tenderness about the fibular collateral ligament due to jamming, restricted inferior fibula joint play, and possibly a slight foot-drop sign.

*Adjustment:* Place the patient supine with the knee extended and hip flexed at about 45 degrees. Stand at the end of the table with the patient's foot placed on the anterior aspect of your thigh. Grasp the patient's ankle with your lateral hand, and take a web or capitate contact at the proximal aspect of the lateral malleolus. With your medial hand, overlap the wrist of your contact hand for stability. Apply traction and simultaneously make a short, inferiorly directed thrust to correct the malposition.

### Inferior Fibula Subluxation

*Subluxation:* An inferior fibula subluxation can be the result of inversion ankle sprain and is often associated with tenderness about the collateral ligament of the fibula and restricted superior fibula joint play.

*Adjustment:* Place the patient in the lateral recumbent position with the affected side upward and the medial aspect of the affected foot resting relaxed on the table. Stand at the foot of the table in line with the longitudinal axis of the patient's affected leg. Apply a capitate contact with your medial hand against the inferior aspect of the lateral malleolus, with your lateral hand grasping your contact wrist for stability. Apply pressure and simultaneously make a short thrust directed superiorly along the vertical axis of the fibula to [correct the malposition](#).<sup>7</sup>

### Anterolateral Fibula Subluxation

*Subluxation:* An anterolateral fibula subluxation is often the result of lateral hamstring strain, inversion ankle sprain or trauma to the posterolateral aspect of the knee. It is characterized by lateral hamstring tendon tenderness, genu varum, excessive ankle pronation, and restricted posteromedial fibula motion.

*Adjustment:* Place the patient prone with the involved knee flexed. Squat at the end of the table (facing the patient) so that the patient's leg can rest on your shoulder for stability. Grasp the involved leg and interlace your fingers around the posterior aspect of the patient's leg proximally. Direct a pisiform contact with your cephalad hand against the anterolateral aspect of the fibular head. Apply traction and simultaneously rotate the fibula posteromedially to correct the

malposition.

### Posteromedial Fibula Subluxation

*Subluxation:* A posteromedial subluxation of the fibula often follows inversion ankle sprain, violent hamstring pull, trauma to the anterolateral knee and genu valgum.

*Adjustment:* Place the patient prone with the involved leg fixed. Squat at the end of the table (facing the patient) so that the patient's leg rests on your shoulder for stability. Grasp the involved leg and interlace your fingers around the posterior aspect of the patient's leg proximally. Apply a specific pisiform contact with your lateral hand against the medial aspect of the involved fibular head. Apply traction, and simultaneously rotate the fibula impulsively anterolaterally to correct the malposition.

### Postero-Inferior Fibula Subluxation

*Subluxation:* The typical physical features of a postero-inferior subluxation of the fibula include pain at the fibula head, lateral collateral ligament pain at the ankle, lateral hamstring complaints, and restricted anterosuperior fibula joint play. This subluxation is often the result of inversion ankle sprain.

*Adjustment:* Place the patient supine with the affected knee flexed. Stand lateral to the involved limb with your cephalad hand with the popliteal fossa. Apply a thenar-pad contact against the fibular head. For leverage, grasp the anterior aspect of the patient's lower leg with your caudad hand. Apply oblique pressure with your stabilizing hand to flex the knee and push the leg superiorly, while simultaneously briskly lifting the fibular head anteriorly with your contact hand to make the correction.<sup>3</sup>

Following the adjustment, application of physiologic therapeutics such as ultrasound or interferential and ice can be applied at the doctor's discretion. For overuse injuries and to correct biomechanical faults, I recommend custom-made, flexible orthotics to provide patients with a balanced, symmetrical foundation and relieve postural stress.

When pain allows, the patient should begin active care stretching and strengthening muscles. During the initial phases of treatment and during stressful activities, a wrap or tape could be applied as necessary to maintain joint integrity.

### References

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