Researchers describe a new anatomic structure in the ankle

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Describing this anatomic structure is now possible thanks to the analysis of fibers that link two of the lateral collateral ligament compounds. Also, for the first time, they have described one of the parts in this new structure as intra-articular. These results, published in the scientific journal *Knee Surgery, Sports Traumatology, Arthroscopy*, change the understanding of this joint and could explain why many ankle injuries produce chronic pain.

The team responsible for this discovery comprises staff from the Faculty of Medicine and Health Sciences of the UB, Jordi Vega, Francesc Malagelada, M Cristina Manzanares and Miquel Dalmau Pastor. The group specializes in the anatomy of the musculoskeletal system.

Fibers linking two ligaments as an only structure

Ankle lateral ligaments are the ones that receive the most injuries in the human body, especially due to ankle sprains. Moreover, many people who suffer from ankle sprains complain about lingering pain in the ankle, and are likelier to experience another sprain. This has not yet been explained medically.

"We saw that linking fibers between ligaments were usually removed because they were not associated with the ligament," says Miquel Dalmau Pastor, researcher from the Human Embryology and Anatomy Unit, and the Department of Pathology and Experimental Therapeutics of the UB.

According to the guidelines of human anatomy, the ligaments in the ankle are grouped by two ligament complexes: The first is the lateral collateral ligament in the side of the joint formed by three independent ligaments. The second is the medial or deltoid collateral ligament. In this new scientific study, the UB research team defined a new anatomical structure in the ankle, the lateral fibulotalocalcaneal ligament complex (LFTCL).

According to the new study, these fibers link the inferior fascicle (a set of ligamentous fibers) in the anterior talofibular ligament and the calcaneofibular ligament, two out of the three components in the lateral collateral ligament. "This connection has never been described, and contrary to what was thought, it suggests that both ligaments are a functional unit. That is, we could consider these two connected ligaments as an anatomic structure we
call lateral fibulotalocalcaneal ligament complex," says Dalmau Pastor.

This description of the ligament fits with some clinical publications showing good results of isolated repair of the anterior talofibular ligament in cases of injuries of the anterior talofibular ligament and calcaneofibular ligament. "These publications made us think that perhaps the calcaneofibular ligament could be repaired by repairing the anterior talofibular ligament, and this could only happen if there was some kind of connection between the ligaments," notes Jordi Vega.

**Implications in the evolution and treatment of the ankle sprain**

The careful dissection of the articular capsule in the ankle enabled the researchers to identify the intra-articular compound in the anterior talofibular ligament. According to the study, this ligament would be built by the superior and inferior fascicles—the superior fascicle lies within the joint and the inferior one is outside. This inferior fascicle, together with the calcaneofibular ligament and fibers, would form the fibulotalocalcaneal lateral complex, which would then be an extra-articular structure.

Describing that part of the anterior talofibular ligament is an intra-articular structure could have implications in the evolution and treatment of this kind of injury. "These findings suggest the behaviour after an injury will be similar to the other intra-articular ligaments, such as the twill, which are not able to cicatrize, and this causes the joint to remain unstable, and in many cases, it requires a surgical operation," says Miquel Dalmu-Pastor.

These results would explain why many sprains cause pain after the patient follows the treatment the doctor suggests. "Since the intra-articular ligament does not cicatrize, the instability of the joint produces pain, so these patients are likely to suffer from another sprain and develop other injuries in the ankle," says Francesc Malagelada.

Apart from the anatomic observation in the dissections carried out at the University of Barcelona, the researchers studied the behaviour of ligaments. "The superior fascicle in the anterior talofibular ligament, apart from being intra-articular, is not an isometric structure—that is, it relaxes when the foot is on a dorsal flexion, and it tenses when it is on a plantar flexion. However, the inferior fascicle, the arciform fibers and the calcaneofibular ligament, the described ligament complex, are extra-articular structures and are isometric, so that they are always taut," concludes Maria Cristina Manzanares.


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