Surgical Modalities versus Conservative Treatment for Acute Injuries of Lateral Ligament of Ankle.

A Systematic Review/META-ANALYSIS for Partial Fulfillment of Master Degree In Orthopaedics

By

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Shady Saleh Mohammed Ahmed

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List of Abbreviations

ATFL:	Anterior Talofibular Ligament.
CFL:	Calcaneofibular Ligament.
LCLs:	Lateral Collateral Ligaments.
MCLs:	Medial Collateral Ligaments.
OAR:	Ottawa Ankle Rules.
OLT:	Osteochondral lesion of talus.
PB:	Peroneus brevis
PTFL:	Posterior Talofibular Ligament.
RCT:	Randomized Control Trial
ROM:	Range of Motion.

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ABSTRACT

Background: Acute ankle sprain is a very common injury which comprises 80% of all ankle injuries. Acute ankle sprain affects almost exclusively the lateral ligamentous complex including ATFL followed by CFL, while PTFL is rarely of clinical significance.

Objective: To study the clinical trials in a Meta-analytical form, in order to compare surgical versus conservative treatments for the management of acute injuries of the lateral ligament complex of the ankle.

Materials and Methods: We performed this systematic review and meta-analysis in accordance to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and Meta-analyses Of Observational Studies in Epidemiology (MOOSE) statements. PRISMA and MOOSE are reporting checklists for Authors, Editors, and Reviewers of Meta-analyses of interventional and observational studies.

Results: In the present study, we searched Medline via PubMed, SCOPUS, Web of Science, and Cochrane Central Register of Controlled Trials (CENTRAL) from their inception till April 2019. The search retrieved 702 unique records. We then retained 48 potentially eligible records for full-texts screening. Finally, 14 studies (Total No. of patients=1896) were included in the present systematic review and meta-analysis

Conclusion: Starting a physiotherapy programme as early as possible is essential to control pain and swelling, to improve and maintain the range of motion, and to minimize the risk of stiffness and muscle wasting, which are the two decisive factors which delay patients from returning to their normal activities. Regardless of severity, surgery for acute ankle sprain is not recommended anymore.

Keywords: Anterior Talofibular Ligament¸ Lateral Collateral Ligaments, Medial Collateral Ligaments

Introduction

Ankle injuries are one of the most commonly encountered musculoskeletal injuries, making between 15% to 20% of sports-related injuries[1].

The ankle is supported laterally by the lateral ligament complex which is formed of anterior talofibular ligament (ATFL), calcaneofibular ligament (CFL) and posterior talofibular ligament (PTFL), while the medial aspect is supported by the deltoid ligament[2].

Forceful inversion of the plantar-flexed foot is the most common mechanism of ankle injury. Ankle sprains account for 80% of all ankle injuries [3, 4], of which 77% are lateral sprains. Traditionally, lateral ankle sprains are due to tear or rupture of the ATFL with equal distribution in both genders [5].

Many different treatment are used for acute ankle sprain, the two main modalities of treatment are:

1) Conservative treatment with plaster cast immobilization

2) Operative treatment [6].

Aim of the work

To study the clinical trials in a Meta-analytical form, in order to compare surgical versus conservative treatments for the management of acute injuries of the lateral ligament complex of the ankle.

Chapter One:

Anatomy

The ankle complex consists of the tibio-talar joint, the subtalar joint, and the distal tibiofibular syndesmosis, coordinating the hind-foot movements in the sagittal-plane motion (plantar flexion-dorsiflexion), frontal-plane motion (inversion-eversion), and transverse-plane motion (internal rotation-external rotation)[7].

1) ***Tibio-talar joint***, also known as talocrural joint formed by the articulation point between lateral and medial malleolus with the tibial plafond superiorly and the talus dome inferiorly. The lateral and medial malleoli constrain the talus rendering the joint functioning as a hinge joint with plantar- and dorsiflexion of the foot. Due to the joint geometry and its oblique rotation axis, it may have minimal transverse and frontal plane motions[8].

2) ***Subtalar joint,*** located between the calcaneus and talus bones, allowing for inversion and eversion of the ankle[8]. There are 4 ligaments stabilizing the subtalar joint. The interosseous talocalcaneal ligament is a strong broad band which plays a key role in linkage between calcaneus and talus bones. Also, cervical ligament has an important role in stabilizing the subtalar joint through resisting excessive subtalar joint supination. Dysfunction of either interosseous talocalcaneal or cervical ligaments result in subtalar

instability. Lateral and anterior talocalcaneal ligaments contribute with a lesser extent to the stability of subtalar joint as they are relatively weak[9].

3) ***Distal tibiofibular syndesmosis,*** located between distal tibia and fibula, allowing for limited movement between the 2 bones. It's supported by a thick interosseous membrane and inferior tibiofibular ligaments[9].

Ankle ligaments:

The ankle ligaments can be divided into three groups, depending on their anatomic position: the lateral collateral ligaments (LCLs), medial collateral ligament (MCL) also known as deltoid ligament, and the ligaments of the tibiofibular syndesmosis. The anterior talofibular ligament (ATFL), the calcaneofibular ligament (CFL), and the posterior talofibular ligament (PTFL) form the lateral collateral complex, while the medial collateral ligament is divided into superficial and deep fibers[10].

1) Lateral collateral ligaments:

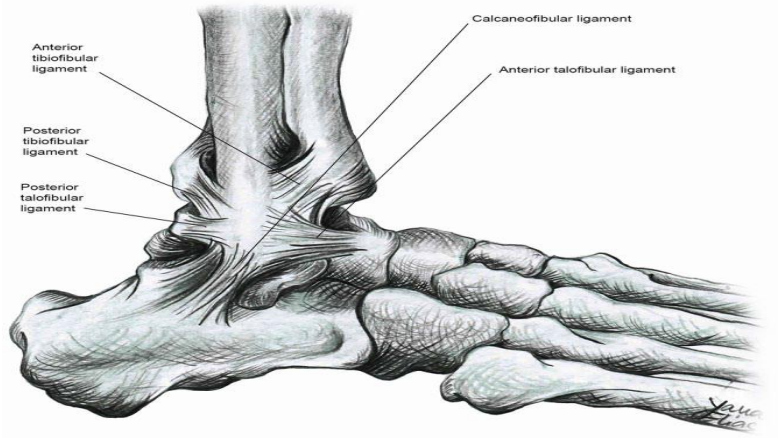

Fig. 1 Lateral collateral ligaments of the ankle joint. Three ligaments – the ATFL, CFL, and PTFL at the lateral aspect – support the tibio-talar joint, which is a hinge joint that allows dorsiflexion and plantarflexion[(11)].

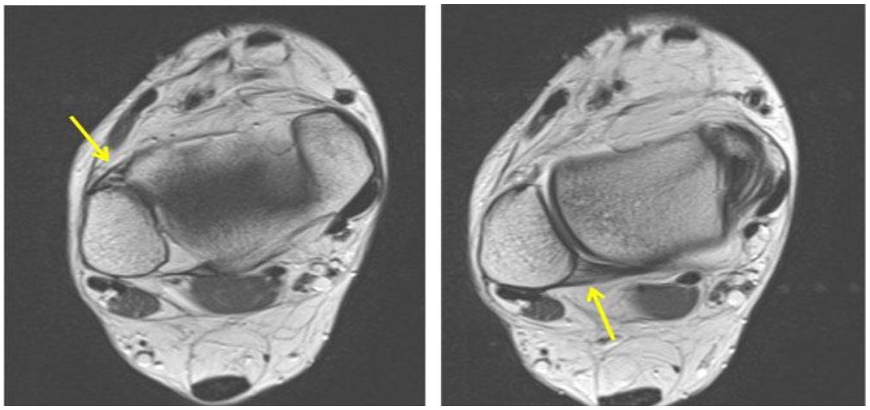

Fig. 2 MRI of lateral aspect of the ankle. a) ATFL is identified by the yellow arrow; b) PTFL is identified by the yellow arrow[(11)].

a) Anterior talofibular ligament (ATFL), which is the most commonly injured ligament of the ankle, especially when the foot is inverted[(11)]. Its main function is controlling and limiting the anterior displacement and plantar flexion of the talus. It originates at the anterior aspect of the lateral

malleolus and is connected directly to the ankle joint capsule. The ATFL is horizontal to the ankle in a neutral position, with upward incline in dorsiflexion and downward incline in plantar flexion[12,13].

b) Calcaneofibular ligament (CFL), originates from the anterior aspect of the lateral malleolus. It's located anatomically below the lower band of the ATFL. In a neutral ankle position, the CFL is directed downwards and backwards obliquely[14].

c) Posterior talofibular ligament (PTFL), originates from the malleolar fossa and runs horizontally to be inserted in posterolateral aspect of the talus. The ligament is in a relaxed state in the neutral and plantar flexion positions of the ankle, while it is tensed in dorsiflexion. The PTFL is rarely injured as it's formed of thick and strong fibers. The PTFL may be injured in ankle inversion sprains[15].

2) Medial collateral ligament:

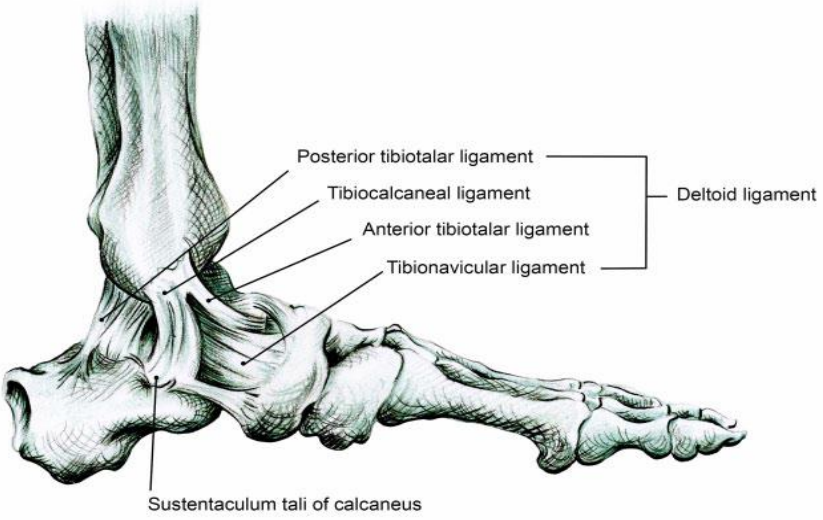

Fig. 3 The medial ligament of the ankle (deltoid ligament)[11].

MCL is composed of 6 bands divided into superficial layer (the tibiospring, tibionavicular, superficial posterior tibiotalar,and tibiocalcaneal ligaments) and deep layer (deep posterior tibiotalar, and deep anterior tibiotalar ligaments)[16]. MCL originates from the medial malleolus to insert in the talus, calcaneus, and navicular bones[10].

Muscles and tendons:

The peroneal brevis and longus muscles are crucial for protecting against lateral ankle sprain and controlling hind-foot supination[17]. There are peroneus tertius, extensor digitorum brevis, extensor digitorum longus and tibialis anterior muscles that provide support and stability for the lateral ankle complex through slowing the plantar-flexion supination[18].

Innervation:

The ankle complex is innervated by the sacral and lumbar plexuses. The sensory innervation to the muscles by the tibial, superficial peroneal, deep peroneal, saphenous and sural nerves, while the motor innervation to the muscles by the superficial peroneal, deep peroneal and tibial nerves[8].