Original Research Article

Do we need early ankle arthroscopy for the patients with acute lateral ankle instability

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ABSTRACT

Background: Lateral ankle injury is the most frequently encountered trauma in physically active populations. The general approach to acute lateral ankle instabilities is conservative treatment.

Methods: We investigated the effects of compliance to conservative treatment on permanent instability and other intra-articular pathologies and the outcomes of insufficiently treated lateral ankle instability. These patients underwent conservative treatment for at least 3 months. At the end of this period, anterior ankle arthroscopy was performed for patients who continued to report ankle problems. The patients were grouped according to compliance and noncompliance with conservative treatment.

Results: The rate of compliance for conservative treatment was 41.4%. Arthroscopy revealed that the rate of osteochondral lesions of the talus was 45.3%; 51.6% of the patients had partial or complete lateral ankle ligament injury. The rate of lateral ankle instability was significantly lower in patients who were compliant with conservative treatment (39.6% vs. 60%, p<0.05). Lateral ankle instability was accompanied by osteochondral defects in only 5 patients who were compliant with conservative treatment.

Conclusions: For ankle injuries associated with lateral ankle instability, conservative treatment can decrease instability levels and other pathologies, which may become chronic over time. However, arthroscopy may be required due to ankle pathologies accompanying instability and an early decision for arthroscopy may reduce the incidence of permanent lateral ankle instability.

Keywords: Ankle ligaments, Brace, Conservative treatment, Osteochondral lesion of talus, Rupture, Sprain

INTRODUCTION

Ankle injuries, especially lateral ankle injuries, are the most frequently encountered traumas in physically active populations.[1] When it is considered that approximately 23,000 people in the United States of America and 5,000 people in the United Kingdom are thought to have ankle injuries each day, the incidence of acute ankle inversion injuries is as high as 1/10,000 per day.[2] One-quarter of all injuries experienced by those engaged in athletics are associated with the ankle.[3] The most frequent mechanism of ankle injury is internal rotation of the ankle/foot complex caused by inversion.[1]

Although the rate of ankle injuries is very high, most of these patients can be treated with non-surgical methods. However, 40% of patients require surgical treatment.[4,5] Ankle instabilities may be classified as lateral, medial, and syndesmotic. Injuries of the anterior talofibular ligament (ATFL), posterior talofibular ligament (PTFL), and calcaneofibular ligament (CFL), which form the lateral ligament complex, constitute approximately 85%

of all ankle ligament injuries.[6] Early diagnosis and evidence-based treatment in lateral ligament injuries results in excellent outcomes in about 60% of patients. Traditionally, lateral ligament instabilities are classified into three grades: Grade I (mild): ligament stretch without macroscopic tearing, little swelling or tenderness, minimal or no functional loss, and no mechanical joint instability. Grade II (moderate): a partial macroscopic ligament tear with moderate pain, swelling, and tenderness over the involved structures. There is some loss of joint motion and mild-to-moderate joint instability. Grade III (severe): complete ligament rupture with marked swelling, hemorrhage, and tenderness. There is loss of function and marked abnormal joint motion and instability.[7] Although this historical classification adequately elucidates mechanical instabilities, there is no consensus on the clinical evaluation of functional instability in the lateral ligament complex of the ankle. Functional treatment in the management of ankle injury includes early mobilization, anti-edema therapy (rest, ice, compression, elevation), strengthening of the surrounding muscles, and proprioceptive rehabilitation.[8,9] Although no consensus has been reached in extensive follow-up instability studies, it has been reported that the ideal treatment would be early functional rehabilitation after 1-3 weeks of immobilization.[1,10,11]

Medication- and physiotherapy-resistant pain and mechanical and functional instability play a major role in surgical need.[3] In the literature, the most common causes of instability on arthroscopy in patients who continue to report ankle problems after trauma have been considered as proprioceptive inadequacy, peroneal tendon instability, and injuries of the lateral ligament complex of the ankle. Moreover, osteochondral lesions of the talus (OCLTs) have been associated with pain.[2,12,13] The ATFL has been found to be damaged in approximately 80% of acute lateral ankle instabilities. In the literature, the general approach to acute lateral ankle instabilities is conservative treatment.[14]

It was observed that isolated instability treatment did not reduce symptoms in patients who underwent conservative treatment whose symptoms of lateral instability did not improve.[15] There is a limited number of radiologic and arthroscopic studies reporting that OCLTs may also accompany lateral ankle instability after trauma in some patients.[12,16]

The effects of compliance to conservative treatment on chronicity of instability and other ankle problems associated with instability such as OCLT have not been extensively investigated in the literature. Our study investigated the effects of compliance to conservative treatment on permanent instability and other ankle pathologies. Our hypotheses were that appropriate conservative treatment given after lateral ankle instabilities could reduce rates of permanent instability and other comorbid pathologies, and that early decision-making for arthroscopy in patients with persistent ankle symptoms could reduce the incidence of permanent instability and other comorbid pathologies.

METHODS

This study included 128 patients who were admitted to two different hospitals due to acute ankle injuries between May 2014 and May 2017, had no fractures on direct radiograph were diagnosed as having lateral ankle instability at their first admission, and underwent ankle arthroscopy because they continued to experience ankle problems despite conservative treatment. The inclusion criteria for the study were being evaluated within 48 hours after acute trauma; being diagnosed as having lateral ankle instability according to physical examination; being aged 15-60 years; instability or joint ROM limitation at the end of at least 3-months follow-up, which disrupted normal life activities and acute pathologic magnetic resonance imaging findings as OCLT, ligament injuries, microfractures except bone marrow edema. The exclusion criteria for the study were as follows: no diagnosis of chronic lateral ankle instability, a history of recurrent ankle injuries, a history of previous trauma and persistent related symptoms, having a fracture or a pathology that required early surgery on radiograph, presence of a comorbid medial instability, and having rheumatologic or other comorbidities, which can lead to arthrosis.

Our study investigated the effects of compliance to conservative treatment on permanent instability and OCLTs and the effects of insufficiently treated lateral ankle instability on OCLTs and other ankle pathologies in patients.

Radiographs of the patient were taken by taking into account the Ottawa Ankle Rules.[17] After patients without fractures were evaluated for instability and other ankle problems, their treatment was organized.

The patients' files and radiographs were examined. All patients were assessed at first admission for the following inclusion criteria in a physical examination: marked ecchymosis, pain and tenderness in the lateral aspect of the ankle indicating instability or at least one of the inversion stress test, the anterior drawer test or the talar tilt test was positive. At least 1 weeks' treatment with an ankle-stabilizing orthosis was recommended for grade 1 injury. At least 3 weeks of ankle stabilizing orthosis treatment was recommended for grade 2 and 3 injuries. Anti-edema therapy and non-steroidal anti-inflammatory (NSAID) treatment were started. Physiotherapy was recommended for receiving early functional rehabilitation and for muscle strengthening with proprioceptive therapy. In our rehabilitation program, we recommend rest, ice, compression, and elevation for all patients as an immediate phase. Although there is general agreement that this is the best approach to an ankle sprain, we want our patients to avoid weight bearing for 24 hours or longer for severe sprains and to use crutches. Then, after

48 hours, gradually progress to full weight bearing as tolerated with grade 1 injuries with the help of ankle stabilizing orthosis for one week. For grade 2 and grade 3 injuries, we recommend ankle stabilizing orthosis use for 3 weeks. In our rehabilitation program, there are 5 main sections as range of motion/flexibility exercises, balance/proprioception exercises, progressive strength exercises, progressive endurance exercises, and agility/plyometric exercises.

Ankle arthroscopy was recommended for diagnostic and therapeutic purposes because the patients' symptoms did not improve within three months or more according to evaluations made in the outpatient clinic, or there were symptomatic pathologies (symptomatic OCLT, ligament injury, which can lead to lateral ankle instability, or anterior/posterior impingement) on magnetic resonance imaging (MRI). An arthroscopic surgery decision was made for diagnostic and therapeutic purposes due to the incompatibility of the rehabilitation program, brace use or the continuing symptoms in patients who were followed for at least 3 months.

Diagnostic ankle arthroscopy was performed from the standard medial and lateral portals during arthroscopy. Then, pathologies, OCLT, and lateral instabilities that may cause anterior impingement were evaluated. Patients were excluded from the study if there was medial instability accompanying lateral instability. The injured ligament in patients with lateral ankle instability was evaluated according to three different structures: elongation, partial rupture, and total rupture.

The patients' files, arthroscopy records, imaging results, and operative notes were examined retrospectively. The effectiveness of conservative treatment in ankle instabilities, other pathologies that may accompany traumas causing instability, and possible surgical need were investigated.

The IBM SPSS statistics package version 22 was used for statistical analysis. The Chi-square test was used to examine the relation of instability and OCLT with compliance to conservative treatment and to make the other binary assessments. A $p<0.05$ was considered statistically significant. Mean and standard deviation values were calculated for all variables, and frequency values were calculated using the same software.

RESULTS

The patients' sociodemographic data, affected sides after trauma, rates of compliance with conservative treatment, and arthroscopy results are presented in Table 1.

Of the 128 patients included in the study, 43.8% (n=56) were female and 56.2% (n=72) were male. The mean age of the patients was 35.9±9.42 years.

Table 1: The demographic characteristics and arthroscopy results of the patients.

Characteristics	Category	N	%
Sex	Female	56	43.8
	Male	72	56.2
Age (groups) (years)	15-30	37	28.9
	30-40	51	39.8
	41-60	40	31.3
Anterior impingement	Negative	17	13.3
	Positive	111	86.7
Posterior impingement	Negative	102	79.7
	Positive	26	20.3
Injury side	Right	74	57.8
	Left	54	42.2
Conservative treatment	Negative	75	58.6
	Positive	53	41.4
Compliance			
OCLT	Negative	70	54.7
	Positive	58	45.3
Location of OCLT	None	70	54.7
	Medial	48	37.5
	Lateral	9	7.0
	Medial/Lateral	1	0.8
Instability on arthroscopy	Negative	62	48.4
	Positive	66	51.6
Toplam		128	100.0

Table 2: The effect conservative treatment compliance on OCLT and instability.

Conservative treatment						
	Negative		Positive			
Parameters	N	%	N	%	z/t	P
Patients	75	58.6	53	41.4		
Instability	45	60.0	21	39.6	5.163	<0.05
OCLT	40	53.3	18	34.0	4.702	<0.05
OCLT+instability	29	38.7	5	9.4	13.732	<0.05

OCLT: Osteochondral lesion of talus.

Table 3: The relations between conservative treatment, OCLT, and instability.

OCLT	Parameters instability	Conservative treatment	N	%
0	0	0	19	14.8
1	1	1	5	3.9
0	1	0	16	12.5
0	1	1	16	12.5
0	0	1	20	15.6
1	0	0	11	8.6
1	1	0	29	22.7
1	0	1	12	9.4
Total			128	100.0

"0" means negative; "1" means positive.

When the patients were evaluated for compliance to conservative treatment (at least 1-3 weeks of ankle stabilizing orthosis), the rate was 41.4% (n=53).

According to arthroscopy results; a total of 45.3% had OCLT, and 82.7% of the lesions were located in the medial talar dome. Of the patients included in the study, 48.4% had no lateral instability on arthroscopy and 51.6% had partial or complete lateral ankle ligament injury. 86.7% had anterior impingement with physical examination at the end of at least 3 months' follow-up. The rate of anterior impingement accompanying instability was statistically significantly higher (p=0.003). It was found that posterior impingement symptoms were less frequent in patients with lateral ankle instability (20.3%) and were more frequent in patients aged over 40 years.

The rate of lateral ankle instability was significantly lower in the patients who were compliant with conservative treatment compared with noncompliant patients (39.6% vs. 60%, p=0.023). Similarly, the rate of osteochondral defects of the talus was significantly lower in the conservative treatment group (34% vs. 53.3%, p=0.03) (Table 2). It was found that the rate of OCLT was 45.3% (p=0.1). Lateral ankle instability was accompanied by osteochondral defects in only 5 patients who were compliant with conservative treatment. This comorbidity rate was significantly lower in the conservative treatment group (9.4% vs. 38.7%, p=0.003). The rates of conservative treatment accompanying instability and OCLTs in the different groups are shown in Table 3.

DISCUSSION

The aim of our retrospective study was to arthroscopically evaluate the effects of conservative treatment on instability and other possible ankle injuries in patients who were admitted after trauma and were diagnosed as having acute lateral ankle instability.

Lateral ankle instability after trauma is a clinical condition that is more common than predicted, especially affects the young and athletic population, cannot be treated sufficiently in the early stages, but may cause serious ankle problems. In the literature, the importance of conservative treatment has been emphasized in patients suspected of lateral ankle instability. In a meta-analysis study conducted by Gribble et al, it was reported that the annual rate of lateral ankle injuries that might occur after inversion injury, especially in internally rotated ankles, was 0.27% and 1.3% of the total population in large-scale studies, and that approximately 50% of these patients did not receive adequate conservative treatment.[1] In the same study, the early-, mid- and late-term economic outcomes of insufficiently treated lateral ankle instabilities were examined. It was observed that the mid-term treatment costs increased about 7 times in patients who were not treated sufficiently in the early period, and that the late-term treatment costs increased about 95 times in patients who were not treated sufficiently in the early- and mid-term period.[1]

Our study findings suggest that early diagnosis and treatment are important. The importance of conservative treatment has been also emphasized. One can conclude that making an early decision for arthroscopy without

waiting at least three months for the chronic process in appropriate patient populations is positive both in terms of patient recovery and cost, in accordance with the literature.

In a study of Karlsoon et al, ankle instabilities were divided into mechanical and functional instability.[18] Functional instability was defined as subjective symptoms with or without trauma where the lateral ligament complex could be injured. Functional instability was thought to be the most serious and permanent problem of the ankle. In our study, there were no fractures on radiography but there were findings of ecchymosis, pain, and tenderness in the lateral aspect of the ankle. At least one of the inversion stress tests, the anterior drawer test or the talar tilt test was positive. The patients' symptoms increased with inversion. After functional instability was diagnosed, treatment planning was performed.

In a study of Malliaropoulos et al, the authors classified lateral instability into three stages in which functional instability could be evaluated.[19] The patients had no fractures on radiography. Lateral instability was diagnosed according to physical examinations and stress tests. They concluded that lateral instability including ATFL injury existed at a rate of 80%, especially in inversion and internal rotation injuries. Our study included patients who were evaluated within 48 hours of trauma and diagnosed as having lateral instability and underwent ankle arthroscopy because they continued to report ankle problems. In our study, 48.4% of the patients had no lateral instability on arthroscopy. This rate was found to be significantly lower in patients who were compliant with conservative treatment than in noncompliant patients. The rate of permanent instability was found to be approximately 2 times higher in noncompliant patients. It was observed that effective conservative treatment significantly reduced the rate of permanent ankle instability.

In a study of Bleakley et al, who analyzed 72 studies on conservative treatment, the authors revealed that NSAIDS, antiedema therapy, cold treatment, and an optimal immobilization period significantly reduced early symptoms in patients with lateral ligament instability after trauma and decreased the risk of lateral ligament injury by helping to heal the ligament complex.[10] Prado et al investigated functional treatment in lateral ankle instabilities in 186 patients; all patients received conservative treatment.[20] The authors showed that functional scores were high in early rehabilitated patients, that pain did not change according to the type of braces, and that mechanical instability did not change significantly according to the type of conservative treatments.

All patients included in our study were evaluated within 48 hours of trauma if needed. One to three weeks of functional bracing were recommended for the patients.

Functional rehabilitation and anti-edema therapy were added to their treatment programs. The treatment given to our patients was similar to the literature. However, patient compliance with conservative therapy was shown to have better outcomes in the removal of conditions that could lead to instability than in noncompliant patients. However, it is understood that conservative treatment is not effective enough for mechanical instability, particularly in grade 2 and 3 injuries.[7]

Marked instability was observed in 51.5% of patients who had instability on arthroscopy. The cause of this instability was the presence of partial rupture and elongation in the ATFL in 88% of patients (n=58). Five of these patients underwent arthroscopic repair with anchor sutures, the remaining patients underwent arthroscopic debridement and bracing. Four patients who were thought to have a total rupture of the ATFL underwent reconstruction with the modified Brostrom method.[21] The other 4 patients who were thought to have a partial injury to the ATFL and CFL underwent debridement and bracing.

Hertel et al investigated functional problems that might accompany lateral ankle injuries and reported that anterolateral impingement might occur due to mechanical damage caused by synovial hypertrophy and chondral fragments after lateral ligament injury.[11] The authors suggested early surgical decompression. In our study, a high proportion (86.7%) of 111 patients had anterior impingement. In accordance with the literature, it was concluded that an early decision for arthroscopy at the end of at least 3 months' follow-up was positive in terms of patient comfort and lateral impingement.

Hintermann et al conducted a study in 148 patients with chronic ankle instability, and ankle arthroscopy revealed that 86% of patients had ATFL injury and 66% of patients had cartilage damage.[3] The reason that the rate of OCLT was lower in our study than in the literature was considered to be related with the fact that arthroscopy was performed without exposure to recurrent trauma because the current instability did not become chronic. In a study by Lee et al in which arthroscopic evaluations of OCLTs were made, the rate of OCLT showed a statistically significant increase in patients with chronic lateral ankle instability, 64% of lesions were located in the medial talar dome, and that the rate of OCLT was significantly higher on the medial side than on the lateral side (p<0.01).[22] Our finding that 82.7% of the lesions were located in the medial talar dome (p<0.01) is similar to the literature.

The rate of OCLT in patients with instability in our study (45.3%) was found to be lower than in the literature. The main reason for this situation was considered as the fact that arthroscopic studies on instability in the literature were often performed 6 months after trauma and ligament injury becomes chronic during this time; OCLT can be increased due to recurrent rotational trauma. In

accordance with the literature, OCLTs in our study were frequently located in the medial talar dome. In this situation, it has been reported that rotational traumas that might cause lateral instability would cause crushing in the medial part of the ankle known as the shoulder region.[12]

The fact that the coexistence of OCLT and instability was significantly lower in patients who were compliant with conservative treatment than in noncompliant patients shows that early diagnosis and appropriate conservative treatment would improve recovery and reduce comorbidities, except for ankle instability, in patients with functional and mechanical instability. Conservative treatment including antiedema therapy, bracing, and early functional rehabilitation must be necessary for ankle injury associated with instability without fracture, regardless of functional or mechanical instability. Conservative treatment can decrease the level of instability, which may become chronic over time, and can improve recovery. However, arthroscopy may be required due to reasons such as ankle impingement syndrome, OCLT or instability. It was concluded that making an early decision for arthroscopy during the evaluation of instability (3 months or more) would be correct because secondary traumas might occur and chronicity would increase. Surgical treatment in addition to appropriate conservative treatment may reduce the amount of instability and severity of associated injuries.

Increasing the number of participants and evaluating early and late arthroscopy results together in patients undergoing similar treatment may be more valuable for subsequent studies.

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