Ankle Arthroscopy for Diagnosis of Full-thickness Talar Cartilage Lesions in the Setting of Acute Ankle Fractures

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Purpose: To delineate the prevalence of chondral lesions, in particular full-thickness talar dome lesions, with concurrent arthroscopy in acute ankle fracture open reduction−internal fixation (ORIF) and evaluate the impact on clinical outcomes. **Methods:** We conducted a retrospective chart review of prospectively collected registry data at our institution from 2012 to 2016. Consecutive patients who underwent acute ankle fracture ORIF with concurrent arthroscopy were identified. Charts were reviewed to determine the prevalence and grade of chondral lesions, fracture type, and associated factors. Clinical outcomes with a minimum of 1 year of follow-up were assessed using the Foot and Ankle Outcome Score. **Results:** The study included 116 consecutive patients undergoing acute ankle fracture ORIF with concurrent arthroscopy. A chondral lesion was identified in 78% (90 of 116). A full-thickness talar dome chondral lesion was identified in 43% of these patients (39 of 90). Patient age was a significant predictor, with patients younger than 30 years being less likely to have a chondral injury than those aged 30 years or older (59% vs 85%, $P = .0077$). Of the patients who sustained a dislocation at the time of injury, 100% had a chondral lesion ($P = .039$). Patients with complete syndesmosis disruption and instability were also more likely to have a chondral lesion (96% vs 73%, $P = .013$). Patients with chondral lesions had statistically significantly worse clinical outcomes than those without them (Foot and Ankle Outcome Score, 81.2 vs 92.1; $P = .009$). **Conclusions:** Ankle arthroscopy performed concomitantly with ankle ORIF is a useful tool in diagnosing chondral injuries. Chondral lesions are common with ankle fractures. An ankle with a dislocation at presentation or a syndesmotic injury may be more likely to present with a chondral lesion and should thus prompt evaluation. The presence of a talar chondral injury may be associated with a negative impact on clinical outcomes. **Level of Evidence:** Level IV, therapeutic case series.

Ankle fractures occur in 0.1% to 0.2% of the population every year and are one of the most common injuries treated by orthopaedic surgeons.[1,2] Unstable ankle fractures are most commonly treated with open reduction−internal fixation (ORIF), which has consistently been shown to yield good to excellent results.[2,3] However, there are still cases in which, despite achieving a perfect anatomic reduction, patients report persistent pain, and post-traumatic arthritis has been reported to develop in 14% to 50%.[4-7]

The residual pain and potential progression to osteoarthritis in some ankle fractures may be due, in part, to the presence of chondral injury or osteochondral lesions (OCLs) that occur concurrently with the initial fracture.[1,8] Trauma is the leading cause of OCLs, and the association between OCLs and trauma has been reported to be between 23% and 79%.[4,8-11] There is a known relation between OCLs and ankle fractures,[1,2,4,9,12,13] and these OCLs are thought to contribute to postoperative pain, loss of function of the ankle, locking and catching, and early osteoarthritis after ORIF of ankle fractures.[1,5,7,8,12,14]

Despite the high incidence of OCLs associated with ankle fractures, there are relatively few studies that

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have examined this relation, and there is little consensus regarding whether OCLs should be addressed acutely and, if necessary, treated concurrently at the time of ORIF.[1] In part, the lack of agreement results from the fact that OCLs are not always symptomatic,[8] and furthermore, the cause of pain from OCLs is widely unknown.[8] In addition, deciding whether to treat an OCL is complicated by the challenge in accurately diagnosing this lesion. Varied methods of nonoperatively diagnosing OCLs exist, including standard anteroposterior, lateral, and mortise ankle radiographs; computed tomography (CT) scans; and magnetic resonance imaging (MRI).[15] OCLs can be hard to visualize on radiographs and are frequently missed, leading physicians to use more advanced diagnostic options.[10,16] MRI can be useful for identifying subchondral lesions but is less reliable in identifying pure chondral lesions.[17] T2-weighted MRI has shown success in determining degenerative and reparative tissue quality and can show pore signals in the subchondral layers, articular surface signals, and margin signals.[15] However, these signals do not necessarily represent an OCL.[13] CT scans have been shown to be as reliable as MRI in detecting OCLs in patients with chronic ankle pain, given that they can help show sclerosis, micropores, honeycombs, and cysts,[15] but they cannot visualize pure chondral lesions alone.[16] Although both of these advanced imaging methods have advantages and disadvantages, some authors have advocated the use of ankle arthroscopy as a better diagnostic tool because it allows for direct visualization of an OCL, identifies pure chondral lesions, and if needed, allows the surgeon to concurrently treat the lesion in the setting of acute ankle fracture.[2,5,6,10,12,18,19]

In the knee, ORIF with the use of arthroscopy to investigate and treat OCLs is becoming more popular to help diagnose and treat chondral injuries that are otherwise easily missed.[12] In the setting of an acute ankle fracture, however, using arthroscopy as a way to inspect the ankle for associated OCLs and treat any findings is not standard practice, although it may be indicated.[1,6,12,18,19] The use of arthroscopy at the time of ankle fracture ORIF remains rare for a number of reasons, including the wide variety in the reported incidence of OCLs associated with ankle fractures, evidence suggesting that OCLs have no significant effect on clinical outcome scores,[2,4,16] and the paucity of literature examining the potential benefit. In a 2016 systematic literature review comparing traditional ORIF with arthroscopically assisted ORIF, the authors found that there is fair-quality evidence that ankle arthroscopy can be used for the identification and treatment of OCLs associated with acute ankle fractures but found insufficient evidence to show that arthroscopically assisted ORIF helps improve patient outcomes more than traditional ORIF.[2]

The aim of this study was to delineate the prevalence of chondral lesions, in particular full-thickness talar dome lesions, with concurrent arthroscopy in acute ankle fracture ORIF and evaluate the impact on clinical outcomes. We hypothesized that the presence of a chondral injury would have a negative impact on clinical outcomes in patients after ankle fracture ORIF when compared with patients without evidence of a chondral injury.

Methods

Study Design

This was a single-center retrospective study conducted from prospectively collected registry data at our institution. All cases were performed by the lead investigator (M.C.D.), an orthopaedic surgeon fellowship trained in both foot and ankle surgery and sports medicine surgery. We included all consecutive cases of acute ankle ORIF with concurrent arthroscopy performed by the lead investigator from 2012 to 2016. We excluded patients with concomitant injuries, fractures treated greater than 4 weeks from the time of injury, cases of revision surgery, nonunions, and patients with known previous ankle pathology. Charts were identified and reviewed to determine the prevalence, grade, and location of chondral lesions; patient and fracture characteristics at the time of presentation; and clinical outcomes. The study took place at the Hospital for Special Surgery and was approved by the institution's Foot and Ankle Registry, which is approved by our Institutional Review Board.

Study Population

One hundred sixteen consecutive patients undergoing acute ankle fracture ORIF with concurrent arthroscopy met the inclusion criteria and were screened against the exclusion criteria. Complete chart, arthroscopic imaging, and radiographic review was performed for all included cases. Fracture type by the Lauge-Hansen classification, as well as by anatomic location, was determined. The presence of a dislocation at the time of injury, unstable syndesmosis injury, or deltoid ligament injury was recorded. Syndesmosis and deltoid ligament injuries were assessed radiographically preoperatively and confirmed intraoperatively by a stress test performed under fluoroscopy, as well as by direct visualization arthroscopically. Baseline patient characteristics are summarized in Table 1.

Surgical Protocol

The surgical protocol was similar for all patients. A single dose of preincision antibiotics was administered. A tourniquet was applied to the upper thigh and inflated to 250 mm Hg. Ankle arthroscopy was performed first. The patient was positioned supine with a

Table 1. Baseline Patient Characteristics

	All Patients (N = 116)	Patients With Chondral Lesion (n = 90)	Patients Without Chondral Lesion (n = 26)
Age, mean (range), yr	42.7 (17-72)	44.4 (17-72)	36.7 (18-64)
M/F sex, n	66 (56.9%):50 (43.1%)	50 (55.6%):40 (44.4%)	16 (61.5%):10 (38.5%)
Fracture type by Lauge-Hansen classification, n			
SER	87 (75%)	67 (74.4%)	20 (76.9%)
PER	27 (23.3%)	22 (24.4%)	5 (19.2%)
SA	1 (0.8%)	0 (0.0%)	1 (3.8%)
PA	1 (0.8%)	1 (1.1%)	0 (0.0%)
Fracture type by anatomic location, n			
Lateral malleolus	46 (39.7%)	32 (35.6%)	14 (53.8%)
Bimalleolar	24 (20.7%)	20 (22.2%)	4 (15.4%)
Trimalleolar	36 (31.0%)	30 (33.3%)	6 (23.1%)

F, female; M, male; PA, pronation-abduction; PER, pronation—external rotation; SA, supination-adduction; SER, supination—external rotation.

bump under the hip. Given the ease of joint entry in an unstable ankle fracture, ankle distraction was not required in any case. A standard anteromedial portal was first made and the arthroscope inserted. An anterolateral portal was then made under direct visualization. A diagnostic arthroscopy was initially performed, in which the presence, location, and grade of chondral lesion were identified (Fig 1), in addition to the presence of any other intra-articular pathology including a deltoid tear, anterior-inferior tibiofibular ligament tear, or posterior-inferior tibiofibular ligament tear. The decision on the type of treatment for cartilage lesions was made intraoperatively based on lesion grade and size. Chondral lesion treatments included debridement, chondroplasty, or microfracture with bone marrow aspirate concentrate with or without augmentation with an extracellular cartilage matrix derived from allograft cartilage (Biocartilage; Arthrex, Naples, FL), which only became available for use at our institution in 2015. Smaller, partial-thickness lesions underwent debridement or chondroplasty, whereas larger, full-thickness lesions typically underwent microfracture with bone marrow aspirate concentrate with or without Biocartilage.

Once arthroscopy was complete, the leg was removed from the leg holder, and ORIF of the fracture was then performed. Posterior malleolus fixation was performed for a fragment of greater than 25% of the articular surface. This was performed through a posterolateral approach with a posterior plate and screw construct. The fibular fracture was addressed through either the posterolateral approach or a direct lateral approach. Fibular fixation was achieved with 1 or multiple lag screws when possible, followed by a lateral neutralization plate. A medial malleolar fracture was addressed through a standard direct medial approach to the medial malleolus. Fixation was achieved by either 2 parallel partially threaded screws, a plate and screw construct, or a tension-band construct. A syndesmosis stress test was performed, and fixation with either parallel screws or a TightRope (Arthrex) was performed if deemed unstable.

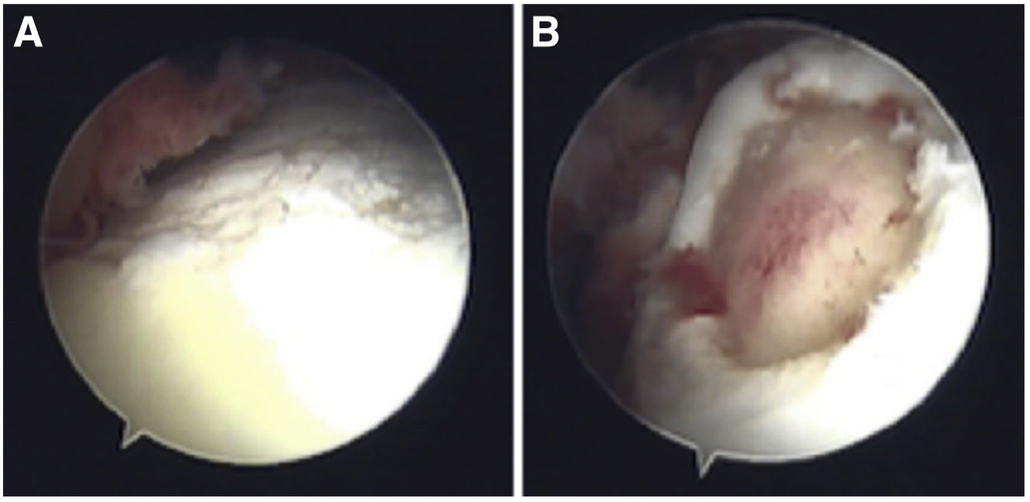

Fig 1. Arthroscopic images showing an example of a partial-thickness chondral lesion (A) versus a full-thickness chondral lesion (B).

Postoperatively, all patients remained non–weight bearing for a minimum of 6 weeks. All patients underwent placement of a splint for 2 weeks, followed by a pneumatic compression boot. Patients were assessed at 2 weeks, 6 weeks, and 3 months postoperatively. Range of motion was started at 2 weeks postoperatively. Final follow-up was obtained at the time of this study.

Outcome Measures

The prevalence of talar dome chondral injuries was determined. The chondral lesion grade, as described by the arthroscopic classification of Loren and Ferkel,[19] was determined based on the operative report and arthroscopic images. The presence of a chondral lesion was also determined based on patient age, fracture type, history of dislocation, presence of a syndesmotic injury, and presence of a deltoid ligament injury. Patient age was stratified into 3 groups to allow for comparison. Age younger than 30 years was chosen to represent the younger cohort, and age between 30 and 50 years and age greater than 50 years represented older cohorts.

The clinical outcomes in patients with a minimum of 1 year of follow-up were assessed. The Foot and Ankle Outcome Score (FAOS) was used to assess clinical outcomes comparing patients with talar dome chondral lesions and patients without such lesions. Subanalysis based on the presence of a full-thickness talar dome chondral lesion and based on the type of treatment performed for the lesion was also conducted to determine the significance on clinical outcomes. The FAOS is a validated patient-administered survey that looks at 5 domains: pain, other symptoms, function in daily activities, function in sports and recreation, and quality of life (QOL). For each subscale, a normalized score is calculated, with 0 indicating extreme symptoms and 100 indicating no symptoms. The score has been validated for use in several specific foot and ankle pathologies.[20-23] The score has also been found to have sufficient reliability and validity in a large-cohort, registry-based study that included various foot and ankle pathologies, with high internal consistency and high test-retest reliability.[24]

Statistical Analysis

Patients were grouped by whether they had a chondral injury or not. Preoperative and postoperative outcome scores were compared within groups. In addition, groups were compared regarding both preoperative and postoperative scores. We used χ^2 and *t* tests to compare categorical and continuous variables, respectively. $P < .05$ was considered statistically significant. All analyses were performed using STATA statistical software (version 14.2; StataCorp, College Station, TX).

Results

Prevalence of Chondral Lesions

Of the 116 patients who underwent acute ankle fracture ORIF with concurrent arthroscopy, 90 (78%) were identified to have a chondral lesion. Among these, 83 of 90 (92%) had talar dome involvement and 39 of 90 (43%) were identified to have a full-thickness talar dome lesion. The most common location of a talar dome chondral lesion was anteromedial (37 of 83, 46%), followed by anterolateral (16 of 83, 19%), central medial (12 of 83, 14%), and central lateral (7 of 83, 8%). Of the patients with a chondral lesion who did not have a talar dome chondral lesion, 7 were identified to have a more significant chondral defect at the level of the fracture site that could not be restored with anatomic reduction (Table 2). Although these fractures were intra-articular in nature, there was no significant chondral defect or damage in the remaining 26 of 116 patients.

Among patients who presented with a history of dislocation requiring a closed reduction at the time of injury, a chondral lesion was present in 100% (20 of 20). This was statistically significant when compared with patients who did not sustain a dislocation ($P = .039$). Patient age was a significant predictor, with patients younger than 30 years being less likely to have a chondral injury than those aged between 30 and 50 years and those older than 50 years (59% vs 90.5% and 78.6%, respectively; $P = .0077$). Patients with complete syndesmosis disruption and instability were more likely to have a chondral lesion than those without them (96% vs 73%, $P = .013$). Fracture type either by the Lauge-Hansen classification or by anatomic location did not show significance in the prevalence of chondral lesions. The presence of a deltoid ligament injury was also not a significant factor (Table 3).

Clinical Outcomes

There were 70 patients with a minimum of 1 year of follow-up available for review. The average time to follow-up was 20.8 months, with a range of 12 to 49 months. All patients included in the study showed significant improvement in the FAOS from preoperatively to postoperatively (30.0 vs 83.5, $P < .001$). Patients in whom a chondral lesion was present had a statistically significantly worse total FAOS than patients who did not have a chondral lesion (81.2 vs 92.1, $P = .009$). In addition, patients with a chondral lesion had statistically significantly worse values for all subcategories of the FAOS, including pain (82.9 vs 93.9, $P = .02$), other symptoms (73.4 vs 86.7, $P = .014$), function in daily activities (88.9 vs 97.3, $P = .016$), function in sports and recreation (68.5 vs 87.0,

Table 2. Patients Presenting With Non–Talar Dome Chondral Lesion

	Lesion Location	Lesion Grade
Patient 1	Lateral malleolus	Grade 3
Patient 2	Lateral malleolus	Grade 4
Patient 3	Lateral malleolus	Grade 4
Patient 4	Medial malleolus	Grade 4
Patient 5	Medial malleolus	Grade 4
Patient 6	Lateral malleolus, medial malleolus	Grade 4, grade 4
Patient 7	Tibial plafond	Grade 1

P = .013), and QOL (64.5 vs 82.3, P = .016). Patients with a full-thickness lesion were found to have a decrease in postoperative QOL scores compared with those without a full-thickness lesion (58.5 vs 73.3, P = .022). Otherwise, there was not a significant difference in pain, other symptoms, function in daily activities, or function in sports and recreation when comparing patients with a full-thickness lesion and patients without a full-thickness lesion among those with chondral injuries (Table 4).

Clinical outcomes in patients with a chondral injury were also assessed and compared based on the type of treatment the lesion underwent, including either debridement alone, chondroplasty, or microfracture with or without Biocartilage as an adjunct. However, the sample size of patients with greater than 1 year of follow-up was not sufficient to determine clinical or statistical significance.

Discussion

The most significant finding of this study shows that the use of concurrent arthroscopy at the time of ankle fracture ORIF allows for acute diagnosis of osteochondral and chondral injuries. In addition, we have shown important patient and fracture factors that are more likely to present with a chondral injury and have shown that the presence of a chondral injury may be associated with a negative impact on clinical outcomes.

Acute displaced ankle fractures treated surgically with ORIF may still be associated with poor clinical outcomes despite achieving an anatomic reduction and in the absence of complications. This may be due, in part, to the presence of a chondral injury. The prevalence of a chondral injury associated with an acute ankle fracture has previously been reported with a highly variable range, largely because of the diagnostic method used. Historically, many surgeons have relied primarily on imaging, in particular CT scans and MRI scans, to diagnose OCLs associated with trauma. Nosewicz et al.[16] used CT scans to investigate the prevalence of OCLs and noted that CT scans have the disadvantage of being unable to visualize chondral lesions. They reported that CT is as reliable as MRI in diagnosing OCLs, but because of the inability of CT scans to detect isolated chondral lesions, it is likely that relying on CT alone would lead a surgeon to underestimate the prevalence of OCLs.[16] Multiple authors have reported on the limitations of using MRI, which include that MRI may overestimate the extent and prevalence of OCLs,

Table 3. Injury and Patient Factors Associated With Presence of Chondral Lesion

	n	Presence of Chondral Lesion (n)	Absence of Chondral Lesion (n)	P Value
Fracture type				
Lateral malleolus	46	69.6% (32)	30.4% (14)	.348
Medial malleolus	2	50.0% (1)	50.0% (1)	
Bimalleolar	24	83.3% (20)	16.7% (4)	
Trimalleolar	36	83.3% (30)	16.7% (6)	
Maisonneuve	8	87.5% (7)	12.5% (1)	*
Fracture type by Lauge-Hansen classification				
SER	87	77.0% (67)	23.0% (20)	.398
PER	27	81.5% (22)	18.5% (5)	
SA	1	0% (0)	100% (1)	
PA	1	100% (1)	0% (0)	
Deltoid injury present				
Yes	55	74.5% (41)	25.5% (14)	.013
No	61	80.3% (49)	19.7% (12)	
Syndesmotic disruption				
Yes	25	96.0% (24)	4.0% (1)	.013
No	91	72.5% (66)	27.5% (25)	
Dislocation at time of injury				
Yes	13	100% (13)	0% (0)	.039
No	103	74.8% (77)	25.2% (26)	
Age at time of surgery				
<30 yr	32	59.4% (19)	40.6% (13)	.008
≥30 yr	84	84.5% (71)	15.5% (13)	

PA, pronation-abduction; PER, pronation–external rotation; SA, supination-adduction; SER, supination–external rotation.

*Included in syndesmotic disruption analysis.

Table 4. Postoperative Mean FAOS Clinical Outcomes Comparing Patients With and Without Presence of Chondral Lesion With Minimum of 1 Year of Follow-up

	Patients With Chondral Lesion (n = 55)	Patients Without Chondral Lesion (n = 15)	*P* Value
Overall FAOS	81.2 ± 15.0	92.1 ± 8.2	.009
FAOS domains			
Pain	82.9 ± 16.8	93.9 ± 8.1	.020
Other symptoms	73.4 ± 19.5	86.7 ± 10.1	.014
Function in daily activities	88.9 ± 12.8	97.3 ± 6.5	.016
Function in sports and recreation	68.5 ± 26.9	87.0 ± 14.2	.013
Quality of life	64.5 ± 26.0	82.3 ± 18.1	.016

NOTE. Data are presented as mean ± standard deviation. $P < .05$ was considered statistically significant.
FAOS, Foot and Ankle Outcome Score.

as well as its potential to identify subchondral lesions but sometimes miss chondral lesions.[13,17] Takao et al.[17] found OCLs in 70.6% of patients with the use of MRI scans, whereas Regier et al.[13] found only a 40.4% prevalence using MRI. Monden et al.[15] compared CT, MRI, and arthroscopy to examine OCLs in 29 patients. They concluded that although MRI and CT can detect signals and signs indicative of an OCL, arthroscopy is ultimately the most reliable way to assess OCLs because of the direct visualization the surgeon has when performing arthroscopy. Loren and Ferkel[19] were some of the first authors to report on using arthroscopy concurrently with ORIF when treating ankle fractures, in a study including 48 patients. They reported a prevalence of OCLs and chondral defects of 63%, with the majority being localized to the talus. In our study we used arthroscopy to diagnose OCLs. Given the varied reports and known limitations of using imaging alone, we believe that arthroscopy is a superior diagnostic method that provides a more accurate report on the prevalence of OCLs, including pure chondral lesions, and allows for acute treatment if an OCL is found.

Identifying patient and fracture characteristics at the time of presentation that may be associated with a chondral injury should raise suspicion and prompt investigation. Loren and Ferkel[19] found a statistically significant association between syndesmosis disruption and the presence of a chondral lesion. In addition, they found that a medial malleolar fracture or deltoid ligament disruption was not a significant factor. Boraiah et al.[4] found OCLs to be most common with a supination injury associated with a trimalleolar fracture. Leontaritis et al.[5] reported on 84 patients treated with ORIF and arthroscopy and found pronation—external rotation or supination—external rotation type IV fractures to be statistically significantly ($P < .05$) more likely to be associated with OCLs than type I fractures. Aktas et al.[1] examined 86 fractures and found that of fractures with chondral lesions, 4 of 27 were bimalleolar fractures, 6 of 15 were trimalleolar fractures, 14 of 20 were distal fibular fractures, and 8 of 19 had deltoid tears. The only group to reach statistical significance was the distal fibular fracture group. Regier et al.[13] studied displaced ankle fractures in 100 patients with postoperative MRI to diagnose the presence of an OCL. They determined that patients with a trimalleolar fracture and a history of ankle dislocation had a significantly higher risk of an OCL developing. In our study we did not find that fracture type or the presence of a deltoid injury was a significant factor. However, we found that in all patients who presented with a history of dislocation, a chondral lesion was present. Patients with a complete syndesmotic injury were also statistically significantly more likely to have a chondral injury. This could be related to dislocation and syndesmotic injury being associated with a higher-energy injury and increased talar displacement, leading to increased axial and shear forces, leading to a chondral injury. In addition, patients aged 30 years or older were more likely to present with a chondral injury than those younger than 30 years. As a possible explanation for this finding, patients aged 30 years or older may be more likely to have a chondral injury, as compared with those younger than 30 years, because they may have poorer bone quality and more friable cartilage with increasing age, which may be more prone to injury. Moreover, even though all patients with prior injury and known ankle pathology were excluded, there is likely still a proportion of patients who may have had a pre-existing asymptomatic and undiagnosed lesion, which would be more likely to be seen with increasing age. For surgeons who do not routinely perform concurrent ankle arthroscopy at the time of ankle fracture ORIF, the presence of these factors should raise clinical suspicion for a chondral injury and advocate for the use of arthroscopy to allow for acute diagnosis and treatment.

Our study found that the presence of a chondral injury is associated with a negative impact on clinical outcomes. A few prior studies have examined the effect on clinical outcomes after ankle fracture ORIF when a chondral injury is present, and in contrast to our study, it has been reported that there is not an association with a poor clinical outcome. Nosewicz et al.[16] reported on 100 ankle fractures and found that the presence of an OCL had no significant effect on postoperative FAOS values. However, the diagnostic modality used was postoperative CT, which likely grossly underestimated the presence of chondral lesions, given that Nosewicz et al. found the prevalence of OCLs to be only 10%. Boraiah et al.[4] reported on 153 patients with persistent pain after ORIF. They reviewed and included patients who underwent preoperative MRI to determine whether an OCL was present and used the FAOS at 6 months postoperatively to assess clinical outcomes. They found no significant difference in the FAOS between patients with and without OCLs. They determined the prevalence of an OCL to be 17% as diagnosed on MRI, which again may have underestimated the presence of pure chondral lesions. Aktas et al.[1] looked at 86 ankle fractures and similarly found that the presence of an OCL had no significant effect on clinical outcomes using the American Orthopaedic Foot & Ankle Society (AOFAS) hindfoot score.

Regier et al.[13] did find a significant correlation between the presence of an OCL and clinical outcomes with an average follow-up period of 34.5 months. They found a significant difference in AOFAS hindfoot scores and reported that the risk of having an OCL increased by up to 5.6% with every point decrease in AOFAS score. In our study we also found a significant difference in clinical outcomes using the FAOS, with patients in whom a chondral lesion was present having statistically significantly lower scores in comparison with those without chondral lesions. Compared with the previous studies reporting on clinical outcomes, this is the first study, to our knowledge, in which arthroscopy was used as the diagnostic tool in determining the presence of a chondral injury in which clinical outcomes were examined.

It has been shown that nonoperative treatment of OCLs leads to suboptimal results. Liu et al.[9] looked specifically at osteochondral fractures of the talus and reported that patients with these injuries had a low success rate of just 45% after nonoperative treatment. Stufkens et al.[7] reported on 288 ankle fractures that were all treated with ORIF with concurrent arthroscopy and reported long-term clinical follow-up (average, 12.9 years) using the AOFAS hindfoot score. They found cartilage damage, in particular a talar chondral lesion, to be associated with a suboptimal clinical score and radiographic outcomes with development of post-traumatic arthritis, showing the potential importance of diagnosing and treating chondral lesions acutely.[7] Because of insufficient numbers in each treatment group with a minimum of 1 year of follow-up, including debridement alone, as well as microfracture and chondroplasty with or without adjuvant treatment, our study was limited by the inability to determine the significance of acute intervention at the time of ankle fracture ORIF. Further study is needed in the area of the clinical effect of acute treatment of chondral lesions.

Limitations

Limitations of this study include its retrospective nature, the lack of a control group that did not undergo ankle arthroscopy for comparison, and the relatively short-term follow-up period. Although the study is retrospective in nature, all data were collected from a prospective database and therefore all outcome scoring was performed prospectively, eliminating recall as a source of bias. When identifying the presence of a chondral lesion, as well as fracture type, dislocation, syndesmosis injury, or deltoid injury, this is not affected by either a retrospective or prospective study design. Only patients treated by the lead investigator were included from our institution. Although this significantly decreased the number of patients included, it mitigated the introduction of selection bias because other surgeons at our institution may only perform concurrent arthroscopy when there is already a suspected chondral injury rather than performing ankle arthroscopy routinely at the time of ankle fracture ORIF. In addition, this is still one of the largest studies to date despite this. Although there is not a control group of patients who underwent ankle fracture ORIF without ankle arthroscopy or who received a CT or MRI scan instead of ankle arthroscopy to diagnose a chondral lesion, prior studies have identified the outcomes and limitations in these groups, which we have drawn on for comparison. A minimum of 1 year of follow-up was chosen to examine the short-term clinical outcome; however, longer-term follow-up is required to determine the long-term clinical effect of the presence of a chondral lesion, such as the development of post-traumatic arthritis compared with patients without a chondral lesion. Further study is required to determine the clinical benefit of ankle arthroscopy and acute treatment of a chondral lesion at the time of fracture fixation.

Conclusions

Ankle arthroscopy performed concomitantly with ankle ORIF is a useful tool in diagnosing chondral injuries. Chondral lesions are common with ankle fractures. An ankle with a dislocation at presentation or a syndesmotic injury may be more likely to present with a chondral lesion and should thus prompt evaluation. The presence of a talar chondral injury may be associated with a negative impact on clinical outcomes.

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