Foot and Ankle Surgery xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Foot and Ankle Surgery

journal homepage: www.elsevier.com/locate/fas

Relationship between symptomatic osteochondral lesions of the talus and quality of life, body mass index, age, size and anatomic location☆

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ARTICLE INFO

Article history:
Received 6 November 2016
Received in revised form 3 March 2017
Accepted 11 April 2017
Available online xxx

Keywords:
Osteochondral lesions of the talus
Aging
Body mass index
Quality of life
Magnetic resonance imaging
Computed tomography

ABSTRACT

Introduction: The aim of the study was to assess the relationship between symptomatic osteochondral lesions of the talus (OLTs) and age, body mass index (BMI), quality of life (QOL), size and anatomic location.

Methods: Fifty-two patients with chronic OLTs were analyzed including BMI, Visual Analogue Scale (VAS), American Orthopaedic Foot and Ankle Society (AOFAS), Short-Form Health Survey (SF-12 divided into Mental (MCS) and Physical (PCS) score) and the 12-Item General Health Questionnaire (GHQ-12). Every patient underwent magnetic resonance imaging (MRI) and computed tomography (CT) examinations. We carried out a sub-analysis by dividing the talus into 6 areas, 3 vertical (medial, central and lateral group) and 3 horizontal (anterior, middle and posterior group).

Results: There were 31 (60%) male and 21 (40%) female patients. Mean MCS and PCS resulted respectively 43.9 and 35.2. OLTs were located as follows: medial 20 (38.50%); central 13 (24.0%); and lateral 19 (36.50%); anterior 24 (46.15%); middle 16 (30.77%); and posterior 12 (23.08%). No significant differences were found among different groups with the exception of the anterior and posterior group for MCS ($p = 0.021$). In the central group we identified a negative correlation ($R = -0.672$) between aging and AOFAS and a positive correlation between BMI and lesion size. We found a positive correlation between CT and MRI in each group.

Conclusions: OLTs impact patients' quality of life particularly in the physical component. Additionally, in patients with central lesions we found a positive linear correlation between lesion size and BMI and a worsening of the ankle with increasing age.

1. Introduction

Correct diagnosis of osteochondral lesions (OLTs) of the talus has a long history that began nearly 280 years ago and is still evolving today. In 1737, Monro became the first to describe a loose body in the ankle, believed to be of traumatic origin. It then took over 150 years before Konig, in 1888, coined the term "osteochondritis dissecans". Thereafter, Kappis in 1922, reported on osteochondral lesions of the talus, and in 1932, Rendu became the first to describe articular fractures of the talus [1,2]. OLTs are being recognized as an increasingly common injury and may occur in up to 50% of acute ankle sprains and fractures, particularly in association with sports injuries [1]. Although the exact incidence is unknown, a retrospective 10-year study among active military personnel estimated an incidence of 27 OLTs per 100,000 persons [3]. The pathophysiology of OLTs is not yet clearly understood, and no consensus in peer-reviewed publications can be found to date. Indeed, although lateral and medial osteochondral lesion etiology predominantly due to ankle instability or trauma is well recognized and described in existing literature, the cause of central lesions remains unclear [4–7]. Several studies have focused their attention on gender, age and weight as predictor factors in the treatment of osteochondral lesions of the talus, but literature is scarce regarding their etiopathogenetic role [1,3,8–10]. Many questions remain unanswered regarding the nature of these injuries, and the field is continuously searching to understand more about this unique condition. Furthermore, while ankle

☆ Level of Evidence: IV.

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http://dx.doi.org/10.1016/j.fas.2017.04.011
1268-7731/

osteoarthritis has proven to impact significantly on general health status, no studies report quality of life (QOL) in patients with OLTs [11]. The aim of the study was to assess the relationship between symptomatic osteochondral lesions of the talus and age, body mass index (BMI), quality of life (QOL), size and anatomic location.

2. Material & methods

After obtaining institutional review board approval, we performed a retrospective study of the medical records of consecutive patients presenting at our office with symptomatic chronic OLTs diagnosed clinically and radiographically by Magnetic Resonance Imaging (MRI) and Computed Tomography scan (CT) between September 1, 2013 and September 31, 2016. The inclusion criteria for this retrospective case series were: symptomatic chronic osteochondral lesion of the talus of types III and IV according to Berndt and Harty's classification [12] confirmed by clinical examination, MRI and CT-scan, pain for more than 6 months or trauma occurred more than 6 months ago, skeletal maturity. Exclusion criteria were: previous surgical treatment or injection of the affected ankle, multiple lesions, arthritis of the ankle joint, bipolar lesions, haemophilia, rheumatoid arthritis, severe metabolic disorders, autoimmune disease, ongoing chemotherapy, radiation treatment or immunosuppression, pregnancy or lactation.

All patients completed the following evaluations: American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot score, Visual Analogue Pain Score (VAS), Short Form Health Survey (SF-12) and the 12-Item General Health Questionnaire (GHQ-12) [13–16]. In addition, the height and weight of each patient were measured to calculate BMI. Clinical data was recorded at the moment of clinical diagnosis at our office before CT and MRI were performed.

Every patient underwent MRI and CT-scan examination. The area of the lesions was defined and measured for each patient on the MRI and CT-scan, according to Choi, using coronal length (horizontal extension measured from the coronal image), sagittal length (horizontal extension measured from the sagittal image), depth (vertical extension measured from the sagittal image) and area (calculated with the ellipse formula as coronal length × sagittal length × 0.79) [17]. As described by Orr, every patient received an MRI scan using a 1.5-Tesla MRI scanner [18]. Standardized ankle MRI protocols were used in all patients, consisting of T1-weighted spin echo and T2-weighted fast spin echo in axial, coronal, and sagittal planes, using 3-mm-thick slice sequences. Each patient also received a CT to further assess lesion morphology. Sizing and localization of lesions were always performed using MRI and CT and if a lesion overlapped more than one zone, we considered the area most occupied by the lesion as that of belonging. All radiological measurements were made using the standard tools of the institution's Picture Archiving and Communication System (PACS). We carried out a sub-analysis dividing the talus into 6 areas with 3 vertical and 3 horizontal strips as follows:

Vertical groups (Fig. 1):

- Medial group (Fig. 2)
- Central group (Fig. 3)
- Lateral group (Fig. 4)

Horizontal groups (Fig. 5):

– Anterior group
– Middle group
– Posterior group

The association of localization, age, gender, quality of life and BMI with the prevalence of lesions was then evaluated and correlated. To assess the quality of life, we used the SF-12 and the 12-Item General Health Questionnaire. The SF-12 is a generic quality of life questionnaire that is not specific to age, individual pathology, or treatment modality, and evaluates the patient's subjective perception of overall health and wellness. SF-12 is divided into Physical Component Summary (PCS) and Mental Component summary (MCS) [15]. Furthermore we carried out a comparison of our SF-12 results with a similar cohort in another patient population [19].

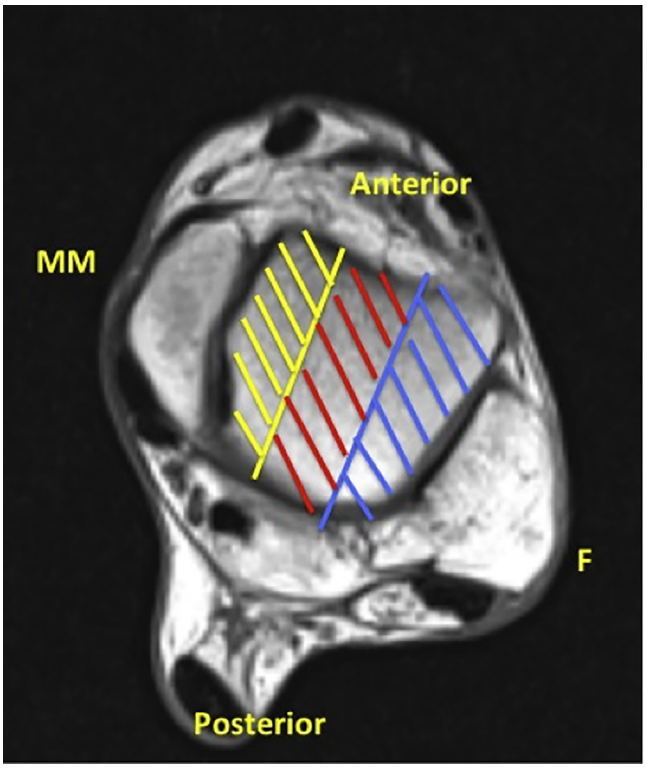

Fig. 1. The grid shows the three vertical groups on the talar dome surface on axial MRI.
In yellow the medial group, in red the central group and in blue the lateral group. F = fibula; MM = medial malleolus (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.).

2.1. Statistical analysis

The statistical analysis was performed with Matlab statistical toolbox version 2008 (MathWorks, Natick, MA, USA) for Windows at 32 bit. The statistical tests were performed with Student T-test and were considered significant with p-value < 0.05. In addition, Pearson's linear correlation coefficient R was calculated and the correspondent p-values were computed with T-Student test, under null hypothesis of Pearson's linear correlation coefficient $R = 0$. All statistical tests with p-value < 0.05, were considered as significant and all measures were expressed as mean ± standard deviation (SD). Mean, standard deviation, Pearson correlation, and p-value of AOFAS and VAS, VAS and PCS, VAS and MCS, VAS and anatomic location, BMI and age, size of the lesion measured with MRI and age, and lesion measured with MRI and lesion measured with CT-scan, nonzero correlations were observed.

3. Results

Of 75 patients screened for eligibility, 52 satisfied the inclusion and exclusion criteria and were enrolled in the study with mean age 35 years (SD ± 13; range 14–65). Of the 23 excluded patients,

Please cite this article in press as: R. D'Ambrosi, et al., Relationship between symptomatic osteochondral lesions of the talus and quality of life, body mass index, age, size and anatomic location, Foot Ankle Surg (2017), http://dx.doi.org/10.1016/j.fas.2017.04.011