Case Report

Trauma-induced spontaneous union of a talar osteochondritis dissecans: case report

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\textbf{ABSTRACT}

We encountered a case of an 18-year-old woman with persisting ankle pain after a healed Weber-B fracture. Additional imaging through a computed tomography (CT) scan revealed a fully united fragmentous osteochondral lesion of the talus (OLT) (17 mm \times 9 mm \times 8 mm) of the right ankle—as opposed to a non-united OLT when the fracture was diagnosed 19 months prior to the presentation.

Our proven hypothesis is that the fragmented OLT was non-symptomatic for many years, based on an osteochondritis dissecans. The ipsilateral ankle trauma induced a fresh fracture in the interface between the talus and the fragmented OLT, and consequently the destabilized fragmented OLT became symptomatic. The ankle trauma initiated fracture healing that resulted in a complete union of the OLT without clinical symptoms. The existing symptoms were established to be based on anterior osseous ankle impingement, due to the presence of osseous fragments in the medial gutter of the ankle joint. Therefore, a nettoyage of the medial gutter including a resection of the corpora libera from the medial gutter with the shaver was performed. Intraoperative macroscopic assessment of the medial osteochondritis dissecans was performed and showed union with completely intact hyaline cartilage at the level of the surrounding articular cartilage requiring no interventions. An increased range of motion was achieved. The patient recovered well with and experienced no more recognizable pain.

In this article, the unstable fragmentous lesion of the patient reached spontaneous union within 19 months after destabilization. Although this is not common for an unstable fragmentous OLT, this could be a stepping stone toward an increased role of conservative treatment for fragmentary OLTs.

\textbf{The case}

- Persisting ankle pain after a healed Weber-B fracture, based on anterior osseous ankle impingement, due to the presence of osseous fragments in the medial gutter of the ankle joint.
- An incidental finding on the initial CT-scan concerned a non-united osteochondral lesion of the talus (OLT) when the fracture was diagnosed. The repeated CT scan 19 months later revealed a fully united fragmentous OLT of the right ankle.
- Our hypothesis entails that the fragmented OLT was non-symptomatic for many years; the ipsilateral ankle trauma induced a fresh fracture in the interface between the talus and the fragmented OLT, and consequently the destabilized fragmented OLT became symptomatic.
- The ankle trauma initiated fracture healing that resulted in a complete union of the OLT without clinical symptoms. Nettoyage and resection of the corpora libera from the medial gutter was performed.
- An increased range of motion was achieved; the patient recovered well and experienced no more recognizable pain.

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Lessons learnt

- Spontaneous union of a fragmentous osteochondral lesion of the talus is possible, through a fracture healing process after an ipsilateral ankle trauma.

1. Introduction

The etiology of an osteochondral lesion of the talus (OLT) is not yet entirely established, though it appears to be traumatic in the majority of cases, occurring after an ankle sprain or fracture [1,2]. On radiological imaging, OLTs have a wide variety of appearances. Presently, OLTs are categorized morphologically among three types: cystic, crater, and fragmentous [3]. Morphological appearances are thought to be inherent to the OLT etiology. Fragmentous lesions are mostly associated with the phenomenon of osteochondritis dissecans (OCD) as OCDs typically present as fragmentous morphologies [4–11]. OCD is a chronic and acquired type of osteochondral lesion (OCL) and most frequently occurs in a growing patient before the epiphyseal plates are closed. The fragment itself may be held in place by fibrous tissue from the early childhood on, until destabilization occurs [1]. Thus, the onset of symptoms following a severe ankle injury suggests either an ‘ordinary’ traumatic OLT or a posttraumatic displacement of an OCD. This illustrates the complication in determining the moment in time that the OCD originated, that is, with either open or closed epiphyseal plates. The etiological hypotheses and different treatment options for OCD including its considerations will be discussed in this case report. Generally, a fragmented OLT, or an OCD in that matter, requires surgery in order to obtain union because conservative treatment fails [12,13].

In the present case report, a young woman is described with persisting ankle pain after a healed Weber-B fracture of the ipsilateral ankle including a surprising incidental finding on the Computed Tomography (CT) scan. The patient was referred to a tertiary referral center and presented at the outpatient clinic of the department of Orthopaedic Surgery and Sports Medicine, Amsterdam UMC, for treatment of persisting posttraumatic ankle pain. This center is a tertiary referral academic hospital accredited as nationally and internationally recognized center for the diagnosis and treatment of cartilage and OCLs of the foot and ankle. The persisting ankle pain was dedicated to the incidental finding on CT imaging, however additional assessment revealed completely different insights than expected.

1.1. Statement of informed consent

The patient (now above 18 years old) was informed that data concerning the case would be submitted for publication. The patient agreed and provided written informed consent.

2. Case presentation

An 18-year-old young woman presented as a tertiary referral for treatment of persisting posttraumatic ankle pain. There was no documented medical history and the patient did not take any medication. Nineteen months prior to the presentation, the patient suffered from a Weber-B ankle fracture of the right ankle following a scooter accident which was treated conservatively. The fracture healed successfully.

![First CT scan directly posttraumatic. A and B show the Weber-B fracture. C and D show the fragmentous osteochondral defect of the medial talus.](image)
The patients’ chief complaint was a deep and load dependent ankle pain persisting after the fracture union. The pain was characterized as different from the direct posttraumatic ankle pain and unrecognizable from before the ankle trauma. Bracing and intraarticular injections did not have any pain-relieving effect. The patient suffered from the ankle pain in her daily life which had forced her to stop horseback riding and made her worry for her future since she aimed to be a hairdresser. The Numerical Rating Scale (NRS) for pain was 5 in rest, 10 during the day, and a radius of action of more than 1 h with severe pain. Therefore, she indicated to be open toward a surgical intervention.

During physical examination, there was no effusion and a mild pes planovalgus was present bilaterally. Both ankles had a sufficient range of motion (right 7/0/45, left 7/0/45), a positive Silfverskiold, and a mild lateral laxity with a bilateral anterior drawer test of 1 cm. The patient experienced no pain during palpation of the medial talardome during plantarflexion though did experience recognizable pain when palpating the medial gutter in dorsiflexion.

CT imaging of the ankle fracture directly posttrauma revealed an incidental finding of an OLT (Fig. 1), concerning a fragmentous OCL of the medial talus. This OLT measured 17 mm anterior–posteriorly, 9 mm mediolaterally and 8 mm in depth. The fragment itself measured 15 mm anterior–posteriorly, 9 mm mediolaterally and 4 mm in depth. CT imaging of the right ankle was repeated at the AUMC at 19 months post-trauma (Fig. 2). This CT scan showed union of the ankle fracture and progressing union of the fragmentous OLT as well. The previously discovered nonunion OLT had achieved union after conservative treatment for the ankle fracture. Additionally, the CT scan showed bony fragments in the medial gutter at the location of the deltoid ligament (Fig. 3). The fragments were suspected to be symptomatic, while the OLT reached complete union and was asymptomatic.

2.1. Diagnosis and decision-making

The diagnosis was established as anterior osseous ankle impingement due to the presence of osseous fragments in the medial gutter of the ankle joint. Secondly, a completely asymptomatic fragmentous OLT with complete union on CT scan was diagnosed. Treatment selection was done through a thorough shared decision making process after which the patient chose for an arthroscopic resection of the anterior impingement.

2.2. Surgical procedure

The surgical procedure was performed by the senior author (GK) and included an anterior arthroscopic procedure in supine position with anteromedial and anterolateral portals. The procedure entailed nettoyage of the medial gutter including a resection of the corpora libera from the medial gutter with the shaver (Figs. 4A and B and 5). Inspection and macroscopic assessment of the medial OCD were performed and showed union with completely intact hyaline cartilage at the level of the surrounding articular cartilage requiring no interventions (Fig. 4A and C). An increased range of motion was achieved after which the portals were closed.
2.3. Postoperative rehabilitation protocol and result

Compression bandage was given for 48–72 h postoperatively. The patient was instructed to start building the range of motion of the ankle directly postoperatively. Weight bearing was allowed as tolerated with the usage of crutches. Three months postoperatively, the patient recovered well and experienced no more recognizable pain.

3. Discussion

We presented a case of a young woman with persisting ankle pain after a healed Weber-B fracture. Imaging revealed a fully united fragmented OLT of the right ankle—although it was discovered as a non-united OLT 19 months earlier. Our hypothesis is that the fragmented OLT was nonsymptomatic for many years with the trauma inducing a fresh fracture and a symptomatic destabilized fragmented OLT. Fracture healing resulted in a complete union of the OLT and symptoms of deep ankle pain resolved without further intervention.

3.1. Etiology of OCD

The etiology of OLTs is not yet clearly understood [4]. The term osteochondritis dissecans may imply an inflammatory disease which is most likely not the case. Prior studies presented several etiological hypotheses of an OCD. In general, various etiological theories for OCD exist: repetitively microtraumatic, ischemic, hereditary or idiopathic etiology. The leading thought on the etiology entails a multifactorial combination of these four [4,14,15]. Ischemia during the endochondral ossification of the epiphyseal cartilage (i.e., epiphyseal plates) may result the development of an OCD. This epiphyseal cartilage is supplied with nutrients through cartilage canals. Normally, these canals eventually close when the cartilage ossifies and matures, with help of anastomoses between the epiphyseal cartilage and the mature bone. However, if this process fails because of instability of these anastomoses, it can lead toward avascular necrosis. This instability occurs due to poor neoangiogenesis [11,16]. As a result, a stable OCD originates which can destabilize after the fragment detaches following an ankle trauma with the OCD becoming symptomatic.

The etiological theory of repetitive microtrauma is biomechanically similar to the etiological mechanism of an ‘ordinary’ traumatic OCL [1]. In OCD patients this damage cascade presumably starts with subchondral stress, consequently disabling the subchondral bone to intercept the ongoing repetitive trauma and damaging of the overlying cartilage [4,17]. This may have happened in the presented case of this article, due to the forced-dorsiflexion ankle position during horseback riding causing repetitive microtraumas.

Genetic factors may play a role in the etiology of an OCD [18–20]. Some studies did show a potential correlation between heritage or genetics and OCD [18–20]. For example, these studies found OCDs among multiple members or even a very high OCD incidence within one family [20–24]. Another study found identical OCDs to be present in identical

Fig. 4. A: An overview of a schematic right ankle and corresponding intraoperative arthroscopic views of the ankle joint. B: Resection of corpora libera out of the soft tissue in the medial gutter. C: Inspection of healed OCD, completely intact hyaline cartilage, with nice integration and smooth transition toward surrounding cartilage.

Fig. 5. Intraoperative arthroscopic images of the medial gutter of the right ankle joint: before (A) and after (B) removal of the intra-articular bony fragments from the soft tissue.
In this case report, it is unknown at what age, that is, with open or closed epiphyseal plates, the OCD occurred. Therefore, establishing which etiological hypothesis underlies this particular OCD, is difficult. In the Amsterdam Ankle Cartilage Team perspective, and in accordance with the aforementioned etiological hypothesis, an OCD concerns a chronic fragmentous intraarticular nonunion of the medial talar dome, resulting from an incomplete endochondral ossification process of the epiphyseal talar cartilage and subchondral bone which results in a fragmentous lesion consisting of hyaline cartilage being connected to the surrounding talar dome through fibrous tissue.

3.2. Prediction of spontaneous union

It would be interesting to predict the chance of spontaneous union in order to prevent unnecessary surgical interventions and potentially expand the role of conservative treatment for fragmentary OLTs. This could improve the cost-effectiveness and patient burdening within the fragmentary OCD treatment. Therefore, it would be necessary to know which predicting factors of spontaneous union could be used to identify the chance for spontaneous union for each individual patient. Some prior studies have developed nomograms, with the most recent nomogram by Kim et al. [6]. However, their results and proposed nomogram should be interpreted with caution considering some concerns in the methodological design of the study. Kim et al. studied the (prediction of) success after conservative treatment, that is, spontaneous union, in the skeletally immature patients, and found that 67% of patients treated conservatively for at least 6 months, achieved union of the OCD. Secondly, they conducted a univariate and multivariate analysis which showed that older age and B&H grade 3 lesions were significant possible predictors of failure of conservative treatment without spontaneous OCD union [6]. Similar predicting correlations were also found by Heyse et al. for skeletally immature patients [25].

3.3. Spontaneous union of OCD

In this article, the unstable fragmentous lesion of the patient reached spontaneous union within 19 months after destabilization. However, this is not common for an unstable fragmentary OLT/OCD. Prior studies showed that 40–50% of conservative treatments for OLT patients fail [12, 13]. In children with OLTs it was found that conservative treatment was clinically successful in only 40% of cases, in contrast with surgical treatments being successful in 70–100% of the children [26]. According to Bruns et al. spontaneous union is to be expected unless the OCD is unstable and detached, which was however the case in our presented case [17]. Perumal et al. showed nonunion in 77% of skeletally immature OCD cases (stable, or unstable and unreplaced lesions) after conservative treatment for 6 months. Moreover, after 12 months in total, nonunion still persisted in 22% of cases [7]. Lastly, Letts et al. found that 54% of conservative cases, eventually required surgical intervention [27].

4. Conclusion

We encountered a case of an 18-year-old woman with persisting ankle pain after a healed ipsilateral Weber-B fracture. Additional CT imaging revealed a fully united fragmentous OLT of the right ankle—although it was discovered as a nonunited OLT 19 months earlier. Our proven hypothesis is that the fragmented OLT was nonsymptomatic for many years with the trauma inducing a fresh fracture and a symptomatic destabilized fragmented OLT. Fracture healing resulted in a complete union of the OLT and symptoms of deep ankle pain resolved without further intervention could be a stepping stone toward an increasing role of conservative treatment for fragmentary OLTs. Potentially, this could be a stepping stone towards an increased role of conservative treatment for fragmentary OLTs.

References


