

Osteochondral Lesion of the Talus Dome: What's New in the Therapeutic Protocol

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Abstract

Review Article

Osteochondral lesions of the talus must be known, and especially in the aftermath of hindfoot trauma. Even if certain mechanisms producing them are known, their etiopathogenesis is not yet formally settled. It seems essential, to characterize them, to use the radiological classification fracture-osteonecrosis-geod (FOG). Their diagnosis, like their surgical treatment, remains always a challenge for the practitioner: certain rules are common to all, such as debridement and abrasion of necrotic tissue, others optional depending on habits, situation and size of lesion. None of them seem superior to the others. Arthroscopy was required for lesions of modest size less than 1.5 cm², while the others must be filled. The support of these lesions therefore always remain delicate and relatively specialized: the literature also encourages us to certain modesty about the results of surgical management.

Keywords: Lesion, Talus, Arthroscopy, Pain, Microfracture.

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1) INTRODUCTION

Osteochondral damage occurs after repeated trauma of the joint. However, most recent studies suggest the possibility of metabolic or genetic causes, which may alter bone architecture or composition.

Traumatic injuries, such as in patients with a history of ankle instability, affect both cartilage and bone in the form of loss of substance. Sometimes a cystic lesion forms within the bone, which can, if it progresses, cause the collapses of the cartilage.

Symptoms are pain, swelling, instability or blockages in the affected joint.

Osteochondral damage can interfere with physical and no-physical activities, causing pain when walking and may make it difficult to perform usual daily activities.

The diagnosis is made by a complete physical examination, combined with an imaging assessment: X-rays but especially arthroscan and MRI. This is also necessary to define the most appropriate treatment.



Figure 1: Clinical aspect of an osteochondral lesion of the talus

2) Physiopathology

It is among the fragmented fractures that we must look for the so-called osteochondral lesions.

Since 1995, it has been frequent in France to use the terminology proposed by Doré and Rosset: we are talking about LODA for osteochondral lesions of the dome of the astragalus. They proposed a radiological classification called fracture-osteonecrosis-geode (FOG) based on the lesion aspect (fracture, sequestration, geode) and on the reports of the lesion with the body of the talus (situation in relation to the surface, condensation around the fragment), distinguishing three forms: "F" for fracture, "O" for osteonecrosis and "G" for geode.

Thus, these necrotic forms can evoke other etiologies: vascular or synovial origin, with or without micro traumatic context, hypertension localized, etc.

A cartilaginous fragment with a thickness variable necrotic avascular subchondral bone isolates itself from the rest of the bone floor. Cartilage in contact with synovial fluid stay normal. It can be continuous (no communication between the articular cavity and the groove surrounding the sequestrum), or discontinuous with all the intermediaries between the crack and the free fragment in the joint.

Trauma or repetitive strain injuries could lead to the individualization of an osteochondral fragment not moved. Isolated from its bony basement, it could evolve either towards pseudarthrosis with appearance of a corresponding sequestrum to its necrosis, or towards consolidation of the fracture. Of the histological studies carried out in patients operated on for osteochondritis have even made it possible to individualize types of

evolution different from the pathological zones, either in trabeculae viable subchondral bone, or cartilage without trabeculae bone. Conversely, during an inversion trauma, the contusion of the superomedial angle of the talus under the tibia can cause the bed of a secondarily necrotic lesion that is not diagnosed much later, when the initial trauma was forget.

This hypothesis, like that of medial hypertension, not involving trauma with fracture, seems interesting to explain the localizations at this level.

Some authors have shown that the center distribution of pressures in the talocrural joint is slightly medialized.

These constraints could be at the origin of metabolic disorders associated with micro fractures that would lead to localized necrosis and the appearance of a necrotic form or a geode. This theory would explain the medial lesions with no history of trauma and lesions.

The geodic shapes could be likewise the translation excessive stresses to the medial side of the dome talar, associated with vascular changes or changes metabolic, resulting in deep necrosis farther from the subchondral bone than in lesions of necrotic type. The images observed on resonance imaging magnetic (MRI) after trauma without fractures where obviously the lesion area extends very far into subchondral spongy bone are another argument, same as the theory of fluid flows responsible for phenomena of cavitation developed more recently, and which could, more than the cartilaginous lesions themselves, explaining some painful phenomena due to hyperpressure during walking.

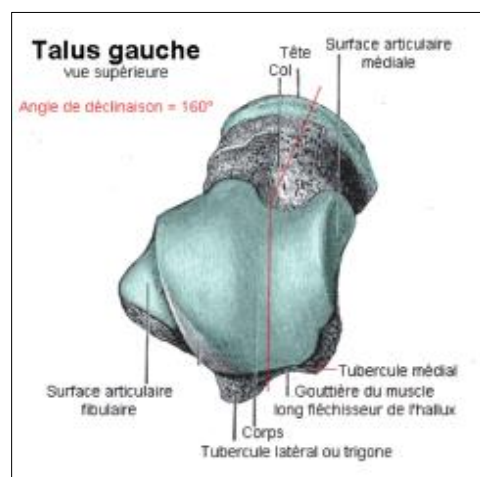


Figure 2: Anatomy of the left talus

3) Diagnostic:

The diagnosis of a LODA poses few problems. Clinically, it is in fact that of a painful ankle, accompanied by a procession of totally non-specific signs (pain whose location is not necessarily related to

the site of the lesion, blockage, jump, instability, joint swelling) and most often presenting a moderate limitation of its joint amplitudes.

The notion of trauma during interrogation is an element major of the diagnostic, most often relating to young and athletic patients. Thus, following a lateral sprain, we evoke in principle this diagnosis which must be eliminated for do not relate these pains to ordinary ligament sequelae, while being wary of lesional associations, particularly frequent.

Most of the diagnosis is based on complementary examinations imagery.

a) X-Ray:

As indicated in the question relating to fractures and dislocations of the talus, standard radiographs are still today the first-line examination.

They have at least one impact anteroposterior of ankle at 15° of medial hip rotation (to clear the superolateral angle of the dome) and a strict profile including the medio and hindfoot. Scanner or MRI supplements these basic incidences depending on the context.



Figure 3: Lesion of the external part of the talus

b) Scanner:

Gold standard in the diagnosis of talus fractures since a few years, this arthroscanner seems to be the examination of choice which allows the most detailed analysis of the bone matrix and the cartilaginous cap.

It must imperatively be made in millimeter cuts with reconstructions and makes it possible to confirm or specify a diagnosis since this fracture remains difficult to see on the X-ray, to locate a foreign body, to highlight a receiver, a geode, to appreciate the extent or the depth of necrosis. The existence of a crack, its depth, its consistency on the different cuts are all

indirect signs the fixity of the fragment, an important element of the pre-therapeutic assessment.

The arthroscanner of the ankle gives us a classification into four stages:

- Stage I: subchondral geode but intact articular surface
- Stage IIa: subchondral geode with open cartilage
- Stage IIb: open cartilage, fragment not displaced
- Stage III: subchondral geode, fragment not displaced
- Stage IV: displaced fragment



Figure 4: Lesion of the talus in CT-Scan

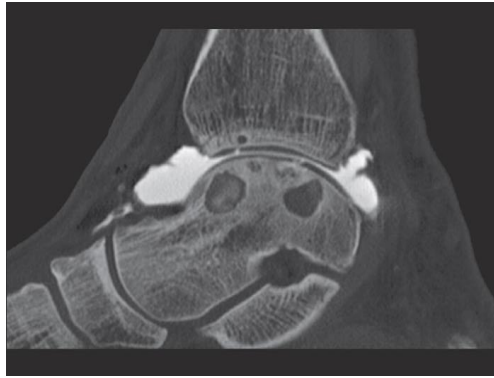


Figure 5: Lesions of the talus in CT-Scan



Figure 6: Lesion of the internal portion of the astragalar dome

3) MRI:

The MRI is of little interest at the time of the trauma, the scanner being the most discriminating examination. As part of the LODAs, it is also used for diagnosis but bone analysis is less fine than with the scanner. Both give similar results, although MRI may show an advantage diagnosis and made it possible to

observe the largest surface and depth of lesions medial to lateral.

Even if its interpretation is therefore sometimes difficult, it has its own advantages by providing information on both joint and all extra-articular elements.



Figure 7: MRI of the ankle showing the osteochondral lesion of the talus dome

4) Classifications:

In 1995, Dore and Rosset proposed a radiological classification called "FOG", distinguishing three forms:

- Form F (for fracture): this isolated fragment is not associated with no modification of the bone structure, condensation or geode. This fracture can be recent or old with in this case a slightly lytic aspect. In the series of the Society Western Orthopedics (SOO), these F forms accounted for 18% cases and sat in 87.5% of cases on the anterolateral side with a constant traumatic history.
- Form O (for osteonecrosis): the appearance here is necrotic, with the presence of a receiver. The underlying bone framework is remodeled with a condensation border associated with micro-geodes. In the series, it represented 75% of the cases.
- Form G (for geode): it is characterized by the absence of free fragment and sequestration. However, there is a significant radiolucent intraosseous cystic image in the bone body. In the series, it was only 7%, which is rarer than in others.

The advent of arthroscopy in the treatment of these lesions in the late 1980s introduced a very interesting additional "palpatory" dimension. Cheng and Ferkel had, as early as 1995, proposed a classification based on the operative aspect in six stages:

- Stage A: smooth and soft cartilage
- Stage B: rough cartilage
- Stage C: fibrillation and fissures
- Stage D: valve or bare bone
- Stage E: sequestration in place
- Stage F: displaced fragment.

Finally, it was not until 2003 that Mintz published his MRI-arthroscopy classification from a retrospective study of 54 patients and concludes with excellent sensitivity 95%, specificity 100%, negative predictive value (NPV) 88% and predictive positive value 100% (PPV):

- Stage 0: normal cartilage
- Stage 1: intact cartilage but abnormal MRI signal
- Stage 2: cracks or fibrillary cartilaginous lesions but bone intact
- Stage 3: cartilaginous flap or exposed subchondral bone
- Stage 4: undisplaced free cartilage fragment
- Stage 5: free fragment displaced

5) Treatment Procedures:

The therapeutic management of LODA is quite delicate and in some cases, it is better to abstain and

temporize, considering after a rigorous analysis that the lesion is above any reasonable therapeutic proposal with a low estimated success rate. In these cases, a strictly, medicine is lawful, superimposable on what can be cases of more extensive talocrural osteoarthritis: joint hygiene rules, fight against overweight, analgesic treatment and/or anti-inflammatories, plantar orthoses.

Orthopedic treatment consists of offloading strict, with or without joint immobilization; the time is variable but not less than 4 weeks. His ambition is osteocartilaginous healing and it can only apply to fresh traumatic lesions, little or not displaced, having real healing potential depending on their size, location or parameters more dependent on the patient (age, socio-professional context, defects, smoking).

Surgical treatment is more complex and multi-option: for different means, the aim is always to bring about the restitution a painless cartilaginous cap, either by simple excision of unstable fragments, or by stimulation of a scarring fibrocartilaginous process, by either bone or osteochondral grafts or cellular. Principles and approaches to procedures conventional or arthroscopic are specified in the relative question to surgical techniques. It is obvious that we must know look "beyond" this anatomically limited lesion, and to endeavor in particular to correct, by the necessary medical or surgical measures, anything that could influence the prognosis joint, in particular an axis defect or laxity in the rear foot.

In F-forms, orthopedic treatment can be offered in recent forms, small sizes, not or only slightly displaced. Elsewhere, surgical treatment is necessary. Large fragments can be repositioned and synthesized or glued under arthroscopy depending on the operator's experience. The small fragments are simply excised and the non-displaced fragments are immobilized for 4 weeks in an immobilization boot or a cast. The chronic forms can evolve towards a release of the fragment with an arthrogenic risk or towards an O form by pseudarthrosis and necrosis. Free fragments will be excised. When they are in place, the therapeutic attitude will be the same as for the O forms.

In O forms (osteonecrosis), the decision will be made based on the size, location and depth of the lesion.

It will therefore be necessary to know how to abstain, especially if the lesions are very deep, extensive and posterior and pauci-symptomatic. The surgical procedure will include excision of free fragments, curettage and excision of necrotic and unstable fragments down to bleeding bone.

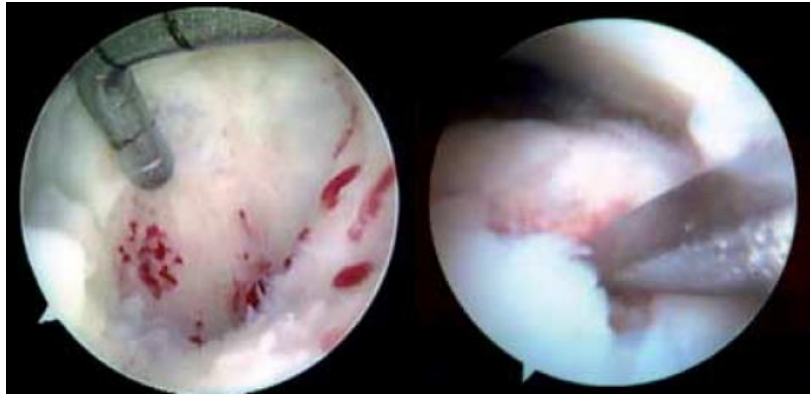


Figure 8: Curettage of the lesion of the internal portion of the talus dome

Micro fractures, in the case of lesions less than 1.5 cm² in area will most often be performed arthroscopically. Initially, debridement with ablation of free or mobile cartilaginous fragments, cleaning of the

cartilaginous areas with a motorized resector or curette, down to the subchondral bone with perforation at the tip and not with the motor.



Figure 9: Microfractures are most often performed under arthroscopy

When the tourniquet is released, there is bleeding through the bony openings. Subsequently, assisted support walking for 2 to 4 weeks depending on the size and location of the lesions is recommended. The resumption of running is envisaged around the 6th week and sport around 6 months. Some subsequently combine visco-supplementation or the injection of

growth factor without studies showing a superiority of these treatments. The different series report nearly 90% good and very good results at 5 years. Beyond 1.5 cm², the practice of a graft is essential. The type of graft, autograft, allograft, cell therapy varies according to the authors and over time.

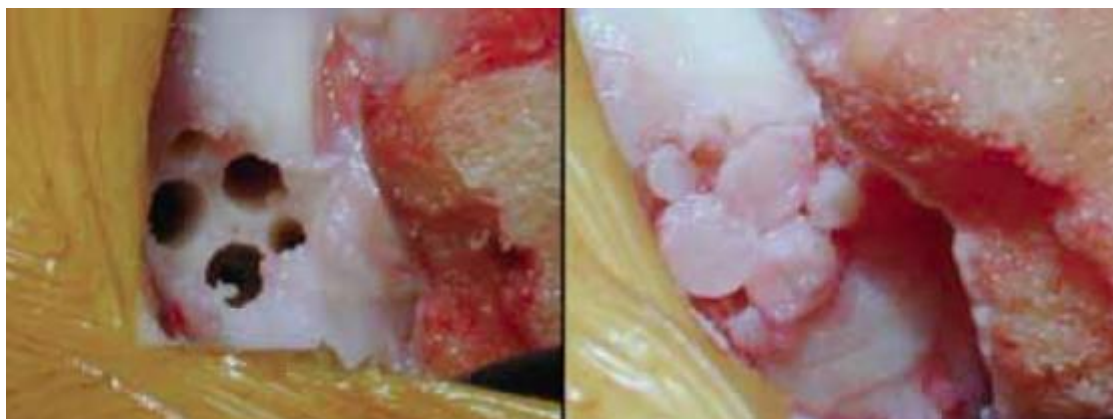


Figure 10: Mosaicplasty with internal malleolar osteotomy, before and after placement of the grafts

6) CONCLUSION

Management of osteochondral lesions of the talus or LODA remains demanding at all stages, which must be scrupulously controlled to ensure the best result. She begins by screening them very early on for post-traumatic forms, particularly numerous in hind foot trauma.

Indeed, the clinical diagnosis is still sometimes missed in front of what appears to be a severe sprain; radiographic diagnosis may also elude the emergency physician or surgeon at because of a too fast reading of the shots or a bad choice of implications. The use of CT must be easy in traumatology.

In a chronic context, we faithfully remain to arthrography more than MRI, which tends to overestimate the lesions, for their pre-therapeutic assessment.

All must use the FOG classification of Dore and Rosset.

Fracture F and Geodic G shapes are easier to be treated, hence the importance of early diagnosis. There management of osteonecrotic forms O ready for many discussions still today.

However, the surgeon who aspires to treat these lesions must master talocrural arthroscopy, including in its most recent developments. Nevertheless, this procedure, despite all the hopes it has raised, cannot claim to treat everything, especially large lesions greater than 1.5 cm². In these cases, filling is necessary.

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