



# Subchondroplasty

Cristian Ortiz, MD  
Clinica U de Los Andes



## Introduction:

Several surgical techniques have been recommended for the surgical treatment of osteochondral defects. Most surgeons agree that most of these options have about an 80-85% successful rate.

There is no level one evidence to recommend one particular kind of treatment but a group of experts has published level 5 evidence (experts opinion) to guide your decision.

## Consensus for OCD treatment:

In general terms, the group of experts recommends microfractures for an OCD in the ankle that has a diameter of less than 10 mm and is no deeper than 5 mm. There is less agreement regarding more extensive or recurrent injuries in which several options may be considered including osteochondral graft, biological techniques, and others. Unfortunately, the consensus groups do not take into consideration other important factors that may influence results and decision-making, like age, instability, location of the OCD, malalignment, etc.

Since there is no consensus about how to treat lesions that have combinations of these factors, we should keep on looking for different treatment options. Surgical treatment should be kept as simple as possible and at the same time consider all the above-mentioned conditions.

One important factor that influences decision is subchondral support for the chondral. Besides bone graft, chondroplasty arises as a good alternative to include in the surgical armamentarium.

*"Fixation Techniques: Proceedings of the International Consensus Meeting on Cartilage Repair of the Ankle. Reiling ML, Murawski CD, DiGiovanni CW, Dahmen J, Ferrao PNF, Lambers KTA, Ling JS, Tanaka Y, Kerkhoffs GMMJ; International Consensus Group on Cartilage Repair of the Ankle. Foot Ankle Int. 2018 Jul;39(1\_suppl):23S-27S."*

## What is subchondroplasty?

Subchondroplasty is a form of subchondral bone augmentation that may or may not be associated with cartilage procedures.

It consists of minimally invasive injections of a bone substitute, like calcium sulfate, that is typically delivered through a syringe with a small incision. GMReis has an Injectable bone graft substitute of  $\beta$ -TCP+Calcium Sulfate.

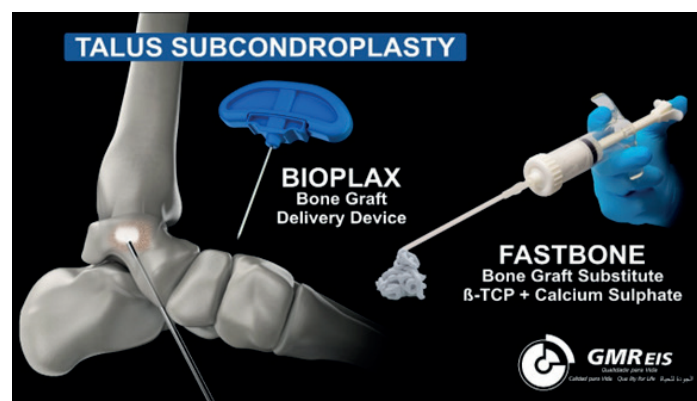


Fig.: Diagram showing subchondroplasty with GMReis Bioplax + FastBone.

## Features:

1. **Injectable bone graft substitute of  $\beta$ -TCP+calcium sulphate;**
2. **An injection syringe allows the application of the graft even in small cavities and regions that are difficult to access;**
3. **A mixture of liquid and powder components completely aseptic through a mixer coupled to the injection system;**
4. **Isothermal hardening;**
5. **Biocompatible;**
6. **Bioresorbable;**
7. **Osteoconductor;**
8. **Radiopaque;**
9. **Mixing time 30 seconds;**
10. **Setting time: approximately 10 minutes.**



"Tofighi AN, Rosenberg AD, Sutaria MP; Balata S, Chang J. New generation of synthetic, bioresorbable and injectable calcium phosphate bone substitute; materials: Alpha-b<sup>sm</sup>®, beta-b<sup>sm</sup>™, and bammo-b<sup>sm</sup>™. J Biomim Biomater Tissue Eng. 2009;2:39-55."

## Indications and technique:

Indications and techniques were published a few years ago at the knee level and we have seen recently more publications related to the ankle.

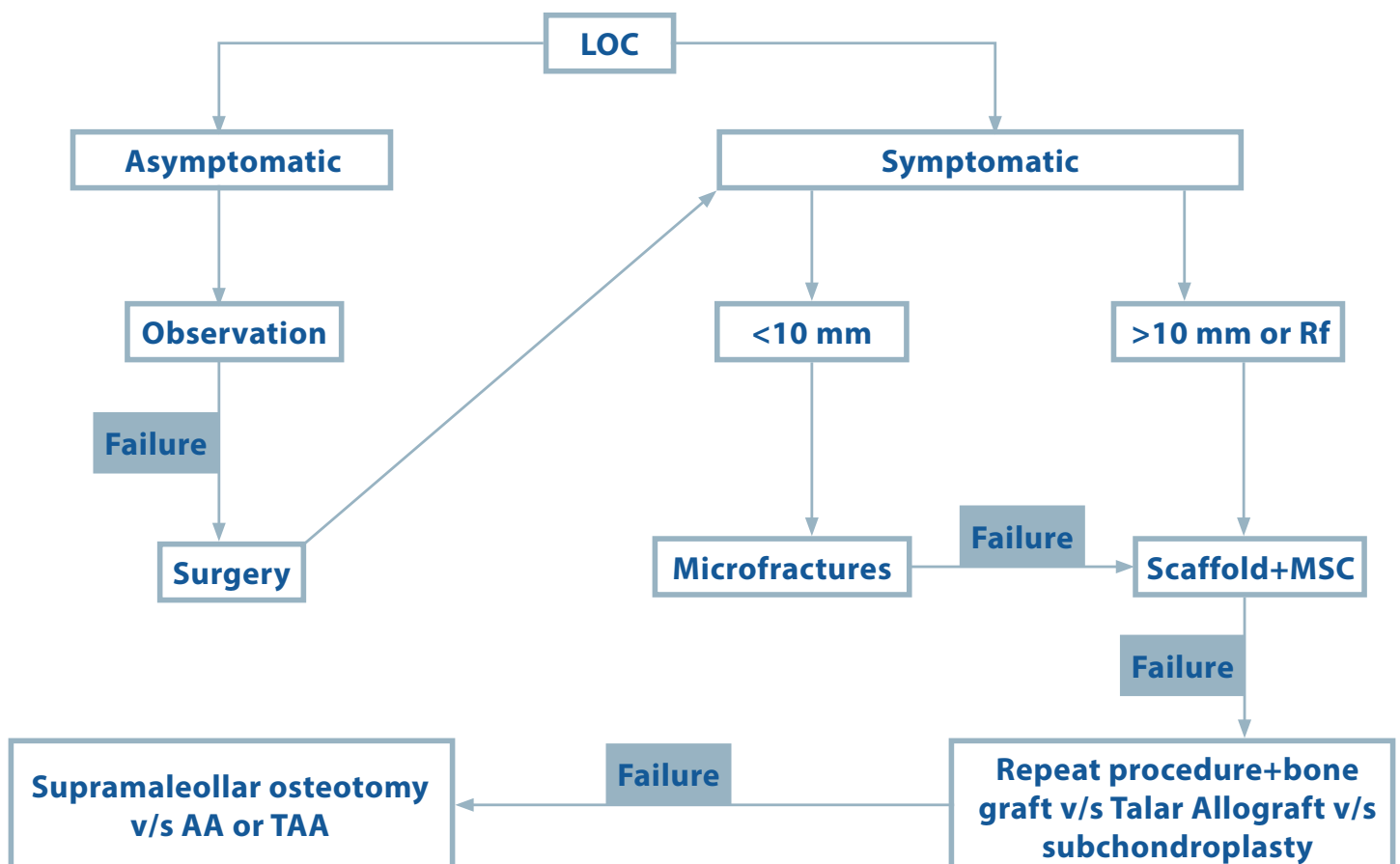
In general terms, the indication of the subchondroplasty is to support poor-quality bone. Indications may include bone marrow edema, bone necrosis, osteochondral defects, poor bone stock, etc

We would reserve its use of a bone marrow edema without satisfactory results with conservative treatment and for some OCD. In this last situation, we would consider subchondroplasty for recurrent cases of osteochondral defects in the tibia and talus with a bone defect deeper than 0,5 mm and more extensive subchondral edema.

For the talus defect, the easier approach would be bone to inject through a minimally invasive incision at the sinus tarsi under arthroscopic control at the ankle joint.

If chondral treatment is needed we would follow our general algorithm that intends to keep the treatment as minimally invasive as possible.

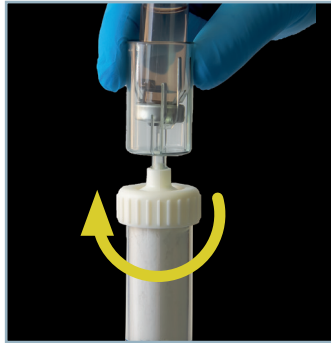
## Our algorithm



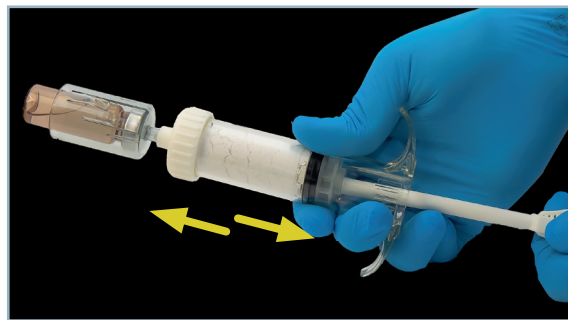
## FAST BONE Application technique



1. Remove the syringe cap and screw the Luer connector on the vial until it is fully seated;



2. Keep the syringe in an upright position, with the vial upwards, and press it against the syringe to pierce the sealing center;



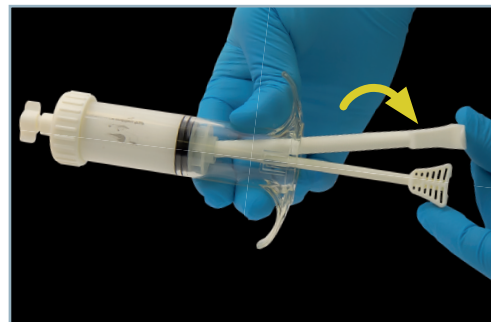
3. Aspirate the entire liquid content of the vial by pulling the plunger up and down, repeating it as many times as necessary;



4. Remove the vial and replace the syringe cap, and remove the plunger rod spacer;



5. Mix for 30 seconds until a homogeneous mixture is obtained, moving the plunger up and down, and rotating it;



6. Pull the plunger fully and reconnect the spacer to its rod. Wait 2 minutes for the mixture to become pasty, in a slightly tilted position so that its texture can be observed;



7. Remove the syringe cap and screw the cannula firmly onto the syringe Luer connector, and verify the consistency of the mixture: the paste should not stick to the glove and,



8. Screw the syringe in the Bioplax device and inject Fast bone until filling the bone defect according to the surgical plan.



*"Subchondroplasty of the Ankle and Hindfoot for Treatment of Osteochondral Lesions and Stress Fractures Initial Imaging Experience.- Geoffrey D. McWilliams, Lawrence Yao, Luke B. Simonet, Connor W. Haysbert, Eric Giza, Christopher D. Kreulen, Robert D. Boutin. Foot & Ankle Specialist. 2019."*

*"Abrams GD, Alentorn-Geli E, Harris JD, Cole BJ. Treatment of a lateral tibial plateau osteochondritis dissecans lesion with a subchondral injection of calcium phosphate. Arthrosc Tech. 2013;2:e271-e274."*

*"Mirghasemi SA, Trepman E, Sadeghi MS, Rahimi N, Rashidinia S. Bone marrow edema syndrome in the foot and ankle. Foot Ankle Int. 2016;37:1364-1373."*

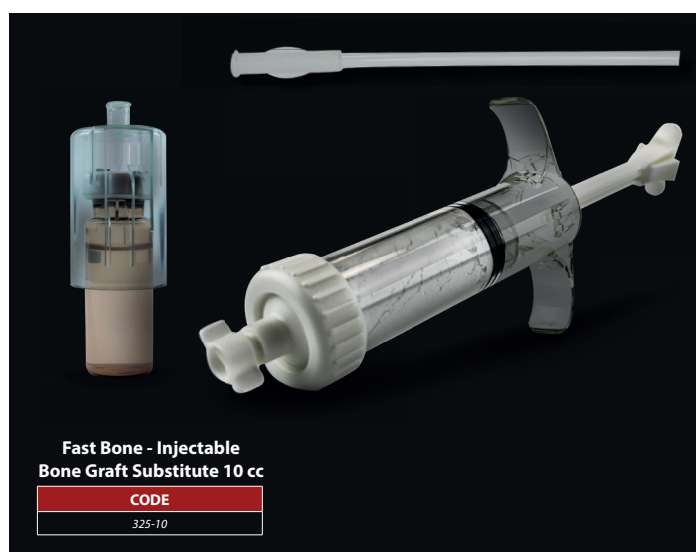
*"Cohen SB, Sharkey PF. Subchondroplasty for treating bone marrow lesions. J Knee Surg. 2016;29:555-563."*

*"Miller JR, Dunn KW. Subchondroplasty of the ankle: a novel technique. Foot Ankle Online J. 2015;8:1-7."*

## Summary

Subchondroplasty has recently been described in the foot and ankle with increasing indications particularly related to OCD in the ankle. In this last case, we would recommend it for OCD deeper than 1 cm with bone marrow edema in MRI, especially in recurrent cases. More evidence is needed to come to more precise indications.

**Cristian Ortiz, MD**



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