

# Platelet-Rich Plasma and Concentrated Bone Marrow Aspirate in Surgical Treatment for Osteochondral Lesions of the Talus



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## KEYWORDS

- Osteochondral lesions of talus • Platelet-rich plasma • Bone marrow stimulations
- Autologous osteochondral transplantation

## KEY POINTS

- Operative treatment can result in nearly 85% success rates in short-term and mid-term outcomes in osteochondral lesions of the talus (OLT); however, the inevitable deterioration of the regenerated or grafted cartilage is now of growing concern.
- Basic science studies have shown that the use of platelet-rich plasma (PRP) and concentrated bone marrow aspirate (CBMA) can improve cartilage repair and the biological environment of the operated ankle joint; however, the clinical use of those biologics in OLT has not been well described to date.
- Bone marrow stimulation produces reparative fibrous cartilage tissue after the debridement of flapped cartilage, necrotic bone, and calcified layer of the talar lesion.
- Autologous autograft transfer is a replacement procedure that uses cylindrical autologous osteochondral graft(s) to fill the talar defect in OLT.
- Currently available basic and clinical evidence suggests that the use of PRP and CBMA as an adjunct to the surgical procedures used to treat OLT can improve clinical and radiological outcomes.

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## INTRODUCTION

Osteochondral lesions of the talus (OLT) frequently accompany foot and ankle injuries, including ankle sprains and fractures.<sup>1</sup> When conservative measures fail to relieve a patient's symptoms, operative treatment, including both reparative and replacement techniques, is indicated.<sup>2</sup> Clinical evidence suggests that both operative treatment modalities demonstrate good to excellent short-term and mid-term clinical outcomes in up to 85% of cases.<sup>3</sup> Nevertheless, the technical difficulty of the operative procedures and the inevitable deterioration of the regenerated or grafted cartilage are of concern.<sup>4-7</sup> Previous studies propose that a combination of mechanical and biological impairments in the injured ankle joint may affect the deterioration, prompting interest in adjuvant modalities that could improve outcomes by addressing some of these deficits.

Platelet-rich plasma (PRP) and concentrated bone marrow aspirate (CBMA) are simple, minimally invasive procedures that could potentially improve the quality of cartilage repair and the biological environment in the ankle joint.<sup>8</sup> Despite numerous basic science articles showing evidence of the benefits associated with the use of these biologics for the treatment of cartilage lesions,<sup>2,8-24</sup> the production techniques used to generate these products and the clinical outcomes following their use in conjunction with operative treatment for OLT have not been well described to date.

In this article, we describe the surgical techniques of the 2 most common operative procedures for OLT, bone marrow stimulation (BMS) and autologous autograft transfer (AOT), and present the current evidence on the use of biologic agents in conjunction with the surgical procedures described.

## INDICATIONS/CONTRAINDICATIONS

Operative treatment is indicated for patients who do not experience symptom relief after 3 months of conservative treatment. It is generally accepted that BMS is performed on patients with small lesion size, whereas AOT is applied in large defects. Currently, the critical size has been established at 15 mm<sup>25</sup> in a diameter or 150 mm<sup>2</sup>.<sup>26,27</sup> Contraindications for surgery include any patient identified as a smoker or having associated medical comorbidities (eg, diabetes, autoimmune disease, active infection). Knee arthritis and patellofemoral syndrome are only relative contraindications for AOT. Global joint degeneration is a controversial indication for BMS, but is contraindicated for AOT. Patients with previous failed BMS may experience better outcomes with AOT.<sup>28</sup>

Indications for use of biologics in both BMS and AOT are not well defined yet in clinical evidence or practice. In the authors' institution, these biologics are not used in patients, with (1) hematologic dyscrasias, particularly platelet dysfunction, (2) active infection, and (3) severe anemia (hemoglobin level <8 g/dL).

### *Preoperative Planning*

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In certain cases, the diagnosis of OLT can be challenging due to a lack of specific clinical symptoms indicating the presence of a lesion and possible false-positive interpretation of standard radiographs.<sup>29-32</sup> A high index of doubt is present in cases with persistent ankle pain following ankle injuries.

OLT commonly occurs concomitantly with other ankle pathologies (eg, synovitis, bony spur, ligament injuries). Examination for the presence of these common concomitant pathologies is also evaluated preoperatively.

Imaging studies are used to diagnose OLT and plan the operative treatment. In 30% to 50% of cases, standard radiographs fail to detect OLT.<sup>29-32</sup> Computed tomography

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