



## **Subchondral bone marrow edema of the knee: ESWT efficacy and correlations between pain reduction and BME area changes**

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### Introduction

Subchondral bone marrow oedema (BME) is a metabolic disorder of the joint causing pain, swelling, and functional impairment. While it can resolve spontaneously, subchondral bone weakening may lead to cartilage damage and altered joint metabolism. Alongside pharmacological treatment and rest, extracorporeal shockwave therapy (ESWT) has emerged as an effective biophysical stimulation modality, with surgery reserved as a last-line option.

### Materials & Methods

Two clinical studies evaluating ESWT in medial compartment knee BME were compared for correlations between lesion size reduction and pain improvement.

Study 1: Eighty-six patients underwent one ESWT session every 3 weeks for 9 weeks using an electromagnetic device with echographic targeting. Each session delivered 2,000 shocks at an energy flux density (EFD) of 0.22–0.43 mJ/mm<sup>2</sup>, frequency 4 Hz. Follow-up (FU) was at 14 and 18 months post-treatment. Thirty-one patients served as 6-month controls.

Study 2: A case series of 72 patients received one ESWT session every 3 weeks for 9 weeks using the same device. Each session delivered 1,500 shocks at a mean EFD of 0.35 mJ/mm<sup>2</sup>, frequency 4 Hz, via anterior approach targeting the middle medial tibial plateau 0.5–2 cm from the articular edge.

### Results

In both studies, ESWT reduced pain and decreased BME area. In Study 1, improvement in pain scores at 3 months did not significantly correlate with BME area reduction. In Study 2, six months after ESWT, a statistically significant regression of BME area was observed, accompanied by significant pain reduction ( $p < 0.05$ ). Larger baseline BME areas were associated with poorer clinical status, while reductions in BME area correlated with parallel decreases in pain.

### Discussion

These findings highlight the importance of monitoring both pain and the BME area when assessing ESWT efficacy for knee BME. The correlation between structural improvement and symptom relief suggests that BME regression may contribute to functional recovery and pain reduction. Fast Spin Echo (FSE) MRI sequences are valuable for visualising BME, quantifying lesion size, and exploring its potential role in the pathogenesis of knee osteoarthritis.