The Influence of Titanium Scaffold Porosity on Bone Regeneration and Implant Stability in TTA. A Radiographic Study

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dvances in Tibial Tuberosity Advancement (TTA) techniques for cranial cruciate ligament rupture (CrCLR) in dogs rely on the selection of different implant material designs that balance strength, biocompatibility, and osseointegration. The focus of this procedure is the stabilisation of the knee joint through the modification of the biomechanical dynamics of the patellar tendon. The porosity of titanium scaffolds have emerged as a transformative option, offering a unique combination of structural stability and improved bone regeneration. Scaffolds with interconnected pores facilitate vascularization and new bone ingrowth, critical for healing large bone defects. This study evaluates the impact of scaffold porosity on bone healing and implant stability, focusing on their radiographic performance over an eightmonth postoperative period. The study included 15 dogs, treated with TTA surgery method using porous titanium scaffolds. Radiographic evaluations were performed immediately postoperatively and at months 3, 6, and 8 to assess bone remodeling and scaffold integration. At eight months, radiographic evaluation showed that progressive and complete osseointegration had been achieved in all cases. Smaller scaffolds promoted faster callus formation and higher trabecular density, while weight-based variations highlighted the importance of tailoring implant designs to individual patient profiles. These radiographic findings confirm the critical role of porous titanium scaffolds in osseointegration in advancing TTA procedures, enhancing short-term outcomes.

Keywords: Tibial Tuberosity Advancement, Titanium Scaffold Porosity, Osseointegration Implant Stability