

# Device-length changes and implant function following surgical implantation of the KineSpring in cadaver knees

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**Introduction:** The KineSpring implant system has been shown to provide load reductions at the medial compartment of the knee, and has demonstrated clinical success in reducing pain and increasing function in patients with medial knee osteoarthritis. These results depend on the ability of the KineSpring to rotate, lengthen, and shorten to accommodate knee motions, and in response to knee position and loading.

**Purpose:** The present study was undertaken to determine length changes of the implanted KineSpring in response to a range of knee positions, external knee loads, and placements by different orthopedic surgeons.

**Materials and methods:** KineSpring system components were implanted in ten cadaver leg specimens by ten orthopedic surgeons, and absorber-length changes were measured under combined loading and in different positions of the knee.

**Results and conclusion:** Spring compression consistent with knee-load reduction, and device lengthening and shortening to accommodate knee loads and motions were seen. These confirm the functionality of the KineSpring when implanted medially to the knee.

**Keywords:** KineSpring, knee, function, preservation, offloading, osteoarthritis

## Introduction

Knee osteoarthritis (OA) is a widespread disease that is affecting ever-younger patients with increasing frequency. This has spurred research efforts to reduce pain, preserve joints, delay replacement, and where possible restore joint function. High loads across the medial compartment of the OA knee in particular have been linked to both disease severity<sup>1,2</sup> and progression,<sup>3</sup> and so reduction of the loads at the knee is the basis for a number of potentially successful OA treatments, such as wedge insoles, braces,<sup>4-23</sup> and high tibial osteotomy.<sup>24-27</sup> A novel approach to reduce loads across the medial knee compartment is offered by the KineSpring system (Moximed, Hayward, CA, USA), which has been in clinical use for unicompartmental knee OA patients since mid-2008.

KineSpring treatment has resulted in pain relief and functional improvement in clinical studies with medium-term follow-up,<sup>28,29</sup> and the active load reduction of the system has been demonstrated in biomechanical studies.<sup>30,31</sup> The KineSpring reduces the load on the medial compartment through compression of its absorber at low knee-flexion angles, and accommodates knee motion via two ball-and-socket joints and a sliding piston (Figure 1). The ball-and-socket joints and sliding piston of the implant allow rotations and translations between the femoral and tibial bases in every direction, thereby accommodating knee motions.

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