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Abstract

Total Hip Arthroplasty (THA) is an effective treatment for severe hip arthritis, with patients reporting high rates of satisfactory results postoperatively. There are a variety of choices regarding THA implant designs. Ceramic on Ceramic and Ceramic on Highly Cross-Linked Polyethylene (XLPE) THAs are the materials of choice nowadays. The purpose of this study is to review the effect of kinematics and kinetics on wear (*in vivo* and *in vitro* testing) that affect wear in Ceramic on Ceramic and Ceramic on XLPE total hip arthroplasties and identify possible advantages amongst them. The study hypothesis was that THA kinematics and/or kinetics, since they directly affect THA wear, could provide data for possible advantages between the examined implant designs. A systematic review of the literature identified no significant evidence for biomechanical advantages between these two prostheses in terms of wear. Further research is proposed with the use of gait analysis systems combined with surface electromyography to further investigate THA biomechanics at a laboratory set up. Wearable sensors technology could also identify detailed biomechanical parameters in more complex daily activities.

Keywords: THA biomechanics ▪ total hip arthroplasty wear ▪ ceramic on ceramic THA kinematics ▪ ceramic on XLPE THA kinetics ▪ THA *in vivo* wear ▪ hip arthroplasty *in vitro* wear