The Impact of Open Patella Knee Cap and Designed Off-Loader Valgus Knee Brace on Muscle Activity Patterns and Joint Loading during Walk In Normal Adult – A Pilot Study

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Abstract

Objective: To assess the biomechanical impacts of open patella knee cap/sleeve and designed polycentric off-loader knee brace on knee joint movement during gait in normal adult. *Method:* Quantitative assessment for the pressure changes of strain gauges of muscles around the knee joint during normal gait with & without knee cap & brace are recorded in MATLAB and further analyzed. *Results:* The application of open patella knee cap reduces co-contractions in magnitude of lateral hamstring pair and increases those of medial hamstring pair. Contrary to it when exposed to offloader valgus knee brace same subjects had significantly vastus lateralis -lateral hamstring co-contractions greater in magnitude than those of vastus Medialis-medial hamstring. *Conclusion:* The application of open patella knee cap/sleeve without hinge joint and designed offloader knee brace attempt to redistribute the load laterally or medially respectively as needed in context to demand in normal adult.

Key words: Offloader brace, Knee Sleeve, Strain gauge sensor, Muscular loading, Gait

Introduction

The concept of unloading the affected compartment by bracing aims to correct the mechanical axis deviation. American *Academy of Orthopaedic Surgeons (1999)* classified knee braces into prophylactic, functional and rehabilitative categories. According to *Burger (1995)* the prophylactic knee braces protect or reduce severity of knee injuries from valgus stress to protect medial collateral ligaments. *Wojtys (1996)* identified that functional knee brace provide stability for ligamentous knees instability and control some degree of external knee rotation & AP joint translation. Rehabilitative braces allow protected & controlled movements in injured knees. Patello-femoral braces improve patellar tracking moderately and thereby relieve anterior knee pain (*Maurer et al, 1995; Paluska & McKeag, 2000*). They also found that unloader / offloader braces provide pain relief in osteoarthritis (OA) knees.

Harrington (1983) study indicated that varum deformity knees had a predictable loading pattern or location of centre of pressure than valgum deformity knees and hence is easily compensated. The study also found that valgus braces reduce medial compartmental loading, pain and improve the performance in

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