

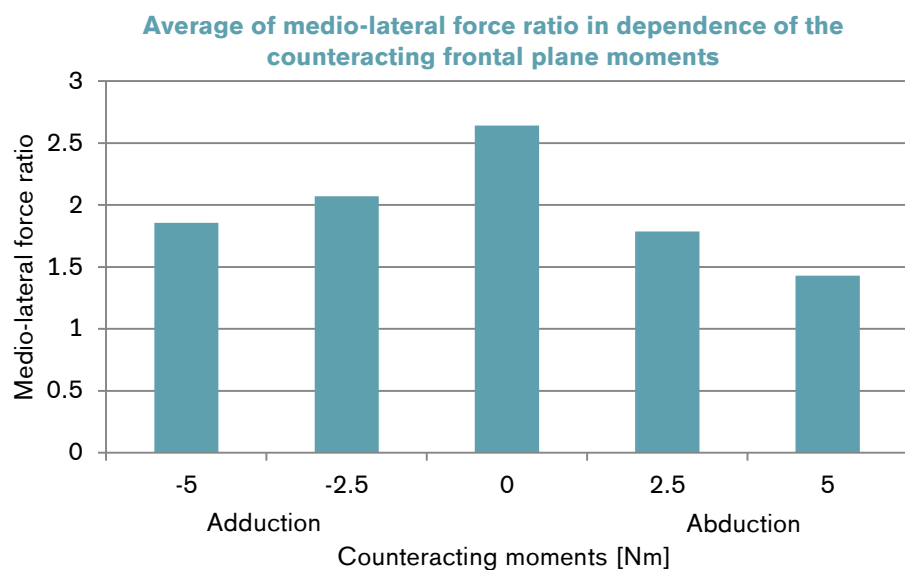
Genu Arthro

Biomechanics - Static measures

Major Findings

With Genu Arthro:

- Higher knee flexion leads to an increase of the medial compartment loading (varus and valgus alignment)
- Counteracting abduction moments have a higher positive influence on the force in the medial knee joint compartment than adduction moments for the lateral compartment.
- The same level of counteracting moment in valgus alignment results in a much higher shift of the COP (center of pressure) than in varus alignment.



The applied counteracting abduction moments led to higher redistributions than the applied adduction moments. (Engel, 2015)

Clinical Relevance

Osteoarthritis (OA) is the most common type of articular joint disease and will become a larger public health problem as a function of the aging demographic (Ehrlich, 2003). It has been experimentally demonstrated that the use of special knee orthoses can modify the resulting net moment of the knee joint during walking and running. Reduction of the knee adduction moment and decreased medial compartment forces were observed after the application of external abduction moments. (Fantini Pagani, 2010).

Summary

With increasing knee flexion angles the forces in the medial compartment loading increase in knee joints with all mediolateral alignments (varus, neutral, valgus) (Engel, 2015).

The knee joints with varus and neutral alignment show higher loading in the medial compartment, whereas more load is transferred through the lateral compartment in knee joints with valgus alignment. These results indicate that the motion of the bones affects the relationship between the levers and the orthosis (Engel, 2015).

The applied counteracting abduction moments lead to higher redistributions than the applied adduction moments. Furthermore, the largest COP shift effect of 4.3 mm to the medial side is found in the joint in valgus alignment when 5 Nm ad-

duction moment are applied. In comparison, the highest COP shift to the lateral side is 1.8 mm (Engel, 2015).

The spring constant of the Genu Arthro and MOS Genu (Bauerfeind) was in focus in another study (Kutzner, 2011). For MOS Genu the spring constant was 145% higher than of Genu Arthro. Due to the author herself calls this study a case report with a limited number of 3 subjects, the results do not allow general conclusions.

References of summarized studies

Engel K, Brüggemann G-P, Heinrich K, Potthast W, Liebau C (2015) Do counteracting external frontal plane moments alter the intraarticular contact force distribution in the loaded human tibiofemoral joint? Munich: Elsevier 2015, *The Knee* 22: 68–72.

Kutzner I, Kuther S, Heinlein B, Dymke J, Bender A, Halder AM, Bergmann G (2011). The effect of valgus braces on medial compartment load of the knee joint– in vivo load measurements in three subjects. *Journal of Biomechanics*; 44: 1354–1360.

Other References

Ehrlich GE (2003). The rise of osteoarthritis. *Bull World Health Org*; 81:630.

Fantini Pagani CH, PotthastW, Brüggemann G-P (2010). The effect of valgus bracing on the knee adduction moment during gait and running in male subjects with varus alignment. *Clin Biomech* 2010;25:70–6.

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