

Biomechanical changes in the conservative treatment of medial compartment osteoarthritis of the knee

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BACKGROUND

Management of medial compartment osteoarthritis of the knee in active individuals who do not yet require surgery, or who are unsuitable for surgery due to associated medical conditions is a challenge.

Various conservative management modalities have been introduced in an attempt to reduce excessive medial compartmental loading in the knee joint, in individuals with medial compartment osteoarthritis (OA). These include valgus knee bracing and lateral wedging of the foot.

This current study investigates the efficacy of knee valgus braces and lateral wedging in subjects with medial compartment OA of the knee, through advanced biomechanical testing of walking and single limb stance. This paper focuses on the three dimensional movements and moments at the knee, and ground reaction forces.

METHOD

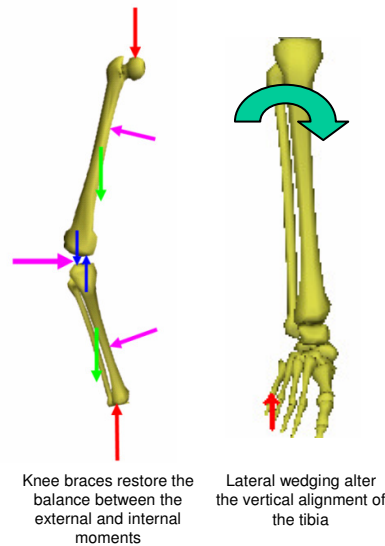
Kinematic data were collected using an eight camera Proreflex MCU240 motion analysis system at 100 Hz. The markers were placed on the foot, shank, thigh and pelvis based on the calibrated anatomical system technique. The data was then smoothed with a Butterworth 4th order filter with a cut off frequency of 6 Hz. Kinetic data were collected from two Kistler force platforms at 200 Hz.

Inclusion criteria

- Isolated medial compartment knee OA
- No ACL deficiency
- No hip/lumbosacral OA
- Larsen grade 2-4

Each subject was tested while wearing no brace, an OA adjuster knee brace, and 5 degree lateral wedging of the foot. The subjects were asked to perform two tasks; a ten metre walk, and single limb standing on the affected side.

Parameters recorded included, knee adduction moments, knee adduction angle, knee flexion, and ground reaction forces.



RESULTS

These results show improvements in the knee angle in the coronal plane during stance phase with both treatments with the brace showing the largest effect in all subjects, Figure 1.

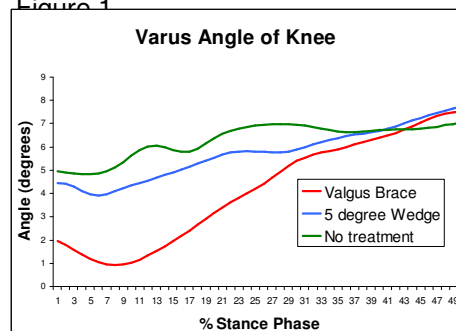


Figure 1

Larger and more normal vertical loading and propulsive forces were seen with both treatments with the brace again showing the largest effect again in all subjects, Figure 2. This is most probably due to an improved stability of the knee and reduction in pain.

The OA adjuster brace also showed no sign of restriction of the sagittal plane motion of the knee. Which has previously been reported in other such braces.

Overall these findings suggest that both the valgus brace and the lateral wedge give a degree of correction to the varus position of the knee which gives the subjects substantial functional improvements during gait.

CONCLUSIONS

Significant improvements were seen in the angulation of the knee in the coronal plane during stance phase with both the valgus brace and the 5 degree lateral wedge. These changes show the knee moving towards a less varus position with the brace showing the largest effect. Larger vertical loading and propulsive forces were also seen whilst wearing the valgus brace and the lateral wedge with the brace again showing the largest effect and greatest

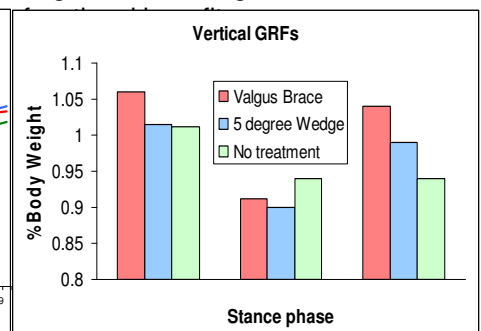


Figure 2