The Bilateral Effects of Unilateral Knee Bracing for the Treatment of Medial Knee Osteoarthritis

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BACKGROUND

There are many types of interventions to treat the pain and disability associated with knee osteoarthritis (OA)
- joint replacement
- pharmaceuticals
- knee bracing

Knee bracing is an effective, conservative method of treatment for knee OA
- reduces pain and improves function in short-term follow-up[1]

It is important to understand long-terms effects of bracing on both the treated and untreated knee
- knee OA often presents unilaterally and progresses to the contralateral limb[2]

Purpose: To examine the short and long-term effects of knee bracing on disease progression in both the involved (treated) and uninvolved (untreated) knee

Hypothesis: The brace was expected to improve pain and objective function in the treated limb with no changes in the untreated limb

CLINICAL SIGNIFICANCE

It is important to understand how unilateral knee bracing affects disease progression in both the treated and untreated limb to ensure that there are no significant negative effects of the intervention on either limb

METHODS

Participants

6 participants (2 F/4 M, 66 ±8 yrs, 1.7 ±0.1 m, 79.1 ±8.2 kgs)

Unilaterally-symptomatic medial knee OA
- Kellgren-Lawrence grade 2 – 4

Protocol

Subjects wore a custom Össur Unloader One knee brace on their involved knee and standardized footwear (New Balance 576) throughout a 12-month intervention

3D instrumented gait analysis (12-camera motion analysis system, 4 forceplates)

Pain and Function were assessed at baseline, 1-week, 4-months, 12-months:
- **Pain** following stair ascent/descent, measured using 100mm VAS
- **Function**: peak stance-phase knee adduction angle and abduction moment (internally-referenced)

Assessed treated and untreated limb in both the braced and unbraced conditions

Statistics

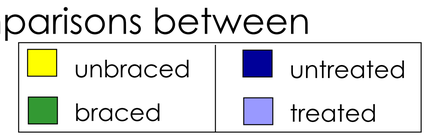
Two-way repeated-measures ANOVA to assess pain in both limbs over time

Linear mixed-models (covaried for speed) to assess angles and moments in both limbs and bracing conditions over time

$P < 0.10$ significant

RESULTS

Figures 1 - 4 shows the results of the comparisons between braced conditions and limbs over time



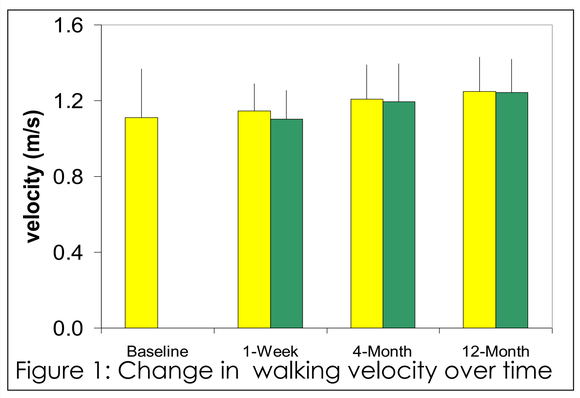


Figure 1: Change in walking velocity over time

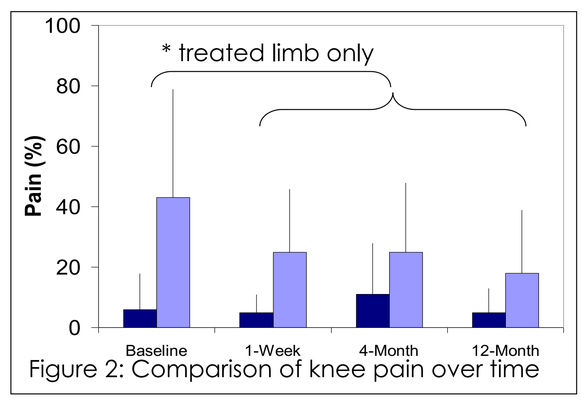


Figure 2: Comparison of knee pain over time

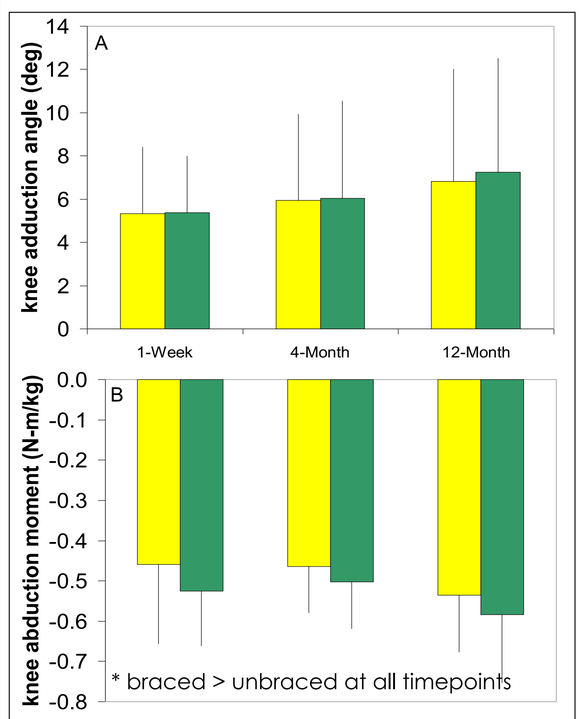


Figure 3: Comparisons of angles (A) and moments (B) between braced and unbraced conditions over time (involved limb only)

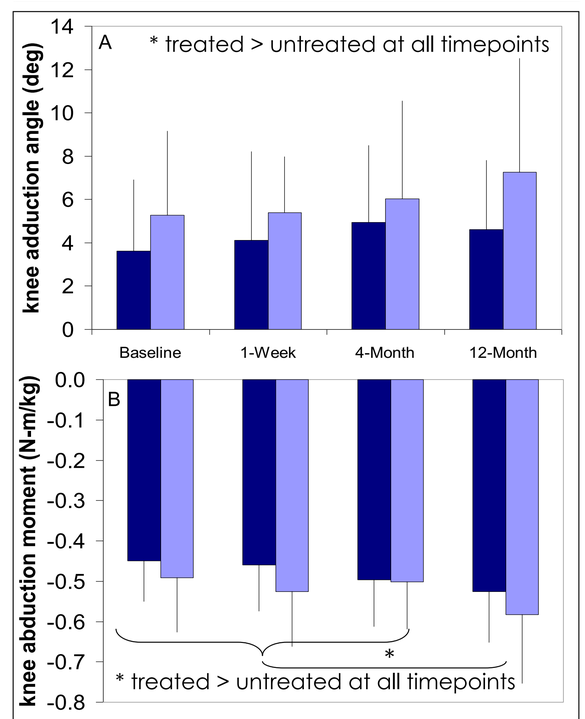


Figure 4: Comparisons of angles (A) and moments (B) between involved and uninvolved limbs over time (braced condition only, except for baseline)

DISCUSSION

Pain was immediately reduced in the treated limb, with no concurrent changes in the untreated limb (Fig 2)

At each timepoint, knee abduction moments were significantly larger in the treated limb when the brace was worn (Fig 3)

The treated limb had more functional knee varum than the untreated limb, and this difference was maintained over time
Increased adduction angles and abduction moments (Fig 4)

Both limbs appeared to exhibit decreased objective function at 12-month follow-up
Increased knee adduction moments (Fig 4)

The reason for this is unclear, but may be related to decreased gait compensations as a result of alleviated pain

This experimental brace may not be sufficiently rigid to control the aberrant mechanics in this population

REFERENCES

[1] Kirkley et al. *J Bone Joint Surg* Am, 1999

[2] Spector et al. *Ann Reum Dis*, 1994

ACKNOWLEDGEMENTS

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New Balance for providing footwear to participants