



THUASNE

EFFECT OF LIGAMENT KNEE BRACES ON JOINT STABILITY

Sprains

- Most common knee injury **(43%)***
- More than **100 000** new cases/year (Europe+US)**
- Incidence **1 per 1000** per year approximately*
- In over **1/3** of cases during a sport activity*



*Brett E. Gage et al. «Epidemiology of 6.6 Million Knee Injuries Presenting to United States Emergency Departments From 1999 Through 2008» Academic Emergency Medicine 2012; 19:378-385

**Steve Bollen «Epidemiology of knee injuries: diagnosis and triage» Br J Sports Med 2000;34:227-228

THE EFFECTS OF A FUNCTIONAL KNEE BRACE

during Early Treatment of Patients with a Non-operated Acute Anterior Cruciate Ligament Tear: A Prospective Randomized Study

Swirtun Linda R. et al. 2005 Clinical Journal of Sport Medicine: Official Journal of the Canadian Academy of Sport Medicine 15 (5): 299–304



22 subjects, non-operated after ACL tears (initial phase after injury) were treated with a **soft ROM ligament brace** for 12 weeks. 20 subjects in a control group.

Sense of instability

Brace group significantly improved ($p=0,047$).

No difference between groups concerning pain, discomfort, ability to walk on even ground, stair climbing, preinjury physical activities, muscle peak torque or Cincinnati knee score.

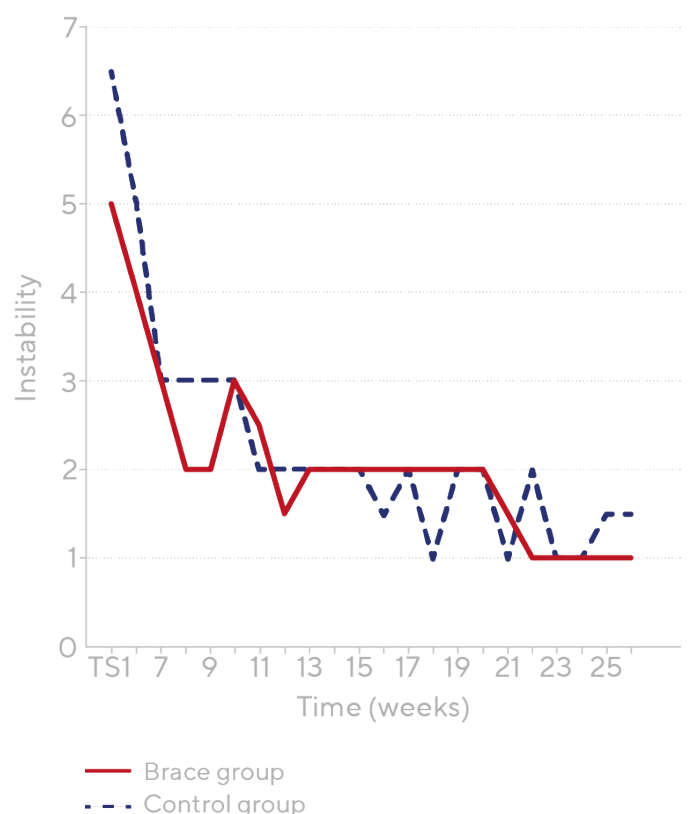
KOOS

At baseline, the **brace group** reported significantly ($p=0,003$) more problems in activities of daily living (ADL).

After brace treatment, no significant difference between the groups → this might reflect a **positive effect of the brace on ADL**.

No significant difference in any other KOOS outcome.

Knee sense of instability during the study



CONCLUSION

The patients subjectively report **benefits from bracing regarding sense of instability and rehabilitation**, although this has not been verified with other conventional outcomes.

EFFECT OF DIFFERENCE KNEE BRACES

in ACL-Deficient Patients.

Focke A. et al. 2020 Front. Bioeng. Biotechnol. 8:964.



17 subjects with ACL deficient knee were treated in alternation with a **soft** and a **rigid** ligament brace for a period of at least 4 weeks.

Knee kinematics during stance phase

Valgus

Both **braces** significantly reduced the maximum **valgus angle** during walking → stabilization of the knee joint.

Flexion

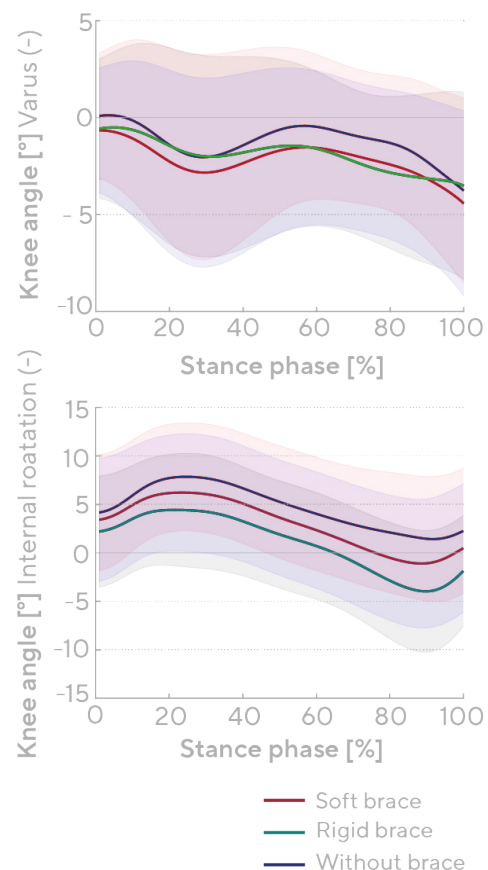
Patients generally walked with a **more flexed knee** in **braced conditions**, whereby mainly the **rigid brace** showed **significant and larger differences**.

External rotation angle

Significantly smaller for the **rigid brace** for walking, and **significantly smaller** for both **braces** during cutting.

ROM

With **both braces** a **significant increase**. **Significantly larger** with the **rigid brace** (**soft brace** <1°; **rigid brace** ≈ 1-2°).



CONCLUSION

Evidence for the **functional effectiveness** of **brace** when applied to ACL-deficient patients

Both **braces** are able to **limit valgus** → **additional stability** when patients return to sports.

Both **rigid and soft** had **similar effects** on joint angles in the frontal and transverse plane.

Rigid brace showed a **stronger reduction of the external rotation** in walking condition but have a significant **extension deficit**.

Therefore, for moderate intensity movement tasks, the **soft brace** seems to be able to stabilize ACL with a lesser impact on physiological gait compared to **rigid brace**.

EVALUATION OF THE MECHANICAL EFFICIENCY

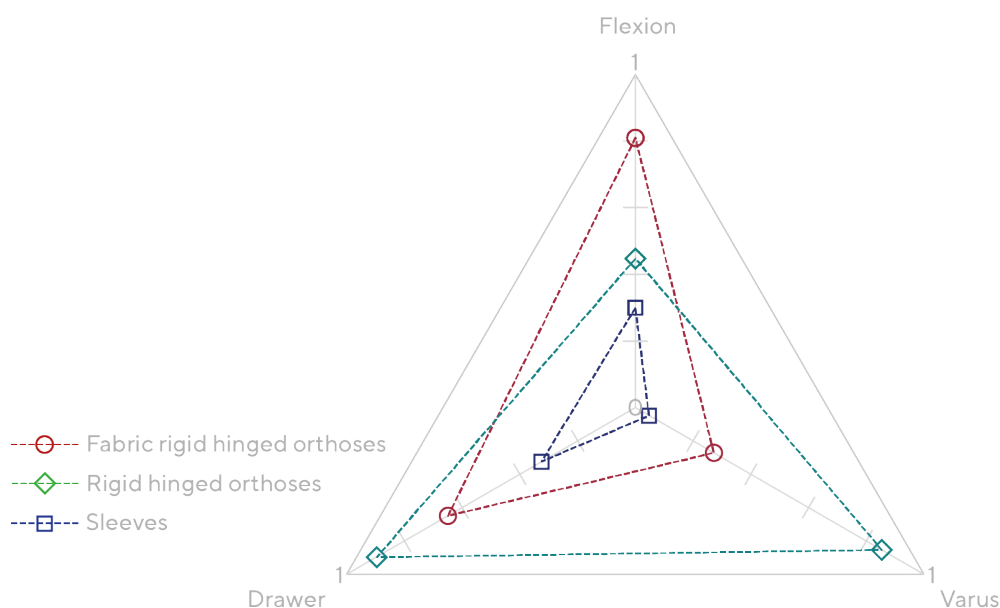
of knee orthoses: a combined experimental-numerical approach.

Pierrat B. et al. 2014 Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine, SAGE Publications, 2014, 228 (6), pp.533-546.



Surrogate lower limb tested with different braces: compression sleeve, soft ligament brace, rigid ligament brace.

Net charts of the mechanical effect
of knee orthoses regarding their motion restriction



Varus restriction

Compression sleeve have a **very low stiffness** → **no varus restriction**. The **rigid ligament braces** were **the best** to restrict varus.

Drawer restriction

Soft ligament brace were **efficient in restricting drawer**, but **the best were rigid ligament braces**.

Flexion promotion

Rigid ligament brace allowed **flexion better** than **soft ligament brace** → globally **more efficient and easier to walk with**.

Acceptance

Rigid ligament brace are usually reported to apply medial/lateral **compression forces to soft tissues**, resulting in a **poor compliance** to the treatment.

CONCLUSION

Soft and rigid ligament braces may bring a **substantial stability to the joint** for low loads and help with **lower grade injuries** (ACL deficiency, ACL partial tear).

EFFECT OF BRACE DESIGN ON PATIENTS

with ACL Ruptures.

Strutzenberger G. et al. 2012 International Journal of Sports Medicine 33 (11): 934–39.



28 subjects, non-operated after ACL ruptures performed tests for knee joint laxity. 3 conditions: unbrace, **soft ligament brace** and **rigid ligament brace**.

Knee joint instability

Significantly reduced by 33% ($p < 0,001$) with **soft ligament brace** and by **14%** ($p = 0,039$) with **rigid brace**.

Postural sway

Significant reduction only for soft brace (-20% $p = 0,024$ for path length, 16% $p = 0,047$ for AP displacement, 23% $p = 0,009$ for ML displacement).

Force development

Significantly increased it by 17% with **soft brace** (compared to non-braced condition) and by 19% compared to the **rigid brace**. This described the ability to **generate strength within a short period of time = fast stiffening of the muscle → active stabilization of the joint**.

CONCLUSION

During **coordinative complex situations** (such as the perturbed single leg stance or the landing after a jump with an inward turn), **rigid and soft braces provide a stabilizing effect** with a **significant reduction of knee joint laxity** and show a tendency to **decrease postural sway**. The **soft brace** showed in most test conditions **higher effect sizes** → might be caused by the flexible area of support and the incorporated mechanisms to address **proprioceptive aspects**.

KEY TAKEAWAYS

Ligament knee braces help to **increase joint stability** after ACL traumatism and can favor a **safe return to sport**.

Soft and rigid knee braces both have pros and cons: **soft** provides a **proprioceptive effect** enhancing **neurocontrol of the knee**, **rigid** provides a **better stabilization** during more demanding movements.

THUASNE PRODUCTS AFTER LIGAMENT INJURIES

MEDICAL INDICATIONS



Genu Ligaflex® range
ROM version



GenuPro control



Rebel® range

Conservative treatment of knee ligament injuries and/or ruptures (cruciate and/or lateral ligaments), post-operative rehabilitation, joint instability/laxity.



Genu Ligaflex® range
Non-ROM version

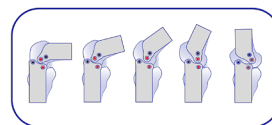
Conservative treatment of knee ligament injuries, joint instability/laxity, knee pain and/or swelling management, sport activities resumption.

Availability of these products might vary from a given country or region to another, as a result of specific local regulatory approval or clearance requirements for sale in such country or region. All the medical devices mentioned on this document are CE marked according to the Regulation 2017/745 on medical devices. Products mentioned in this document are CE class I. Please read carefully the instructions for use, indications and contraindications of the product.

TECHNICAL FEATURES

TM5

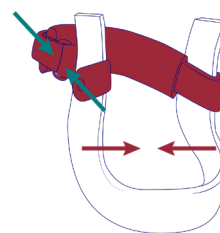
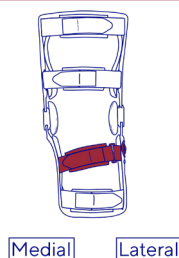
Ligament protection, prevent tibial instabilities⁽¹⁾⁽²⁾. Roll-back and glide movement similar to natural movement⁽²⁾. No pistonning, no migration⁽²⁾.



SYNERGISTIC SUSPENSION STRAP

Better comfort⁽¹⁾ as the brace stays in place on the leg.

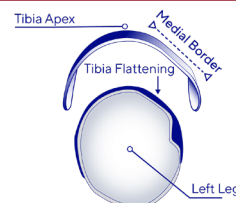
Anterior-posterior (AP) + medio-lateral (ML) tightening (front/back and left/right). Asymmetrical attachment on the narrowest aspect of the leg.



TIBIAL BOLSTER

Prevent rotation⁽¹⁾ and protect the ligaments⁽¹⁾.

Musculo-skeletal lock using the flat medial border of the tibia.



(1) Internal CE marking data. (2) A2S biomechanical study « Biomechanical study of the stride during use of different braces » 2020



Genu Ligaflex® range
Thuasne France
120 rue Marius Auphan
92300 Levallois Perret

GenuPro control
Thuasne DEUTSCHLAND
GmbH - Im Steinkamp
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Rebel® range
Townsend Design
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