STUDY ADVANCE COPY WITH SELECTED RESULTS

EVALUATION OF THE PAIN-REDUCING AND PROPRIOCEPTIVE EFFECT OF THE GENUPOINT PATELLAR TENDON SUPPORT

BAUERFEIND.COM

BACKGROUND

Jumper's knee (patellar tendinitis, patellar tendinopathy) is a chronic, painful overuse injury of the patellar tendon. The condition is caused by a disturbed balance between load and load tolerance and is often seen in sports that require frequent jumping. The most important symptom is pain at the patellar tendon insertion point. Conservative treatment methods include a.o. relative rest, physiotherapy, and drug-based treatment. This study examines the effect of a patellar tendon support on pain and knee joint proprioception in athletes with patellar tendinopathy.

STUDY DESIGN

Randomized cross-over study

METHODOLOGY

Test support:	Patellar tendon support (GenuPoint, Bauerfeind AG)
Test method:	Test set-up 1: Sample: n = 28 (8 females, 20 males), age: 18–50 functional patellar tendon loading tests with and without a patellar strap, two-week wearing test during sports. The pain was assessed using the Visual Analogue Scale (VAS 0–100). Wearing comfort grade. Test set-up 2: Sample: n = 24 (6 females, 18 males), age: 18–50 Angle reproduction test with the »MR Cube« from »FysioRoadmap monitored rehab systems«, with and without a patellar strap combined with a leg extension training device
Data analysis:	VAS score tests: Mixed model analysis Proprioception: Mixed model analysis, significance level: 5 percent, Software: IBM, SPSS version 22.
Inclusion criteria:	· Age: 18-50 · Unilateral or bilateral patellar tendinopathy, · Knee complaints due to patellar tendinopathy greater than 80 on a 100 VISA-P Score (Victorian Institute of Sport Assessment-Patellar Score) · The symptoms existed for more than three months
Exclusion criteria:	· Acute knee pain · Knee complaints less than 80 on a 100 VISA-P Score · Patients with other knee conditions · Corticosteroid treatment in the last three months · Neurological impairments · Daily use of painkillers over the past year

Source:
Astrid J. de Vries, Inge van den Akker-Scheek, Svenja L.Haak, Ron L. Diercks, Henk van der Worp, Johannes Zwerver;
Effect of a patellarstrap on the joint position sense of the symptomatic knee in athletes with patellar tendinopathy;
Journal of Science and Medicine in Sport,(2017) http://dx.doi.org/10.1016/j.jsams.2017.04.020

BAUERFEIND AG · Triebeser Straße 16 · 07937 Zeulenroda-Triebes · Germany

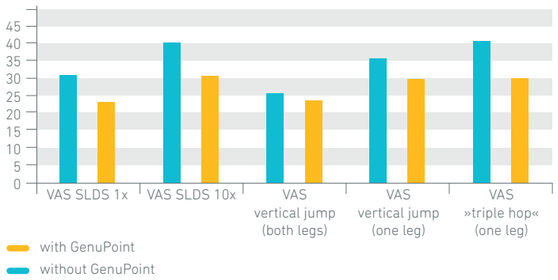
Rev.1 – 2017-06_19003060421003

RESULTS

During functional tests as the single leg decline squat (1x & 10x), vertical jump (one leg) and triple hop test (one leg) young athletes with patellar tendinopathy, showed a significant reduction in pain in the affected knee when the GenuPoint was used.

In the case of single and multiple squats, a respective pain reduction of 6.8 and 8.3 points was measured. With two-legged and one-legged vertical jumps, pain decreased by 1.7 and 6.1 points, and with the triple hop test (one leg), a 10.3 point reduction in pain was measured on average on the 100 mm VAS scale. This latter value indicates that wearing the patellar tendon support causes a clinical relevant reduction in pain.

Pain when carrying out functional squats and jumping exercises:
Fig. 1: Pain measurements from 28 athletes with patellar tendinopathy (jumper's knee) using a 100 mm VAS scale. (SLDS: single leg decline squat)

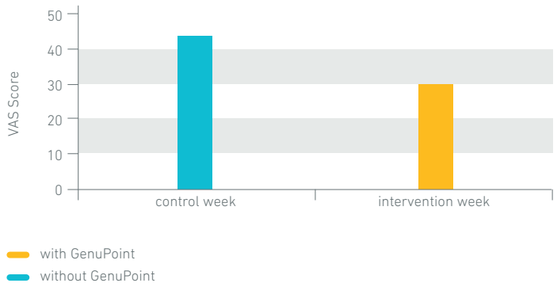


Over the course of two weeks, athletes with jumper's knee documented their subjective level of pain. They wore GenuPoint during sport with an average of four hours of sporting activity per week.

In the first week, no patellar tendon supports were worn and in the second week, the test subjects received a GenuPoint support.

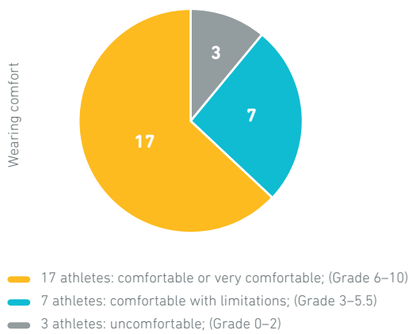
In the week in which the GenuPoint was worn, the average pain per week fell by 15.2 units (from 43,2 to 28.0) on the 100 mm VAS scale, compared to when the GenuPoint was not used.

Pain during sporting activities
Fig. 2: Pain measurements during sport using a 100 mm VAS scale over the course of two weeks. First week without, second week with the GenuPoint.



Wearing comfort was assessed by the test subjects after one week of using the GenuPoint.
On average a total of four hours of sport was played per week over three days.
The majority of the test subjects were satisfied with the GenuPoint's wearing properties:
63 percent of the test subjects found the GenuPoint comfortable or very comfortable to wear.
26 percent of the test subjects rated the wearing comfort as satisfactory.
11 percent of the test subjects found the support uncomfortable.

Wearing comfort after a 14-day period of wear
Fig. 3: Grade 10 = best comfort; Grade 0 = worst comfort

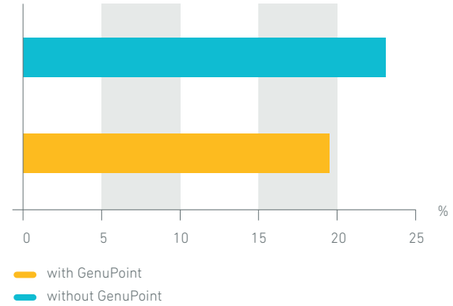


Study participants raise a weight when bending and stretching the knee joint in a leg extension machine in order to simulate movement under loading. The weights are kept low to ensure that the participants do not exceed their limits when they try to lift it (women 3 kilograms, men 5 kilograms). The range of extension and flexion achieved corresponds to 50 percent of the maximum possible range of motion of the knee joint.

Participants had to replicate the 50 % range of motion without visual feedback. The deviation from the correct joint position is measured with and without the patellar strap.

Test subjects with low proprioceptive capability (n = 15) showed a 17.2 (from 23.2 to 19.2) relative percent improvement in joint perception through wearing the patellar tendon support.

Evaluation of the active angle reproduction tests
Fig. 4.: Indicator of improved proprioception: deviation from the correct leg position during the extension test expressed as a percentage; n = 15 (group of patients with low proprioception)



DISCUSSION

Patellar tendon support results in reduction of pain in all functional tests except for the jump test on both legs. Two of the »one leg« jumping tests show a clinically relevant reduction of pain. These two tests take the greatest effort with the highest potential of producing pain presumably. Due to the fact the pain reducing effect of the support might be greatest under these conditions. The pain reducing effect is confirmed in sports specific situations of daily life also.

The patellar tendon support don´t have a clear proprioceptive effect on the entire group. There are different results dividing the total group of test subjects into a group with good proprioceptive capabilities and into a group with substantially reduced proprioceptive capabilities.

The patellar tendon support causes no significant improvement in patients with good proprioception of the knee joint despite their diseases. However, in the case of the group of subjects with poor proprioception of the knee joint, the patellar tendon support significantly improves their proprioceptive capabilities. This is consistent with results from studies on healthy test subjects with low proprioceptive ability.
The difference in patellar strap effect between athletes with high and low proprioceptive ability may be due to the fact that there is more room for improvement by an increase in proprioceptive feedback in those with low proprioceptive ability.

For the proprioceptive measurement an »active joint position reproduction test« was used in contrast to the more commonly used passive TTDPM test (Threshold to Detection of Passive Motion). The advantage of the active test method is that proprioception can be measured during movement. It provides a more real life assessment of proprioceptive ability.

It is hypothesized that patellar strapping improves proprioceptive ability by enhancing proprioceptive feedback from mechanoreceptors, causing the conduction of extra proprioceptive information to the central nervous system. An improvement in joint perception could result in improving the ability of coordination. That could lead to a physiological, stable gait and could prevent for harmful movements.

CONCLUSION

Wearing the GenuPoint demonstrably increases the proprioceptive capabilities of test subjects suffering from a patellar tendinopathy (jumper's knee), particularly those with pathologically reduced sensorimotor function.

Pain due to jumper's knee is significantly reduced by wearing the GenuPoint, both in test conditions and during sports in the normal sports environment.