OA. There was no difference in the range of knee extension between those with PFJ OA and those with no OA, but participants with PFJ OA performed significantly worse on functional tests than those who were free of OA
Conclusions: PFJ OA is relatively common ~7 years after HT ACLR and is associated with worse symptoms and reduced functional performance

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THE EFFICACY AND COMPLIANCE OF AN ELASTIC KNEE SLEEVE COMBINED WITH THE SUBTALAR STRAPPED INSOLE FOR PATIENTS WITH OSTEOARTHRITIS OF THE KNEE

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Purpose: We developed a novel lateral wedged insole with elastic fixation of the subtalar joint (the strapped insole) for patients with knee osteoarthritis (OA) to correct the femorotibial angle, this limitation of the traditional inserted insoles. However, the strapped insole of the knee had a limitation in that it was difficult to improve knee pain with ambulation on uneven ground. In order to solve this limitation of the strapped insole, we considered adding a knee orthotic device to the insole. Therefore, this study was designed to evaluate the efficacy and compliance of knee orthotic devices as assistance for the strapped insole.
Methods: The 110 knee OA patients were prospectively randomized and treated with one of the following interventions: a strapped insole alone (the control group, n=37), the strapped insole combined with a relatively long elastic knee sleeve (the plus long sleeve group, n=36), or the insole plus a short sleeve (the plus short sleeve group, n=37). In the course of the four-week study, every participant could propose quitting the allocated orthotic device for any discomfort.
Results: In the 93 patients that completed the study, the mean values and standard deviations for changes in the Lequsne index at the final assessment, compared with the baseline assessment, were -4.8±5.2 in the control group, -4.0±4.7 in the plus long sleeve group, and -4.7±6.2 in the plus short sleeve group. Participants wearing the strapped insole alone ($P<0.0001$), the strapped insole with long sleeve ($P=0.0001$) and the strapped insole with short sleeve ($P<0.0001$) demonstrated significantly improved Lequesne index values in comparison with their baseline assessments. The number of participants that could walk without knee pain on uneven ground was significantly increased at the final assessment compared with that at the baseline assessment in the plus long and short sleeve groups ($P=0.005$ and 0.002, respectively), but not in the control group ($P=0.32$). The frequency of withdrawal was more common in the plus long sleeve group (13/36, 36.1%) than in the control (1/37, 2.7%) or the plus short sleeve groups (3/37, 8.1%).
Conclusions: In the plus long and short sleeve groups, the number of participants that could walk easily on uneven ground was increased at the final assessment compared with that at the baseline assessment. These results suggested that an elastic knee sleeve, when combined with use of the strapped insole, was useful to prevent the increased pain due to ambulation on uneven ground. For compliance, the short sleeve may be more comfortable than the long sleeve as an assistant knee sleeve for the strapped insole.

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TRANSDERMAL PERMEATION OF HIALSORB® UNDER THE EFFECT OF ULTRASOUNDS

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Purpose: The aim of this study was to evaluate the transdermal permeation of Hialsorb® in the presence/absence of ultrasound. Hialsorb® is a fluid emulsion for joint massage that contains 0.25% of hyaluronic acid and 0.25% of other mucopolysaccarides.
Phonophoresis or sonophoresis is the use of ultrasound to increase percutaneous absorption of a drug. Recent studies have shown that ultrasound-mediated transdermal drug delivery offers a promising potential for noninvasive drug administration.
Methods: The transdermal permeation of the mucopolysaccharides present in Hialsorb® was studied *in vitro* with human skin from the abdomen of healthy women who underwent cosmetic surgery (0.4 mm thick). The transdermal permeation was determined in natural conditions (Experiment 1) and also after the application of ultrasound (Experiments 2 and 3). Skin samples from 7 healthy donors were used and barrier integrity of the skin was characterized by transepidermal water loss (Tewl) measurements. We used Franz-type vertical diffusion cells with an effective permeation area of approximately 13 ml (17 ml for experiments 2 and 3). The formulation studied (0.3g-0.8g) was placed in the donor compartment and the receptor chamber was filled with PBS (phosphate-buffered saline, pH 7.4) and kept at 37±0.5 °C. In experiments 2 and 3 we treated samples with the ultrasound device for 15 minutes under 2 different conditions, 1 W/cm^2 continuous mode and 2.4 W/cm^2 pulsed mode (1:4), respectively. This approach corresponds to a simultaneous application of drug and ultrasound to the skin. Samples of 400 μl were withdrawn from the receptor compartment during 24 hours. The determination of the glycosaminoglycans was done by means of a colorimetric assay. The ultrasound device used was MEGASONIC 700 (Ultrasound 1-3 MHz, Electromedicarin S.A.).
Results: The study shows that the degree of permeation of Hyaluronic Acid and other mucopolysaccharides (expressed as total glycosaminoglycans) through the skin of 6 different donors and from the emulsion called Hialsorb® at 24 h was approximately 17%. We have found an increase in the permeation of glycosaminoglycans compared to its corresponding control condition of 9.93% for experiment 2 and 11.62% for experiment 3.
Conclusions: The experiments performed have demonstrated that therapeutic ultrasound (1-3 MHz) is able to increase by around 10% the permeation of the glycosaminoglycans present in Hialsorb®, therefore topical application of the formulation is suitable for ultrasound transmission, to enhance the effects of physiotherapy and speed up functional recovery. This emulsion is an effective treatment for knee pain caused by joint-cartilage loss and/or soft-tissue injuries such as tendinosis and bursitis, when diagnosed by ultrasound.

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THE FEASIBILITY OF A PROGRESSIVE TWELVE-WEEK NEUROMUSCULAR AND STRENGTH TRAINING PROGRAM IN MIDDLE-AGED PATIENTS WITH DEGENERATIVE MENISCUS TEARS

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Purpose: To describe the feasibility of a progressive twelve-week neuromuscular and strength training program in middle-aged patients with degenerative meniscus tear by the use of a single case report. Feasibility was determined as 1) acceptable self-reported pain during the program, 2) decreased pain throughout the program, 3) improved knee muscle strength, 4) improved physical performance, and 5) improved global rating of knee function.
Methods: A 51-year-old man (1.73m, 80kg) with unilateral degenerative meniscus tear included in an ongoing randomized controlled trial, completed a twelve-week progressive neuromuscular and strength training program. The program included standardized progressive muscle strength training and neuromuscular exercises performed two to three times per week for 12 weeks. The principles and progression were in accordance with current American College of Sports Medicine guidelines in terms of frequency, volume and recovery time for recreational athletes at a novice and intermediate level. Single and multiple joint exercises, open and closed kinetic chain, as well as concentric and eccentric exercises were included. Single leg exercises on balance pads and variations of single-leg hops were included to maintain neuromuscular performance. Pain was self-reported during and immediately after each training session by a visual analogue scale (VAS) from 0-10, where 0 to 2 indicated no or minimal pain, >2 to 5 some pain, and >5 high levels of pain. Level 0-5 was defined as acceptable levels of pain. Levels of pain week one were compared to levels of pain week 12, in order to evaluate pain throughout the program. Isokinetic quadriceps and hamstrings strength (60°/sec) were evaluated before and after the program and presented in percent difference between legs for peak torque (PT) and total work (TW). Physical performance was evaluated by two single-leg hop tests: the one-leg hop for distance (OLH) and the 6-meter timed hop test (6MTH). Percent difference between legs before and after the program is presented. Global rating of knee function was recorded