**Novel pneumatic Knee Brace Technology for Knee dysfunction: Osteoarthritis to Arthroplasty.**

**Presenter**

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Guardian rehabilitator Knee Braces, combine three unique features, a pneumatic joint unloading system of air bladders, an active extension swing assist mechanism that resists quadriceps eccentrically and hamstrings concentrically, and a proprietary flexible and elastically deformable brace construction to eliminate brace migration and allow for dynamic conformability. Guardian family of braces offers an OA brace, Sports brace and a longer Sports Extension Brace. OA brace has unloading component to strategically placed pneumatic bladders to off load affected knee joint compartment. Sports brace has bladders to support and stabilize the knee joint and the longer Sports Extension brace offers two condylar and two bladders in the anteroposterior position to extend the knee joint. All braces have extension assist bands on each side.

A randomized controlled single blinded clinical study on 60 patients completed at the Rubin Institute of Advanced Orthopedics found significant improvements over standard of care treatment in multiple clinical and patient reported outcomes for moderate to severe knee Osteoarthritis patients. Patients who used a pneumatic unloader knee brace with dynamic extension assist for minimum 90 days achieved improved quadriceps and hamstring strength, functional capabilities, and subjective function compared to a control group that did not use the brace and was treated with Injections and Physical Therapy. All testing was performed without the brace to examine the retained effects of rehabilitating knee brace.

After 90 days of use of novel brace only 2 patients went on to have Total Knee Arthroplasty as compared to 5 patients in control group. The leg strengthening OA Rehabilitator™ Knee Brace use for 90 days showed delay the progression of knee OA and significantly improved pain score, functional and subjective scores as well as Gait parameters.

The brace therapy also has significant clinical implications for its use for prehabilitation prior to Total Knee Replacement surgery and rehabilitation after the TKA surgery. It is believed that the strengthening and gait rehabilitating benefits of the OA Rehabilitator may significantly improve patient outcomes if the brace is used several weeks prior to TKR surgery and within 2 weeks
after surgery. By strengthening the affected thigh muscles and correcting gait abnormalities prior to surgery, recovery from TKA could be accelerated and patient outcomes improved. Our preliminary data shows that patients that use Sports Rehabilitator in this fashion show improved quadriceps strength and function at 6 and 12 weeks post surgically as compared to patients that do not use the brace. The same unique knee bracing technology can also be employed in complex knee pain and problems including knee ligament instabilities. The Sport Rehabilitator™ Knee Brace has a pneumatic air system to support and protect the knee joint, a dynamic extension swing assist to correct quadriceps avoidance gait, and a dynamically conformable brace construction to eliminate brace migration. When used post knee injury or surgery, the strengthening brace therapy significantly accelerate recovery by simply wearing the brace three hours or more a day and being active with the brace. The Sport EXT Rehabilitator™ Knee Brace is ideal for the treatment of pre or post surgical knee flexion contractures exceeding 10 to 15 degrees. The Sport Extension brace design is longer than the Sport Rehabilitator™ providing an excellent dynamic ambulating lever to reverse knee flexion contractures both actively and passively during brace use. Use of the brace during walking reduces habitual limping gait pattern, which in turn inhibits quadriceps activation and subsequent weakness. Use of the brace uniquely facilitates full weight bearing ambulation to reverse flexion contractures while simultaneously facilitating quadriceps firing to strengthen the weakened leg during brace use. Patients are allowed to wear it for longer period of time. The brace is effective both during rest in supine as well as during ambulation.