The Role of SacroLoc® in the Management of Sacroiliac Pain Syndrome

Insufficient self-locking of the sacroiliac joint has been suggested to generate sacroiliac pain syndromes. Many causes, including pregnancy, mechanical dysfunction and inadequate coordination, can contribute to the onset of this condition. Degenerative and inflammatory changes can modify the rough articular cartilage of the wedge-shaped sacrum, reducing the ability of its multiple articular groves and ridges to withstand shear forces -normally in the range of 1750 N-. Biomechanical evidence of the effect of pelvic belts to generate forces able to restore the sacroiliac faulty closure mechanism and reduce pain have been provided by Pel et al. The adjustable tension system of SacroLoc® allows patients to improve their condition also by learning to interfere with pain.

SI joint pain is a component of a larger problem of pelvic instability. Pelvic instability has traditionally been underappreciated as a cause, not only, of low back pain, buttock pain but also of groin pain, and leg pain.

The prevalence rate of sacroiliac pain, in patients with low back and buttock pain, has been reported to be between 13 and 30% by Schwarzer and 22.5%, (in 1293 patients) by Bernard and Kirkaldy-Willis respectively.

Although the role of the SI joint is to provide stability, it has limited motion. Its major movement comes from ligamentous stretching. Within the pelvic girdle, the primary function of the SI joint is to provide shock absorption for the spine by stretching in various directions.

Studies by Weisel indicate that most movement occurs when rising from the sitting to the standing position. Since the amount of motion is small, making assessment of sacroiliac motion during physical examination is quite difficult.

Biomechanically the pelvis acts as a central base through which large forces are accepted (from the lower extremities) and dissipated (to the torso) or vice versa. Aided by power generated by the hip abductors (gluteus medius/ minimus, TFL and piriformis), the pelvic joints brace the weight-bearing side during gait.

Fortsin et al. found that pain referral patterns can be extremely variable because of the wide possibility of innervations. The SI joint is innervated at multiple levels (1°, 2° and 3° on average, with only minimal translation of 0.5-1.6 mm).

Selvik suggested that hyperextension produces the greatest degree of motion, if the motion in the pelvis is asymmetric, then dysfunction may occur. Some conditions that cause asymmetric motion include leg-length inequalities, a unilaterally weak lower limb (eg, polio), tight myofascial structures (eg, iliopectos), and scoliosis. Hip osteoarthritis can lead to leg-length shortening and SI joint pain.

Since conservative treatment of SIJ dysfunctions is the first option, the potential contribution of SacroLoc® appears understandable and quite straightforward. The findings of Pel et al. demonstrated the need of cause-related designing of new pelvic belts to unload painful pelvic joints or muscles in upright posture. The efficiency of sacroiliac joint belts has been confirmed by Foley et al.


Pregnancy increases the likelihood of SIJ dysfunction. During this period the long dorsal sacroiliac ligament can become stretched because of reduced lumbar lordosis. The application of pelvic belts has been reported to significantly decrease pregnancy-related pelvic pain. (The mechanical effect of pelvic belt in patients with pregnancy related pelvic pain – Mens JM; Damen L; Snijders CJ, Stamm HJ.-Clin Biomech –Bristol Avon-2006 Feb; 21(2):122-7. Epub 2005 Oct 7.)
Product Features

SacroLoc® is a pelvic belt combining the effect of a compressive force on the sacroiliac joint, generated by overlapping strap systems, with the massage effect achieved by two symmetric visco-elastic inserts targeting the skin on the same area.

SacroLoc® features an anatomical belt with an elastic posterior area fixed to the non-elastic lateral and flat knitted fabric elements.

The abdominal overlapping pocket system is fixed by a robust 10 cm velcro.

External, non-elastic tension straps cross SacroLoc® dorsally and can be fixed, at variable levels, on the abdominal pocket system. The maximal force needed to achieve full extension of the elastic 17 cm high dorsal area is 150N. This level exceeds however the normal needs and, regardless the effect of the external straps can be considered the upper tension limit of the system.

Work of Pel et al. demonstrate that increasing the compression up to 100N (equivalent to 50N belt tension force) reduced the vertical SIJ shear force by 10% and increased SIJ compression force with 52%.

(Biomechanical model study of pelvic belt influence on muscle and ligament forces - Pel JJ, Spoor CW, Goossens RH, Pool-Goudzwaard AL. - J Biomech.2008;41(9):1879-84 Epub 2008 May 14-

Possible mechanism by which SacroLoc exerts its effect include:

- bringing the adjoining sacral and iliac surface and the SI joint together,
- enhancing a self-bracing mechanism that normally ensures stability to the SI joint and allows for transfer of other lumbosacral load to the legs while minimizing the shears between the iliac and sacral surfaces;
- it decreases the amount of anterior rotation of the innominates and posterior tilting of the lower part of the sacrum by exerting a direct pressure against these structures.
Indications

The passive stabilisation of SI joint hypermobility requires sacroiliac supports or belts as advocated by Cyriax, Grieve, Lee, Macnab, Mannel and Portfield and DeRosa.

It should be emphasized that 25% of all lower back pain involves sacroiliac dysfunction.


The bracing effect of SacroLoc® reproduce and support the action of the transversally oriented muscle interlocking the sacroiliac joint.

From a biomechanical point of view, the active muscle corset that increases the compression force, between the coxal bones and the sacrum, protects the ligamentous system and support the transfer of trunk load to the legs and vice versa. Interlocking of the SIJ may be promoted by transversely oriented muscles, e.g., M. transversus abdominis, M. piriformis, M. gluteus maximus, M. obliquus externus abdominis, and M. obliquus internus abdominis, which has been described as self-bracing.


Though the pelvic action of SacroLoc® is transversal to the sacroiliac joint the consequences of this action interact with the complex balance involving muscles acting in the longitudinal direction of the spine. The mainly vertical shear forces acting through the SIJ are not only caused by trunk load, but also for example the M. psoas and M. rectus abdominis. Stability of both spine and SIJ are obviously depending on the efficiency and robustness of the feedback of the passive, active and control sub-systems. (Spine stability: “the six blind men and the elephant.” Clin Biomech (Bristol, Avon). Volume 22 - n page 486:).

SacroLoc® is more than just a passive brace. It can allow patients to improve their condition learning to interfere with pain. The adjustable tension of the SacroLoc® belt system allows for patients to cope with changing stability demands related to task, pathological conditions or simply to pain. The intensity of the massage of the two symmetric visco-elastic inserts – and their pain killing effect (gate control theory)- depends on the tension level of the belts and, of course, on movement.

Indications for SacroLoc®:

- SI joint syndrome
- SI joint osteoarthritis
- SI joint instability
- SI joint dysfunction
- Myalgia and tendinopathy in the pelvic area
- Pelvic girdle instability
- Prevention of recurrent SI dysfunction and myotendinopathies (rectus abdominis muscle, piriformis adductor muscle)
- Symphysis diastasis and loosening


Conclusion

Pelvic girdle pain generally arises in relation to pregnancy, trauma, arthritis and/or osteoarthritis and after spinal fusion. Though sufficient biomechanical evidence support the effectiveness of orthosis, clinically pelvic belts do not yet enjoy levels of evidence to be recommended in the method guidelines of the Cochrane Back Review group for the treatment of pelvic girdle pain. Lack of evidence however does not mean lack of effectiveness. The heterogeneity of causes and symptoms related to pelvic girdle pain make the performance of reliable studies (on homogeneous groups of patients) quite difficult. The application and the biomechanics of SarcoLoc® is understandable and quite straightforward in cases of joint pain or hypermobility. The adjustable tension system of SarcoLoc® allows patients to improve their condition also by learning to interfere with pain.

References


