

## Efficacy of Lumbosacral Supports

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### Definition

- A lumbar support is a type of lumbosacral or thoracolumbosacral orthotic made of soft, flexible fabric which may have horizontal or vertical rigid reinforcements. <sup>1</sup>

### What types of Orthotics are available?

1. Flexible: cloth belts and supports.
2. Rigid: plastic body jackets containing plastic or metal reinforcements.
3. Semi-rigid. combine the strength and support of traditional rigid materials with the comfort of fabrics such as cotton, nylon, or rayon.

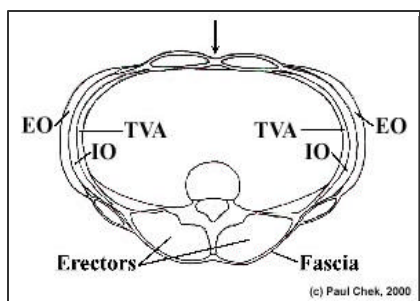
### History

The history and treatment of low back pain dates all the way back to 1500 B.C. Lumbar supports have been in use since the early 1900's for the treatment of scoliosis, however, the use of spinal orthotics dates back to the middle ages. Originally metal and leather were used to make orthotics. Today orthotics are made of materials ranging from cotton to a new generation of lightweight, durable thermoplastics. <sup>2</sup>

### Why Are They Used?

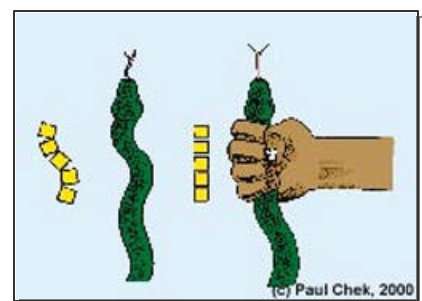
- The primary effect of a lumbar support is to increase intra-abdominal pressure. <sup>1</sup>
- It has been demonstrated that intra-abdominal pressure (IAP) contributes to mechanical spine stability through co-activation of trunk flexor and extensor musculature. As the abdominals contract IAP increases and converts the abdomen into a rigid cylinder that greatly increases stability of the spine. <sup>3</sup>

The synergistic contraction of the transversus abdominis (TVA) and posterior fibers of the internal obliques (IO) generate a lateral tension on the thoracolumbar fascia (TLF). As the TVA is activated, the abdominal wall is drawn inward, pushing the viscera upward into the diaphragm and downward into the pelvic floor, creating intra-abdominal pressure (IAP). Because the TLF attaches to both the spinous and transverse processes of each lumbar vertebra, lateral tension due to activation of the TVA and IO serves to stabilize each vertebrae.

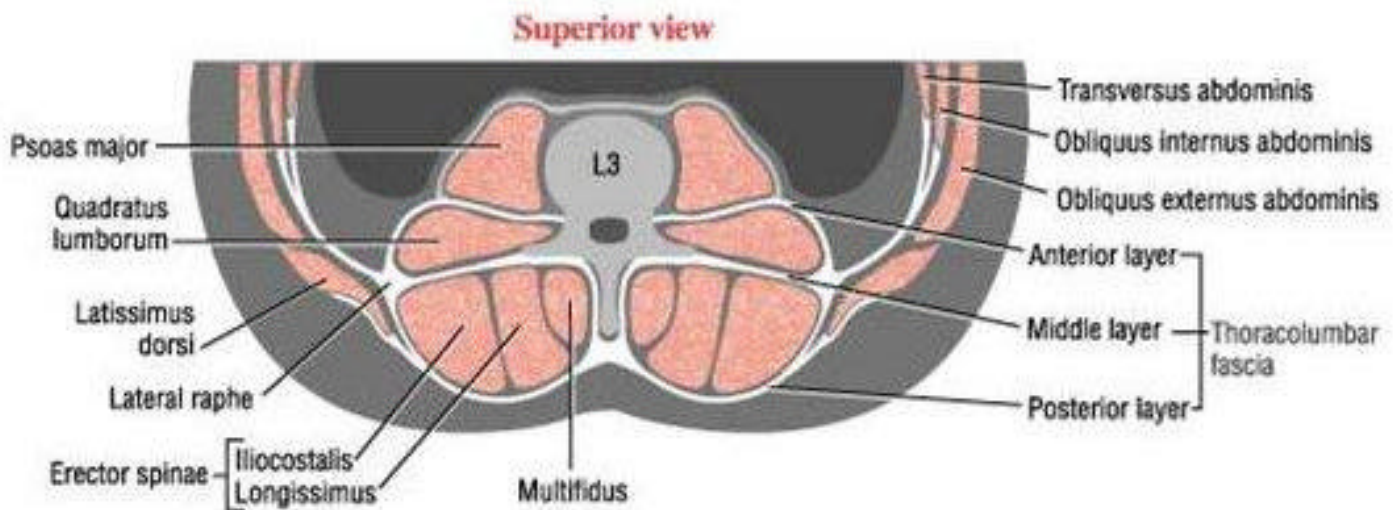


#### IAP (Transverse View) <sup>4</sup>

When activated, the transversus abdominis and posterior fibers of the internal oblique draw the umbilicus inward toward the spine (see arrow). This creates intra-abdominal pressure and 'hoop tension', which serves to stabilize the lumbar spine.



- More recently, Cholewicki et. Al (1999) suggested that IAP is most effective at stabilizing the spine when applied in concert with co-activation of the erector spinae muscles.
- The erector spinae musculature are housed in a fascial envelope which is stabilized when the umbilicus is drawn inward. When the erector spinae muscles contract within this relatively non-expansible envelope, pressure is exerted against the fascia, which produces an extension force on the forward bent or flexed spine



The aponeurosis of the latissimus dorsi and fibers from the serratus posterior inferior, IO, and TA muscles all blend together at the lateral raphe.

- The basis for supporting the lumbar spine also hopes to accomplish the following effects:<sup>5</sup>
  1. Decrease the need for muscular spasm, by splinting the inflamed or injured low back.
  2. Postural improvement through a reduction or increase of the lumbar lordosis based on a patient's condition.
  3. Restriction of lumbosacral spine movement, allowing the hips and knees to perform the major portions of bending and lifting activities.

### The Five "L" s of Lifting

1. **Load** – always test load before lifting! Ask for help if too heavy!
2. **Leverage** – You want MA! Loads are easier to lift when close to BOS + COG
3. **Lungs** – take a deep breath as you prepare to lift and exhale on exertion! Never hold your breath when exerting yourself. (this helps to avoid the Valsalva Maneuver)
4. **Legs** – use your legs to lift. Lower COG by bending at the hips and knees and not your back.
5. **Lordosis** – protect your back! Maintain "neutral" spine position when lifting.

## Potential Risks and Considerations

Studies have suggested that prolonged use of lumbar orthotics and support belts may lead to:

- decrease in strength of abdominal and back muscles, but no clear evidence has been found.
- muscular atrophy of the trunk flexor and extensor musculature through prolonged wear.
- pinching of the lower abdomen and risk of skin breakdown if too tight or worn improperly.
- loss of orthotic contact with portions of the body in seated positions decreasing support.<sup>5</sup>

## Efficacy Theories & Recommendations

- compresses abdomen causing increased intra-abdominal pressure, thereby unloading the spine.
- serves as mechanical reminder to decrease bending and reinforce proper lifting techniques, however the orthotic alone does not provide total body support.
- orthotics may improve proprioception by increasing sensory input via the mechanoreceptors of the skin. This promotes postural awareness and aids in keeping the patient in mid-range positions.<sup>6</sup>
- as a patient begins to recover it is suggested an orthotic be abandoned in exchange for an active structured exercise program.<sup>7</sup>
- the combination of active exercise and the limited use of a lumbar support during activities which abnormally load the spine may be beneficial.<sup>8</sup>
- If an orthotic is to be worn on long term basis a trunk strengthening program should be implemented.<sup>7</sup>
- The costs of lumbar supports can vary from low to moderately expensive. The inexpensive supports are usually over the counter and can be obtained at a local pharmacy or drug store.
- Purchasing a custom-fitted orthotic usually is more expensive because the orthotic is measured and fitted specifically for one individual and requires the skills of a trained clinician such as an orthotist.

## References

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