Soft Robotic Back Orthosis

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Technology description

With an aging population that continues to grow, more people are undergoing spinal surgeries and may need to wear a brace to stabilize their spine for a period of time afterwards. Additionally, certain spinal injuries, most notably, lumbar spondylosis, require orthoses or braces to prevent worsening of the injury. Conventional braces utilize hard plates to limit patient motion and provide stability. However, they are uncomfortable for prolonged use, fatigue the skin and overly restrict patient movements. New devices are needed that are comfortable for the patient while at the same time offer flexibility and support.

Researchers at Arizona State University and Barrow Neurological Institute have developed a novel soft robotic back orthosis for spinal stabilization. This orthosis limits patient motion that would aggravate injuries and stabilizes the lumbosacral spine, without sacrificing comfort. Using variable stiffness components, this device is able to detect patient positions and adjust the stiffness accordingly to create a more comfortable brace for long-term use. The integrated variable stiffness components can be replaced if damaged and repositioned at any time for customizable and modifiable configurations. By providing variable support to the spine as needed, this device relieves pain and discomfort traditionally experienced with current spinal orthoses while providing support to the spine and enabling successful healing and rehabilitation.

Application area

• Back orthoses
o Post-surgical stabilization
o Lumbar spondylosis treatment
o Back injury stabilization/rehabilitation
o Other applications (scoliosis, fractures, spinal multiple sclerosis)

Advantages

• Increased patient comfort – can reduce stiffness when the patient is in a position that doesn't require much support, such as sitting or lying down
o Doesn't require the patient to remove the device or components to change the stiffness/support
• Customizable and modifiable

• Provides both waist and back support

• Lack of rigid materials enables longer wear without pain, and padding on the stiffness components further increases patient comfort

• The level of support and time when the orthosis is activated can both be programmable

• Can be arranged to limit flexion and extension of spinal motion to promote spinal healing

Institution

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