An Expandable Spacer for Replacing Vertebrae Using Minimally Invasive Posterior Surgery

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Technology description

The vertebral body replacement segment is underserved at present providing vertebrectomy solutions that are designed only for an anterior approach. Using present day implants from the posterior approach often requires sacrificing nerve roots. Vertebral body excision (also called vertebrectomy) is frequently required to decompress the spinal cord and/or stabilize the vertebral column when a vertebra is weakened by trauma, tumor, or infection. Vertebral bodies can be removed from either an anterior or posterior approach. Anterior approaches provide the widest access but are associated with considerable co-morbidities with respect to the thoracotomy and abdominal wall pain. Posterior approaches are less invasive but are limited by access. Access from the posterior approach is limited to the space between the nerve roots. Current vertebral body replacements will not collapse sufficiently to permit use of the small incisions used in Minimally Invasive Surgery, nor will they collapse sufficiently to pass between adjacent pairs of nerve roots. Moreover, ad-hoc spacers made of unconfined bone cement are difficult to shape once inserted and can cause complications due to cement contact with adjacent nerves and organs. The present invention is perfectly adapted to any posterior Minimal Access Surgery or anterior vertebrectomy, and eliminates the danger of nerve root sacrifice or cement injury to adjacent organs and nerves.

The intellectual property relates to a surgical system (implant and custom instruments) for implantation of a novel expandable spacer that can be inserted through a minimally invasive procedure to replace unstable vertebrae or other compromised bone structures. The spacer is characterized by an expansion ratio of over 300% and can be implanted through smaller surgical openings than in traditional vertebrectomy. The spacer is inserted fully contracted, with the aid of a specifically designed tool, then expanded to the required height and contracted to reposition, as required. The implant’ s endplates freely adjust to variable angulations of the adjacent vertebral endplates. When the spacer is finally correctly positioned, the attached surgical tool is used to fill the spacer with the necessary amount of self-setting cement. The spacer contains pores which allow for the evacuation of air but contain the self-setting cement, and the insides of the end portions are shaped so that the cement is rigidly fixed to them once cured. Thus, once the cement fully cures the entire device is rendered rigid and capable of withstanding physiological axial loads.

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