US007396360B2

(12) **United States Patent**
Lieberman

(10) **Patent No.: US 7,396,360 B2**
(45) **Date of Patent: Jul. 8, 2008**

(54) **MINIMALLY INVASIVE METHOD AND APPARATUS FOR FUSING ADJACENT VERTEBRAE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 822 days.

(21) Appl. No.: **10/952,654**

(22) Filed: **Sep. 29, 2004**

(65) **Prior Publication Data**

US 2006/0084977 A1 Apr. 20, 2006

(51) **Int. Cl.**

A61B 17/70	(2006.01)
A61B 17/88	(2006.01)
A61B 17/58	(2006.01)
A61B 17/90	(2006.01)
A61F 2/44	(2006.01)

(52) **U.S. Cl.** **606/247**; 606/279; 606/104

(58) **Field of Classification Search** 606/54, 606/57, 59, 61, 64, 72, 73, 86, 96–99, 102, 606/104

See application file for complete search history.

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(57) **ABSTRACT**

The present invention is a minimally invasive surgical method for fusing adjacent vertebrae. A first K-wire is inserted into the spinous process of an upper vertebrae. A second K-wire is inserted into a transverse process of a lower vertebrae. A first fixation block is secured to the first K-wire and a second fixation block is secured to the second K-wire. A rod member extends across the K-wires. A swivel block assembly is secured to achieve a desired angle for a first axis along which a first screw will be implanted into a facet joint. The swivel block assembly is secured at a desired axial position on the rod member. Percutaneous access to the upper vertebrae along the first axis is then obtained via a cannula. A removable screw having a threaded section for implantation across the facet joint and an elongated shank section that is shearable subcutaneously is inserted through the cannula. The threaded section is implanted along the first axis across the facet joint to attach the upper and lower vertebrae. A shearing tool is inserted percutaneously over the shank section and the shank section is sheared off immediately above the lamina.

12 Claims, 28 Drawing Sheets