METHODS AND INSTRUMENTATION FOR VERTEBRAL INTERBODY FUSION

CROSS-REFERENCES TO RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. patent application Ser. No. 09/756,492 filed Jan. 8, 2001, and now issued as U.S. Pat. No. 6,648,895, which is a continuation-in-part of U.S. patent application Ser. No. 09/498,426, filed Feb. 4, 2000, and now issued as U.S. Pat. No. 6,575,981; which claims the benefit of the filing date of Provisional application Serial No. 60/118,793, filed Feb. 4, 1999.

BACKGROUND OF THE INVENTION

The present invention relates generally to surgical procedures for spinal stabilization and more specifically to instrumentation adapted for inserting a spinal implant within the intervertebral disc space between adjacent vertebra. More particularly, while aspects of the invention may have other applications, the present invention is especially suited for disc space preparation and implant insertion into a disc space from an anterior surgical approach to the spine.

Various surgical methods have been devised for the implantation of fusion devices into the disc space. Both anterior and posterior surgical approaches have been used for interbody fusions. In 1956, Ralph Cloward developed a method and instrumentation for anterior spinal interbody fusion of the cervical spine. Cloward surgically removed the disc material and placed a tubular drill guide with a large foot plate and prongs over an alignment rod and then embedded the prongs into adjacent vertebrae. The drill guide served to maintain the alignment of the vertebrae and facilitated the reaming out of bone material adjacent the disc space. The reaming process created a bore to accommodate a bone dowel implant. The drill guide was thereafter removed following the reaming process to allow for the passage of the bone dowel which had an outer diameter significantly larger than the reamed bore and the inner diameter of the drill guide. The removal of the drill guide left the dowel insertion phase completely unprotected.

More recent techniques have advanced this concept and have provided further protection for sensitive tissue during disc space preparation and dowel insertion. Such techniques have been applied to an anterior approach to the lumbar spine.

An initial opening or openings are made in the disc space and the height of the disc space is distracted to approximate normal height. Typically, a first distractor is inserted with a height estimated by radiological examination. If additional distraction is required, the first distractor is removed and a second, larger distractor is inserted. However, since the positioning of the distractors is performed without the benefit of protective guide sleeves, the switching of distractors increases the potential for damage to neurovascular structures and may correspondingly increase the time of the procedure.

For bilateral procedures, a double barrel sleeve may be inserted over the distractors, with a central extension extending into the disc space to maintain distraction. One limitation on guide sleeve placement is the amount of neurovascular retraction that must be achieved to place the guide sleeves against the disc space. For some patients, a double barrel sleeve may not be used because there is insufficient space adjacent the disc space to accept the sleeve assembly. Thus, there remains a need for guide sleeves requiring less neurovascular retraction for proper placement and providing greater protection to adjacent tissue.

While the above-described techniques are advances, improvement is still needed to reduce the procedure time by utilization of improved instruments and techniques, to reduce the potential for damage to sensitive tissue adjacent the disc space, and to limit the amount of vessel retraction necessary to utilize the protective instrumentation. The present invention is directed to this need and provides more effective methods and instrumentation for achieving the same.

SUMMARY OF THE INVENTION

The present invention relates to methods and instrumentation for vertebral interbody fusion. The instruments include distractors having tips inserted into the disc space that conform to the anatomical configuration of the disc space. Such distractors are self-centering in the disc space both laterally and in the cephalad/caudal directions, and better maintain their position after insertion. Thus, subsequent procedures performed in the disc space based upon positioning of the distractors are more symmetrical about the spinal column axis and also more uniform between the adjacent vertebral endplates.

In another aspect of the invention, a surgical instrument assembly for distracting a spinal disc space is provided. The assembly includes a first distractor that has a first shaft extending between a proximal end and a distal end and a first distractor tip defining a distraction height that extends from the distal end of the first shaft. The assembly further includes a second distractor having a second shaft extending between a proximal end and a distal end and a second distractor tip extending defining a distraction height. Each of the first and second distractor tips are self-centering in the disc space both laterally and in the cephalad/caudal directions, and better maintain their position after insertion. In one embodiment, there is provided a guide sleeve having a working channel extending between a proximal end and a distal end the sleeve. The first and second distractors are received in the working channel of the guide sleeve.

Related objects, advantages, aspects, forms, and features of the present invention will be apparent from the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1***a* is a perspective view of a distractor according to the present invention.

FIG. **1***b* is an enlarged front view of the tip of the distractor of FIG. **1***a*.

FIG. **1***c* is an enlarged side view of the tip of the distractor of FIG. **1***a*.

FIG. **2***a* is a perspective view of a distractor according to another aspect of the present invention.

FIG. **2***b* is an enlarged front view of the tip of the distractor of FIG. **2***a*.

FIG. **2***c* is an enlarged side view of the tip of the distractor of FIG. **2***a*.

FIG. **2***d* is an elevation view of a distractor clip.

FIG. **3** is a perspective view of a guide sleeve according to another aspect of the present invention.

FIG. **4** is a front view of the guide sleeve of FIG. **3**.

FIG. **5** is a side view of the guide sleeve of FIG. **3**.

FIG. **6** is a perspective view of a guide sleeve assembly according to another aspect of the present invention.