Orthopedic and Pedicle Access Devices

Published date: Nov. 14, 2013

Technology description

Background

Millions of people suffer from a variety of musculoskeletal disorders or traumatic occurrences which require the use of methods and devices to facilitate spinal stabilization and healing, and according to a MarketsandMarkets report, the global spine surgery devices market is set to be worth $14.8 billion in five years. The current methods of stabilization, while holding some benefits, also all hold notable drawbacks. Fusion devices such as pedicle screws, plates, rods and/or vertebra interbodies are typically formed from rigid materials, such as titanium or stainless steel which despite sufficient strength and load carrying capabilities are non-flexible and unyielding, which tends to decrease bone growth around the bone fasteners. When formed of semi-rigid materials, despite providing a flexible or yielding interface between the device and the surrounding bone, the strength and load carrying capabilities of the bone anchor are reduced, thereby increasing the risk of fracture or breakage. Finally, the use of bone autograft and allograft does allow for biointegration of the devices/fasteners, but while bone is quite strong in compressive loading, it is relatively weak in tension and shear, and devices made of allograft and/or autograft bone tissue often fail. Thus there is a need for improved spinal stabilization devices.

Technology Description

Dr. Paul Kaloostian in the department of neurosurgery at the University of New Mexico has developed the following devices for spine stabilization.
Orthopedic Devices
Devices and methods to facilitate spine stabilization using bone screws, rods, plates, set screws, and interbodies have been developed. These innovations are designed to provide both strength and load carrying capabilities and increase integration of the devices with the surrounding bone tissue. The bone used in these devices can be either cancellous or corticol bone, allowing for greater adaptability including that the devices may be designed in different lengths and proportions to be used in cervical, thoracic, lumbar, sacral, occipital, extremity and orthopedic surgery. The devices allow insertion via robotic tools, may be coated with antibiotic to prevent undue infection, and they hold the potential for enhanced healing from injury.

Pedicle Access Device for Guiding and Forming a Hole in Bone Tissue

The pedicle is thestrongest point of attachment of the spine. Since the pedicles are the strongest parts of the spinal vertebrae, they provide a secure foundation for the pedicle screws to which fixing rods or plates are attached. The deeper the screws are inserted in the pedicle, the more stable vertebral bodies will be fixed. However, deviations in the angle of screw insertion can injure nerve roots and the spinal cord and lead to vascular injury. Dr. Kaloostian has developed a pedicle screw device that helps insert the screws to provide both strength and load carrying capabilities and increase integration of the devices with the surrounding bone tissue. The device includes a sensor and a feedback device configured to communicate bone density information to a user.

Application area

Increase integration with surrounding bone tissue and provide strength/load carrying capability
Devices work together to allow for complete stabilization system
Allows for more flexibility than current solid metal fusion devices allowing for greater bone growth
Risk of breakage/fracture associated with current semi-rigid materials in use is overcome
Devices may be used in other parts of the body such as, for example, joints, long bones or bones in the hand, face, feet, extremities, and cranium

Institution

The University of New Mexico

Inventors

Paul Kaloostian

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com