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Commentary

Proximal Junctional Fractures (PJFr) and its Classifications with Computed Tomography

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DESCRIPTION

The most common consequences of adult spine deformity surgery are Proximal Junctional Fractures (PJFr). This kind of fracture may have a disastrous effect on the patient, leading to substantial kyphosis, discomfort, or new neurological impairments, with or without a hardware failure at the construct's end or close by.

Osteoporosis has been proven to have the ability to increase the risk of compression fractures and proximal junctional failure. Since the need for spine surgery has progressively increased in the elderly population, osteoporosis is a really unsettling condition that frequently affects this group. Numerous studies have found evidence of a possible link between adult spinal malformation and osteoporosis.

In adult lumbar scoliosis patients, it was shown that scoliosis was prevalent in the osteoporotic population. Osteoporosis diagnosis is important since this particular subset of patients can have significant problems from surgery. The use of Dural-Energy X-Ray Absorptiometry (DEXA) scans as a conventional osteoporosis screening method has become standard screening tool. However, localized sclerosis linked to spinal degeneration has been mentioned as a potential confounder, leading to reports of inaccurate spinal DEXA values. In place of spinal DEXA scans, investigators have recently reported using Computed Tomography (CT) scans as surrogate studies.

In the surgical treatment of adult degenerative spine abnormalities, identification of the upper end vertebrae for instrumentation is essential, particularly when structures are extended to the pelvis. Lessening the occurrence of complications in patients with osteoporosis by using the best surgical aids is more crucial. The Upper Instrumented End Vertebrae (UIV) is determined by a number of variables. One element that determines how healthy a vertebrae is the mineralization of the bone. Osteoporosis is frequently missed by defects in spinal DEXA scans, which can have an impact on surgical choices and the prognosis of proximal junctional fractures.

In order to determine whether decreased bone mineralization at the Upper Instrumented end Vertebrae (UIV) or adjacent segments play any role in predicting proximal junctional fractures before surgery. This information would allow surgeons to schedule surgery, analyse bone minerals at the upper end levels, and inform patients about associated risks. CT scans can be used to quantify the Bone Mineral Density (BMD) of UIVs and their surrounding segments before surgery so surgeons can calculate BMD in Hounsfield Units (HU).

In Hounsfield Units (HU), the BMD of the cortical bone of the vertebral body was measured using preoperative CT scans. Using image-processing tools, an elliptical Region of Interest (ROI) was produced, and the BMD HU values were calculated at the mid-sagittal and axial cross sections of the vertebrae in the sagittal and axial planes. At the UIV, UIV+1 (one level proximal), and UIV-1 (one level distal), these measures were recorded . The proximal kyphotic angle was also measured using the usual preoperative radiographs and subsequent follow-up radiographs. A difference of at least 10° between the preoperative angle measured between the inferior end plate of the UIV and the superior end plate of the UIV+2 was considered to indicate proximal junctional kyphosis (two levels proximal to the UIV).

Patients were divided into three groups: Control (NoPJD, or no proximal junctional deformity); PJK, or proximal junctional kyphosis; and PJFr, or proximal junctional fracture, which did not include PJK patients.

Prospective research with a larger patient population is needed to examine the impact of preoperative CT scans in individuals with lower BMD values at the UIV level and adjacent segments in predicting their risk of proximal junctional fractures. Additionally, research will need to be done to establish a CT BMD cutoff point for the risk of proximal junctional fractures. Although values are presented in relation to CT BMD values, readers should be aware of the study's small sample size. Despite this, taking note of these dimensions may help in planning structures' proximal extent as well as surgical techniques to avoid proximal junctional failures.

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