Posterior ligament complex injury

The mechanical stability of thoracolumbar spine is evaluated by whether posterior ligament complex (PLC), which is composed of supraspinous ligament, interspinous ligament, ligamentum flavum, and facet joint capsule, is damaged or not [1) 2) 3)].

Currently, no consensus exists on radiographic imaging parameters that may indicate injury to the posterior ligamentous complex.

A retrospective study of 105 patients with acute thoracic and lumbar spine fractures on CT, with MRI as the reference standard for PLC injury. Three readers graded CT for facet joint alignment (FJA), widening (FJW), pedicle or lamina fracture (PLF), spinous process fracture (SPF), interspinous widening (ISW), vertebral translation (VBT), and posterior endplate fracture (PEF). Univariate and multivariate logistic regression analyses were performed separately for each reader to test for associations between CT and PLC injury, and diagnostic performance of CT was calculated.

Fifty-three of 105 patients had PLC injury by MRI. Statistically significant predictors of PLC injury were VBT, PLF, ISW, and SPF. Using these four CT findings, odds of PLC injury ranged from 3.8 to 5.6 for one positive finding, but increased to 13.6-25.1 for two or more. At least one positive CT finding was found to yield average sensitivity of 82% and specificity 59%, while two or more yielded sensitivity 46% and specificity 88%.

While no individual CT finding is sufficiently accurate to diagnose or exclude PLC injury, greater the number of positive CT findings (VBT, PLF, ISW, and SPF), the higher the odds of PLC injury. The presence of a single abnormal CT finding may warrant confirmatory MRI for PLC injury, while two or more CT findings may have adequate specificity to avoid need for MRI prior to surgical intervention [4)].

An extensive review of the literature from 1949 to the present was performed to identify key radiographic elements that have been suggested as indicators of PLC injury. Twelve items identified as such were placed on a survey and sent to the members of the Spine Trauma Study Group. They were asked to rank the items from most important to least important, and the results were compiled for analysis.

Twenty-eight surveys were returned for final analysis. Fifty-percent (14/28) of the members ranked “vertebral body translation” on plain radiographs as the most important factor in determining disruption of PLC. Plain radiographic signs were ranked higher than computed tomography or magnetic resonance imaging indicators, and history of the mechanism ranked lowest. The members were also given freedom to add other criteria that they felt were important in determining PLC integrity. “Interspinous spacing 7 mm greater than that of level above or below on antero posterior plain X-rays” was the only new category that was suggested.

Plain radiographic findings were felt to be most helpful in determining PLC injury by the members of the Spine Trauma Study Group. Physical examination findings and history of the mechanism of injury were ranked lower than imaging studies. Future analysis should focus on indicators of PLC injury when plain radiographic findings are either subtle or not present [5)].

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