

4th International Conference on

Central Nervous System Disorders & Therapeutics

November 12-13, 2018 | Edinburgh, Scotland

Comparative study of percutaneous pedicle screw fixation after direct decompression with anterior column reconstruction for thoracolumbar burst fracture

Seul-Kee Lee, Ju-Hui Kim and Jung-Kil Lee

Chonnam National University Hospital & Medical School, Gwangju, South Korea

Background: Thoracolumbar burst fractures (TLBFs) are among the most common spinal traumas, and its appropriate management remains undetermined. This study aimed to compare the clinical and radiological results between anterior corpectomy and fusion technique versus posterior decompression with percutaneous pedicle screw fixation technique in the treatment of TLBFs.

Methods: A total of 46 patients (from 2002 to 2015) with TLBFs were included in this study. The inclusion criteria were single-level Magerl type A3 burst fracture of the thoracolumbar spine (T12–L2). These patients were divided into two groups: Group A (22 patients) was treated by anterior corpectomy with fusion, while Group B (24 patients) was treated by posterior decompression with percutaneous pedicle screw fixation (PPSF). For the radiologic parameters, kyphosis angle was measured preoperatively, early postoperatively, and at the last follow-up using Cobb angle. The average correction in degrees and loss of correction were calculated accordingly. All neurological deficits were identified on the initial evaluation and graded using the ASIA grading system. Operation time and intraoperative blood loss were also measured.

Results: The patients consisted of 17 males and five females in Group A and 13 males and 11 females in Group B. The involved levels were three T12, twelve L1, and seven L2 in Group A and one T12, thirteen L1, and ten L2 in Group B. The average follow-up period was 44.9 months in Group A and 14.7 months in Group B. The corrections of kyphotic change were 6.4 degrees in Group A and 9.2 degrees in Group B. Among the patients with neurologic deficit, 11 of 15 patients in Group A and 20 of 23 patients in Group B demonstrated at least one ASIA grade improvement on the final observation. However, there was no significant difference between two groups ($p = .13$). In addition, a shorter mean operating time and less mean perioperative blood loss were observed in Group B than in Group A ($p < 0.01$ and $p < 0.01$, respectively; 167.3 minutes and 305.9 mL in Group A; 365 minutes and 1566.7 mL in Group B).

Conclusions: Spinal canal decompression via a small laminotomy followed by PPSF in the treatment of TLBFs with neurological deficits offers excellent biomechanical stability with clinical and radiological improvement. Furthermore, it can be a safe and effective surgical option with the advantages of less invasiveness for the treatment of TLBFs.

winnerisk@hanmail.net

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