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Effectiveness of Vertebral Augmented and Screw Reinforced Posterior Short Segment Fixation for Thoracolumbar Burst Fractures

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Purpose: Conventional surgical treatment regimens in patients with thoracolumbar brust fractures(TLBF) are extensive, huge and invasive procedure that requires a long skin incision.
The aim of this study was to compare the effectiveness of posterior fusion methods in patients with TLBF.
Material & methods: This study retrospectively evaluates the results of surgical outcome.
The current study was conducted in 98 patients with TLBF patients who underwent surgery from May of 2003 to August of 2009. Based on the surgical treatment modalities, patients were assigned to the following four groups:
(1) Group A (n=28): The long segment, vertebral non-augmented, screw non-reinforced, transpedicuclar screw fixation and posterior fusion.
(2) Group B (n=26): The short segment, vertebral non-augmented, screw non-reinforced, transpedicular screw fixation and posterior fusion, but the status of bone quality was relatively good.
(3) Group C (n=23): The short segment, vertebral augmented, screw reinforced, transpedicular screw fixation and posterior fusion, but the status of bone quality was relatively poor.
(4) Group D (n=21): The percutaneously short segment, vertebral augmented, screw reinforced, transpedicular screwing without fusion.
The following outcome measures were compared between the four groups: kyphotic angle (KA), vertebral height (VH) and implant failure rate seen on radiographs which was taken preoperatively, immediately after surgery and at final follow-up. The vertebral augmentation procedure was performed for fracture level itself with polymethylmetacrylate. The screw reinforcing procedure was performed for above-and-below one level of fracture site with polymethylmetacrylate or hydroxyapatite. Percutaneous screw fixation was performed using a percutaneous screwing system (Apollon System, Solco Medical, South Korea).
Results: In the corresponding order of Group A, B, C, D, mean follow-up period was 41.36 months, 28.31 months, 25.65 months and 22.19 months. Mean age was 45.78 years, 36.58 years, 53.60 years and 49.38 years. BMD was -1.04, 0.42, -2.13 and -1.67. KA was measured on preoperative, postoperative and last follow-up, which showed that it was Group A : 24.71, 9.75 and 11.39, Group B : 23.81, 8.19 and 12.23, Group C : 23.70, 8.35 and 9.83 and Group D : 23.62, 8.14 and 9.76. VH change was also measured, which showed that it was Group A : 43.57%, 78.79% and 73.36%, Group B : 50.38%, 81.26% and 71.15%, Group C : 43.13%, 81.30% and 78.35% and Group D : 43.48%, 84.14% and 80.24%. Implant failure was detected in Group A : 4 patients (14.28%), Group B : 7 patients (26.92%), Group C : 3 patient (13.04%) and Group D : 2 patient (9.52%).
Conclusion: In the Group B, BMD was relatively higher but a screw pull-out/implant failure was more prevalent than the Group A, C and D. Also, the KA change and VH loss were also greater in the group B than the other group. In addition to, the KA change, the loss of VH and screw loosening were not greater in Group D than Groups B and C. In conclusion, vertebral augmented, screw reinforcing, short-segment posteior fixtaion including fractured level will be helpful for preventing implant failure, KA change and VH loss and diminished the postoperative disability and pain.
Keywords: Thoracolumbar burst fractures, posterior fusion, short segment fixation, vertebral augmentation, screw reinforcing.