CLINICAL ARTICLE

The Difference of Disease Injury and Postoperative Recovery in the Occupational Characteristics of Thoracolumbar Fracture Patients: A Retrospective Study

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Objectives: Understanding the occupational characteristics of patients is not only related to patients' life and health, but also conducive to improving their happiness. However, there were no studies that had been conducted on the relationship between occupation characteristic and postoperative recovery in patients with spinal fractures. The purpose of this study was to explore the relationship between the occupation characteristics of patients with thoracolumbar fracture and the characteristics of disease injury, treatment, and recovery so as to reduce the incidence and improve postoperative rehabilitation.

Methods: Patients ($n = 719$) with thoracolumbar fractures were recruited. Patients were grouped according to the characteristic of occupations: unemployed group ($n = 299$), white-collar worker group ($n = 20$), and blue-collar worker group ($n = 400$). Data were collected, including the characteristics, injury and treatment information, and the recovery records for 1 year after operation. One-way ANOVA analysis, χ^2 test, and binary logistic regression analysis was used to explore the relationship among these factors.

Results: Male, high-falling injuries and single segment injury (mainly T 11, T 12 and L2) were common in patients with thoracolumbar fractures, especially in the blue-collar worker group (70.8%, 78.3%, and 85.4%). Compared with the unemployed group, the patients in the white-collar worker group and blue-collar worker group had a higher proportion of young patients, a higher height and weight, a lesser rate of hypertension or diabetes. One week after injury, 73.4% of patients underwent surgery, with the blue-collar worker group accounted for the largest proportion. One month after surgery, 77.1% of patients were able to get out of bed, with the white-collar worker group accounted for the largest proportion. In the postoperative recovery information, patients in the blue-collar worker group were more likely to have severe low back pain (OR = 2.023, 95% CI: 1.440-2.284) and pain-disturbed sleep (OR = 2.287, 95% CI: 1.585-3.299) than those who in the unemployed group.

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Conclusions: Blue-collar workers, with a high risk of thoracolumbar fracture, have a higher incidence of low back leg pain and pain-disturbed sleep in the recovery after thoracolumbar fracture surgery, and this requires more attention.

Key words: Occupations; Spinal fractures; Spinal injury; Thoracolumbar spine

Introduction

Spinal fractures include cervical spine, thoracic vertebra, and lumbar fractures, accounting for about 5%–6% of all systemic fractures, and most of them occur in the thoracolumbar segment[1–3]. In recent years, the incidence of spinal cord injury has significantly increased in China[4]. Whether for children or adults, spinal cord injury can greatly affect the health and life of patients and increase the burden on family and society[5–8]. Furthermore, thoracolumbar segment of injury may be result in the impairment of sensation and movement of lower limbs[9], which increases the difficulty of rehabilitation and treatment cost[10]. It is important to continuously optimize existing prevention programs to reduce the incidence of spinal fractures, especially thoracolumbar fractures. Although many epidemiological studies have been conducted on spinal fractures[11,12], there were few regional or national clinical investigations on patients with thoracolumbar vertebral fracture in different occupations in China. Therefore, this study included all patients with thoracolumbar fracture during the study period, so as to understand part of the information of different occupational characteristics of patients with thoracolumbar fracture in southwest China.

Stewart *et al.*[13] stated occupational engagement could have both positive and negative effects on health and wellbeing and called for awareness of the relationship between occupational and health and wellbeing. It is important to understand that occupational characteristics of patients are not only related to their life and health, but also conducive to improving their happiness. A retrospective analysis of more than half a million people in China by Chen W *et al.* showed that the incidence of traumatic fractures varies among patients with different occupational stratification[14]. Yang *et al.*[15] reviewed 3832 patients with spinal cord injury in Guangdong, China, and found that workers, farmers, and the unemployed were occupational categories at high risk for spinal fracture.

Unfortunately, these studies did not consider the relationship between occupation and postoperative recovery in patients with spinal fractures and did not provide clear treatment guidance for the characteristics of patients with different occupations for thoracolumbar fracture. So, this study further analyzed the disease injury characteristics and postoperative rehabilitation information of patients with thoracolumbar fracture of different occupational characteristics, so as to guide the clinical treatment of patients and improve the postoperative rehabilitation of patients.

Methods

Patients with thoracolumbar fractures from November 2009 to January 2019 were collected from the Affiliated Hospital of Zunyi Medical University in Guizhou Province. This study was approved by the Ethics Committee of the Affiliated Hospital of Zunyi Medical University (No. KLL-2020-275). Finally, based on the inclusion and exclusion criteria, a total of 719 patients with thoracolumbar fracture were included in this study. They were divided into three groups according to their occupational characteristics: unemployed group ($n = 299$), white-collar worker group ($n = 20$), and blue-collar worker group ($n = 400$). All patients were followed up for at least 1 year to observe their recovery.

Inclusion and Exclusion Criteria

Inclusion criteria: (1) Patients with thoracolumbar fractures combined with severe spinal stenosis (fracture fragment protruding into the spinal canal more than 50% of the sagittal diameter of the spinal canal, thoracolumbar injury classification and severity score (TLICS) > 4 score, Supplementary material 1, Part A in Appendix S1); (2) Patients underwent posterior unilateral laminectomy with small fenestration and bone grafting in vertebral body under general anesthesia; (3) Patients were assigned into three groups according to their occupational characteristics, including unemployed or freelance (unemployed group, $n = 299$), white-collar worker (such as civil servants, company staff) or student (white-collar worker group, $n = 20$), and blue-collar worker (such as construction workers, farmers) (blue-collar worker group, $n = 400$); (4) The patient information on epidemiological characteristics of patients, the characteristics of fracture injury (including Frankel classification [Supplementary material 1, Part B in Appendix S1], Visual Analog Scale [VAS] [Supplementary material 1, Part C in Appendix S1]), postoperative recovery (including Oswestry disability index (ODI) scores [Supplementary material 1, Part D in Appendix S1] and Japanese Orthopaedic Association [JOA] scores [Supplementary material 1, Part E in Appendix S1] 1 year after surgery) and complications was available. Exclusion criteria: Absence of preoperative statistics from the injured segment.

Surgery Process

After general anesthesia and exposemen the injured and adjacent vertebral bodies of patients. Pedicle screws were installed on the adjacent vertebral bodies. The side with more severe spinal stenosis or spinal nerve injury (according to preoperative CT results) was selected for small fenestration of laminar space and spinal canal exploration. On the lateral side of the posterior longitudinal ligament, the fracture block protruding into the spinal canal was pressed into the vertebral body (Figure 1A-D) with a self-made patent implant (China, No. ZL201620261038.9) (Figure 1E-I). If reduction is difficult, bite off. The ventral dural sac was explored. After decompression of the spinal canal, a pre-bent connecting rod was installed, locked screw. Intraoperative imaging examination to determine the vertebral body reduction and fixation. Then, a scraping spoon was used to probe into the fracture space between the inner wall of the pedicle and the posterior longitudinal ligament, to form a bone defect inside the vertebra. The mixed bone particles (allograft bone particles and autogenous accessory bone particles removed during decompression) were filled. Collagen sponge was used to seal the bone graft. After the spinal canal was explored unobstructed and without obvious active bleeding, biological protein glue was placed to cover the window and transverse connection was installed. The vertebral and adjacent vertebral lamina, cortical bone of spinous process, and articular process were polished with high-speed grinding drill. Bone graft beds were prepared, and mixed bone particles were placed. After placing negative pressure drainage, the incision was closed layer by layer.

Statistical Analysis

The data were classified into quantitative data (age, height, weight, BMI, operation time, intraoperative blood loss), counting data (sex, complication, the injured spinal segment, analgesics during treatment), and grade data (preoperative TLICS scores, preoperative Frankel grading, VAS, ODI, and JOA scores). By SPSS 21.0 (IBM, Chicago, USA), One-way ANOVA was performed on quantitative data, χ^2 test or Fisher's exact probability method was used for the counting data, and the rank sum test was used for grade data. $p < 0.05$ was regarded as statistically significant.

This study first analyzed and compared the differences among the three groups. Due to the small sample size of the white-collar worker group, after analyzing the epidemiological

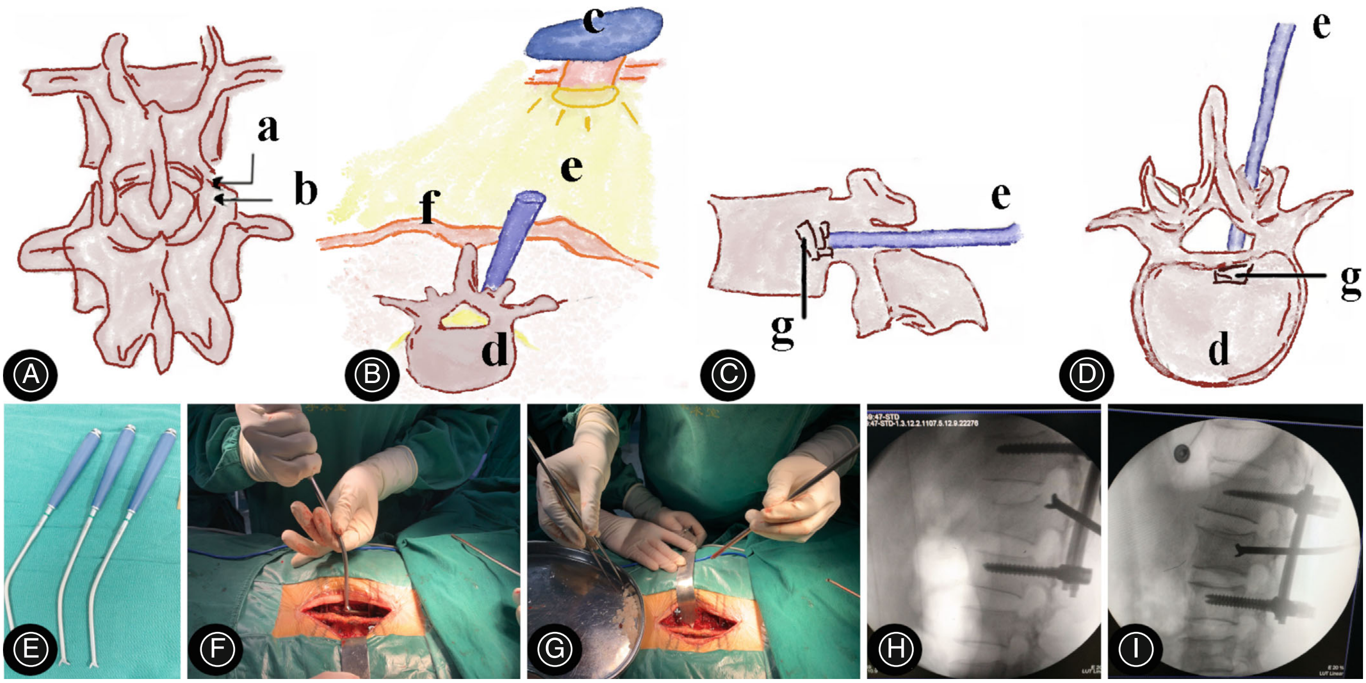

FIGURE 1 Surgical information display. Hand-drawn diagrams of key surgical procedures (A-D). The upper and lower lamina were excised by opening the lamina space window (a). Then, the vertebral body protruding into the vertebral canal is pushed into the vertebral body along the medial side of the pedicle (b), and the bone is implanted into the vertebral body (A). Under the microscope (c), through the skin (f), placed in the working routeway (e) (B). The walking path of the working routeway (e) was viewed from the side of the vertebral body (C) and from the coronal plane of the vertebral body (D). A 23-year-old female suffered from burst fracture and dislocation injury of the first and second lumbar vertebrae. During the operation, the posterior lumbar first and second vertebral fractures were disengaged and reduced through the laminar space window and decompression of the spinal canal and intervertebral bone graft and fusion of the first and second lumbar vertebrae were treated with internal fixation (E-I). By homemade patented implants (E). The invention discloses a bracing device for the treatment of vertebral compression fracture. The patent holder is the Affiliated Hospital of Zunyi Medical College [China, ZL201620261038.9], vertebroplasty was performed by decompression of the spinal canal and driving the fracture into the vertebral body through the spinal canal and further bone grafting of the vertebral body (F, G). Intraoperative mobile CT showed the use of the invention a bracing device (H, I). a, excise the upper lamina and lower lamina; b, pedicle of vertebral arch; c, microscope; d, vertebral body, e, working routeway; f, skin; g, fracture block.

characteristics of patients in each group, subsequent difference analysis removed the white-collar worker group to increase statistical credibility[16]. Equal sample sizes can give a greater power to detect differences[17]. Thus, the unemployed group and blue-collar worker group of patients were matched to the same sample size through the randomization method of digital table, forming new groups (unemployed group [$n = 299$] and new blue-collar worker group [$n = 299$]), so as to improve the credibility of the study after defining the disease characteristics of patients with different occupations. The influencing factors of postoperative sleep quality decline and chronic lumbar and leg pain were further analyzed by binary regression analysis, expressed as odds ratio (OR) and 95% confidence interval (CI).

Results

Basic Information

Among the three groups, male patients were more common, especially in the blue-collar worker group (70.8%), followed by the white-collar worker group (70.0%) and unemployed group (55.9%) (Table 1, $p < 0.001$). The white-collar worker group had the lowest mean of age (29.30 ± 17.19 years old), compared with the blue-collar worker group (40.29 ± 8.21 years old) and unemployed group (48.71 ± 16.26 years old) (Table 1, $p < 0.001$). In the white-collar worker group, patients aged 11–20 years were the most common (50.0%). In the unemployed group (41.5%) and the blue-collar worker group (56.5%), patients aged 40–60 years were the most common (Table 1). The average height and weight of patients in the unemployed group were the smallest, while those in the blue-collar worker group were the largest. The blue-collar worker group had the highest BMI, and the white-collar worker group had the lowest BMI (Table 1). Patients with thoracolumbar fractures were generally less likely to have diabetes (3.0%, 9/719) or hypertension (12.3%, 39/719), of which patients in the unemployed group has the highest rate of diabetes or hypertension (Table 1, $p = 0.015$).

After deleting the white-collar worker group, the results of the unemployed group and NC showed that the differences were statistically significant, including genders ($p = 0.001$), age ($p < 0.001$), height ($p < 0.001$), weight ($p < 0.001$), BMI ($p < 0.001$), and combined with hypertension ($p < 0.001$) or diabetes ($p = 0.038$) (Supplementary material 2, Table 1s).

Information of Injury

High fall injury was the most common cause of injury, especially in the blue-collar worker group (78.3%), followed by the unemployed group (50.5%) and the white-collar worker group (45.0%) (Table 2, $p < 0.001$). In

TABLE 1 Basic information of patients

Items	Unemployed group ($n = 299$)	White-collar worker group ($n = 20$)	Blue-collar workers group ($n = 400$)	Chi-square or F value	p value
Sex, n (%)					
Male	167 (55.9%)	14 (70.0%)	283 (70.8%)	16.859	$p < 0.001$*
Female	132 (44.1%)	6 (30.0%)	117 (29.3%)		
Age (years), mean ± std	48.71 ± 16.26	29.30 ± 17.19	40.29 ± 8.21	52.253	A vs B, A vs C, and B vs C: All $p < 0.001$*
Age cohorts, n (%)					
11–20 years	17 (5.7%)	10 (50.0%)	1 (0.3%)	264.661	$p < 0.001$*
20–40 years	67 (22.4%)	4 (20.0%)	168 (42.0%)		
40–60 years	124 (41.5%)	4 (20.0%)	226 (56.5%)		
60–80 years	91 (30.4%)	2 (10.0%)	5 (1.3%)		
≥60 years	91 (30.4%)	2 (10.0%)	5 (1.3%)	136.544	$p < 0.001$*
<60 years	208 (69.6%)	18 (90.0%)	395 (98.8%)		
Height (cm), mean ± std	162.56 ± 9.97	166.05 ± 5.38	169.25 ± 6.54	58.239	A vs B: $p = 0.041$**, A vs C: $p < 0.001$*
Weight (kg), mean ± std	55.99 ± 9.65	56.50 ± 9.32	64.80 ± 10.25	68.685	A vs C: $p < 0.001$*, B vs C: $p = 0.001$*
BMI (kg/m^2), mean ± std	21.05 ± 1.99	20.40 ± 2.56	22.50 ± 2.51	37.930	A vs C: $p < 0.001$*, B vs C: $p = 0.005$*
BMI cohorts, n (%)					
<18.5 kg/m^2	32 (10.7%)	4 (20.0%)	36 (9.0%)	51.552	$p < 0.001$*
18.5-25 kg/m^2	258 (86.3%)	15 (75.0%)	286 (71.5%)		
≥25 kg/m^2	9 (3.0%)	1 (5.0%)	78 (19.5%)		
Complication					
Diabetes, n (%)	8 (2.7%)	0 (0.0%)	1 (0.3%)	7.906	$p = 0.016$**
Hypertension, n (%)	30 (10.0%)	0 (0.0%)	9 (2.3%)	20.104	$p < 0.001$*

Abbreviations: %, percentage; BMI, body mass index; cm, centimeter; kg, kilogram; m, meter; n, number; std, standard deviation.; * The difference was statistically significant, $p < 0.01$.; ** The difference was statistically significant, $p < 0.05$.

TABLE 2 Injury information of each subgroup

Items	Unemployed group (n = 299)	White-collar worker group (n = 20)	Blue-collar workers group (n = 400)	Chi-square value	p value
Causes of injury, n (%)					
Crushing	17 (5.7%)	1 (5.0%)	26 (6.5%)	84.376	$p < 0.001$*
Fall to injury	87 (29.1%)	4 (20.0%)	30 (7.5%)		
Chronic injury	4 (1.3%)	1 (5.0%)	2 (0.5%)		
High fall injury	151 (50.5%)	9 (45.0%)	313 (78.3%)		
Traffic accident	40 (13.4%)	5 (25.0%)	29 (7.3%)		
Injured segment, n (%)					
Single	245 (81.9%)	14 (70.0%)	340 (85.4%)	11.047	$p = 0.020$**
Double	44 (14.7%)	6 (30.0%)	37 (9.3%)		
Triple and above	10 (3.3%)	0 (0.0%)	21 (5.3%)		
Mainly injured single segment, n (%)					
T 11	13 (5.4%)	0 (0.0%)	15 (4.5%)	4.763	$p = 0.543$
T 12	55 (22.7%)	2 (15.4%)	76 (22.8%)		
L 2	174 (71.9%)	11 (84.6%)	243 (72.8%)		
Mainly injured double segment, n (%)					
T 11-12	6 (14.6%)	0 (0%)	3 (8.8%)	5.639	$p = 0.674$
T 12-L 1	21 (51.2%)	2 (33.3%)	15 (44.1%)		
T10-11	4 (9.8%)	1 (16.7%)	4 (11.8%)		
L 2-L 3	3 (7.3%)	2 (33.3%)	6 (17.6%)		
L 1-2	7 (17.1%)	1 (16.7%)	6 (17.6%)		
Frankel classification, n (%)					
A	25 (8.4%)	1 (5.0%)	36 (9.0%)	1.095	$p = 0.578$
B	13 (4.3%)	0 (0.0%)	16 (4.0%)		
C	18 (6.0%)	2 (10.0%)	21 (5.3%)		
D	11 (3.7%)	1 (5.0%)	31 (7.8%)		
E	232 (77.6%)	16 (80.0%)	296 (74.0%)		
Preoperative Tlics score, n (%)					
5	33 (11.0%)	1 (5.0%)	26 (6.5%)	1.945	$p = 0.378$
6	91 (30.4%)	4 (20.0%)	137 (34.3%)		
7	101 (33.8%)	9 (45.0%)	151 (37.8%)		
8	59 (19.7%)	4 (20.0%)	64 (16.0%)		
9	15 (5.0%)	2 (10.0%)	22 (5.5%)		

Abbreviations: %, percentage; cm, centimeter; kg, kilogram; L, lumbar vertebra; m, meter; n, number; T, thoracic vertebrae.; * The difference was statistically significant, $p < 0.001$.; ** The difference was statistically significant, $p < 0.05$.

the three groups, single segment injury was the most common, mainly T11, T12, and L2 segments. The second is double segments, T12–L1 segments were the most common. The proportion of single segment injury in the blue-collar worker group was the highest (85.4%), that in the white-collar worker group was the lowest (70%) (Table 2, $p = 0.020$). There were no statistically significant differences in Frankel grade ($p = 0.578$) and TLICS scores ($p = 0.378$) before surgery (Table 2).

The comparison between the unemployed group and new blue-collar worker group showed the same results as the above comparison, especially in the cause ($p < 0.001$), site ($p = 0.031$) and severity of injury (Frankel grade, $p = 0.207$; TLICS scores, $p = 0.523$) (Supplementary material 2, Table 2s).

Information of Treatment

The majority of patients underwent surgery within the first week after injury (blue-collar worker group: 78.4% > unemployed group: 67.6% > white-collar worker group: 60%), with the blue-collar worker group having the shortest average time (6.14 ± 3.87 days), followed by the unemployed group (7.65 ± 8.93 days) and the white-collar worker group (11.90 ± 25.70 days) (Table 3, $p = 0.002$). There was no statistical significance in VAS score, operation time, intraoperative blood loss, and the use of analgesics (Table 3, all $p > 0.05$).

After the removal of the white-collar worker group, the difference between the unemployed group and the new blue-collar worker group in the interval from injury to surgery was still statistically significant ($p = 0.011$), and there were no significant differences in the other information of treatments (All $p > 0.05$) (Supplementary material 2, Table 2s).

Information of Postoperative Recovery

The majority of patients with thoracolumbar fracture begin walking within 1 month or less after surgery (white-collar worker group: 95.0% > blue-collar worker group: 81.0% > unemployed group: 70.5%), of which the white-collar worker group is the earliest walking (30.30 ± 14.84 days), followed by the blue-collar worker group (35.43 ± 22.71 days)

TABLE 3 Information on the treatment period of each subgroup

Items	Unemployed group (n = 299)	White-collar worker group (n = 20)	Blue-collar workers group (n = 400)	Chi-square or F value	p value
Preoperative VAS score, n (%)					
6	0 (0.0%)	0 (0.0%)	1 (0.3%)	0.210	$p = 0.900$
7	103 (34.6%)	7 (35.0%)	134 (33.5%)		
8	167 (56.0%)	11 (55.0%)	242 (60.5%)		
9	28 (9.4%)	2 (10.0%)	23 (5.8%)		
Days from onset of injury to start of surgery					
Mean ± std	7.65 ± 8.93	11.90 ± 25.70	6.14 ± 3.87	7.551	A vs C: $p = 0.020$**
≤7 days, n (%)	202 (67.6%)	12 (60.0%)	312 (78.4%)	12.133	$p = 0.002$**
>7 days, n (%)	97 (32.4%)	8 (40.0%)	86 (21.6%)		
Operation time (h)	2.78 ± 1.15	3.23 ± 1.20	2.85 ± 1.16	1.449	$p = 0.236$
Intraoperative blood loss (ml)	301.49 ± 263.20	429 ± 429.85	302.85 ± 247.64	2.302	$p = 0.101$
The use of analgesics in peri-treatment period					
Use of preoperative analgesics type, n (%)					
Paracetamol dihydrocodeine	197 (65.9%)	13 (65.0%)	266 (66.5%)	0.248	$p = 0.995$
Celecoxib	55 (18.4%)	4 (20.0%)	71 (17.8%)		
Etoricoxib	47 (15.7%)	3 (15.0%)	63 (15.8%)		
Days of preoperative analgesic use, n (%)					
5	72 (24.1%)	5 (25.0%)	98 (24.5%)	0.936	$p = 0.626$
6	27 (9.0%)	2 (10.0%)	36 (9.0%)		
8	112 (37.5%)	9 (45.0%)	168 (42.0%)		
10	88 (29.4%)	4 (20.0%)	98 (24.5%)		
Amount of preoperative total dosage, mean ± std					
Paracetamol dihydrocodeine (mg)	957.87 ± 55.67	955.38 ± 45.57	952.78 ± 46.64	0.573	$p = 0.564$
Celecoxib (mg)	2034.91 ± 231.59	2050.00 ± 100.00	2081.69 ± 99.01	1.201	$p = 0.304$
Etoricoxib (mg)	184.47 ± 116.52	170.00 ± 17.32	167.14 ± 14.97	0.701	$p = 0.498$
Use of postoperative analgesics type, n (%)					
Paracetamol dihydrocodeine	197 (65.9%)	13 (65.0%)	266 (66.5%)	0.248	$p = 0.995$
Celecoxib	55 (18.4%)	4 (20.0%)	71 (17.8%)		
Etoricoxib	47 (15.7%)	3 (15.0%)	63 (15.8%)		
Days of postoperative analgesic use, n (%)					
2	19 (6.4%)	1 (5.0%)	27 (6.8%)	1.522	$p = 0.467$
3	77 (25.8%)	6 (30.0%)	107 (26.8%)		
4	113 (37.8%)	9 (45.0%)	168 (42.0%)		
5	90 (30.1%)	4 (20.0%)	98 (24.5%)		
Amount of postoperative total dosage, mean ± std					
Paracetamol dihydrocodeine (mg)	208.83 ± 62.64	195.38 ± 60.64	203.31 ± 62.22	0.616	$p = 0.541$
Celecoxib (mg)	1216.73 ± 270.38	1250.00 ± 100.00	1281.69 ± 99.01	1.781	$p = 0.173$
Etoricoxib (mg)	79.36 ± 19.04	80.00 ± 17.32	77.14 ± 14.97	0.253	$p = 0.777$

Abbreviations: %, percentage; h, hour(s); mg, milligram; ml, milliliter; n, number; std, standard deviation.; ** The difference was statistically significant, $p < 0.05$.

and unemployed group (41.95 ± 27.28 days) (Table 4, $p = 0.003$). There were no statistically significant differences in the distance of longest walking and VAS score (Table 4, All $p > 0.05$).

By the JOA score, the probability of frequently mild or occasionally severe lumbago and leg pain in the unemployed group, the white-collar worker group, and blue-collar worker group was 58.9%, 55%, and 72%, respectively (Table 4, $p = 0.001$). There was no significant difference in gait and spectator function among the three groups (Table 4, All $p > 0.05$). In the ODI assessments, the proportion of patients whose sleep quality by affected pain was highest in the blue-collar worker group (60.5%) (Table 4, $p < 0.001$). There were no statistically significant differences in pain intensity, personal self-care degree, lifting, walking, sitting, standing, sexual life, social activities, and traveling (Table 4, All $p > 0.05$). The radiographic review showed that patients were recovering well after surgery (Figure 2 and 3).

Except for the difference of JOA-gait ($p = 0.004$), the difference of postoperative recovery in the unemployed group and the new blue-collar worker group was consistent as above, including VAS score ($p = 0.527$), postoperative

TABLE 4 Postoperative recovery information

Items[a]	Unemployed group ($n = 299$)	White-collar worker group ($n = 20$)	Blue-collar workers group ($n = 400$)	Chi-square or *F* value	*p* value
Postoperative VAS score at rest 1 month after surgery, *n* (%)					
0	36 (12.1%)	1 (5%)	36(9%)	0.419	$p = 0.811$
1	125 (41.9%)	9 (45%)	181 (45.3%)		
2	112 (37.6%)	9 (45%)	143 (35.8%)		
3	25 (8.4%)	1 (5%)	39 (9.8%)		
5	0 (0%)	0 (0%)	1(0.3%)		
Postoperative recovery time of walking (days)					
Mean ± std	41.95 ± 27.28	30.30 ± 14.84	35.43 ± 22.71	7.007	A vs B: $p = 0.011$** A vs C: $p = 0.003$**
<30 days, *n* (%)	74 (24.7%)	6 (30%)	130 (32.5%)	16.009	$p = 0.002$**
=30 days, *n* (%)	137 (45.8%)	13 (65%)	194 (48.5%)		
>30 days, *n* (%)	88 (29.4%)	1(5%)	76 (19%)		
Postoperative walking distance (m)					
Mean ± std	1775.92 ± 417.67	1800.00 ± 410.39	1755.00 ± 430.63	0.278	$p = 0.758$
1000 m, *n* (%)	67 (22.4%)	4 (20%)	98 (24.5%)	0.487	$p = 0.808$
2000 m, *n* (%)	232 (77.6%)	16 (80%)	302 (75.5%)		
JOA record					
JOA—patient with lower back/legs pain, *n* (%)					
2	123 (41.1%)	9 (45%)	112 (28%)	14.275	$p = 0.001$**
3	175 (58.9%)	11 (55%)	288 (72%)		
JOA—gait of patients, *n* (%)					
3	141 (47.2%)	10 (50%)	163 (40.8%)	3.186	$p = 0.203$
2	158 (52.8%)	10 (50%)	327 (59.3%)		
JOA—bladder function of patients					
0	291 (97.3%)	20 (100%)	391 (97.8%)	0.632	$p = 0.729$
−3	8 (2.7%)	0 (0%)	9 (2.3%)		
ODI record					
Pain intensity, *n* (%)					
0	44 (14.7%)	1 (5%)	52 (13%)	0.503	$p = 0.778$
1	216 (72.2%)	17 (85%)	294 (73.5%)		
2	38 (12.7%)	2 (10%)	54 (13.5%)		
3	1 (0.3%)	0 (0%)	0 (0%)		
Personal life, *n* (%)					
0	167 (55.9%)	12 (60%)	199 (49.8%)	1.911	$p = 0.385$
1	101 (33.8%)	5 (25%)	161 (40.3%)		
2	30 (10%)	2 (10%)	39 (9.8%)		
3	1 (0.3%)	1 (5%)	1 (0.3%)		
Lifting, *n* (%)					
0	19 (6.4%)	4(20%)	30(7.5%)	2.006	$p = 0.367$
1	214 (71.6%)	12 (60%)	292 (73%)		
2	57 (19.1%)	3 (15%)	71 (17.8%)		
3	9 (3%)	1 (5%)	7 (1.8%)		
Walking, *n* (%)					
0	31 (10.4%)	2 (10%)	54 (13.5%)	1.580	$p = 0.454$
1	188 (62.9%)	10 (50%)	238 (59.5%)		
2	80 (26.8%)	8 (40%)	107 (26.8%)		
4	0 (0%)	0 (0%)	1 (0.3%)		
Sitting, *n* (%)					
0	20 (6.7%)	0 (0%)	32 (8%)	0.416	$p = 0.812$
1	213 (71.2%)	17(85%)	267 (66.8%)		
2	62 (20.7%)	3 (15%)	92 (23%)		
3	4 (30.8%)	0 (0%)	9 (2.3%)		
Standing, *n* (%)					
0	27 (9%)	1 (5%)	49 (12.3%)	1.591	$p = 0.451$
1	215 (71.9%)	17 (85%)	282 (70.5%)		
2	54 (18.1%)	1 (5%)	68 (17%)		
3	3 (1%)	1 (5%)	1(0.3%)		
Sleeping, *n* (%)					
0	165 (55.2%)	9 (45%)	158 (39.5%)	21.534	$p < 0.001$ *
1	108 (36.1%)	4 (20%)	172 (43%)		
2	26 (8.7%)	6 (30%)	67 (16.8%)		
3	0 (0%)	1 (5%)	3 (0.8%)		
Sex life, *n* (%)					
0	270 (90.3%)	18 (90%)	358 (89.5%)	0.099	$p = 0.952$
1	26 (8.7%)	1 (5%)	41 (10.3%)		

TABLE 4 Continued

Items[a]	Unemployed group ($n = 299$)	White-collar worker group ($n = 20$)	Blue-collar workers group ($n = 400$)	Chi-square or F value	p value
2	2 (0.7%)	1 (5%)	0 (0%)		
3	1(0.3%)	0 (0%)	1(0.3%)		
Social life, n (%)					
0	287 (96%)	19 (95%)	379 (94.8%)	0.558	$p = 0.756$
1	9 (3%)	0 (0%)	19 (4.8%)		
2	3 (1%)	1 (5%)	2 (0.5%)		
Traveling, n (%)					
0	289 (96.7%)	19 (95%)	389 (97.3%)	0.501	$p = 0.778$
1	8 (2.7%)	0 (0%)	9 (2.3%)		
2	0 (0%)	0 (0%)	1 (0.3%)		
3	2 (0.7%)	1 (5%)	1 (0.3%)		
ODI index (%), mean ± std	13.85 ± 4.275	15.20 ± 4.96	14.28 ± 4.33	1.478	$p = 0.229$

Abbreviations: %, percentage; JOA, Japanese Orthopaedic Association Scores; n, number; ODI, Oswestry Disability Index; std, standard deviation.; [a] Items: The numbers from −3 to 5 in JOA and ODI represent the scores of each indicator. For specific meanings, see Appendix S1.; * The difference was statistically significant, $p < 0.001$.; ** The difference was statistically significant, $p < 0.05$

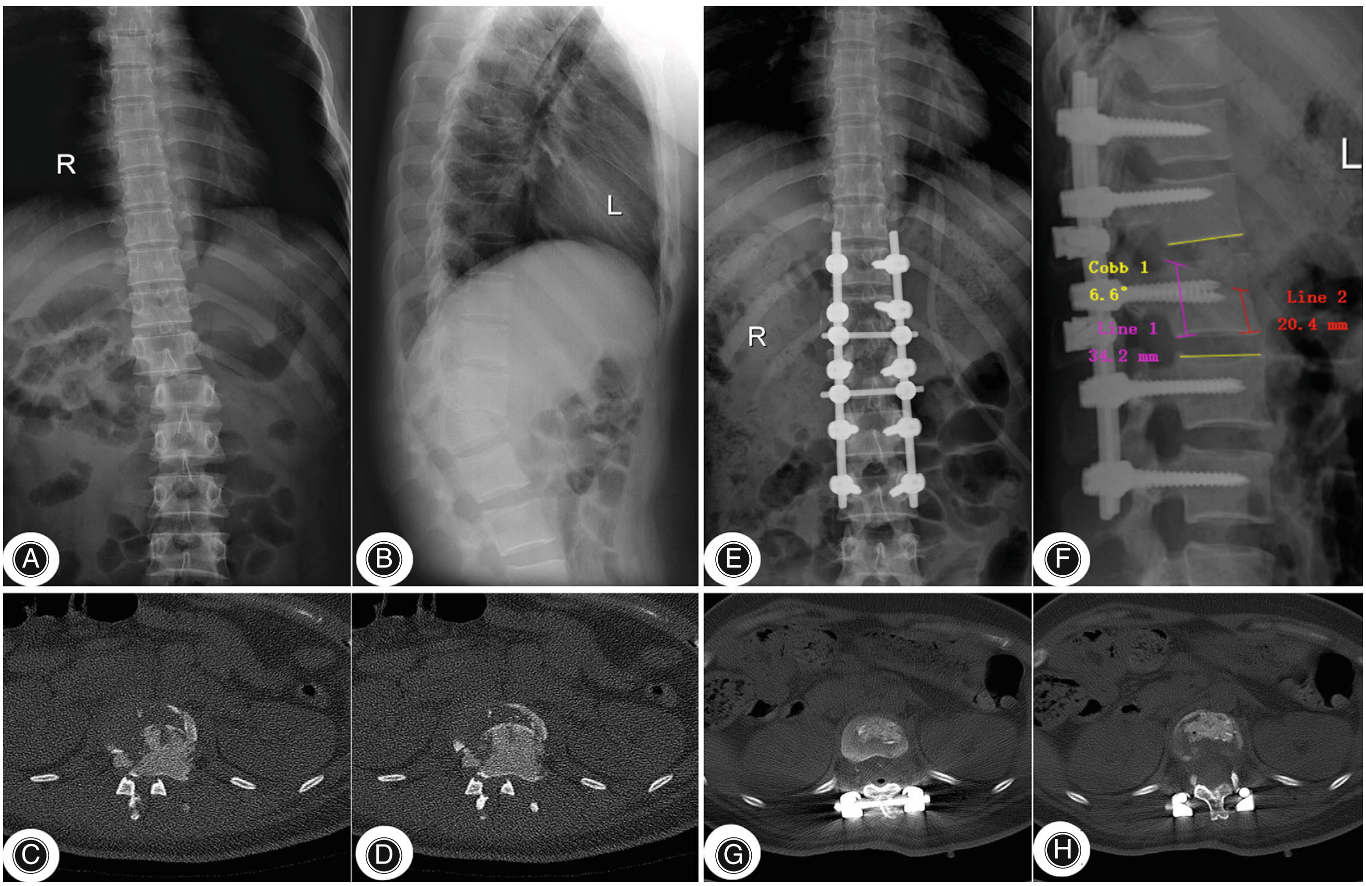

FIGURE 2 A 23-year-old female suffered from lumbar 1 and 2 vertebral burst fracture combined with fracture and dislocation injury with TLICS score of 9 points (Cobb angle: 6.6°, Anterior vertebral losing height of fractured vertebra = line 2/line 1 = 0.60). Preoperative imaging examinations of anteroposterior and lateral (A, B) radiographs, CT (C, D) showed that vertebral burst fracture resulted in spinal stenosis due to intruding of the fracture block into the spinal canal. The patients were followed up for 4 years after posterior lumbar 1 and 2 vertebral fractures were decompressed by translaminar window and intervertebral fusion with bone graft. Anteroposterior and lateral radiographs (E, F), CT (G, H) were reviewed, the results showed no compression of the spinal canal and bone graft tamping in the vertebral body was satisfactory. TLICS, thoracolumbar injury classification and severity score; CT, computerized tomography.

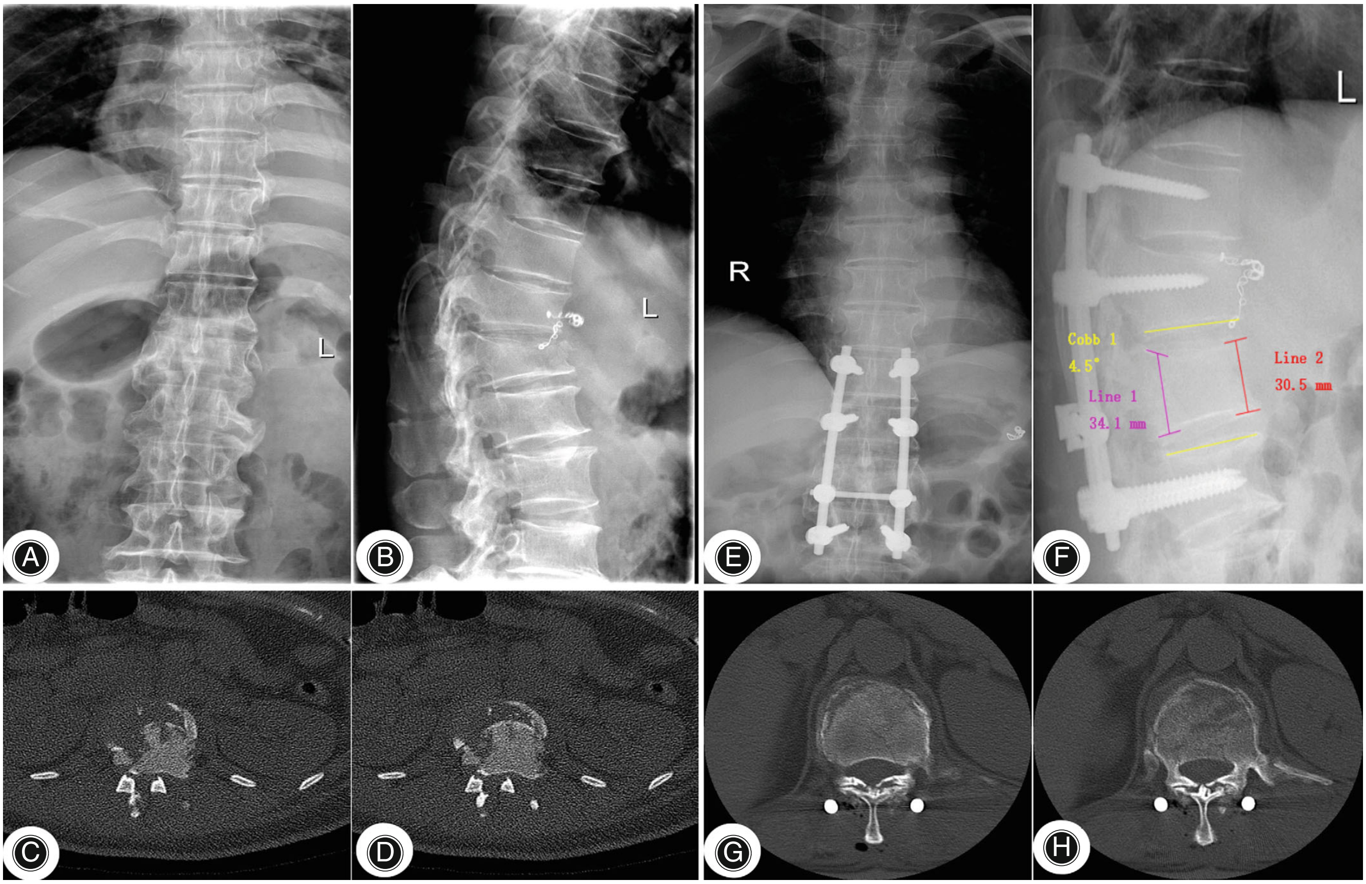

FIGURE 3 A 46-year-old man had a burst fracture of the 2nd and 3rd lumbar vertebrae with a TLICS score of 6 points (Cobb angle: 4.5°, Anterior vertebral losing height of fractured vertebra = line 2 / line 1 = 0.89). Preoperative imaging examinations of anteroposterior and lateral (A, B) radiographs, CT (C, D) showed that the fracture fragment intruding into the spinal canal leading to spinal stenosis. The patients were followed up for 6 years after posterior lumbar 2 and 3 vertebral fractures were decompressed by translaminar window and lumbar 3 vertebral graft vertebroplasty. Anteroposterior and lateral radiographs (E, F), CT (G, H) were reviewed. TLICS, thoracolumbar injury classification and severity score; CT, computerized tomography.

walking time ($p = 0.006$) and longest distance ($p = 0.501$), ODI index ($p = 0.598$), proportion of each ODI items ($p_{(Sleeping)} < 0.001$, Others $p > 0.05$), and other JOA evaluation ($p_{(Lumbar\ and\ leg\ pain)} = 0.001$, $p_{(Urinate)} = 0.401$) (Supplementary material 2, Table 3s).

Binary Logistic Regression Analysis

According to the above results, the JOA-lower back/leg pain of the patients 1 year after surgery was divided into two groups: no pain or occasional mild pain after surgery, and long-term mild pain or occasional severe pain after surgery. Single-factor analysis showed that characteristics of occupation, Frankel grade, preoperative TLICS score, and the maximum distance of postoperative walk had an impact on patients' frequently mild or occasionally severe pain after surgery (Table 5). Patients whose occupation was characterized primarily by physical labor, such as blue-collar workers, were a risk factor for frequent mild or occasionally severe lower back/leg pain (compared with no occupation or freelancer, $p < 0.001$, OR = 1.797, 95% CI: 1.306-2.468). Subsequently, after controlling other contributing factors (Frankel grade, preoperative TLICS score, and the maximum distance of postoperative walk), the influence of occupation on postoperative lumbago and leg pain of patients was increased (OR = 2.023, 95% CI: 1.440-2.284) (Figure 4A).

By ODI-sleep, patients were divided into two groups according to whether their sleep was susceptible to pain disturbance within 1 year after surgery. Single-factor analysis results showed that height, characteristics of occupation, the cause of injury, Frankel grade, interval from injury to surgery, time from surgery to walking, and distance of walking were the influencing factors of postoperative sleep being easily disturbed by pain. Blue workers (no occupation or freelancer as reference parameter, $p < 0.001$, OR = 1.886, 95% CI: 1.329-2.555), high fall injuries (car accidents as reference parameter, $p = 0.044$, OR = 1. 660, 95% CI: 1.015-2.715),

TABLE 5 Factors that influence the frequency of mild or occasionally severe pain in the first year after surgery—single-factor analysis

			95% CI of OR	
	p value	OR	Lower limit	Upper limit
Male [female[a]]	0.560	0.908	0.657	1.256
Age (years old)	0.060	1.011	1.000	1.023
Height (cm)	0.700	0.997	0.979	1.014
Weight (kg)	0.637	1.003	0.989	1.018
BMI (kg/m^2)	0.378	1.029	0.966	1.097
With hypertension [Without hypertension[a]]	0.101	1.722	0.899	3.297
With diabetes [Without diabetes[a]]	0.462	0.553	0.114	2.680
Occupation characteristics [Unemployed group[a]]	0.001*			
White-collar worker group	0.734	0.854	0.344	2.123
Blue-collar workers group	0.000*	1.797	1.308	2.468
[Injuries caused by car accident injuries[a]]	0.564			
An injury caused by crushing	0.567	0.801	0.375	1.711
An injury caused by a fall	0.836	1.065	0.586	1.938
Injury caused by chronic injury	0.999		0.000	
Injuries caused by high fall injuries	0.351	1.273	0.766	2.115
[A spinal segmental injury[a]]	0.597			
Two spinal segmental injuries	0.796	0.940	0.587	1.504
More than two spinal segments were injured	0.337	1.496	0.658	3.403
[Frankel classification—E[a]]	0.000*			
Frankel classification—A	0.000*	0.253	0.147	0.433
Frankel classification—B	0.000*	0.157	0.070	0.354
Frankel classification—C	0.000*	0.274	0.144	0.522
Frankel classification—D	0.000*	0.277	0.147	0.521
VAS evaluation the day before surgery	0.966	0.994	0.765	1.293
Preoperative Tlics score	0.024*	0.837	0.718	0.977
The length of time between the injury and the operation (days)	0.527	0.994	0.975	1.013
The operation time (h)	0.374	0.942	0.825	1.075
Bleeding volume during operation (ml)	0.801	1.000	0.999	1.001
Analgesic ([a]aminophenol dihydrocodeine tablet)	0.844			
Celecoxib	0.924	0.980	0.650	1.477
Etoricoxib	0.561	0.881	0.574	1.352
VAS evaluation 1 month after surgery	0.379	1.090	0.899	1.322
The length of time between the end of the operation and the ability to walk (days)	0.428	0.998	0.991	1.004
The longest distance to walk at one time (m)	0.000*	1.001	1.001	1.002

Abbreviations: BMI, body mass index; CI, confidence interval; cm, centimeter; kg, kilogram; m, meter; ml, milliliter; OR, odds ratio; VAS, visual analog scale.; [a] Reference variable.; * $p < 0.05$.

and severe spinal cord injuries (non-spinal cord injuries as reference parameter, $p = 0.006$, OR = 2.214, 95% CI: 1.258-3.897) were the risk factors for pain-disturbed sleep (Table 6). After controlling the above factors, the influence of occupation on postoperative pain-disturbed sleep of patients was increased (OR = 2.287, 95% CI: 1.585-3.299) (Figure 4B).

Complications

Most of the patients had wound healing at one stage, without wound infection. Two cases had poor wound healing (one case in the unemployed group and one case in the blue-collar worker group), which improved after dressing change. One case had wound infection (in the blue-collar worker group), and wound healing was achieved after adjusting antibiotics. None of the patients had complications such as cerebrospinal fluid leakage, and loosening, shedding, rupture of internal fixator.

Discussion

A total of 719 patients with thoracolumbar fractures were included in this study for retrospective analysis. The more common characteristics of thoracolumbar fracture patients were male, age of 40–60 years, single-level injury, and predominantly physical labor occupation. The most common cause of patients with thoracolumbar fractures was high falling injury. These results were similar to previous studies[7,12,14,15]. It is important to note that the results of this study also detailed additional information on patients with thoracolumbar fractures in different occupations.

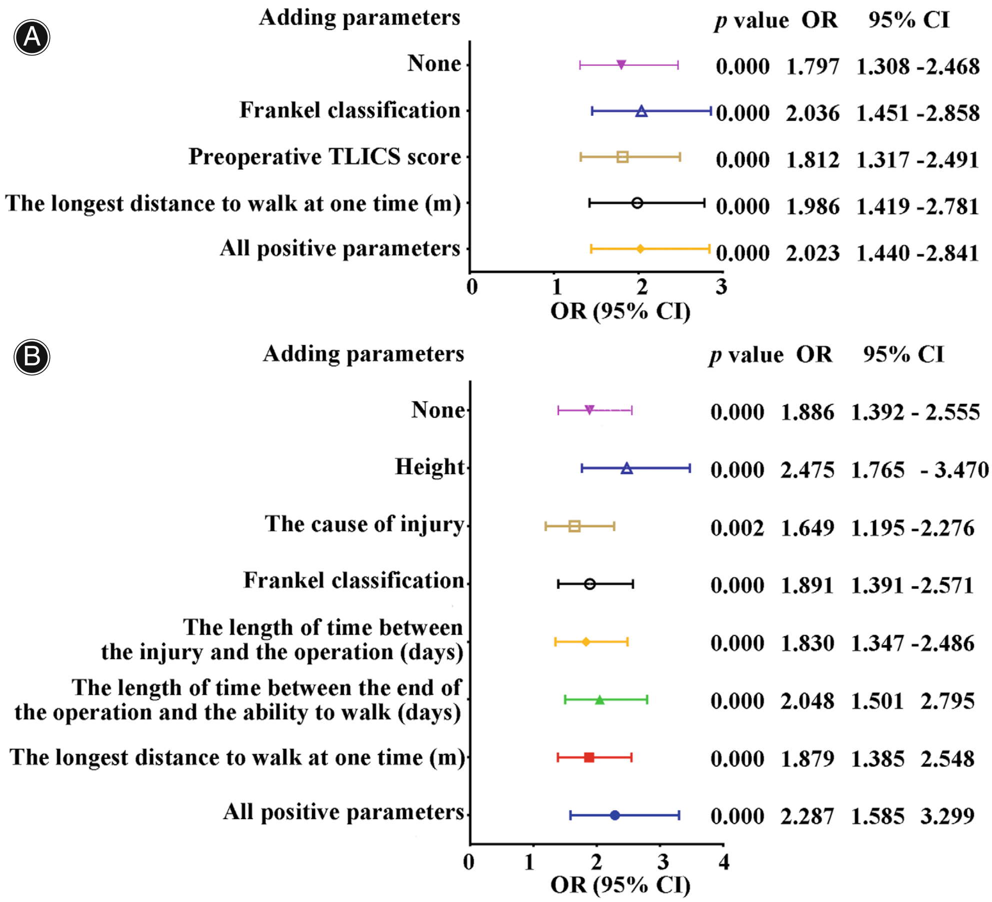

FIGURE 4 Multivariate analysis was used to compare the influence of occupational characteristics on postoperative partial recovery. After adding other parameters (the left side of the image) to the model, the influence of occupational characteristics on frequent mild or occasionally severe low back and leg pain after surgery (A) or postoperative pain induced sleep disturbance in patients (B). And the right side shows their significance, odds ratio (OR), and confidence interval (CI) of odds ratio. OR, odds ratio; CI, confidence interval; TLICS, thoracolumbar injury classification and severity score; m, meter.

TABLE 6 Factors affecting postoperative sleep quality of patients—single-factor analysis

			95% CI of OR	
	p value	OR	Lower limit	Upper limit
Height (cm)	0.031*	0.981	0.965	0.998
Occupation characteristics [unemployed group[a]]	0.000*			
White-collar worker group	0.379	1.505	0.606	3.739
Blue-collar workers group	0.000*	1.886	1.392	2.555
[Injuries caused by car accident injuries[a]]	0.000*			
An injury caused by crushing	0.248	0.637	0.296	1.369
An injury caused by a fall	0.296	0.733	0.409	1.314
Injury caused by chronic injury	0.238	2.786	0.508	15.281
Injuries caused by high fall injuries	0.044*	1.660	1.015	2.715
[Frankel classification—E[a]]	0.030*			
Frankel classification—A	0.006*	2.214	1.258	3.897
Frankel classification—B	0.230	1.601	0.742	3.453
Frankel classification—C	0.115	1.696	0.879	3.272
Frankel classification—D	0.339	1.359	0.724	2.548
The length of time between the injury and the operation (days)	0.008*	0.953	0.920	0.988
The length of time between the end of the operation and the ability to walk (days)	0.004*	1.009	1.003	1.015
The longest distance to walk at one time (m)	0.022*	1.000	0.999	1.000

Abbreviations: BMI, body mass index; CI, confidence interval; cm, centimeter; kg, kilogram; m, meter; ml, milliliter; OR, odds ratio; VAS, visual analogue scale.; [a] Reference variable.; * $p < 0.05$.

Demographic Characteristics of Patients with Thoracolumbar Fracture in Various Occupations

Among the three groups, blue-collar workers, whose characteristics were manual labor, had the largest proportion of males, the largest proportion of age under 60 years, and the highest average height, weight, and BMI. The main characteristic of the freelancers or non-professionals with thoracolumbar fractures was highest proportion of the elderly, hypertension, and diabetes. The incidence of thoracolumbar fracture was lowest in the group whose main occupation was mental work, which has a large proportion of young people aged 11–40 years. As is known to all, the characteristics of patients with different occupations are different with the content required by the occupation itself, the ability of patients, and the level of education, and even the national conditions of each country[18]. Occupations involving mainly manual labor may be more suitable for male groups, due to the requirement for strength. In addition, on account of family care, pregnancy, and other reasons, women of China are not favored in the job market. These factors may account for the relatively high proportion of male patients with thoracolumbar fractures in occupational groups, especially blue-collar workers and white-collar workers. The proportion of elderly patients without occupation or freelance occupation was higher, and the proportion of middle-aged and young patients with mental or physical labor was higher. In China, people usually retire after the age of 60, which explains why the elderly account for the largest proportion of patients with thoracolumbar fractures who are not employed or freelance. Decline of height by age was modeled based on data derived from the Baltimore Longitudinal Study of Aging[19]. As a result, the average height of patients with thoracolumbar fractures in the non-employed or freelancers was relatively lower than that in other occupations. Considering that body weight can reflect the nutritional status of patients[20] and there is a certain correlation between body weight and height[21], it can naturally explain why patients without occupation or freelance occupation have lower body weight. Correspondingly, younger patients were more likely to be blue-collar or white-collar workers or students, who were taller and heavier. And due to the physical demands of blue-collar worker, their average BMI is higher. It has been widely reported in many studies that the elderly had higher rates of hypertension and/or diabetes than the young and middle-aged[22,23]. So, unemployed or freelance patients had the highest proportion of combination with hypertension or diabetes. To sum up, the characteristic of patients with thoracolumbar fracture are different in various occupations.

Characteristics of Disease Injury in Patients with Thoracolumbar Fracture in Various Occupations

The injury causes of patients in various occupations were different. High fall injuries accounted for the largest proportion, especially in the blue-collar workers (78.3%). Falls was the second common cause of injury, which accounted for the highest proportion in patients without occupation or freelance occupation (29.1%). The third common injury was car accident, which was more common among white-collar workers or students (25.0%). By analyzing the medical records of 3832 patients with spinal cord injury from 2003 to 2011 in Guangdong Province, China, Yang *et al.*[15] found that the proportion of patients increased from 7.0% to 14.0% and the main cause of spinal cord injury was traffic accidents (21.7%). The study of Smits *et al.*[24] showed that most patients were injured by falling from the same level (low energy), followed by (high energy) traffic accidents in the Netherlands from 2010 to 2017. In Saudi Arabia, road traffic accident was the most common cause of traumatic spinal injury in 120 patients with traumatic spinal injury, accounting for 33.6% of all spinal fractures[25]. In the Guizhou Province, China, the most common cause of injury of patients in each group included high fall injuries, and the incidence of falling injuries may increase with the rapid development of industrialization and urbanization in the next few years.

There were some differences in plane of injuries among patients with different occupations. For patients who were unemployed or freelancers, the plane of injuries was dominated by T12 (22.7%) and L2 (71.9%) in single segment, and T12–L1 (51.2%) in double segment. For blue-collar workers, L2 was dominant in single segment (84.6%), while T12–L1 and L2–L3 were both dominant in double segment (33.3%). For white-collar workers or students, the injury site of single segment was dominated by L2 (72.8%), and the double segment was dominated by T12–L1 (44.1%). By analyzing 120 cases of traumatic spine injury in Saudi Arabia, the result showed that thoracolumbar fracture was relatively more common (85/120, 70.83%) in spine injury stratification.[25]. In 512,187 participants of China, Liu *et al.*[26] reported similar findings that thoracolumbar fractures (T11–L2) were the most common fracture. An analysis of 194 patients with spinal injuries found that L1 was the dominant vertebral body (29.7%), followed by T12 and L2[27]. The injury sites of patients with various occupations were concentrated in the thoracolumbar transitional department (T12–L2) for the following reasons[28,29]: (1) this part is the position with more physiological load; (2) here is the physiological curve of the shifting site; (3) the thoracolumbar transitional position is from the thoracic vertebra with limited movement to the lumbar vertebra with flexible movement; (4) because of its anatomical nature, the lumbar spine is highly flexible in the sagittal direction and is therefore susceptible to both flexion and extension forces, with the thoracolumbar joint being the most vulnerable part.

Characteristics of Treatment in Patients with Thoracolumbar Fracture in Various Occupations

Most patients underwent surgery within the first week after their injury (73.4%), in which blue-collar workers receiving treatment the fastest and white-collar workers or students the slowest. There were no significant differences among the three groups in operative time, intraoperative bleeding, and the use of analgesics in treatment period. The timing of surgery after injury was related to the state of the patient at that time[30]. In this study, patients with mental work as their primary occupation had the highest proportion of chronic injuries, compared with the other two occupations. Acute or chronic injuries may be one of the reasons for the difference in time from injury to surgery among various occupations. Older or more complications will undoubtedly increase the preoperative preparation requirements of patients, such as preoperative examinations. So, for the non-employed or freelancers, the proportion of older patients and more patients with hypertension or diabetes may be reasons for the prolonged time from injury to surgery compared to blue-collar workers.

Characteristics of Postoperative Recovery in Patients with Thoracolumbar Fracture in Various Occupations

Under the absence of statistically significant differences in the degree of preoperative spinal cord injury, preoperative pain score, and analgesic use around and during treatment, the majority of patients with thoracolumbar fracture were able to walk within 1 month or less after surgery (77.1%). Among the three occupations, patients without occupation or freelance occupation had a higher average age and the longest time from surgery to ambulation. While the average age of patients with mental work as their main occupation was the lowest, they had the shortest time from surgery to ambulation. The effect of age on postoperative recovery has been reported in many studies[31,32]. It is easy to understand that patients with no occupation or freelance occupation in this study had the least postoperative activity time.

Compared with other professional types, physical labor patients had a higher proportion of frequently mild or occasionally severe waist and leg pain, and a higher proportion of pain-interfered sleep. Regression analysis showed that patients with major physical labor were more likely to have severe back and leg pain (OR = 2.023, 95% CI: 1.440-2.284) and pain-disturbed sleep after surgery (OR = 2.287, 95% CI: 1.585-3.299) than those without occupation or freelance work. By analyzing the psychology of pain, Chapman found that acute and chronic pain complaints are in part determined by psychological factors unrelated to disease or trauma. And chronic pain tends to be linked to personality problems and payoffs in the home and job situation for adopting a sick role. This pain states may be usefully construed as problems of perceptual distortion[33]. In a study of upper body pain, Harrington *et al.*[34] found that patients with higher perceived work stress had higher levels of upper body pain 6 months after the consultation. In Guizhou and even in most areas of China, patients who are mainly engaged in manual labor are often the main labor force of their families and bear greater economic responsibilities for their families. After thoracolumbar trauma, the labor force of these patients is greatly reduced, which may increase their psychological stress. And this may be the cause of relatively serious lumbar and leg pain and sleep disturbance in these patients after surgery. Therefore, for these patients, not only should the functional recovery after surgery be strengthened but also appropriate psychological counseling is needed to improve the quality of postoperative recovery.

Strengths and Limitations

This study not only compared the characteristics of patients with thoracolumbar fractures in various occupations (including the patient's demographic characteristics, characteristics of disease injury, and characteristics of treatment), but also compared their recovery 1 year after surgery. At present, there were few regional or national clinical investigations on patients with thoracolumbar vertebral fracture in different occupations in China. This study on the characteristics of patients with thoracolumbar vertebral fractures in various occupations has a certain guiding significance for their prevention, clinical diagnosis, and treatment, and also provides a basis for the rational allocation of social medical resources. Unfortunately, the number of patients who take mental work as their occupation was relatively small, which may be caused by the insufficient sample size. Because this part of the medical treatment crowd was too few, we further deleted these patients and compared the other two groups to improve the credibility of this study. In addition, this study also has other shortcomings. For example, the conclusion of this study needs to be added by more regions, so as to play a more accurate guiding role. Therefore, we hope that a larger range of data collection and analysis can be carried out in the later stage to reduce the incidence in the related population and improve their prognosis.

Conclusions

The common group of patients with thoracolumbar fracture were male, age of 40–60 years, unemployed, freelance, or blue-collar worker. Therefore, safety education and guidance should be strengthened for this group. High fall injury and single segment injury (mainly T11, T12, or L2) was the most common characteristics of disease injury, especially in the blue-collar worker. A total of 73.4% of patients underwent surgery within 1 week after injury, and 77.1% of patients were able to get out of bed within 1 month after surgery. On the characteristics of postoperative recovery, blue-collar workers receive surgery treatment fastest, while white-collar workers could get out of bed earliest. Blue-collar workers had a higher rate of chronic low back pain and pain-disturbed sleep after surgery. These results provide a certain reference value for improving the treatment and postoperative rehabilitation of patients with thoracolumbar fracture.

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Author Contributions

Tingting Li, Liu-Lin Xiong, and Hao Yuan concepted the study. Tingting Li, Yi Wei, and Qiu-Xia Xiao wrote the original manuscript. Hao Yuan, Hong-Su Zhou, Jun Ao, and Ting-Hua Wang made major revisions to the article. Yi Wei, Qiu-Xia Xiao, Ting-Ting Li, and Qi-Jun Li analyzed the data. Hao Yuan, Chong Wang, and Jun Ao collected all data.

Authorship Declaration

All authors listed in this study meet the authorship criteria according to the latest guidelines of the International Committee of Medical Journal Editors, and all authors are in agreement with the manuscript.

Ethics Approval

The study was approved by Ethic Committee of the Affiliated Hospital of Zunyi Medical University (No. KLL-2020-275).

Supporting Information

Additional Supporting Information may be found in the online version of this article on the publisher's web-site:

Appendix S1 Supporting information

References

1. Schousboe JT. Epidemiology of vertebral fractures. J Clin Densitom. 2016;19(1):8–22.
2. Hu R, Mustard CA, Burns C. Epidemiology of incident spinal fracture in a complete population. Spine (Phila Pa 1976). 1996;21(4):492–9.
3. den Ouden LP, Smits AJ, Stadhouder A, Feller R, Deunk J, Bloemers FW. Epidemiology of spinal fractures in a level one trauma Center in The Netherlands: a 10 years review. Spine (Phila Pa 1976). 2019;44(10):732–9.
4. Liu P, Yao Y, Liu MY, et al. Spinal trauma in mainland China from 2001 to 2007: an epidemiological study based on a nationwide database. Spine (Phila Pa 1976). 2012;37(15):1310–5.
5. Ferrero E, Compagnon R, Pesenti S, et al. Surgical management of burst fractures in children and adolescents: a multicentre retrospective study. Orthop Traumatol Surg Res. 2020;106(1):173–8.
6. Ross PD. Clinical consequences of vertebral fractures. Am J Med. 1997;103(2a):30S–42S. discussion 42S-43S.
7. Wang H, Li C, Xiang Q, Xiong H, Zhou Y. Epidemiology of spinal fractures among the elderly in Chongqing, China. Injury. 2012;43(12):2109–16.
8. Kendler DL, Bauer DC, Davison KS, et al. Vertebral fractures: clinical importance and management. Am J Med. 2016;129(2):221.e221–10.
9. Hernández-Fernández A, Massó A, Beristain M, et al. Spinal trauma. Radiologia. 2016;58(Suppl 1):60–7.
10. van der Roer N, de Bruyne MC, Bakker FC, van Tulder MW, Boers M. Direct medical costs of traumatic thoracolumbar spine fractures. Acta Orthop. 2005;76(5):662–6.
11. Alseddeeqi E, Bashir N, AlAli KF, Ahmed LA. Characteristics of patients with low-trauma vertebral fractures in The United Arab Emirates: a descriptive multi-center analysis. Endocr J. 2020;67(7):785–91.
12. Kwok AW, Leung JC, Chan AY, et al. Prevalence of vertebral fracture in Asian men and women: comparison between Hong Kong, Thailand, Indonesia and Japan. Public Health. 2012;126(6):523–31.
13. Stewart KE, Fischer TM, Hirji R, Davis JA. Toward the reconceptualization of the relationship between occupation and health and well-being. Can J Occup Ther. 2016;83(4):249–59.
14. Chen W, Lv H, Liu S, et al. National incidence of traumatic fractures in China: a retrospective survey of 512 187 individuals. Lancet Glob Health. 2017;5(8):e807–17.
15. Yang R, Guo L, Wang P, et al. Epidemiology of spinal cord injuries and risk factors for complete injuries in Guangdong, China: a retrospective study. PLoS One. 2014;9(1):e84733.
16. Findik H, Kanat A, Aydin MD, et al. Describing a new mechanism of retinal detachment secondary to ophthalmic artery vasospasm following subarachnoid hemorrhage: an experimental study. J Neurol surg Part A Cent Eur Neurosurg. 2019;80(6):430–40.
17. Caglar O, Firinci B, Aydin ME, et al. First emerging evidence of the relationship between Onuf's nucleus degeneration and reduced sperm number following spinal subarachnoid haemorrhage: experimental study. Andrologia. 2021;53(5):e14030.
18. Nelson DL. Occupation: form and performance. Am J Occup Ther. 1988;42(10):633–41.
19. Niewenweg R, Smit ML, Walenkamp MJ, Wit JM. Adult height corrected for shrinking and secular trend. Ann Hum Biol. 2003;30(5):563–9.
20. Frisancho AR. New standards of weight and body composition by frame size and height for assessment of nutritional status of adults and the elderly. Am J Clin Nutr. 1984;40(4):808–19.
21. Weight-height relationships and body mass index. Some observations from the diverse populations collaboration. Am J Phys Anthropol. 2005;128(1):220–9.
22. Sarno F, Bittencourt CAG, Oliveira SA. Profile of patients with hypertension and/or diabetes mellitus from primary healthcare units. Einstein (Sao Paulo). 2020;18:eAO4483.
23. Jorgensen JMA, Hedt KH, Omar OM, Davies JI. Hypertension and diabetes in Zanzibar —prevalence and access to care. BMC Public Health. 2020;20(1):1352.
24. Smits AJ, Ouden LPD, Deunk J, Bloemers FW. Incidence of traumatic spinal fractures in The Netherlands: analysis of a Nationwide database. Spine. 2020;45(23):1639–48.
25. Aldosari KH, Aldhfyan YM, Karrar MH, et al. Severity and neurosurgical management of patients with traumatic spinal fractures in Saudi Arabia: a cross sectional study. Pan Afr Med J. 2019;34:26.
26. Liu B, Zhu Y, Liu S, Chen W, Zhang F, Zhang Y. National incidence of traumatic spinal fractures in China: data from China National Fracture Study. Medicine. 2018;97(35):e12190.
27. Wang XR, Xu FR, Huang QL, Wáng YXJ. Radiological features of traumatic vertebral endplate fracture: an analysis of 194 cases with 263 vertebral fractures. Chin Med J. 2020;133(22):2696–702.
28. Grieser T. Radiological diagnostics of lumbar spine fractures. Radiologe. 2020;60(7):624–41.
29. Blecher R, Yilmaz E, Ishak B, et al. Uptrend of cervical and sacral fractures underlie increase in spinal fractures in the elderly, 2003-2017: analysis of a state-wide population database. Eur Spine J. 2020;29(10):2543–9.
30. Jiang X, Suo L, Liu LJ, et al. Investigation on operation timing of limb fractures combined with severe craniocerebral trauma in children. Zhongguo Gu Shang. 2014;27(6):486–90.
31. Phillips C, Gelesko S, Proffit WR, White RP Jr. Recovery after third-molar surgery: the effects of age and sex. Am J Orthod Dentofacial Orthop. 2010;138(6):700.e701–8. discussion 700-701.
32. Saito H, Shiraishi A, Nomori H, et al. Impact of age on the recovery of six-minute walking distance after lung cancer surgery: a retrospective cohort study. Gen Thorac Cardiovasc Surg. 2020;68(2):150–7.
33. Chapman CR. Psychological aspects of pain patient treatment. Arch Surg. 1977;112(6):767–72.
34. Harrington CB, Siddiqui A, Feuerstein M. Workstyle as a predictor of pain and restricted work associated with upper extremity disorders: a prospective study. J Hand Surg Am. 2009;34(4):724–31.