

· 临床研究 ·

手术治疗胸腰椎爆裂骨折的临床研究

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【摘要】 目的: 探讨胸腰椎爆裂骨折的手术方式选择和其临床疗效。方法: 2005 年 9 月至 2009 年 3 月, 手术治疗 94 例胸腰椎爆裂骨折, 男 59 例, 女 35 例; 年龄 20~63 岁, 平均 36.8 岁。骨折按 Denis 分型: A 型 17 例, B 型 32 例, C 型 6 例, D 型 24 例, E 型 15 例。神经损伤按 ASIA 分级: A 级 3 例, B 级 4 例, C 级 23 例, D 级 38 例, E 级 26 例。其中 42 例选择后路手术复位、减压, 椎弓根螺钉内固定, 18 例同时行后外侧植骨; 36 例选择前路手术减压、植骨, TSRH 钉棒系统内固定 16 例, Zeplate 钢板固定 20 例; 16 例因三柱严重损伤骨折块明显突入椎管并且压迫脊髓行 I 期前后联合入路、后路椎弓根螺钉内固定、前路椎体次全切除减压钛网植骨术, 8 例同时行前路钉棒、钛钢板内固定术。结果: 所有患者均获随访, 时间 9~52 个月, 平均 22.8 个月。前路、后路及前后联合手术均获得较好的疗效, Cobb 角由术前的 $(25.00 \pm 5.50)^\circ$ 矫正至术后 $(4.20 \pm 1.80)^\circ$, 术后椎体前缘、后缘高度分别从术前 $(50.80 \pm 2.82)\%$ 恢复至 $(94.85 \pm 1.80)\%$ 及 $(79.30 \pm 3.08)\%$ 恢复至 $(98.20 \pm 1.40)\%$, CT 显示椎管狭窄率从术前 $(33.10 \pm 1.40)\%$ 恢复至 $(6.70 \pm 1.50)\%$ 。矢状面的畸形矫正, 随访中无明显的后凸角丢失和高度丢失。无内固定松动和钛网移位。除 1 例 ASIA 功能评定为 A 级的患者神经功能无恢复外, 其余病例均有不同程度的恢复。术后 ASIA 分级 A 级恢复至 B 级 2 例, B 级恢复至 C 级 2 例, D 级 2 例; C 级恢复至 D 级 16 例, E 级 7 例; D 级恢复至 E 级 38 例。结论: 只要术前病情判断准确, 手术方式选择合理, 前路、后路及前后联合手术均可获得较好的疗效。决定胸腰椎骨折手术入路选择最重要的两个因素是椎体后方韧带复合结构的完整性及神经系统功能状态, 对有不完整神经功能操作且影像学检查证实压迫来自椎管前方者, 通常需要前路减压; 对椎体后方韧带复合结构破坏者, 通常需要后路手术; 对两种损伤均存在者通常需要前后路联合手术。

【关键词】 胸椎; 腰椎; 骨折固定术, 内; 脊柱融合术; 骨移植; 减压

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Clinical study on surgical treatment for thoracolumbar burst fractures XU Wei-xing*, XU Rong-ming, JIANG Wei-yu, DING Wei-guo, ZHU Wei-min, ZHANG Chun, WANG Jian, LU Di. *Zhejiang Chinese Medical University, Hangzhou 310053, Zhejiang, China

ABSTRACT **Objective:** To explore the choice of operative approach for thoracolumbar burst fractures and evaluate its clinical effects. **Methods:** From September 2005 to March 2009, the clinical data of 94 patients with thoracolumbar burst fractures were analyzed retrospectively. Including 59 males and 35 females with an average age of 36.8 years (ranged from 20 to 63). The fractures were classified according to Denis classification: 17 cases of type A, 32 cases of type B, 6 cases of type C, 24 cases of type D, 15 cases of type E. Neurological injuries were classified according to ASIA classification: 3 cases of grade A, 4 cases of type B, 23 cases of grade C, 38 cases of grade D, 26 cases of grade E. Among the patients, 42 cases were treated with reduction, decompression, internal fixation with pedicle-screw through posterior approach, meanwhile, of them, 18 cases with posterior-lateral bone graft fusion; 36 cases were treated with decompression, bone graft, through anterior approach, of them, 16 cases with TSRH system fixation and 20 cases with Zeplate system fixation; 16 cases (because of bone block intruded into vertebral canal leading to spinal cord compression) were treated with anterior and posterior approach, internal fixation with pedicle-screw through posterior approach and subtotal vertebrectomy, decompression, titanium mesh cages bone graft fusion through anterior approach, meanwhile, of them, 8 cases with screw-rod and titanium steel plate system fixation. **Results:** All patients obtained good results and were followed up from 9 to 52 months with an average of 22.8 months. Cobb angle were corrected from preoperatively $(25.00 \pm 5.50)^\circ$ to postoperatively $(4.20 \pm 1.80)^\circ$. Height of anterior and posterior border of vertebral body improved from preoperatively $(50.80 \pm 2.82)\%$, $(79.30 \pm 3.08)\%$ to postoperatively $(94.85 \pm 1.80)\%$, $(98.20 \pm 1.40)\%$, respectively. The ratio of protruded bones to the spinal canal anteroposterior diameter decreased from preoperatively $(33.10 \pm 1.40)\%$ to postoperatively $(6.70 \pm 1.50)\%$. Sagittal abnormality were corrected; posterior convex angle and height were no markedly lost during follow-up; no internal fixation loosening and titanium mesh displacement were found. In the aspect of never function, except for 1 case of grade A there is no recovered others obtained different improvement, among them, from grade A to B was in 2 cases; B to C, D was in 2, 2, respectively; C to D, E was 16, 7, respectively; D to E was in 38 cases. **Conclusion:** The two factors decide surgical methods: the integrity of

posterior ligamentous complex and nervous system function. Anterior approach refers to patients with incomplete spinal cord injury and anterior vertebral canal compression; posterior approach refers to patients with injury of posterior ligamentous complex; combination with anterior and posterior approach refers to patients with two injury factors.

KEYWORDS Thoracic vertebrae; Lumbar vertebrae; Fracture fixation, internal; Spinal fusion; Bone transplantation; Decompression

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胸腰椎爆裂骨折是临床常见的损伤,统计表明,近 40%的脊柱骨折发生在胸腰段(T₁₁-L₂),其中爆裂骨折占胸腰段骨折的 10%~20%^[1]。目前对胸腰椎爆裂骨折治疗的术式选择,仍存在争议。2005 年 9 月至 2009 年 3 月,我们共手术治疗胸腰椎爆裂骨折 94 例,根据伤情分别采用前路、后路、前后联合入路手术减压、植骨内固定,疗效满意,报告如下。

1 资料与方法

1.1 临床资料 本组 94 例,男 59 例,女 35 例;年龄 20~63 岁,平均 36.8 岁。致伤原因:交通伤 34 例,高处坠落伤 48 例,重物压伤 12 例。损伤节段:T₁₁ 5 例, T₁₂ 10 例, L₁ 32 例, L₂ 26 例, L₃ 18 例, L₄ 3 例。按 Denis 分型:A 型 17 例, B 型 32 例, C 型 6 例, D 型 24 例, E 型 15 例。神经损伤按 ASIA 分级:A 级 3 例, B 级 4 例, C 级 23 例, D 级 38 例, E 级 26 例。94 例中合并 1 个相邻节段椎体或附件骨折者 33 例,合并 2 个以上节段的多发损伤者 7 例;伴其他合并伤 26 例,包括颅脑损伤、跟骨骨折、多发肋骨骨折、骨盆骨折等。伤后距手术时间平均 6.3 d(3~12 d)。根据病情分别采用后路、前路、I 期前后联合入路手术方式。42 例选择后路手术复位、减压、椎弓根螺钉内固定,18 例同时行后外侧植骨;36 例选择前路手术减压、植骨,其中采用 TSRH 钉棒系统内固定 16 例, Zeplate 钢板固定 20 例;16 例因三柱严重损伤骨折块明显突入椎管并且压迫脊髓行 I 期前后联合入路,后路椎弓根螺钉内固定、前路椎体次全切除减压钛网植骨术,8 例同时行前路钉棒、钛钢板内固定术。

1.2 手术方法

1.2.1 后路手术 短节段固定 24 例,短节段结合伤椎固定 14 例,长节段固定 4 例。手术患者气管插管全麻下取俯卧位位于脊柱体位托上,短节段固定适当复位后于伤椎上下相邻椎置入 1 枚椎弓根螺钉固定;短节段结合伤椎固定适当复位后于伤椎上下相邻椎置入 1 枚椎弓根螺钉固定,再结合伤椎固定;长节段固定于伤椎上下相邻椎各置入 2 枚椎弓根螺钉固定。装上连接棒撑开椎体后壁加以维持,然后恢复伤椎前方高度,锁紧固定螺母。18 例患者将椎板及横突用骨凿去骨皮质后,用自体骨或异体骨植入行后外侧植骨。如棘间、棘上韧带等后方韧带复合体断裂,则予以缝合修复。关闭伤口,放置引流。

1.2.2 前路手术 36 例患者选择前路手术减压、植骨。患者气管插管全麻侧卧位,升起腰桥。若损伤在 L₁-L₃ 节段时,则采用腹膜外斜切口入路,切除第 12 肋骨,显露肾囊,切开膈肌脚,向上推开胸膜可显露 T₁₂ 椎体侧方,向下后完整分离推开腰大肌,显露骨折椎体及相邻上下各一正常椎体的侧前方;若损伤在 T₁₂ 以上时,则切除 T₁₁ 肋骨,经胸显露伤椎及相邻上下各一正常椎体的侧前方。分别切断 3 个椎体的节段血管,断端行双重结扎,必要时缝扎。减压前预先测量好可能需要植骨块长度,如用髂骨植骨取含 3 层皮质的髂骨块备用,如用钛网则装入椎体减压切除骨植骨。首先打入上下相邻正常椎体的固定螺栓,准备植骨床;然后行伤椎椎体次全切除,彻底去除突入椎管内的骨块及椎间盘组织,椎管前方予以充分减压。止血、撑开植骨块植入,降下腰桥,将内固定置入固定,轴向加压锁紧各螺钉。关闭伤口,放置引流管。

1.2.3 I 期前后联合入路手术 16 例患者采用 I 期前后联合入路手术。气管插管静脉复合麻醉,先俯卧位行后路钉棒系统内固定术,然后右侧卧位,左侧经胸、腹膜后入路,以病椎的形态来定位,结扎并切断病椎及其上下椎节段的动静脉。切除病椎上下椎间盘,先用薄骨刀切除椎体后 1/3,形成一骨槽,保留一层皮质,再用刮匙刮除,显露硬膜,使脊髓完全减压,用明胶海绵压迫止血。将切除骨质剪成碎块,放入钛网内置入减压区域,其中 8 例辅以 TSRH 钉棒或 Zeplate 钢板系统内固定术。

术后常规应用抗生素 4~5 d,保持引流管通畅,观察引流量少于 50 ml 后拔除引流管,术后 4 周离床佩带支具行走、活动,术后 3~6 个月始复查 X 线、CT 检查了解植骨融合情况。

1.3 观察项目与方法 比较手术前及手术 1 年后 X 线片、CT 及功能恢复情况。X 线侧位片分别测量骨折椎体前后缘高度,并测出脊柱后凸 Cobb 角,测定并计算伤椎前后缘高度及椎管狭窄程度,公式为:伤椎前后高(%)=[2×伤椎前后高/(上椎前后高+下椎前后高)]×100%;椎管狭窄程度=[1-伤椎管前后径/(上椎管前后径+下椎管前后径)]×100%。术前及术后 1 年全部病例行胸腰段 CT 检查测量骨折椎管及相邻椎体椎管的矢状径,按照 ASIA 进行神经

分级,以观察骨折椎体、椎管狭窄程度及神经功能恢复情况。

1.4 统计学处理 运用 SPSS13.0 统计分析软件处理数据,采用配对设计定量资料的 *t* 检验比较手术前后的各项指标,以 *P*<0.05 为差异有统计学意义。

2 结果

94 例均获随访,时间 9~52 个月,平均 22.8 个月。所有患者切口均 I 期愈合,无伤口感染、神经损伤加重等并发症。胸膜损伤 1 例,行胸腔闭式引流后愈合。术后 1 年 Cobb 角、椎体前后缘高度、椎管狭窄恢复结果见表 1。矢状面的畸形矫正,随访中无明显的后凸角丢失和高度丢失。无内固定松动和钛网移位。骨折全部获得融合,无假关节形成。除 1 例 ASIA 功能评定为 A 级的患者神经功能无恢复外,其余病例均有不同程度的恢复。术后 ASIA 分级 A 级恢复至 B 级 2 例, B 级恢复至 C 级 2 例、D 级 2 例; C 级恢复至 D 级 16 例、E 级 7 例; D 级恢复至 E 级 38 例。典型病例后路手术见图 1-3,前路手术见图 4, I 期前后联合入路手术见图 5。

3 讨论

3.1 胸腰椎爆裂骨折治疗分类及损伤程度评分系统的运用 对于胸腰椎爆裂骨折的治疗选择需依据其解剖的稳定性及神经功能的状态,具体胸腰椎爆裂骨折的手术适应证的选择可参考胸腰椎损伤分类及损伤程度评分系统(TLICS)中关于爆裂骨折的相关内容,综合评分大于或等于 5 分者应手术治疗,小于或等于 3 分者非手术治疗,4 分者可选择手术或非手术治疗^[2]。本组病例 TLICS 评分均大于或等于 5 分。现临床上也用载荷分享分类法来指导临床手术治疗,其是基于椎体粉碎程度和后凸的严重程度经行分类并量化。该评分系统基于 X 线片和 CT 检查结果,分为 3 部分:骨折累及范围、骨折移位程度、后凸畸形程度。侧位片骨折累及范围:累及椎体头侧<30%时为 1 分,30%~60%为 2 分,>60%为 3 分。骨折移位程度(轴位 CT)分为:小,移位<2 mm 为 1 分;中,移位≥2 mm,累及椎体周径<50%为 2 分;大:移位≥2 mm,累及椎体周径>50%为 3 分。后凸畸形:≤3°为 1 分,4°~9°为 2 分,≥10°为 3 分。当胸腰椎骨折无脱位时,

表 1 94 例患者手术前后影像学测量结果($\bar{x}\pm s$)

Tab.1 Results of imageology of 94 patients before and after operation($\bar{x}\pm s$)

项目	术前	术后 1 年	<i>t</i> 值	<i>P</i> 值
椎体前缘高度(%)	50.80±2.82	94.85±1.80	-73.40	0.000
椎体后缘高度(%)	79.30±3.08	98.20±1.40	-31.10	0.000
脊柱后凸 Cobb 角(°)	25.00±5.50	4.20±1.80	38.30	0.000
椎管狭窄程度(%)	33.10±1.40	6.70±1.50	18.65	0.000

≤6 分选择后路; ≥7 分选择前路;但存在脱位时 ≤6 分选择后路; ≥7 分选择前后路联合^[3]。虽然这种分类方法国内运用较少,但对胸腰椎损伤手术入路的选择提供了一定的依据。

3.2 胸腰椎爆裂骨折手术方式选择 Vaccaro 等^[2]认为,影响胸腰椎骨折手术入路选择最重要的两个因素是椎体后方韧带复合结构的完整性及神经系统功能状态,其原则是:对有不完整神经功能操作且影像学检查证实压迫来自椎管前方者,通常需要前路减压;对椎体后方韧带复合结构破坏者,通常需要后路手术;对两种损伤均存在者通常需要前后路联

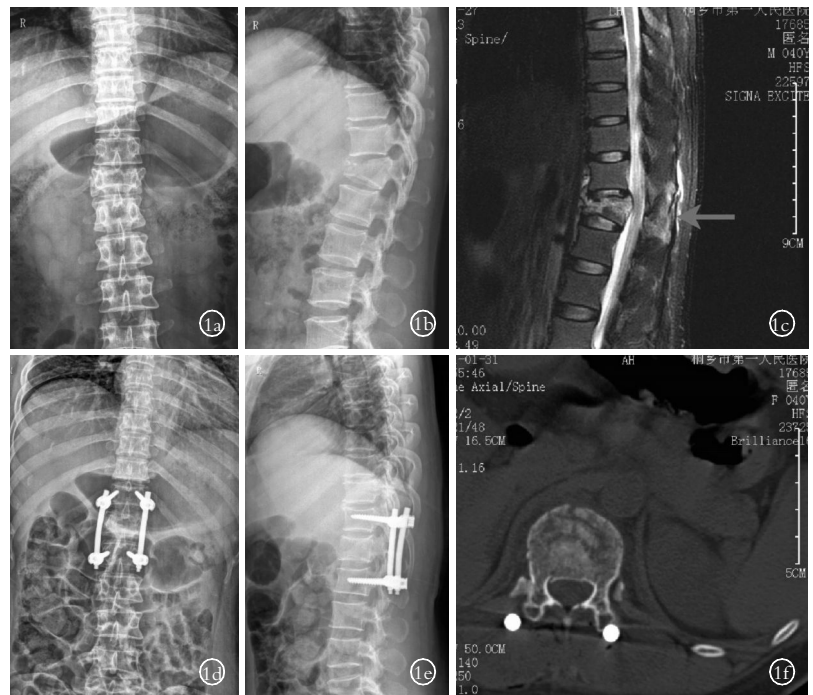


图 1 男性患者,28 岁,重物压伤致腰背疼痛伴活动受限,Denis 分型 B 型,ASIA 分级 E 级 **1a,1b**.术前腰椎正侧位 X 线片示 L₁ 骨折,后凸畸形 **1c**.术前 MRI 示 L₁ 水平脊髓受压,后方韧带复合体断裂 **1d,1e**.术后腰椎正侧位 X 线片示骨折复位良好,后路短节段固定,内固定在位良好 **1f**.术后 1 年 CT 复查骨折愈合良好,椎管无明显占位

Fig.1 A 28-year-old male patient was crushed with weighty things leading to lumbar and back pain accompanied with limitation of activity. Classification of fracture was type B of Denis and nerve injury was grade E of ASIA **1a,1b**.Preoperative AP and lateral X-ray films showed fracture in L₁ and kyphosis deformity **1c**. Preoperative MRI showed spinal cord compression in L₁ level and posterior ligamentous complex injury **1d,1e**. The patient was treated with short segmental pedicle-screw fixation through posterior approach. Postoperative AP and lateral X-ray films showed fracture was reduced and position of internal fixation was good **1f**. CT showed bone fusion and no obviously obstruction in spinal canal at 1 year after operation



图2 男性患者,39岁,坠落伤致腰背疼痛伴活动受限,双下肢肌力、感觉正常,Denis分型B型,ASIA分级E级 2a,2b. 术前腰椎正侧位X线片示T₁₂骨折,后凸畸形 2c. 术前MRI示T₁₂水平脊髓受压,后方韧带复合体断裂 2d. 术前CT示T₁₂爆裂性骨折 2e,2f. 术后腰椎正侧位X线片示骨折复位良好,后路短节段结合伤椎固定,内固定在位良好 2g. 术后9个月CT平扫复查骨折愈合

Fig.2 A 39-year-old male patient with lumbar and back pain, limitation of activity, and muscle force and aesthema of lower extremities was normal. Classification of fracture was type B of Denis and nerve injury was grade E of ASIA 2a,2b. Preoperative AP and lateral X-ray films showed fracture in T₁₂ and kyphosis deformity 2c. Preoperative MRI showed spinal cord

compression in T₁₂ level and posterior ligamentous complex injury 2d. Preoperative CT showed burst fracture in T₁₂ 2e,2f. The patient was treated with short segmental pedicle-screw fixation through posterior approach. Postoperative AP and lateral X-ray films showed fracture was reduced and position of internal fixation was good 2g. CT showed bone fusion at 9 months after operation



图3 男性患者,42岁,坠落伤致胸背疼痛伴活动受限,Denis分型D型,ASIA分级D级 3a,3b. 术前腰椎正侧位X线片示T₁₂骨折脱位伴后方关节交锁 3c,3d. 术前腰椎CT平扫示T₁₂爆裂性骨折 3e. 术前MRI示T₁₂水平脊髓受压,后方韧带复合体断裂 3f,3g. 术后腰椎正侧位X线片,后路长节段固定,内固定在位良好 3h. 术后1年CT复查骨折愈合良好

Fig.3 A 42-year-old male patient with lumbar and back pain, limitation of activity. Classification of fracture was type D of Denis and nerve injury was grade D of ASIA 3a,3b. Preoperative lumbar AP and lateral X-ray films showed fracture and dislocation in T₁₂ accompanied with posterior locked joint 3c,3d. Preoperative CT showed burst fracture in T₁₂ 3e. Preoperative MRI showed spinal cord compression in T₁₂ level and posterior ligamentous complex injury 3f,3g. The patient was treated with long segmental pedicle-screw fixation through posterior approach. Postoperative AP and lateral X-ray films showed the position of internal fixation was good 3h. CT showed bone fusion at 1 year after operation

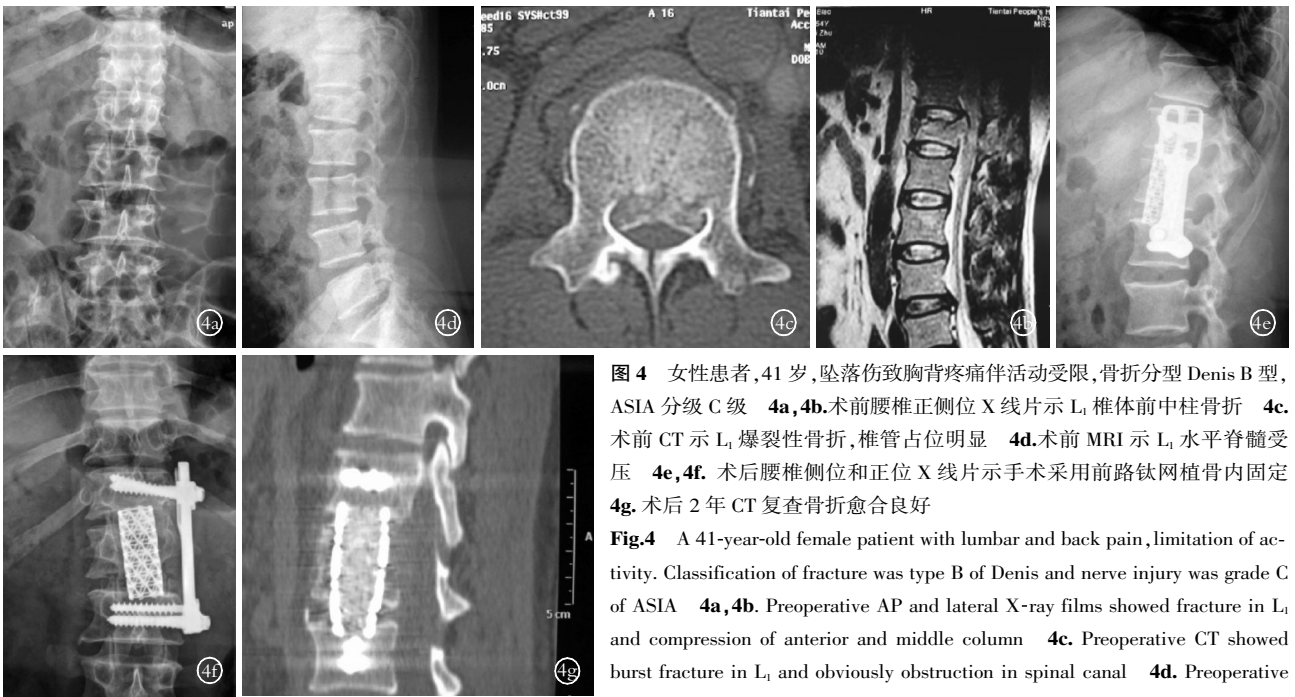


图4 女性患者,41岁,坠落伤致胸背疼痛伴活动受限,骨折分型 Denis B 型, ASIA 分级 C 级 4a,4b.术前腰椎正侧位 X 线片示 L₁ 椎体前中柱骨折 4c.术前 CT 示 L₁ 爆裂性骨折,椎管占位明显 4d.术前 MRI 示 L₁ 水平脊髓受压 4e,4f.术后腰椎侧位和正位 X 线片示手术采用前路钛网植骨内固定 4g.术后 2 年 CT 复查骨折愈合良好

Fig.4 A 41-year-old female patient with lumbar and back pain, limitation of activity. Classification of fracture was type B of Denis and nerve injury was grade C of ASIA 4a,4b. Preoperative AP and lateral X-ray films showed fracture in L₁ and compression of anterior and middle column 4c. Preoperative CT showed burst fracture in L₁ and obviously obstruction in spinal canal 4d. Preoperative MRI showed spinal cord compression in L₁ level 4e,4f Postoperative X-ray film

showed that the patient was treated with titanium mesh cages bone graft fusion through anterior approach 4g. CT showed bone fusion at 2 years after operation

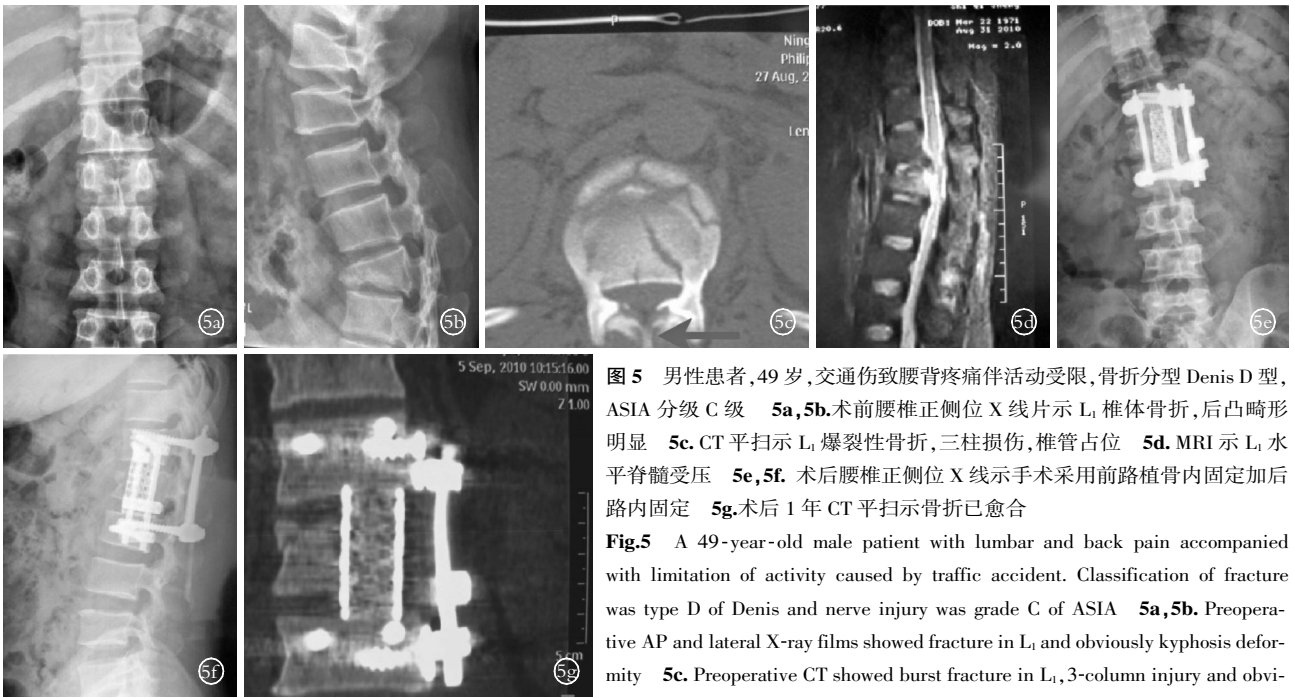


图5 男性患者,49岁,交通伤致腰背疼痛伴活动受限,骨折分型 Denis D 型, ASIA 分级 C 级 5a,5b.术前腰椎正侧位 X 线片示 L₁ 椎体骨折,后凸畸形明显 5c. CT 平扫示 L₁ 爆裂性骨折,三柱损伤,椎管占位 5d. MRI 示 L₁ 水平脊髓受压 5e,5f.术后腰椎正侧位 X 线片示手术采用前路植骨内固定加后路内固定 5g.术后 1 年 CT 平扫示骨折已愈合

Fig.5 A 49-year-old male patient with lumbar and back pain accompanied with limitation of activity caused by traffic accident. Classification of fracture was type D of Denis and nerve injury was grade C of ASIA 5a,5b. Preoperative AP and lateral X-ray films showed fracture in L₁ and obviously kyphosis deformity 5c. Preoperative CT showed burst fracture in L₁, 3-column injury and obviously obstruction in spinal canal 5d. Preoperative MRI showed spinal cord compression in L₁ level 5e,5f. Postoperative AP and lateral X-ray films showed that the patient was treated with bone graft and internal fixation through anterior and posterior approach 5g. CT showed bone fusion at 1 year after operation

fusion at 1 year after operation

合手术。结合载荷分享分类评分当胸腰椎骨折无脱位时,≤6分选择后路;≥7分选择前路;但存在脱位时≤6分选择后路;≥7分选择前后路联合。基于上述观点,本组 36 例患者选择前路手术减压、植骨内固定。前入路可在直视下对椎管前侧充分减压、矫正畸形、融合固定,为神经功能的恢复创造有利条件,

还可避免刺激脊髓致神经症状加重,但术者需有胸外科及普外科基础,操作相对复杂。其主要适应证:①急性胸腰椎爆裂骨折合并脊髓损伤,椎管占位>50%或椎管内有骨块压迫;②伤后 2 周以上,后路不能复位者;③陈旧骨折合并脊髓损伤,椎管内有压迫致不完全性脊髓损伤;④不完全脊髓损伤或有脊髓

损伤综合征;⑤后路复位后,椎管前方致压物未解除或脊柱仍不稳;⑥前方致压的迟发性不全瘫;⑦椎体高度减少 50%以上。Kirkpatrick^[4]认为前路治疗伴有神经损伤、后部韧带完整的胸腰椎骨折较为合适。

后路手术适应证的选择主要是:①损伤累及后柱,后方韧带复合体断裂,椎管骨块占位少于 50%,或无明显神经症状;②胸腰椎骨折伴有脊髓完全性损伤,尤其伤后 6 h 以内者,急诊后路减压复位固定,以减少脊髓继发性损害;③进行性脊髓损伤与伤椎病变不稳有关,并排除血管受累因素;④脊髓神经功能恢复到一定程度即停滞不前,经影像学证实椎管后方有骨性致压物;⑤合并神经损伤或中度狭窄的胸腰椎爆裂骨折,椎管内有骨片存留。短节段椎弓根钉内固定术因具有创伤小、手术操作相对简单、可提供三维矫形和坚强固定等优点,被认为是目前较为理想的经脊柱后路固定治疗胸腰椎爆裂性骨折的方法,已在临床上广泛应用^[5]。本组后路手术患者中有 24 例采用短节段椎弓根钉内固定术,但单纯短节段后路固定易出现椎体高度丢失,内固定断裂移位松脱等并发症。本组 18 例后路手术病例同时采用后外侧植骨融合术,特别对载荷分享评分>6 分的患者更应考虑植骨融合。由于短节段后路固定对于不稳定胸腰椎爆裂骨折有较高的失败率,故本组后路手术短节段结合伤椎固定 14 例。对 4 例屈曲牵张型损伤致胸腰椎骨折脱位严重者采用长节段固定。

但目前对于胸腰椎爆裂骨折后路固定节段长度存在争议,Modi 等^[6]认为对于胸腰椎爆裂骨折,长节段固定手术时间长,明显增加出血量,所以推荐伤椎以上 2 个节段固定,远端 1 个节段固定,保留了腰椎运动节段,有效防止后凸畸形的发生。而 Sapkas 等^[7]研究认为对不稳定胸腰椎骨折,长节段固定较短节段固定有较好的临床结果。此外 Guven 等^[8]对不稳定胸腰椎爆裂骨折后路根钉固定结合伤椎置钉或不置钉进行研究,72 例患者平均分为 4 组:1 组伤椎上下各 2 个椎体固定;2 组置钉同 1 组,但结合伤椎置钉;3 组伤椎上下各 1 个椎体固定;4 组置钉同 3 组,结合伤椎置钉,4 组优势更为明显,认为对于不稳定胸腰椎爆裂骨折,伤椎置钉可有效提供后凸矫正和即刻脊柱稳定。

本组 16 例因系胸腰椎前后柱均损伤不稳定,既有后方韧带复合体损伤,又有椎管骨块占位明显,有明显的神经症状。一种手术入路不能解决的复杂三柱骨折而采用前后联合手术,前路可彻底减压,重建

前柱稳定,进行有效支撑,后路结合椎弓根螺钉固定,可更好地稳定脊柱。Tezeren 等^[9]的研究认为,前后路固定比单纯传统前路固定稳定性佳。但前后路联合手术创伤较大,出血相对较多,适应证选择应谨慎。

决定胸腰椎骨折手术方式选择最重要的两个因素是椎体后方韧带复合结构的完整性及神经系统功能状态,对有不全神经功能操作且影像学检查证实压迫来自椎管前方者,通常需要前路减压;对椎体后方韧带复合结构破坏者,通常需要后路手术;对两种损伤均存在者通常需要前后路联合手术。只要术前病情判断准确,手术方式选择合理,前路、后路及前后联合手术均获得较好的疗效。

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