

· 临床研究 ·

经伤椎置钉短节段内固定术治疗单节段胸腰椎骨折的临床疗效及术后并发症发生情况

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【摘要】目的 探讨经伤椎置钉短节段内固定术治疗单节段胸腰椎骨折的临床疗效及术后并发症发生情况。方法 2016年9月—2018年9月收治单节段胸腰椎骨折患者100例, 依据随机数字表法分为经伤椎短节段内固定组(A组, 50例)和跨伤椎短节段内固定组(B组, 50例)。比较2组围手术期情况、脊柱稳定性、Oswestry功能障碍指数(ODI)和疼痛视觉模拟量表(VAS)评分改善情况及术后并发症发生情况。结果 所有手术顺利完成。所有患者随访12~22(18.23±3.68)个月。2组术中出血量、住院时间差异无统计学意义($P>0.05$), A组手术时间长于B组, 差异有统计学意义($P<0.05$)。2组术后6、12个月伤椎Cobb角、椎体前缘高度压缩比、ODI、VAS评分均较术前改善, 且A组改善情况均优于B组, 差异均有统计学意义($P<0.05$)。2组均无断钉、断棒、脊柱后凸畸形等严重并发症发生, A组慢性腰痛、螺钉松动发生率低于B组, 差异有统计学意义($P<0.05$)。结论 经伤椎置钉短节段内固定术可有效改善单节段胸腰椎骨折患者脊柱稳定性、腰椎功能及疼痛情况, 且可减少慢性腰痛、螺钉松动等并发症的发生, 值得临床推广。

【关键词】胸椎; 腰椎; 脊柱骨折; 内固定器

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Clinical efficacy and postoperative complications of single-segmental thoracolumbar fracture treated by trans-injured vertebral short segment internal fixation

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【Abstract】Objective To investigate the clinical efficacy and postoperative complications of single-segmental thoracolumbar fracture treated by trans-injured vertebral short segment internal fixation. Methods From September 2016 to September 2018, 100 patients with single-segmental thoracolumbar fracture were treated. According to the random number table, they were equally divided into 2 groups: trans-injured vertebra short segment internal fixation group (group A, 50 cases) and cross-injured vertebral short segment internal fixation group (group B, 50 cases). The perioperative condition, the improvement of spinal stability, Oswestry disability index (ODI) and pain visual analogue scale (VAS) score, and postoperative complications were compared between the 2 groups. Results All the operations were successfully completed. All the patients were followed up for 12-22 (18.23±3.68) months. There was no significant difference in the intraoperative blood loss and hospital stay between the 2 groups ($P>0.05$). The operation time was significantly higher in group A than in group B, and the difference was statistically significant ($P<0.05$). The Cobb's angle, compression ratio of vertebral body anterior height, ODI and VAS score in the 2 groups were significantly improved at postoperative 6 and 12 months, and the improvement of group A was better than that of group B, and the differences were all statistically significant ($P<0.05$). There were no serious complications such as breakage nail or rod, kyphosis occurred in the 2 groups. The incidence of chronic low back pain and loosening of nails were significantly lower in group A than in group B, and the difference was statistically significant ($P<0.05$). Conclusion Trans-injured vertebral short segment internal fixation can effectively improve spinal stability, lumbar function and pain of patients with single-segmental thoracolumbar fracture, and reduce the complications such as chronic low back pain and loosening of screws, thus being worthy of further clinical promotion.

【Key Words】Thoracic vertebrae; Lumbar vertebrae; Spinal fractures; Internal fixators

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胸腰椎骨折可导致胸腰背部疼痛、局部血肿、活动受限等, 严重影响患者生活质量^[1]。跨伤椎置钉短节段内固定术是治疗胸腰椎骨折常用方法, 可

有效修复固定骨折椎体, 改善患者临床症状, 但近期研究显示其固定作用一般, 易影响患者腰椎功能的恢复, 并易发生腰椎不稳相关并发症^[2]。经伤椎置钉有良好抗压、抗张力作用, 可有效提高骨折修

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复固定效果,近年来已逐渐应用于脊柱骨折治疗中^[3]。本研究采用经伤椎和跨伤椎短节段内固定术治疗单节段胸腰椎骨折患者,通过对比观察经伤椎置钉短节段内固定术的临床疗效及并发症发生情况,为临床应用提供参考。

1 资料与方法

1.1 一般资料

纳入标准:①经病史、临床症状及实验室、CT或MRI等检查确诊为胸腰椎骨折;②T₁₂~L₂单节段骨折,病程不超过14 d、Frankel 分级^[4]为C~E

级;③年龄超过18岁,无精神病病史;④签署知情同意书。排除标准:①妊娠期、哺乳期女性;②恶性肿瘤;③有短节段置钉内固定术治疗禁忌证;④有严重心、肝或肾等重要脏器相关疾病;⑤陈旧、不稳定、畸形性骨折。根据以上标准,2016年9月—2018年9月共100例单节段胸腰椎骨折患者纳入研究,依据随机数字表分为经伤椎短节段内固定组(A组,50例)和跨伤椎短节段内固定组(B组,50例)。本研究经本院伦理委员会审批备案,2组术前一般资料差异无统计学意义($P>0.05$,表1),具有可比性。

表1 2组一般资料
Tab. 1 General data of 2 groups

组别 Group	n	年龄/岁 Age/year	性别 Gender		体质量指数/(kg·m ⁻²) Body mass index/ (kg·m ⁻²)	病程/d Course of disease/d	伤因 Cause of injury		
			男 Male	女 Female			交通 Traffic	高坠 Falling	压砸 Smashing
A	50	44.70±7.58	28	22	22.62±2.81	6.47±1.71	22	16	12
B	50	45.52±7.81	32	18	22.37±2.74	6.80±1.73	18	18	14

组别 Group	骨折节段 Fracture segment				Frankel 分级 Frankel classification			Magerl 分型 Magerl type		
	T ₁₁	T ₁₂	L ₁	L ₂	C	D	E	A	B	C
A	4	16	20	10	12	28	10	30	8	12
B	6	14	18	12	14	24	12	26	10	14

1.2 手术方法

A组患者术前进行生理、生化、影像学等检查,取俯卧位消毒、铺巾,全身麻醉后在X线机透视下评估伤椎周围结构并制订修复计划。取伤椎上下相邻2个椎体棘突做正中切口,切开皮肤及皮下组织,暴露伤椎及周围组织;于伤椎及上下椎体椎弓根分别置入螺钉并安装连接棒,行椎板部分切除减压,解除椎管压迫;以相邻椎体为支撑点进行撑开复位,尽可能恢复伤椎高度;X线机透视下调整钉棒至复位满意后紧固螺钉,安装横连接并行植骨融合;术毕常规冲洗术区、止血、放置引流管,逐层缝合切口。术后常规监测生命体征(呼吸、脉搏、心率、血压等)、预防感染(头孢尼西钠2~3 d,每日1次,每次1.0 g)、拔除引流管(术后2~3 d,引流量<50 mL/d)、活动锻炼(指导床上腰背肌锻炼、术后1个月佩戴硬质腰围下床活动、依据康复情况指导腰部功能锻炼等)。

B组术前准备同A组,取伤椎上下相邻2个椎体棘突做正中切口,切开皮肤及皮下组织、暴露伤椎及周围组织,腰椎采取人字嵴顶点法于伤椎上下相邻椎体椎弓根置入螺钉,胸椎采取 Roy-Camille 法

于伤椎上下相邻椎体椎弓根置入螺钉,于损伤生理曲度折弯侧安装连接钉棒,行椎板部分切除减压,解除椎管压迫。其余操作及术后处理同A组。

1.3 指标观察

记录患者术中出血量、手术和住院时间。评估患者脊柱稳定性指标包括伤椎 Cobb 角(伤椎上位与下位椎体下终板延长线间的夹角)、椎体前缘高度压缩比[(相邻椎体前缘高度-伤椎前缘高度)/相邻椎体前缘高度×100%],其中相邻椎体前缘高度(mm)=(伤椎上位椎体前缘高度+伤椎下位椎体前缘高度)/2。采用 Oswestry 功能障碍指数(ODI)^[5]评估腰椎功能;采用疼痛视觉模拟量表(VAS)评分^[6]评估腰椎疼痛程度。术后并发症包括切口感染、神经根损伤、慢性腰痛、螺钉松动、断钉、断棒、脊柱后凸畸形等。

1.4 统计学处理

采用 SPSS 22.0 软件对数据进行统计学分析,计数资料以率表示,采用 χ^2 检验;符合正态分布的计量资料以 $\bar{x}\pm s$ 表示,组间比较采用独立样本 t 检验,同组手术前后比较采用配对 t 检验;以 $P<0.05$

为差异有统计学意义。

2 结 果

所有手术顺利完成。所有患者随访12~22 (18.23 ± 3.68)个月。2组术中出血量、住院时间差异无统计学意义 ($P>0.05$), A组手术时间长于B组, 差异有统计学意义 ($P<0.05$, 表2)。2组术后6、12个月伤椎 Cobb角、椎体前缘高度压缩比、ODI、

VAS评分均较术前改善, 且A组改善优于B组, 差异均有统计学意义 ($P<0.05$, 表2)。2组均无断钉、断棒、脊柱后凸畸形等严重并发症。A组术后发生慢性腰痛2例、切口感染1例、神经根损伤1例, 无螺钉松动; B组术后发生慢性腰痛8例、切口感染2例、神经根损伤1例, 螺钉松动6例; A组慢性腰痛、螺钉松动发生率低于B组, 差异有统计学意义 ($P<0.05$)。2组典型病例影像学资料见图1、2。

表2 2组术后统计数据

Tab. 2 Postoperative statistical data of 2 groups

组别 Group	n	术中出血量/mL Intraoperative blood loss/mL	手术时间/min Operation time/min	住院时间/d Hospital stay/d	Cobb角/(°) Cobb's angle/(°)		
					术前 Pre-operation	术后6个月 Postoperative 6 months	术后12个月 Postoperative 12 months
A	50	245.37 ± 30.27	172.37 ± 20.34	9.75 ± 2.64	30.27 ± 3.81	6.12 ± 0.78 [△]	11.28 ± 1.32 [△]
B	50	240.75 ± 29.67	153.56 ± 18.64*	10.27 ± 2.72	30.72 ± 3.88	7.96 ± 0.85* [△]	13.75 ± 1.68* [△]

组别 Group	椎体前缘高度压缩比(%) Compression ratio of vertebral body anterior height(%)			ODI(%)			VAS评分 VAS score		
	术前 Pre-operation	术后6个月 Postoperative 6 months	术后12个月 Postoperative 12 months	术前 Pre-operation	术后6个月 Postoperative 6 months	术后12个月 Postoperative 12 months	术前 Pre-operation	术后6个月 Postoperative 6 months	术后12个月 Postoperative 12 months
A	40.57 ± 4.58	5.46 ± 0.68 [△]	6.26 ± 0.72 [△]	45.76 ± 5.03	24.14 ± 3.26 [△]	17.45 ± 2.17 [△]	6.90 ± 1.04	3.20 ± 0.54 [△]	2.30 ± 0.50 [△]
B	41.05 ± 4.83	6.41 ± 0.72* [△]	7.42 ± 0.86* [△]	46.29 ± 5.27	30.41 ± 3.74* [△]	26.18 ± 3.21* [△]	7.10 ± 1.12	3.90 ± 0.60* [△]	2.90 ± 0.54* [△]

注: *与A组相比, $P<0.05$; △与术前相比, $P<0.05$ 。

Note: * $P<0.05$, compared with group A; △ $P<0.05$, compared with pre-operation.

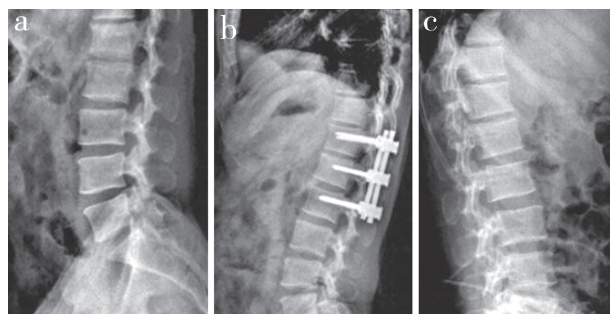


图1 A组典型病例影像学资料

Fig. 1 Imaging data of a typical case in group A

男, 56岁, 高坠伤致L₁骨折 a: 术前X线片示椎体前缘压缩 b: 术后6个月X线片示椎体前缘高度恢复良好、内固定位置良好 c: 末次随访示椎体前缘高度未见丢失

Male, 56 years old, L₁ fracture caused by falling a: Preoperative roentgenograph shows compression of anterior vertebral body b: Roentgenograph at postoperative 6 months shows vertebral body anterior height recover well and position of internal fixation is good c: Roentgenograph at final follow-up shows vertebral body anterior height is not lost

3 讨 论

胸腰椎骨折主要由高能量间接或直接作用于胸腰椎所致, 胸腰椎骨折后脊柱的稳定性受到严重影

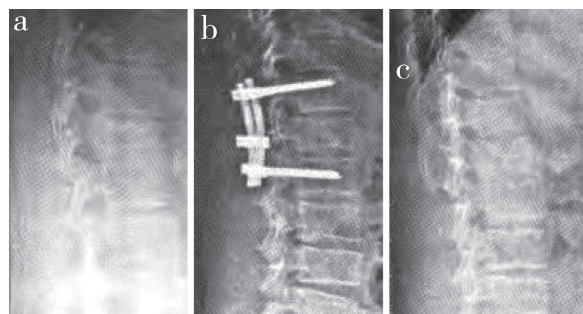


图2 B组典型病例影像学资料

Fig. 2 Imaging data of a typical case in group B

男, 48岁, 交通伤致L₁骨折 a: 术前X线片示椎体前缘压缩 b: 术后6个月X线片示椎体前缘高度恢复良好、内固定位置良好 c: 末次随访X线片示椎体前缘高度少量丢失

Male, 48 years old, L₁ fracture caused by traffic a: Preoperative roentgenograph shows compression of anterior vertebral body b: Roentgenograph at postoperative 6 months shows vertebral body anterior height recover well and position of internal fixation is good c: Roentgenograph at final follow-up shows vertebral body anterior height is slight lost

响, 脊柱为人体中轴骨骼, 在负重、减震、运动中具有重要作用, 胸腰椎骨折后若不及时治疗将严重影响患者健康及正常生活^[7]。目前, 手术是治疗胸腰椎骨折的主要方法, 治疗的基本原则是及时恢复

伤椎曲度和高度,减压和维持脊柱稳定。其中,跨伤椎置钉短节段内固定术是常用术式,通过置入椎弓根螺钉并配合植骨,可复位骨折及重建脊柱稳定性,其临床疗效已逐渐被认可^[8-9]。有研究显示,跨伤椎置钉短节段内固定术通过在伤椎上下椎体置入螺钉并纵向撑开而起到修复、复位及稳定椎体的作用,其固定原理为平行四边形效应,可有效改善患者腰椎功能^[8,10]。也有研究显示,跨伤椎置钉的短期疗效佳,但难以长期维持伤椎稳定性,影响腰椎功能恢复,严重者可引起伤椎椎间盘损伤疼痛及螺钉松动、断钉、断棒、脊柱后凸畸形等并发症^[11-12]。

经伤椎置钉技术是一种在跨伤椎置钉基础上发展而成的新型短节段内固定技术,在伤椎及其上下椎体置入螺钉并纵向撑开从而起到修复、复位及稳定椎体的作用,其固定原理类似力学杠杆效应,较跨伤椎置钉具有更好的固定作用,并可对伤椎施加向腹侧的压力,有助于抵制悬浮效应、提高横向稳定性及螺钉的抗切出力,从而获得良好疗效^[13-14]。本研究结果也显示,2组术后6、12个月伤椎Cobb角、椎体前缘高度压缩比、ODI、VAS评分均较术前改善,且A组改善情况均优于B组。以上结果提示,跨伤椎固定平行四边形效应的稳定作用一般,患者长期活动下会影响脊柱稳定性而易出现移位、高度及角度偏离等情况,影响患者腰椎功能及疼痛情况的改善;经伤椎置钉内固定,6枚椎弓根螺钉纵向撑开起到类似杠杆效应的修复固定作用,能更好地维持脊柱稳定性,为患者提供长期活动所需的强力支撑作用,更好地改善患者腰椎功能及疼痛情况。本研究结果亦显示,A组慢性腰痛、螺钉松动发生率明显低于B组,亦可证明经伤椎置钉短节段内固定术可更有效地维持脊柱稳定性,减少了因固定效果欠佳所致的慢性腰痛、螺钉松动等并发症发生。

此外,本研究2组间术中出血量、住院时间、切口感染、神经根损伤等并发症发生率比较,差异均无统计学意义,提示经伤椎置钉短节段内固定术不会显著增加手术创伤及创伤性并发症,对患者术后康复无明显不良影响。本研究A组手术时间长于B组,原因为经伤椎置钉较跨伤椎置钉增加了于伤椎置入2枚椎弓根螺钉的操作,伤椎置钉难度较正常椎体高(经伤椎置钉前需严格评估伤椎周围结构,以使螺钉能够安全、有效地置入)。本研究组认为,通过加强对术者经伤椎置钉相关知识和技能的培训,并随着术者临床经验的增加,手术质量可进一步提高、手术时间会有所缩短。

综上所述,经伤椎置钉短节段内固定术治疗单

节段胸腰椎骨折可有效增加脊柱稳定性,有利于改善患者腰椎功能及疼痛状况,且可减少术后慢性腰痛、螺钉松动等并发症的发生,值得临床推广。

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