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伤椎置钉与不置钉短节段内固定对胸腰椎爆裂骨折患者临床疗效及血清炎症损伤介质的影响*

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摘要 目的:探讨伤椎置钉与不置钉短节段内固定对胸腰椎爆裂骨折患者临床疗效及血清炎症损伤介质的影响。**方法:**回顾性分析2017年3月~2018年7月期间内蒙古医科大学第三附属医院骨科收治的269例胸腰椎爆裂骨折患者的临床资料,根据手术方式的不同分为A组(n=131,给予短节段内固定治疗)和B组(n=138,给予伤椎置钉联合短节段内固定治疗),比较两组患者围术期指标、影像学指标、血清炎症损伤介质及并发症。**结果:**两组术后1周、术后半年、术后1年伤椎椎体前缘高度呈先升高后降低趋势,且B组术后半年、术后1年伤椎椎体前缘高度均低于A组($P<0.05$);两组术后1周、术后半年、术后1年Cobb'S角呈先降低后升高趋势,且B组术后半年、术后1年Cobb'S角均大于A组($P<0.05$)。两组患者手术时间、术中出血量、住院时间及并发症发生率比较无差异($P>0.05$)。两组术后3d血清白细胞介素-6(IL-6)、白细胞介素-8(IL-8)、白细胞介素-1 β (IL-1 β)、肿瘤坏死因子- α (TNF- α)、髓过氧化物酶(MPO)水平均升高($P<0.05$),但两组术后3d血清炎症损伤介质比较差异无统计学意义($P>0.05$)。**结论:**伤椎置钉与不置钉短节段内固定治疗胸腰椎爆裂骨折患者,可获得相似的临床疗效,且对患者损伤程度基本一致,但伤椎置钉在恢复伤椎椎体前缘高度、Cobb'S角方面更优,临床应用价值较高。

关键词:伤椎置钉;伤椎不置钉;短节段内固定;胸腰椎爆裂骨折;临床疗效;炎症

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Effect of Short-segment Internal Fixation with or without Screw Placement in Injured Vertebra on Clinical Efficacy and Serum Inflammatory Injury Mediators in Patients with Thoracolumbar Burst Fracture*

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ABSTRACT Objective: To investigate the clinical effect of short-segment internal fixation with or without screw placement in injured vertebra in patients with thoracolumbar burst fracture and the influence of serum inflammatory damage mediators. **Methods:** Retrospective analysis of 269 cases of thoracolumbar burst fracture who were treated in orthopaedics department of the Third Affiliated Hospital of Inner Mongolia Medical University from March 2017 to July 2018. The patients were divided into group A (n=131, treated with short-segment internal fixation) and group B (n=138, treated with screw placement in injured vertebra combined with short-segment internal fixation) according to the different surgical methods. Perioperative indicators, imaging indicators, serum inflammatory mediators and complications were compared between the two groups. **Results:** In the two groups, the height of injured vertebral anterior edge increased first and then decreased at 1 week after operation, half a year after operation and one year after operation, and the height of injured vertebral anterior edge in group B was shorter than that in group A ($P<0.05$). Cobb'S angle in two groups decreased first and then increased at 1 week after operation, half a year after operation and one year after operation, and Cobb'S angle in group B at half a year after operation and one year after operation were higher than than in group A ($P<0.05$). There were no significant differences in operation time, intraoperative bleeding volume, hospitalization time and complications between the two groups ($P>0.05$). The levels of serum interleukin-6 (IL-6), interleukin-8 (IL-8), interleukin-1 β (IL-1 β), tumor necrosis factor- α (TNF- α) and myeloperoxidase (MPO) increased in two groups at 3d after operation ($P<0.05$), but there was no significant difference between the two groups in the levels of inflammatory mediators at 3d after operation ($P>0.05$). **Conclusion:** Short-segment internal fixation for thoracolumbar burst fracture can achieve similar clinical efficacy with or without screw placement in injured vertebra and the degree of injury is basically the same. However, screw

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placement in injured vertebra can effectively restore the height of injured vertebral anterior edge and Cobb'S angle, which has a high clinical value.

Key words: Screw placement in injured vertebra; Without screw placement in injured vertebra; Short-segment internal fixation; Thoracolumbar burst fracture; Clinical efficacy; Inflammation

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前言

胸腰椎爆裂骨折是指胸腰段脊椎受到暴力时引起的椎体和(或)椎板骨折的一种严重损伤,是临床中常见的脊柱骨折^[1,2]。该病临床表现为伤处局部疼痛、皮下瘀血、棘突压痛及叩击痛,若未能及时予以治疗,可导致患者活动功能受限,易并发脊髓损伤,造成残疾,给患者生活质量带来严重影响^[3,4]。胸腰椎爆裂骨折的主要治疗目的是纠正脊柱畸形、恢复脊柱稳定性,手术是治疗胸腰椎爆裂骨折的常用方法,其中后入路椎弓根螺钉固定是骨科医生最常用的治疗方法,该类手术操作简便、切口小、出血量少,疗效较好^[5]。后入路椎弓根螺钉固定分短节段固定和长节段固定,尽管长节段固定的固定强度大、椎管形态恢复好,但依旧存在过多的牺牲脊椎运动节段的缺点^[6]。近年来,短节段内固定取得较大的进展,但现临床医师对伤椎是否置钉这一问题,尚存在一定争议。为进一步明确伤椎置钉与不置钉短节段内固定治疗胸腰椎爆裂骨折患者的临床效果,本研究就此展开分析,以期临床胸腰椎爆裂骨折的治疗提供数据支持。

1 资料和方法

1.1 一般资料

回顾性分析内蒙古医科大学第三附属医院骨科自2017年3月~2018年7月收治的胸腰椎爆裂骨折患者的临床资料,纳入标准:(1)经X线、CT以及MRI等影像学证实为胸腰椎爆裂骨折,均有明确的外伤史,且不伴有脊髓神经受压;(2)临床表现为伤处局部疼痛、皮下瘀血、棘突压痛及叩击痛等;(3)均具备手术适应证;(4)均为新鲜骨折(骨折时间不超过三周);(5)患者知情本研究且签署了同意书。排除标准:(1)伴有骨质疏松症者;(2)妊娠及哺乳期妇女者;(3)既往伴有胸腰椎疾病史者;(4)合并骨盆和下肢骨折者;(5)病理性骨折或开放性骨折者;(6)无法纠正凝血机制障碍和出血倾向者;(7)未能完成随访,中途失联者。依据上述纳入排除标准,最终有269例胸腰椎爆裂骨折患者符合要求被纳入本研究,将入选的患者根据手术方式的不同分为A组(n=131,给予短节段内固定治疗)和B组(n=138,给予伤椎置钉联合短节段内固定治疗),其中A组男76例,女55例,年龄24~72岁,平均(49.38±4.26)岁;伤椎节段:T₁₁29例、T₁₂27例、L₁35例、L₂40例;致伤原因:高处坠落伤29例,摔伤38例,交通事故伤64例;骨折Denis分型:A型38例,B型31例,C型35例,D型27例。B组男80例,女58例,年龄27~71岁,平均(49.25±5.38)岁;伤椎节段:T₁₁33例、T₁₂30例、L₁38例、L₂37例;致伤原因:高处坠落伤32例,摔伤36例,交通事故伤70例;骨折Denis分型:A型42例,B型35例,C型39例,D型22例。两组患者一般资料比较无差异($P>$

0.05),具有可比性。

1.2 治疗方法

两组患者术前行常规实验室、查体及影像学检查,经专业医师评估患者耐受力后并为其选择合适的手术方式。术前常规禁饮禁食等,均给予短节段内固定治疗,具体操作如下:患者取俯卧位,全麻,后纵中切口,逐层分离皮肤、皮下组织和肌肉后,暴露伤椎及相邻的上下两个椎体,采用Weinstein法确定椎弓根入钉点,置入椎弓根螺钉,A组伤椎不置钉,即4钉固定;B组患者伤椎置钉,即6钉固定,安放适度预弯的连接棒,采用C臂机透视,复位或撑开复位椎体骨折,随后安装横行连接杆。C臂机透视确认骨折复位情况良好后,彻底冲洗手术区域、置负压引流管、逐层缝合、包扎切口,术后1~2周内佩戴腰围或支具辅助下适当坐起或下床活动,采用门诊复查、电话随访等方式对所有患者进行为期1年的随访。

1.3 观察指标

(1)记录两组围术期指标,包括术中出血量、手术时间、住院时间。(2)于术前、术后1周、术后半年、术后1年分别测量两组患者伤椎椎体前缘高度、Cobb'S角,其中Cobb'S角为矢状面上伤椎下位椎体的下终板和伤椎上位椎体的上终板间的成角。(3)采集两组患者术前、术后3d的肘静脉血4 mL,4500 r/min离心12 min,离心半径8 cm,分离血清,置于-30℃冰箱中待测,采用酶联免疫吸附法检测白细胞介素-6(Interleukin-6, IL-6)、白细胞介素-8(Interleukin-8, IL-8)、白细胞介素-1 β (Interleukin-1 β , IL-1 β)、肿瘤坏死因子- α (Tumor necrosis factor- α , TNF- α)、髓过氧化物酶(Myeloperoxidase, MPO),严格遵守试剂盒(上海信裕生物工程有限公司)说明书进行操作。(4)记录两组患者术后并发症发生情况。

1.4 统计学方法

研究数据采用SPSS25.0进行统计分析,计量资料以均数±标准差($\bar{x}\pm s$)描述,组间比较采用独立样本t检验,组内比较采用配对样本t检验。计数资料采用率(%)描述,组间比较采用 χ^2 检验。检验标准设置为 $\alpha=0.05$ 。

2 结果

2.1 影像学指标比较

两组术前伤椎椎体前缘高度、Cobb'S角比较差异无统计学意义($P>0.05$);两组术后1周、术后半年、术后1年伤椎椎体前缘高度呈先升高后降低趋势,且B组术后半年、术后1年伤椎椎体前缘高度均低于A组($P<0.05$);两组术后1周、术后半年、术后1年Cobb'S角呈先降低后升高趋势,且B组术后半年、术后1年Cobb'S角均大于A组($P<0.05$);详见表1。

2.2 两组围术期指标比较

两组患者手术时间、术中出血量、住院时间比较差异无统

表 1 两组影像学指标比较($\bar{x} \pm s, ^\circ$)Table 1 Comparison of two groups of imaging indicators($\bar{x} \pm s, ^\circ$)

Groups	Height of injured vertebral anterior edge (mm)				Cobb'S angle ($^\circ$)			
	Preoperative	1 week after operation	Half a year after operation	One year after operation	Preoperative	1 week after operation	Half a year after operation	One year after operation
Group A (n=131)	60.05 $\pm$ 8.53	92.55 $\pm$ 10.42 ^a	88.48 $\pm$ 8.43 ^{ab}	84.76 $\pm$ 8.19 ^{abc}	14.91 $\pm$ 1.95	4.58 $\pm$ 0.91 ^a	5.72 $\pm$ 0.65 ^{ab}	6.83 $\pm$ 0.67 ^{abc}
Group B (n=138)	60.01 $\pm$ 9.48	91.64 $\pm$ 9.38 ^a	84.39 $\pm$ 9.41 ^{ab}	80.93 $\pm$ 10.15 ^{abc}	14.87 $\pm$ 1.83	4.62 $\pm$ 0.85 ^a	6.86 $\pm$ 0.74 ^{ab}	7.86 $\pm$ 0.55 ^{abc}
t	0.036	0.754	3.748	3.395	0.174	0.373	13.396	13.811
P	0.971	0.452	0.000	0.001	0.862	0.710	0.000	0.000

Note: Compared with preoperative, ^a $P<0.05$; compared with 1 week after operation, ^b $P<0.05$; compared with half a year after operation, ^c $P<0.05$.

计学意义($P>0.05$);详见表 2。

表 2 两组围术期指标比较($\bar{x} \pm s$)Table 2 Comparison of perioperative indicators between two groups($\bar{x} \pm s$)

Groups	Operation time (min)	Intraoperative bleeding volume (mL)	Hospitalization time (d)
Group A (n=131)	117.31 $\pm$ 12.72	334.72 $\pm$ 14.69	9.24 $\pm$ 0.68
Group B (n=138)	118.28 $\pm$ 10.60	337.63 $\pm$ 13.71	9.28 $\pm$ 0.64
t	0.681	1.680	0.497
P	0.497	0.094	0.620

2.3 血清炎症损伤介质比较

两组术前血清 IL-6、IL-8、IL-1 β 、TNF- α 、MPO 水平比较差异无统计学意义($P>0.05$),两组术后 3d 血清炎症损伤介质均

升高($P<0.05$),但两组术后 3d 上述血清炎症损伤介质比较差异无统计学意义($P>0.05$);详见表 3。

表 3 两组血清炎症损伤介质比较($\bar{x} \pm s$)Table 3 Comparison of serum inflammatory mediators between two groups($\bar{x} \pm s$)

Groups	IL-6 (pg/mL)		IL-8 (pg/mL)		TNF- α (ng/mL)		IL-1 β (ng/mL)		MPO (pg/mL)	
	Preoperative	3d after operation	Preoperative	3d after operation	Preoperative	3d after operation	Preoperative	3d after operation	Preoperative	3d after operation
Group A (n=131)	14.68 $\pm$ 1.55	19.56 $\pm$ 1.48 ^a	11.32 $\pm$ 1.49	18.71 $\pm$ 1.08 ^a	2.94 $\pm$ 0.41	5.02 $\pm$ 0.55 ^a	7.57 $\pm$ 0.93	10.96 $\pm$ 0.58 ^a	6.69 $\pm$ 0.57	9.71 $\pm$ 0.78 ^a
Group B (n=138)	14.61 $\pm$ 1.04	19.76 $\pm$ 1.73 ^a	11.41 $\pm$ 1.57	18.73 $\pm$ 1.32 ^a	3.05 $\pm$ 0.52	4.93 $\pm$ 0.43 ^a	8.52 $\pm$ 0.78	10.28 $\pm$ 0.83 ^a	6.71 $\pm$ 0.63	9.69 $\pm$ 0.71 ^a
t	0.437	1.098	0.482	0.136	1.920	1.499	0.483	1.637	0.273	0.220
P	0.662	0.273	0.630	0.892	0.556	0.135	0.621	0.612	0.785	0.826

Note: Compared with preoperative, ^a $P<0.05$.

2.4 两组并发症发生情况比较

A 组术后发生 4 例伤口感染、5 例下肢深静脉血栓、3 例骨折不愈合、6 例内固定断裂,并发症发生率为 13.74% (18/131); B 组术后发生 5 例伤口感染、3 例下肢深静脉血栓、3 例骨折不愈合、2 例内固定断裂,并发症发生率为 9.42% (13/138),两组并发症发生率比较差异无统计学意义($\chi^2=1.230, P=0.267$)。

3 讨论

由于胸腰段脊柱处于脊柱生理弯曲的交界处,其功能解剖特点决定了该段椎体是外伤性骨折的多发部位^[7,8]。胸腰椎爆裂骨折多由屈曲、垂直等高能损伤引起,高能作用于脊柱后

使椎间盘的髓核疝入椎体,导致椎体内压急剧升高,椎体自内向外爆裂而形成骨折^[9-11]。据以往报道统计^[12],脊柱骨折中约有 50% 的患者为胸腰椎爆裂性骨折。后路复位内固定是胸腰椎爆裂骨折的常用治疗方式,临床的典型术式包括短节段和长节段内固定治疗,均可获得较好的治疗效果^[13]。随着临床研究的深入,不少学者发现长节段内固定治疗胸腰椎爆裂骨折易引起相邻节段的退变,而短节段内固定创伤小、手术时间短、术后可较好地恢复椎体高度与生理曲度,优势明显^[14,15]。在短节段内固定治疗的应用中,通常采用短节段跨伤椎固定即伤椎不置钉治疗,但部分患者出现伤椎相对前缘高度丢失,同时易增加内固定断裂、松动等并发症发生风险^[16,17]。因此,寻找发挥短节段内

固定优势、避免术后矫正度丢失以及内固定失败问题的有效术式具有积极的临床意义。近年来,伤椎置钉内固定治疗逐渐在临床中应用,并获得了一定的效果^[18]。现临床有关上述两种置钉方式孰优孰劣尚存在一定争议,本文就此展开分析。

本次研究结果显示,两组在手术时间、术中出血量、住院时间方面相比,未见显著差异。这主要是由于两组均选取相同的手术入路,手术操作过程基本一致,唯一不同之处在于置钉数量,故围术期指标方面差异不大^[19]。既往有学者^[20]认为伤椎置钉可增加手术创伤,而手术所造成的全身创伤则多表现为炎症反应的增强及炎症损伤介质的增多。其中 IL-6、IL-8、IL-1 β 可促进白细胞分泌、浸润、迁移,具有较强的促炎作用^[21,22];TNF- α 可介导组织的炎症性损伤,可促进炎症反应级联扩大化^[23];MPO 是中性粒细胞的特征性酶,可反应中性粒细胞的浸润程度^[24]。本研究两组患者经手术治疗后均有一定程度的炎症介质水平升高,但两组术后 3d 上述血清炎症损伤介质无差异,可见伤椎置钉不增加炎症损伤,这可能与伤椎置钉可加大固定强度、分散固定后每个螺钉所承受的应力负荷有关,一定程度上缓解手术操作带来的损伤^[25,26]。本次研究结果还显示,伤椎置钉者其术后半年、术后 1 年伤椎椎体前缘高度、Cobb'S 角的改善程度均优于伤椎不置钉者,分析其原因可能为伤椎置钉的 6 钉固定理念是三平面固定,可降低传统的 4 钉的平行四边形效应,减轻短节段螺钉负荷。其次,伤椎置钉可克服椎后凸应力,促进伤椎向腹侧移动,恢复腰椎节段的生理曲度^[27-29]。本文结果显示两组并发症发生率比较无差异,可见伤椎置钉与不置钉安全性相当,但李中锋等人^[30]研究结果却显示,伤椎置钉内固定治疗胸腰椎爆裂骨折患者,可有效减少并发症发生率,这与本次研究结果存在一定差异,可能是因为纳入患者存在个体化差异,致使研究结果存在一定差异,后续将进行进一步的研究。

综上所述,短节段内固定治疗胸腰椎爆裂骨折患者,伤椎置钉与不置钉可获得相似的临床疗效,且伤椎置钉可有效恢复伤椎椎体前缘高度、Cobb'S 角,临床应用价值更高。

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