临床论著

一期后路病灶清除减压融合内固定术治疗老年布鲁氏菌性脊柱炎的疗效观察

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【摘要】目的:观察一期后路病灶清除减压融合内固定术治疗老年布鲁氏菌性脊柱炎的早期疗效。**方法**:回顾性分析 2015 年 4 月~2021 年 8 月首都医科大学附属北京地坛医院骨科收治的 19 例接受一期后路病灶清除减压融合内固定术治疗的老年(≥65 岁)布鲁氏菌性脊柱炎患者的临床资料,其中男 14 例,女 5 例,年龄 67.9±2.4 岁(65~73 岁),病程 10.8±2.7 个月(7~16 个月),14 例有接触牛羊史,3 例有生食牛羊肉史,2 例有食用牛奶或羊奶史,均有腰背部疼痛,其中 3 例伴发热,16 例伴下肢疼痛/麻木;根据美国脊柱损伤协会(American Spinal Injury Association,ASIA)分级 C 级 9 例,D 级 7 例,E 级 3 例。影像学检查病变节段为 L1–2 1 例,L2–3 1 例,L3–4 7 例,L4–5 7 例,L5–S1 1 例,L1–2+L5–S1 1 例,L3–S1 1 例;所有患者脊柱病变节段椎间隙均狭窄,其中 18 例有病变节段腰椎不稳,17 例有椎前鸟嘴样骨刺,17 例表现为"花边椎",16 例有硬膜外脓肿,3 例有腰大肌脓肿。术前疼痛视觉模拟评分(visual analogue scale,VAS)7.05±0.97 分,Oswestry 功能障碍指数(Oswestry disability index,ODI)(42.05±2.61)%,血沉(erythrocyte sedimentation rate,ESR) 55.84±4.53mm/h、C 反应蛋白(C–reactive protein,CRP) 46.47±3.25mg/L。入院时 13 例合并高血压,14 例合并糖尿病,8 例合并冠心病,16 例合并低蛋白血症。围术期积极予以系统支持治疗,手术前后均应用利福平、多西环素、左氧氟沙星三联化疗方案 2 周以上,出院后继续口服利福平和多西环素治疗 6 个月。统计术后 1 个月、3 个月、6 个月、12 个月的腰腿痛 VAS、ODI、ESR、CRP,统计末次随访的 ASIA 分级及植骨融合情况,统计术中及术后并发症情况。**结果**:所有患者均手术顺利,手术时间 192.11±35.92min(150~300min),术中出血量 527.37±108.09ml(400~800ml),术后 1 个月、3 个月、6 个月、12 个月随访时腰腿痛 VAS、ODI、ESR 和 CRP 较术前显著降低(P<0.05);所有患者在术后 6 个月时 ESR 及 CRP 均恢复正常,术后 6 个月和术后 12 个月时的 ESR 与 CRP 差异无统计学意义(P>0.05)。术后随访 17.53±3.15 个月 (12~24 个月),术前 9 例 ASIA 分级 C 级患者末次随访时恢复到 D 级 1 例,E 级 8 例;术前 7 例 ASIA 分级 D 级患者末次随访均恢复到 E 级。所有患者术中及术后未出现明显并发症,末次随访时均获得满意的骨性融合。**结论**:针对老年布鲁氏菌性脊柱炎患者,在围术期对症支持治疗及抗感染治疗的基础上,行一期后路病灶清除减压融合内固定术效果较满意,能有效促进病灶炎性修复及神经功能恢复。

【关键词】布鲁氏菌性脊柱炎;后路病灶清除减压融合内固定术;老年;疗效

doi:10.3969/j.issn.1004–406X.2023.02.04

中图分类号:R687.3,R681.5 **文献标识码**:A **文章编号**:1004–406X(2023)–02–0123–09

Observation on the efficacy of one–stage posterior focus debridement, decompression, fusion and internal fixation in the treatment of senile brucellosis spondylitis/WANG Jie, ZHANG Yaoshen, ZHAO Changsong, et al//Chinese Journal of Spine and Spinal Cord, 2023, 33(2): 123–131

【Abstract】 Objectives: To observe the preliminary effect of one–stage posterior focus debridement, decompression, fusion and internal fixation in the treatment of senile brucellosis spondylitis. **Methods:** A retrospective analysis was made on the clinical data of 19 senile patients(≥65 years) with brucellosis spondylitis treated in the Department of Orthopedics, Beijing Ditan Hospital affiliated to Capital Medical University from April 2015 to August 2021. There were 14 males and 5 females, aged 67.9±2.4 years(65–73 years), and the course of disease was 10.8±2.7 months (7–16 months). 14 cases had a history of contact with cattle and

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sheep, 3 cases had a history of eating raw beef and mutton, and 2 cases had a history of drinking milk or goat's milk. All the patients had symptoms of low back pain, including 3 with fever and 16 with lower limb pain/numbness; according to the American Spinal Injury Association(ASIA) impairment scale, 9 cases were of grade C, 7 cases of grade D and 3 cases of grade E. Imaging examination showed that the segments involved were: L1–2 in 1 case, L2–3 in 1 case, L3–4 in 7 cases, L4–5 in 7 cases, L5–S1 in 1 case, L1–2+L5–S1 in 1 case and L3–S1 in 1 case; the segmental intervertebral space of spinal lesions was narrow in all the patients, including 18 cases of lumbar instability of diseased segments, 17 cases of prevertebral beak-like spur, 17 cases of "lace vertebra", 16 cases of epidural abscess and 3 cases of psoas muscle abscess. The visual analogue scale(VAS), Oswestry disability index(ODI), erythrocyte sedimentation rate(ESR), and C-reactive protein(CRP) before operation in the 19 patients were 7.05±0.97, (42.05±2.61)%, 55.84±4.53mm/h, and 46.47±3.25mg/L respectively. On admission, 13 cases were complicated with hypertension, 14 cases with diabetes, 8 cases with coronary heart disease and 16 cases with hypoproteinemia. Active systemic support therapy was given during the perioperative period by treating the patients with rifampicin, doxycycline and levofloxacin for more than 2 weeks before and after operation and giving oral administration of rifampicin and doxycycline for six months after discharge. The low back and leg pain VAS, lumbar ODI, ESR, and CRP at 1 month, 3 months, 6 months and 12 months postoperatively were calculated, ASIA grading, and bone graft fusion were calculated at final follow-up, intraoperative and postoperative complications were also counted. **Results:** All the patients underwent operation smoothly. The operation time was 192.11±35.92min(150–300min) and the intraoperative blood loss was 527.37±108.09ml(400–800ml). The low back and leg pain VAS, lumbar ODI, ESR, and CRP decreased significantly at 1 month, 3 months, 6 months and 12 months postoperatively compared with the preoperative ones (P<0.05). The infection indexes of ESR and CRP all returned to normal at 6 months postoperatively, the differences of ESR and CRP respectively between 6 months and 12 months postoperatively were not statistically significant. The patients were followed up for 17.53±3.15 months (12–24 months) after surgery, and 9 cases of ASIA grade C before operation recovered to grade D in 1 case and grade E in 8 cases at the last follow-up; and 7 cases of ASIA grade D all recovered to grade E at the last follow-up. All the patients had no obvious complications during and after operation, and satisfactory bone fusion was obtained at the last follow-up. **Conclusions:** For senile patients with brucellosis spondylitis, one-stage posterior focus debridement, decompression, fusion and internal fixation has a satisfactory effect on the basis of perioperative symptomatic support treatment and anti-infective treatment, which can effectively promote focal inflammatory repair and neurological function recovery.

【Key words】 Brucellosis spondylitis; Posterior focus debridement, decompression, fusion and internal fixation; Senile; Efficacy

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布鲁氏菌病是地域性人畜共患病，多见于中国北部畜牧区的人群，可侵犯人体骨关节系统、循环系统、神经系统、泌尿生殖系统等，骨关节系统受累时主要引起布鲁氏菌性脊柱炎，临床表现与脊柱结核相似且易复发[1~3]。随着人均寿命的提高，老年(≥65岁)布鲁氏菌性脊柱炎患者逐年增多，非流行地区由于缺乏对该病的认识，临床上易误诊误治。目前国内外对老年布鲁氏菌性脊柱炎的研究比较少，针对感染性脊柱炎，行腰椎融合手术是否安全有效尚存在争议[4,5]。本研究旨在分析一期后路病灶清除减压融合内固定术治疗老年布鲁氏菌性脊柱炎的初步疗效，为该病的治疗方式选择提供参考。

1 资料与方法

1.1 一般资料

病例纳入标准：(1)年龄≥65岁；(2)血清凝集试验、病灶细菌培养、Giemsa染色、多重聚合酶链式反应(polymerase chain reaction，PCR)及影像学检查明确证实布鲁氏菌性脊柱炎的诊断；(3)在首都医科大学附属北京地坛医院骨科首诊为布鲁氏菌性脊柱炎；(4)手术指征明确：腰背部剧烈

性疼痛无法缓解/椎管内炎性组织刺激、压迫硬膜囊及神经根引起神经损伤/椎间盘及邻近椎体破坏严重引起脊柱不稳;(5)手术方式为一期后路病灶清除减压融合内固定术;(6) 围术期应用利福平、多西环素、左氧氟沙星三联抗菌方案;(7)获得 1 年以上随访且资料完整。排除标准:(1)年龄<65 岁;(2)存在明确手术禁忌证,不能耐受手术的老年患者;(3)合并脊柱结核等其他脊柱感染。

2015 年 4 月~2021 年 8 月共有 19 例符合上述标准的老年布鲁氏菌性脊柱炎患者。其中男性 14 例,女性 5 例,年龄 67.9±2.4 岁(65~73 岁),14 例患者年龄 65~70 岁,5 例患者超过 70 岁; 病程 10.8±2.7 个月(7~16 个月)。14 例有接触牛羊史,3 例有生食牛羊肉史,2 例有食用牛奶或羊奶史。13 例最初于外院误诊为腰椎退行性疾病,6 例最初于外院误诊为骨质疏松性椎体压缩骨折。均表现为腰背部疼痛, 其中 3 例伴发热,16 例伴下肢疼痛/麻木; 根据美国脊柱损伤协会(American Spinal Injury Association,ASIA)分级 C 级 9 例,D 级 7 例,E 级 3 例。影像学检查提示所有患者均为腰椎受累,其中 L1–2 受累 1 例,L2–3 1 例,L3–4 7 例,L4–5 7 例,L5–S1 1 例,L1–2+L5–S1 1 例,L3–S1 1 例; 所有患者脊柱病变节段椎间隙均狭窄,其中 18 例有病变节段腰椎不稳,17 例病变节段椎体前方有鸟嘴样骨刺形成,17 例病变节段椎体表现为“花边椎”,16 例病变节段后方有硬膜外脓肿,3 例病变节段旁有腰大肌脓肿。术前实验室检查中,13 例虎红平板凝集试验阳性,3 例血培养布鲁氏菌阳性,19 例患者血沉(erythrocyte sedimentation rate,ESR)55.84±4.53mm/h、C 反应蛋白(C–reactive protein,CRP)46.47±3.25mg/L。入院时 13 例患者合并高血压,14 例合并糖尿病,8 例合并冠心病,16 例合并低蛋白血症,19 例患者均合并骨质疏松。

1.2 术前处理

所有患者入院后一旦确诊为布鲁氏菌脊柱炎,立即采用利福平(600mg/d)+多西环(200mg/d)+左氧氟沙星(500mg/d)三联化疗方案。术前三联化疗方案时长大于 2 周,待 ESR、CRP 明显降低,疾病活动性得到有效控制后进行手术。术前积极处理老年患者合并的基础病。对于高血压患者,术前调整血压稳定在 140/90mmHg 以下; 对于糖尿病患者,围手术期使用门冬胰岛素控制血糖,空腹或餐前血糖 6.1~7.8mmol/L, 餐后 2h 或随机血糖 7.8~10.0mmol/L;对于冠心病患者,完善心肌酶、心电图、心脏彩超、冠脉 CT 血管成像或冠脉造影检查,请麻醉科及心内科评估可耐受手术,停用抗血小板药物,使用低分子肝素钙替代治疗;对于低蛋白血症患者, 术前输注人血白蛋白保证患者血清白蛋白大于 30g/L;对于骨质疏松患者,围术期及出院后长期口服阿仑膦酸钠、钙、维生素 D 三联抗骨质疏松药治疗。

1.3 手术方法

所有患者均全身麻醉, 在俯卧位下行一期后路病灶清除减压融合内固定术, 沿着病变节段椎体的棘突做后正中切开,暴露脊柱后方棘突、椎板和关节结构后, 将椎弓根钉棒系统固定在病变节段的两侧, 椎体破坏严重的一侧延长一个固定节段。在有严重骨质破坏、硬膜外脓肿和神经根病的一侧进行部分椎板和小关节切除, 双侧影像学表现较重及双下肢症状明显的情况下进行双侧部分椎板和小关节切除。16 例术前影像学检查提示硬膜外脓肿的患者减压后椎管内可见血性脓液,对感染的椎间盘、软骨终板和硬膜外脓肿进行清创,并在钝性剥离下尽可能彻底地引流椎旁脓肿,清创的原则是直至观察到病灶被充分清除且椎体松质骨出血, 在行椎间盘及软骨终板切除时注意保护骨性终板防止术后融合器 (cage) 下沉。根据 cage 试模结果选择匹配的聚醚醚酮(polyetherether ketone,PEEK)cage,将减压过程中切除的椎板及关节突去皮质化, 松质骨充分填充 PEEK cage,用稀释的聚维酮碘溶液、双氧水和生理盐水冲洗,将 PEEK cage 置入病变节段椎间隙后,利用钉棒系统进一步加压内固定。17 例患者采用单节段融合,1 例患者采用双节段融合,1 例患者采用三节段融合;2 例患者采用单节段内固定,12 例患者采用双节段内固定,5 例患者采用三节段内固定;18 例术前明确病灶节段失稳的患者附加横联固定。冲洗后切口内留置引流管 1 根,逐层缝合切口。

1.4 术后处理

术后注意血压、血糖、白蛋白水平等的控制,指导患者活动下肢, 预防下肢深静脉血栓形成。24h 引流量小于 50ml, 同时引流液性质为清亮的淡血性时,拔除引流管。所有患者术后继续维持 2 周以上的三联化疗方案, 出院后改为口服利福平

和多西环素治疗 6 个月。所有患者术后卧床 1 周后佩戴支具下床活动,支具佩戴 3 个月。

1.5 观察指标

统计术前及术后 1 个月、3 个月、6 个月、12 个月的腰腿疼痛视觉模拟评分(visual analogue scale,VAS)、Oswestry 功能障碍指数(Oswestry disability index,ODI)、ESR、CRP,统计末次随访的 ASIA 分级及植骨融合情况,统计术中及术后并发症情况。

1.6 统计学方法

采用 SPSS 22.0 软件进行统计学分析,符合正态分布的定量资料用均数±标准差表示,同一指标两个时间点的比较采用配对 t 检验,三个以上时间点的比较采用重复测量方差分析;非正态分布数据采用中位数(四分位间距)表示,手术前后各时间点比较采用秩和检验。定性资料采用例数表示,手术前后各时间点比较采用 χ^2 检验。P<0.05 为差异有统计学意义。

2 结果

所有患者均手术顺利,手术时间 192.11±35.92min(150~300min),术中出血量 527.37±108.09ml(400~800ml)。术中清除的病灶在术后细菌培养布鲁氏菌阳性 5 例,Giemsa 染色(图 1)布鲁氏菌阳性 18 例,多重 PCR 布鲁氏菌阳性 19 例,其中羊种布鲁氏菌感染 17 例,牛种布鲁氏菌 2 例。

所有患者术中均未出现大出血、硬膜损伤;术后随访 17.53±3.15 个月(12~24 个月),均无脑脊液漏、继发感染、神经型布鲁氏菌病、血栓形成、螺钉松动及断裂(图 2)等并发症,末次随访时均获得满意的骨性融合(图 3)。

患者不同时间点的腰腿痛 VAS 评分、ODI、ESR 及 CRP 见表 1。患者腰腿痛 VAS 评分、ODI、ESR、CRP 术后均呈持续下降趋势(P<0.001)。术后 1、3、6、12 个月时的 VAS 评分、ODI 均较术前显著降低(P<0.05),术后 3 个月和术后 1 个月、术后 6 个月和术后 3 个月、术后 12 个月和术后 6 个月比较差异均有统计学意义(P<0.05)。术后 1、3、6、12 个月时的 ESR、CRP 均较术前显著降低(P<0.05),术后 3 个月和术后 1 个月、术后 6 个月和术后 3 个月比较差异均有统计学意义(P<0.05),术后 6 个月和术后 12 个月比较差异无统计学意义(P>0.05)。术后 6 个月时感染指标 ESR 及 CRP 均已恢复正常。

9 例术前 ASIA 分级 C 级患者中,1 例在术后 1 个月恢复至 E 级,2 例在术后 3 个月恢复至 E 级,3 例在术后 6 个月恢复至 E 级,2 例术后 12 个月时恢复至 E 级,1 例末次随访时恢复至 D 级;7 例术前 ASIA 分级 D 级患者中,1 例在术后 1 个月即恢复至 E 级,其余 6 例均在末次随访时恢复至 E 级(表 2)。

3 讨论

我国布鲁氏菌病的发病年龄介于 20~65 岁,多发于中青年,老年(≥65 岁)布鲁氏菌性脊柱炎

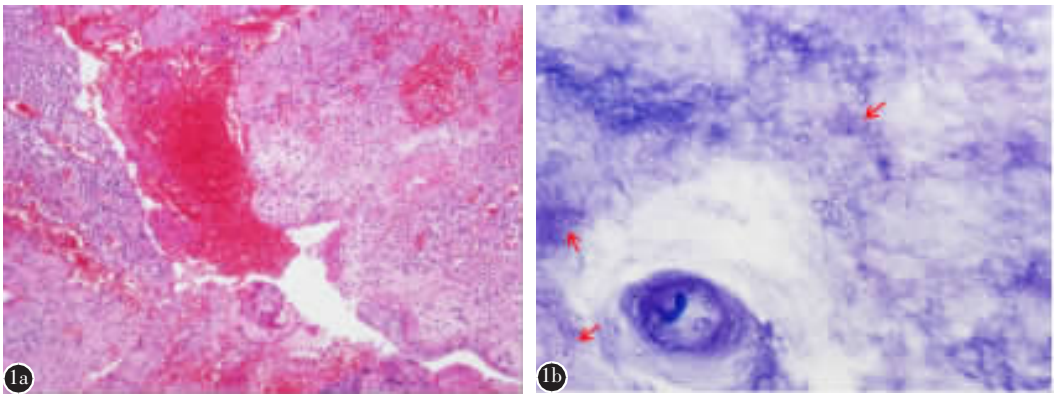

图 1 术中炎性病灶组织病理染色 **a** HE 染色示纤维结缔组织,伴出血、水肿、大量混合炎细胞浸润及脓肿形成,局灶薄壁血管增生,伴肉芽组织形成(×400) **b** Giemsa 染色示细小棒状布鲁氏菌(×1000)

Figure 1 Histopathological staining of inflammatory lesions during operation **a** HE staining showed fibrous connective tissue with hemorrhage, edema, massive mixed inflammatory cell infiltration and abscess formation, focal parenchyma angiogenesis, with granulation tissue formation(×400) **b** Giemsa staining showed tiny rod-shaped brucella(×1000)

患者临床上较为少见[6-8]。布鲁氏菌病侵犯成人骨关节系统时主要引起布鲁氏菌性脊柱炎，较少累及髋、膝、踝、肩、肘关节[9-12]。中青年布鲁氏菌性脊柱炎患者中，腰椎 L4-5 及 L5-S1 节段最常受累，胸椎及颈椎少见[6,13,14]。既往对布鲁氏菌性脊柱炎临床特点和治疗方式的研究集中于中青年，目前鲜有老年布鲁氏菌性脊柱炎的临床研究。我们首次揭示老年布鲁氏菌性脊柱炎患者慢性期临床特点，避免因老年布鲁氏菌性脊柱炎患者慢性期时症状不典型而漏诊或误诊误治；同时针对有手术指征的慢性期老年患者，评估一期行后路病灶清除减压融合内固定术的临床疗效和安全性，对今后老年布鲁氏菌性脊柱炎患者诊治有指导性意义。

本组老年布鲁氏菌性脊柱炎患者全部位于慢性期(病程>6 个月)，早期临床表现症状轻，仅表

图 2 患者男，68 岁，腰痛 7 月余，加重伴双下肢疼痛麻木 2 周 **a、b** 术前腰椎正侧位 X 线片示 L3/4 椎间隙狭窄，L3 椎体侧方及前缘骨质硬化增生，与 L4 椎体侧方及前缘形成“鸟嘴样”骨刺 **c~e** 术前 CT 示 L3 椎体类圆形破坏灶形成，破坏灶周边骨质硬化明显 **f~h** 术前 MRI 示 L3/4 椎间盘及邻近椎体炎性改变，病变椎间盘组织 T1WI 呈低信号，T2WI 及 T2WI 压脂呈高信号，椎管内脓肿形成，压迫后方硬膜囊及神经根 **i、j** 术后 1 周腰椎正侧位 X 线片示内固定及融合器位置良好 **k、l** 术后 12 个月腰椎正侧位 X 线片示内固定无松动及断裂，椎间骨性融合可

Figure 2 A male patient, 68 years old, low back pain for more than 7 months, aggravated with pain and numbness of both lower limbs for 2 weeks **a, b** Preoperative anteroposterior and lateral lumbar X-ray showed stenosis of L3/4, sclerosis and hyperplasia of bone on the lateral and anterior edge of L3 forming "beap-like" spur with the lateral and anterior edge of L4 vertebra **c-e** Preoperative lumbar CT showed round destruction focus of L3 was formed, the bone sclerosis around the destruction focus was obvious **f-h** Preoperative lumbar MRI showed inflammatory changes of L3/4 disc and its adjacent vertebrae, low signal intensity on T1WI, high signal intensity on T2WI and T2WI FS, formation of intraspinal abscess and compression of posterior dural sac and nerve root **i, j** One week postoperatively, lateral lumbar X-ray showed well position of internal fixation and fusion cage **k, l** 12 months postoperatively, lumbar X-ray showed no loosening and fracture of internal fixation, bony fusion formed between L3 and L4

现为轻微腰痛,大多无发热、出汗,最终因腰背部疼痛加重伴下肢疼痛/麻木就诊,已错过最佳保守治疗时机。本研究 19 例老年患者中,16 例入院时存在椎管内硬膜外脓肿及神经损伤。与既往文献

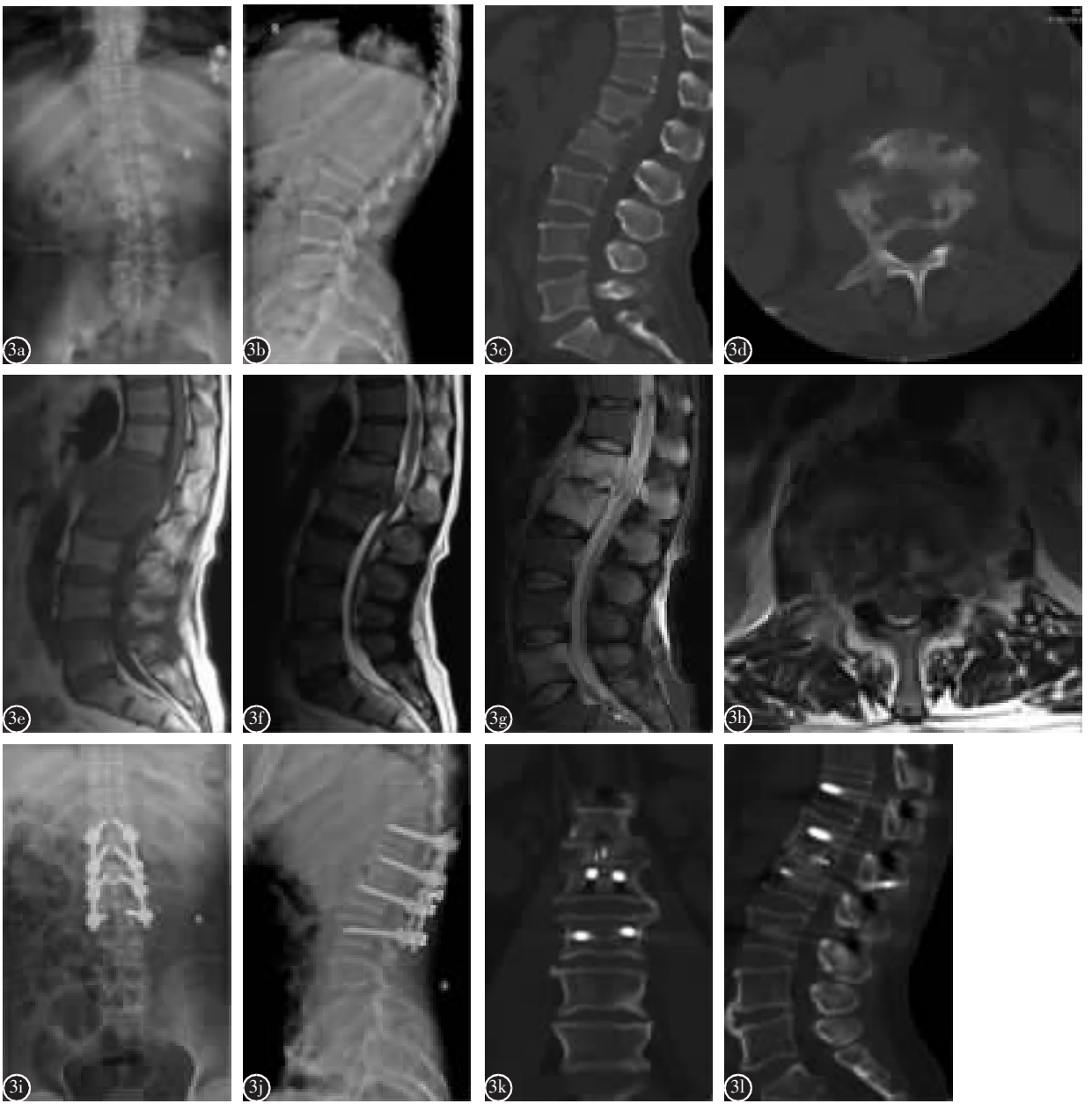

图 3 患者男,66 岁,腰痛 9 月余,加重伴双下肢疼痛麻木 3 周 **a、b** 术前腰椎正侧位 X 线片示 L1/2 椎间隙狭窄,腰椎退行性改变 **c、d** 术前 CT 示 L1 椎体下缘及 L2 椎体上缘多发骨质破坏,"花边椎" 形成 **e~h** 术前 MRI 示 L1/2 椎间盘及邻近椎体炎性改变,T1WI 呈低信号,T2WI 及 T2WI 压脂呈高信号,椎旁脓肿形成,硬膜外脓肿压迫硬膜囊及双侧神经根 **i、j** 术后 1 周腰椎正侧位 X 线片示内固定及融合器位置良好 **k、l** 术后 18 个月腰椎 CT 示椎间骨性融合

Figure 3 A male patient, 66 years old, low back pain for more than 9 months, aggravated with pain and numbness of both lower limbs for 3 weeks **a, b** Preoperative anteroposterior and lateral lumbar X-ray showed stenosis of L1/2 intervertebral space, degenerative changes of lumbar spine **c, d** Lumbar CT before operation showed multiple bone destruction occurred at the lower edge of L1 vertebra and the upper edge of L2 vertebra, and the "lace vertebra" was formed **e-h** Lumbar MRI before operation showed inflammatory changes of L1/2 disc and its adjacent vertebrae, low signal intensity on T1WI, high signal intensity on T2WI and T2WI FS, formation of paravertebral abscess, compression of dural sac and bilateral nerve roots by epidural abscess **i, j** One week postoperatively, lumbar X-ray showed well position of internal fixation and fusion cage **k, l** Lumbar CT demonstrated intervertebral osseous fusion 18 months postoperatively

表 1 不同时间点的 VAS、ODI、ESR 及 CRP

Table 1 VAS, ODI, ESR, and CRP at different follow-ups

	术前 Preoperative	术后 1 个月 1 month postoperatively	术后 3 个月 3 months postoperatively	术后 6 个月 6 months postoperatively	术后 12 个月 12 months postoperatively	*F*值 *F* value	*P*值 *P* value
VAS(分)	7.05±0.97	4.42±0.84①	2.95±0.85①②	1.89±0.88①③	1.16±0.69①④	553.42	<0.05
ODI(%)	42.05±2.61	33.79±3.26①	23.37±3.58①②	12.7±2.23①③	7.21±1.32①④	1812.82	<0.05
ESR(mm/h)	55.84±4.53	43.37±3.99①	25.47±3.60①②	11.2±2.20①③	10.5±2.39①④	2899.14	<0.05
CRP(mg/L)	46.47±3.25	22.99±1.73①	7.75±1.03①②	2.52±0.80①③	2.46±0.78①④	1352.62	<0.05

注:①与术前比较 *P*<0.05;②与术后 1 个月比较 *P*<0.05;③与术后 3 个月比较 *P*<0.05;④与术后 6 个月比较 *P*<0.05

Note: ①Compared with preoperative condition, *P*<0.05; ②Compared with 1 month after surgery, *P*<0.05; ③Compared with 3 months after surgery, *P*<0.05; ④Compared with 6 months after surgery, *P*<0.05

表 2 术前及末次随访的 ASIA 分级

Table 2 Preoperative and final follow-up ASIA grading

术前 Preoperative	例数 Cases	末次随访 Final follow-up				
		A	B	C	D	E
A						
B						
C	9				1	8
D	7					7
E	3					3

报道[14~17]的数据相比,老年布鲁氏菌性脊柱炎患者发生椎管内硬膜外脓肿及神经损伤的风险远高于中青年患者,而发热、出汗发生率远低于中青年患者。老年布鲁氏菌性脊柱炎患者临床表现明显区别于中青年人群,部分原因可能是老年患者由于机体新陈代谢缓慢,加之本身基础疾病较多(高血压、糖尿病、冠心病、营养不良),引起机体免疫力低下,机体对椎体及椎间盘炎性病变反应轻,发病早期症状体征不明显;疾病后期易形成椎管内硬膜外脓肿,出现明显神经损伤体征时被确诊[18]。本组老年患者中,有 13 例最初于外院误诊为腰椎退行性疾病,6 例最初于外院误诊为骨质疏松性椎体压缩骨折。老年患者早期症状体征轻且无特异性,相比于中青年患者更容易漏诊甚至误诊,延误最佳诊治时机。老年布鲁氏菌性脊柱炎患者应着重与骨质疏松性椎体压缩骨折、脊柱转移瘤、脊柱结核相鉴别[3,19,20]。布鲁氏菌性脊柱炎早期骨质破坏不明显时,影像学表现和骨质疏松性椎体压缩骨折很相似,因此对于不典型的骨质疏松性椎体压缩骨折(胸腰段以外椎体),应仔细询问布鲁氏菌相关流行病史,完善血清凝集实验等检查,必要时行穿刺活检除外布鲁氏菌性脊柱炎,因为误诊为骨质疏松性椎体压缩骨折从而行椎体强化术的结果是灾难性的[21]。

对于合并硬膜外脓肿的老年布鲁氏菌性脊柱炎患者,手术时机的选择至关重要,炎症指标(ESR、CRP)明显降低后实施手术对恢复脊髓、马尾和神经根功能是有益的,这更加突出了围术期化疗方案选择的重要性[22~24]。老年布鲁氏菌性脊柱炎患者大多处于慢性期,硬膜外脓肿可与硬膜囊形成紧密粘连,术中清除脓肿时应谨慎操作,避免硬膜囊撕裂引起脊髓感染。围术期规范化抗感染控制布鲁氏菌活动性也有利于减少术后神经型布鲁氏菌病的发生率,本组老年患者术后均无中枢神经系统相关并发症。

老年布鲁氏菌性脊柱炎患者病灶主要为单节段受累,本组患者中有 17 例采用单节段融合,所有患者采用病椎置钉短节段内固定,椎体骨质破坏严重侧会延长一个固定节段增强稳定性。一方面病椎置钉可缩短固定节段,最大程度上保留老年患者脊柱活动度,减少邻近节段退变发生率,增强老年患者生活质量;另一方面病椎置钉能提供更坚强的固定,为病灶修复及椎间融合提供更稳定的环境,在控制感染、预防复发、提升融合率方面有积极意义[14,25]。已有生物力学研究证明单纯椎弓根钉棒系统不能完全对抗短节段失稳,横联的应用具有更佳的抗旋转效果[26]。本组病例中,有 18 例术前明确病灶节段失稳的患者术中附加横联固定,能够显著提升腰椎稳定性、促进病灶修复、促进骨性融合,末次随访时均获骨性融合。相比较于自体骨或同种异体骨植骨,人工椎间融合器的生物力学支撑力更强,恢复椎间隙原有高度。在脊柱感染区域行脊柱融合术通常是禁忌的,因为置入物表面会有细菌生物被膜形成的风险;但

一项体外研究[27]表明,与实心钛 cage 相比,PEEK cage 可以看到同等甚至更低级别的生物膜形成。由于 PEEK cage 在放射透明度和生物力学性能方面优于实心钛 cage,很多学者已将 PEEK cage 应用于脊柱感染的椎间融合并证实其有效性和安全性[28,29]。本研究初步证实了老年布鲁氏菌性脊柱炎患者使用 PEEK cage 椎间融合器的有效性及安全性,所有患者随访期间均无不融合、感染加重、感染复发情况发生。

目前关于布鲁氏菌性脊柱炎手术治疗指征已形成统一共识:椎旁脓肿或腰大肌脓肿、椎间盘破坏、脊柱不稳定、脊髓和神经根受压以及混合感染者[14]。已报道的手术方式包括经前路、后路、前后路联合的开放手术和脊柱内镜、斜外侧腰椎椎间融合术(oblique lumbar interbody fusion,OLIF)、微创腰椎经椎间孔入路椎间融合术(minimal invasive surgery-transforaminal lumbar interbody fusion,MIS-TLIF)等微创手术,每种入路都有其独特优势[19]。本组老年患者均存在椎间隙狭窄及腰椎不稳,84.21%的患者存在神经损伤,手术指征明确。老年患者炎性病灶及硬膜外脓肿均位于脊柱中后柱,而微创手术完全清除病灶比较困难,内固定并发症高发,后入路彻底病灶清除是首选治疗方案[30-32]。术前及术后 1 个月、3 个月、6 个月、12 个月的腰腿痛 VAS 评分、ODI、ESR、CRP、ASIA 分级变化情况均证实了老年布鲁氏菌性脊柱炎患者行一期后路病灶清除减压融合内固定术的有效性。

老年患者骨质疏松、基础疾病多、营养状态差,与脊柱手术的安全性密切相关,应引起高度重视[33-35]。本研究中老年患者合并有高血压、糖尿病、冠心病、低蛋白血症,围手术期都给予了针对性处理,围术期未出现手术部位感染、菌血症、脓毒性休克、心肌梗死、脑梗死等严重并发症,出院后均随访 1 年及以上,无脊柱炎复发、椎弓根螺钉松动/断裂、cage 下沉/移位等并发症。以上证实了一期病灶清除减压融合内固定术治疗老年布鲁氏菌性脊柱炎患者的安全性。

4 结论

针对老年布鲁氏菌性脊柱炎患者,在围术期对症支持治疗及抗感染治疗的基础上,行一期后路病灶清除减压融合内固定术效果较满意,能有效促进病灶炎性修复及神经功能恢复,并发症发生率低。

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（收稿日期:2022-09-04 末次修回日期:2023-02-12）
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