

双侧椎旁阻滞用于经皮椎体后凸成形术 2 例报告

魏 滨 张 华^① 徐 懋* 张丽萍 郭向阳 田 耘*^②

(北京大学第三医院麻醉科, 北京 100191)

【内容提要】 2015 年 12 月我院 2 例老年骨质疏松性椎体压缩骨折患者在双侧椎旁阻滞 (paravertebral block, PVB) 下接受经皮椎体后凸成形术 (percutaneous kyphoplasty, PKP), 2 例在双侧 PVB 下顺利完成 PKP, 术中操作无疼痛不适, 术后恢复良好, 无麻醉相关并发症。我们认为双侧 PVB 临床操作简便, 麻醉效果确切, 对老年患者脆弱的心、脑、肺等重要脏器功能干扰轻微。

【关键词】 椎旁阻滞; 骨质疏松性椎体压缩骨折; 经皮椎体后凸成形术

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Application of Bilateral Paravertebral Block in Percutaneous Kyphoplasty: Two Cases Report Wei Bin*, Zhang Hua, Xu Mao*, et al. * Department of Anesthesiology, Peking University Third Hospital, Beijing 100191, China

Corresponding author: Xu Mao, E-mail: anae@163.com; Tian Yun, E-mail: tianyunbj@sina.com

【Summary】 Two elderly patients with osteoporosis vertebral compression fracture (OVCF) treated with percutaneous kyphoplasty (PKP) under bilateral paravertebral block (PVB) in December 2015 were retrospectively analyzed. The operations were performed successfully under bilateral PVB. The patients had no pain or discomfort during the operation. The postoperative recovery was smooth and no complications related to anesthesia occurred. Bilateral PVB has the advantages of simple and convenient performance, good anesthesia effect, and slight disturbance on the functions of vulnerable organs such as heart, brain and lung in elderly patients.

【Key Words】 Paravertebral block; Osteoporosis vertebral compression fracture; Percutaneous kyphoplasty

伴随着我国的人口老龄化, 骨质疏松性椎体压缩骨折 (osteoporosis vertebral compression fracture, OVCF) 的患病率正逐年增高^[1,2]。OVCF 不仅导致患者剧烈的疼痛, 还会引起脊柱畸形, 严重影响患者的生活质量^[3]。经皮椎体后凸成形术 (percutaneous kyphoplasty, PKP) 作为微创的治疗手段能够快速缓解疼痛, 恢复患者活动功能, 在临床中得到广泛的应用^[4-6]。对于接受 PKP 的老年患者, 麻醉管理具有较大的挑战性, 全身麻醉和局部浸润麻醉是目前常用的麻醉方法^[7]。全身麻醉的优势是患者舒适度高, 但容易导致术中血流动力学波动, 全麻药物的使用和气管插管也会增加相关不良事件的发生风险^[8]; 局部浸润麻醉利于早期发现手术损伤或骨水泥渗漏导致的神经损伤, 劣势是麻醉效果差, 有变更麻醉方式和降低手术依从性的顾虑^[9]。椎旁阻滞

(paravertebral block, PVB) 是将局麻药注射到椎体两侧、出椎间孔的脊神经根附近, 阻断疼痛信号的传导通路, 从而减轻或解除患者的疼痛^[10]。目前, 将 PVB 用于 PKP 的报道很少, 我院 2015 年 12 月对 2 例老年患者 OVCF 采用双侧 PVB 下行 PKP, 麻醉效果满意, 报道如下。

1 临床资料

病例 1: 女, 76 岁。因摔倒伤及腰部疼痛、活动受限 40 d 于 2015 年 12 月入院。患者 40 d 前不慎摔倒, 臀部着地, 伤后感腰部疼痛活动受限, 当时无昏迷、头痛头晕、胸闷憋气、四肢麻木无力、恶心呕吐及大小便失禁。由家人送外院诊治, 相关检查后考虑腰椎压缩骨折, 未住院治疗, 在家卧床休息及口服止痛药 (具体不详), 保守治疗后病情加重出现腰部

* 通讯作者, E-mail: anae@163.com (徐懋); tianyunbj@sina.com (田耘)

① 临床流行病学研究中心

② 骨科

及双侧大腿疼痛,为进一步治疗到我院就诊。既往原发性高血压 30 年,规律服用氨氯地平、厄贝沙坦治疗,自诉血压控制良好;冠心病 25 年,规律服用阿司匹林、阿托伐他汀,20 d 前可疑心绞痛发作 1 次;帕金森病史多年,规律服药治疗。入院查体:BP 165/101 mm Hg,HR 79 次/min,RR 20 次/min,SpO₂ 91%,神志清楚,双上肺呼吸音粗,双下肺可闻及少量湿罗音。辅助检查:腰椎正侧位 X 线片示 L₁ 椎体压缩骨折;腰椎 CT(平扫+重建)及 MR(平扫)示 L₁ 椎体压缩骨折;胸部正位 X 线片示双肺纹理多;骨密度检查示重度骨质疏松;心电图示房性早搏;超声心动图示主动脉瓣中度狭窄,左室射血分数 51%;下肢血管超声示双下肢肌间静脉血栓形成。实验室检查:血常规 Hb 98 g/L;尿常规尿蛋白 1+;生化、凝血检查大致正常;动脉血气检查示 PaO₂ 62 mm Hg。专科查体:自主体位,蹒跚步态。胸腰部无软组织肿胀,腰部 L₁ 棘突水平触痛、叩击痛阳性;功能活动受限;双下肢活动肌力及感觉正常。术前诊断:L₁ 椎体压缩骨折;骨质疏松症;冠心病;高血压病;帕金森病;贫血;下肢肌间静脉血栓形成。患者术前常规禁食水,完善术前检查,评估并存疾病。入室后建立静脉通路,监测脉搏血氧饱和度、无创血压和心电图。采用双侧 T₁₂~L₁ 间隙 PVB:患者俯卧于手术床,胸部下面垫胸枕,双下肢略屈曲。使用 G 形臂机定位 L₁ 椎体,记号笔标记 L₁ 椎体的棘突,旁开棘突约 2 cm 处作为穿刺点。选择超声联合神经刺激器引导下进行 PVB 阻滞,神经刺激器起始电流 1 mA,频率 2 Hz,脉冲宽度 0.1 ms。超声定位选择 M-Turbo 便携式超声仪低频凸阵探头。局部麻醉药物选择 0.4% 罗哌卡因,单侧 PVB 药量为 10 ml。常规消毒局部皮肤,铺巾,无菌耗材包裹超声探头,同时将神经电刺激器与刺激针连接,准备穿刺。采用 1% 利多卡因浸润穿刺点,操作者左手持超声探头,右手持穿刺针,在超声实时引导下进针,PVB 采用传统入路,平面外穿刺技术。超声探头置于脊柱中线 L₁ 椎体水平矢状切面扫描,找到 L₁ 椎体棘突后,侧向移动探头,直至关节突、横突和腰大肌的典型超声图像出现。在超声探头外侧中点处进针,当针尖越过 L₁ 椎体的横突上缘后,注意观察肋间及腹壁肌肉是否发生颤搐,若穿刺针越过 L₁ 横突上缘 1 cm 后,未引出上述靶肌肉颤搐,退针调整方向后继续缓慢进针直至肋间及腹壁肌肉出现颤搐,然后将刺激电流减小至 0.5 mA,若仍能引出靶肌肉的颤搐,且穿刺针回抽无血、脑脊液,给予 0.4% 罗哌卡因 3 ml,观察 5 min。若患者无蛛网膜下腔阻滞征象和其他不适后,再给予 0.4% 罗哌卡因 7 ml,局麻药共计 10 ml。依法行对侧 PVB,穿刺完成后,覆盖无

菌纱布,利用针尖测定患者的麻醉阻滞范围。麻醉满意后行 PKP,患者顺利完成手术,麻醉时间为 73 min,手术时间 49 min,术中出血量 2 ml,术中及术后均无麻醉相关并发症。PVB 完成 10 min 后测定麻醉平面,左侧麻醉平面上界为 T₁₂,下界为 L₃;右侧麻醉平面上界为 T₁₂,下界为 L₄。患者在手术通道建立、球囊扩张椎体和灌注骨水泥等关键手术步骤中均无疼痛不适,手术依从性好,术中未追加镇静镇痛药物。术后 1 d 出院。术后 1 年随访无麻醉相关并发症。

病例 2:女,79 岁。2015 年 12 月因摔伤致胸腰部疼痛 1 d 入院。患者 1 d 前不慎摔伤致胸腰部疼痛,活动受限。受伤部位无软组织开放性损伤、血管损伤。入院前胸腰段正侧位 X 线片提示 T₁₂ 椎体压缩骨折、L₃₋₅ 椎管狭窄术后,为进一步治疗到我院就诊。既往 2014 年因腰椎管狭窄行 L₃₋₅ 手术治疗,术后左脚大脚趾皮肤感觉稍减退;2012 年行房颤射频消融术,平素口服富马酸比索洛尔治疗;原发性高血压、高脂血症 20 余年,规律服用苯磺酸氨氯地平、缬沙坦、阿托伐他汀等药物治疗,自诉血压控制良好。入院查体:BP 145/96 mm Hg,HR 71 次/min,RR 20 次/min,SpO₂ 96%,神志清楚,双上肺呼吸音清,未闻及干湿罗音。辅助检查:胸腰段 CT(平扫+重建)及 MR(平扫)示 T₁₂ 椎体压缩骨折;骨密度检查示重度骨质疏松;心电图示 ST-T 改变;超声心动图示左室肥厚,左室射血分数 56%;下肢血管超声未见静脉血栓形成。实验室检查:血常规、尿常规、生化、凝血检查大致正常。专科查体:自主体位,蹒跚步态。T₁₂ 棘突水平压痛、叩击痛阳性,椎旁肌压痛阳性,腰椎活动略受限;左脚大脚趾皮肤感觉稍减退,余下肢皮肤感觉正常,双下肢肌力正常。术前诊断:T₁₂ 椎体压缩骨折;骨质疏松症;腰椎管狭窄术后(L₃₋₅);房颤射频消融术后;原发性高血压;高脂血症。该患者手术准备同病例 1,采用双侧 T₁₁₋₁₂ 间隙 PVB,同样采取传统入路,平面外穿刺技术。超声探头行矢状切面扫描,寻找 T₁₁ 和 T₁₂ 横突、肋横突韧带和胸膜的超声图像,穿刺针越过肋横突韧带后,注意观察肋间及腹壁肌肉是否出现颤搐。上述靶肌肉出现颤搐后,将刺激电流减小至 0.5 mA,若仍能引出靶肌肉的颤搐,分次缓慢推注局麻药,给药方式同上。给药后超声下可见到胸膜向前侧推移。再依法行对侧 PVB 阻滞,麻醉满意后行 PKP。该患者顺利完成手术,麻醉时间 103 min,手术时间 71 min,术中出血量 5 ml,术中及术后无麻醉相关并发症。PVB 完成 10 min 后测定麻醉平面,左侧麻醉平面上界为 T₁₁,下界为 L₂;右侧麻醉平面上界为 T₁₀,下界为 L₂。患者在手术通道建立、球囊扩张椎体和灌注骨水泥

等关键手术步骤中亦均无疼痛不适,术中亦均未追加镇静镇痛药物。术后 1 d 出院。术后 1 年随访无麻醉相关并发症。

2 讨论

OVCF 是老年人常见的骨折类型^[11],保守治疗效果常不理想,长期卧床会带来肺部感染、尿路感染、下肢深静脉血栓形成等一系列严重并发症,危及患者生命安全^[12,13]。手术治疗可以迅速缓解 OVCF 引起的疼痛,但老年患者麻醉手术风险高,目前临床上尚缺乏公认的 OVCF 患者手术的最优麻醉方案。

OVCF 患者常具有高龄、合并疾病众多和病情危重的特点,准确的术前风险评估和选择合适的麻醉方法对降低 OVCF 患者术后并发症和改善其转归有很大帮助。目前,PKP 的麻醉方法主要有全身麻醉和局部浸润麻醉 2 种,全身麻醉更为常用^[7]。全身麻醉舒适度高,机械通气便于呼吸的管理,对于骨水泥栓塞或过敏等危急状况也利于迅速实施抢救^[14];但全麻药物的大量使用会增加术后麻醉相关不良事件的发生风险,这种风险对于老年患者尤甚^[15,16]。老年人随着年龄的增加,重要的器官功能日渐衰退,全身麻醉对于老年人脆弱的心、脑、肺、肝、肾功能的影响是巨大的,结局也可能是灾难性的^[17]。相比之下,局部浸润麻醉可避免全身用药、气管内插管及机械通气,保证患者处于清醒状态,有利于早期发现手术损伤或骨水泥渗漏导致的不良反应。但局部浸润麻醉的劣势也是不容忽视的,麻醉阻滞效果不完善可能带给病人巨大的痛苦,部分病人甚至因此而不能耐受手术,降低患者的手术依从性,增加手术风险。Lee 等^[18]报道采用小剂量的镇静镇痛药物可以缓解 OVCF 患者因局部浸润麻醉阻滞不全带来的疼痛不适,并取得了不错的疗效。清醒镇静实施短小手术在临床中有广泛的应用^[19,20],但对于俯卧位下接受 PKP 的高龄、合并疾病众多及病情危重的 OVCF 患者而言,应谨慎的使用镇静药物,避免因气道丢失而造成灾难性后果。Hannallah 等^[21]报道将椎管内麻醉应用于 PKP,麻醉后血流动力学波动、老年人脊椎退行性变及 OVCF 致脊柱畸形导致的穿刺困难和损伤是临床中不容忽视的问题。

PVB 应用于临床已有近百年的历史^[22],伴随着麻醉可视化技术的不断进步与成熟,PVB 的应用日益广泛。Murata 等^[23]报道胸椎 PVB 可以有效缓解多发性肋骨骨折造成的急性疼痛,相较于静脉自控镇痛,PVB 可以改善患者的呼吸功能且相关副作用更少。Ohtori 等^[24]报道 PVB 可以有效缓解 OVCF 造

成的急性疼痛。带状疱疹后遗神经痛是一种顽固的神经病理性疼痛,严重影响患者的生活和工作^[25,26]。Makharita 等^[27]报道胸椎 PVB 可以有效降低带状疱疹后遗神经痛的发生风险。Zaporowska-Stachowiak 等^[28]报道 PVB 可以有效管理晚期癌痛。全身麻醉复合 PVB 可以降低开胸手术患者的应激反应,提供完善的术后镇痛和更低的麻醉相关副反应^[29,30]。Kashiwagi 等^[31]报道胸椎 PVB 用于胸腔镜手术可以改善患者术后的呼吸功能。Sun 等^[32]报道双侧胸椎 PVB 在冠状动脉旁路移植患者中的镇痛效果明显优于静脉自控输注吗啡,同时还可以降低术后心血管并发症的发生风险。另外,PVB 在乳腺^[33]和腹部^[34]等手术中都得到成功的应用。

超声技术的引入和神经刺激器的使用令 PVB 操作简便,阻滞成功率提高,并发症发生风险降低^[27]。PVB 可以有效阻滞脊神经的各分支,对呼吸循环功能影响小,术后麻醉并发症少,可以为 PKP 提供完善的麻醉。PVB 还可以根据不同患者和病情的需要提供急、慢性疼痛治疗,癌痛治疗,复合麻醉和术后镇痛,在临床工作中发挥巨大的作用,是重要的辅助治疗手段^[30,33,35]。

综上所述,PVB 临床操作简便,麻醉效果确切,对老年患者脆弱的心、脑、肺等重要脏器功能干扰轻微,只要应用恰当,PVB 可作为老年患者接受 PKP 的麻醉方法。

参考文献

- 1 Svedbom A, Hernlund E, Ivergård M, et al. Osteoporosis in the European Union: a compendium of country-specific reports. Arch Osteoporos, 2013, 8: 137.
- 2 Svedbom A, Ivergård M, Hernlund E, et al. Epidemiology and economic burden of osteoporosis in Switzerland. Arch Osteoporos, 2014, 9(6): 187–195.
- 3 Landham PR, Gilbert SJ, Baker-Rand HL, et al. Pathogenesis of vertebral anterior wedge deformity: a 2-stage process? Spine (Phila Pa 1976), 2015, 40(12): 902–908.
- 4 Abdelgawaad AS, Ezzati A, Govindasamy R, et al. Kyphoplasty for osteoporotic vertebral fractures with posterior wall injury. Spine J, 2017 Nov 14. pii: S1529–9430(17)31150–6. [Epub ahead of print]
- 5 Lee JH, Lee DO, Lee JH, et al. Comparison of radiological and clinical results of balloon kyphoplasty according to anterior height loss in the osteoporotic vertebral fracture. Spine J, 2014, 14(10): 2281–2289.
- 6 Kruger A, Oberkircher L, Figiel J, et al. Height restoration of osteoporotic vertebral compression fractures using different intravertebral reduction devices: a cadaveric study. Spine J, 2015, 15(5): 1092–1098.
- 7 Cheng X, Long HQ, Xu JH, et al. Comparison of unilateral versus bilateral percutaneous kyphoplasty for the treatment of patients with osteoporosis vertebral compression fracture (OVCF): a systematic

- review and meta-analysis. *Eur Spine J*, 2016, 25 (11) : 3439 – 3449.
- 8 Fernandez-Bustamante A, Frendl G, Sprung J, et al. Postoperative pulmonary complications, early mortality, and hospital stay following noncardiothoracic surgery: a multicenter study by the perioperative research network investigators. *JAMA Surg*, 2017, 152 (2) : 157 – 166.
- 9 Zapalowicz K, Radek M. Percutaneous balloon kyphoplasty in the treatment of painful vertebral compression fractures: effect on local kyphosis and one-year outcomes in pain and disability. *Neurol Neurochir Pol*, 2015, 49 (1) : 11 – 15.
- 10 Copik M, Bialka S, Daszkiewicz A, et al. Thoracic paravertebral block for postoperative pain management after renal surgery: A randomised controlled trial. *Eur J Anaesthesiol*, 2017, 34 (9) : 596 – 601.
- 11 Harvey NC, McCloskey E, Kanis JA, et al. Bisphosphonates in osteoporosis: NICE and easy? *Lancet*, 2017, 390 (10109) : 2243 – 2244.
- 12 Lee HM, Park SY, Lee SH, et al. Comparative analysis of clinical outcomes in patients with osteoporotic vertebral compression fractures (OVCFs): conservative treatment versus balloon kyphoplasty. *Spine J*, 2012, 12 (11) : 998 – 1005.
- 13 Papanastassiou ID, Phillips FM, Van Meirhaeghe J, et al. Comparing effects of kyphoplasty, vertebroplasty, and non-surgical management in a systematic review of randomized and non-randomized controlled studies. *Eur Spine J*, 2012, 21 (9) : 1826 – 1843.
- 14 Kasper DM. Kyphoplasty. *Semin Intervent Radiol*, 2010, 27 (2) : 172 – 184.
- 15 Hausman MS, Jr., Jewell ES, Engoren M. Regional versus general anesthesia in surgical patients with chronic obstructive pulmonary disease: does avoiding general anesthesia reduce the risk of postoperative complications? *Anesth Analg*, 2015, 120 (6) : 1405 – 1412.
- 16 Helwani MA, Avidan MS, Ben Abdallah A, et al. Effects of regional versus general anesthesia on outcomes after total hip arthroplasty: a retrospective propensity-matched cohort study. *J Bone Joint Surg Am*, 2015, 97 (3) : 186 – 193.
- 17 Guay J, Choi PT, Suresh S, et al. Neuraxial anesthesia for the prevention of postoperative mortality and major morbidity: an overview of cochrane systematic reviews. *Anesth Analg*, 2014, 119 (3) : 716 – 725.
- 18 Lee JM, Lee SK, Lee SJ, et al. Comparison of remifentanyl with dexmedetomidine for monitored anaesthesia care in elderly patients during vertebroplasty and kyphoplasty. *J Int Med Res*, 2016, 44 (2) : 307 – 316.
- 19 Kim N, Yoo YC, Lee SK, et al. Comparison of the efficacy and safety of sedation between dexmedetomidine-remifentanyl and propofol-remifentanyl during endoscopic submucosal dissection. *World J Gastroenterol*, 2015, 21 (12) : 3671 – 3678.
- 20 Cho JS, Shim JK, Na S, et al. Improved sedation with dexmedetomidine-remifentanyl compared with midazolam-remifentanyl during catheter ablation of atrial fibrillation: a randomized, controlled trial. *Europace*, 2014, 16 (7) : 1000 – 1006.
- 21 Hannallah M, Gibby E, Watson V. Fluoroscopy-guided, small-dose spinal anesthesia for kyphoplasty: a collaborative effort between the anesthesiologist and interventional radiologist. *Anesth Analg*, 2008, 106 (4) : 1329 – 1330.
- 22 Yenidunya O, Bircan HY, Altun D, et al. Anesthesia management with ultrasound-guided thoracic paravertebral block for donor nephrectomy: A prospective randomized study. *J Clin Anesth*, 2017, 37 (1) : 1 – 6.
- 23 Murata H, Salviz EA, Chen S, et al. Case report: ultrasound-guided continuous thoracic paravertebral block for outpatient acute pain management of multilevel unilateral rib fractures. *Anesth Analg*, 2013, 116 (1) : 255 – 257.
- 24 Ohtori S, Yamashita M, Inoue G, et al. L2 spinal nerve-block effects on acute low back pain from osteoporotic vertebral fracture. *J Pain*, 2009, 10 (8) : 870 – 875.
- 25 Gan EY, Tian EA, Tey HL. Management of herpes zoster and post-herpetic neuralgia. *Am J Clin Dermatol*, 2013, 14 (2) : 77 – 85.
- 26 Makharita MY. Prevention of post-herpetic neuralgia from dream to reality: a ten-step model. *Pain Physician*, 2017, 20 (2) : E209 – E220.
- 27 Makharita MY, Amr YM, El-Bayoumy Y. Single paravertebral injection for acute thoracic herpes zoster: a randomized controlled trial. *Pain Pract*, 2015, 15 (3) : 229 – 235.
- 28 Zaporowska-Stachowiak I, Kotlinska-Lemieszek A, Kowalski G, et al. Lumbar paravertebral blockade as intractable pain management method in palliative care. *Onco Targets Ther*, 2013, 6 (9) : 1187 – 1196.
- 29 Fibla JJ, Molins L, Mier JM, et al. A randomized prospective study of analgesic quality after thoracotomy: paravertebral block with bolus versus continuous infusion with an elastomeric pump. *Eur J Cardiothorac Surg*, 2015, 47 (4) : 631 – 635.
- 30 Tamura T, Mori S, Mori A, et al. A randomized controlled trial comparing paravertebral block via the surgical field with thoracic epidural block using ropivacaine for post-thoracotomy pain relief. *J Anesth*, 2017, 31 (2) : 263 – 270.
- 31 Kashiwagi Y, Iida T, Kunisawa T, et al. Efficacy of ultrasound-guided thoracic paravertebral block compared with the epidural analgesia in patients undergoing video-assisted thoracoscopic surgery. *Masui*, 2015, 64 (10) : 1010 – 1014.
- 32 Sun LX, Cong L, Wang MS, et al. Feasibility study of bilateral thoracic paravertebral block for postoperative analgesia in patients after off-pump coronary artery bypass grafting. *Zhonghua Yi Xue Za Zhi*, 2013, 93 (45) : 3569 – 3572.
- 33 Odom EB, Mehta N, Parikh RP, et al. Paravertebral Blocks Reduce Narcotic Use Without Affecting Perfusion in Patients Undergoing Autologous Breast Reconstruction. *Ann Surg Oncol*, 2017, 24 (11) : 3180 – 3187.
- 34 Fentie DY, Gebremedhn EG, Denu ZA, et al. Efficacy of single-injection unilateral thoracic paravertebral block for post open cholecystectomy pain relief: a prospective randomized study at Gondar University Hospital. *Local Reg Anesth*, 2017, 10 (7) : 67 – 74.
- 35 Hanoura S, Elsayed M, Eldegwy M, et al. Paravertebral block is a proper alternative anesthesia for outpatient lithotripsy. *Anesth Essays Res*, 2013, 7 (3) : 365 – 370.

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