

经皮椎体成形术中椎体高度丢失 1 例

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Percutaneous vertebroplasty intraoperative vertebral height loss: a case report

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患者,女,81岁。摔倒致腰背部疼痛3h余。患者因3h前散步时摔倒,出现腰部、臀部痛,立感头部眩晕,持时间短,具体不详,无下肢疼痛麻木,无恶心、呕吐,无呼吸困难、胸痛等。于2021年4月6日就医。病史:高血压30年。入院后查体:体温36.7℃,血压146/70 mmHg(1 mmHg=0.133 kPa)。颈椎无压痛,活动可,心律齐,腰背部压痛明显,腰部活动受限,臀部疼痛,双上肢感觉活动可,肌力5-级。双下肢肌力5-级,双下肢活动可,末梢感觉血运可,生理反射存在,病理反射未引出。行腰椎正侧位DR检查L₁椎体稍变扁,椎体上缘骨质稍凹陷,考虑L₁椎体压缩性骨折(图1a-1b)。腰椎椎体平扫CT检查,L₁椎体稍变扁,椎体骨质不连续,考虑L₁椎体压缩性骨折(图1c)。术前诊断:(1)骨质疏松性椎体压缩性骨折(L₁)。(2)重度骨质疏松症。(3)高血压。排除明显手术禁忌证,于2021年4月9日行经皮椎体成形术(percutaneous vertebroplasty, PVP)。

患者俯卧于手术台,经C形臂X线透视定位L₁椎体左侧椎弓根的体表投影,并作标记后,术区消毒铺巾,用2%利多卡因局麻,自左侧标记点各做一约0.4 cm小切口,透视监测下用穿刺针沿椎弓根穿刺进入椎体,成功建立工作通道后,依次向椎体左侧注入调配均匀骨水泥共约3 ml,骨水泥注射过程中透视见前缘椎体高度无恢复,反而出现塌陷。待骨水泥稍干结后拔出穿刺针,敷贴包扎伤口,术毕患者无不适症状,安返病房。术中骨水泥注射过程中的椎体透

视见图1d-1i。

术后行卧床制动、抗骨质疏松、镇痛、促骨折愈合等对症支持治疗。术后2d复查胸腰段椎体正侧位DR检查:提示L₁椎体术后,胸腰段椎体退行性病变(图1j-1k)。患者术后腰背部疼痛好转,腰围辅助下地活动良好,于术后8d出院。

术后按注射过程拍摄的一系列影像学图片编序为图1a-1k,并用imagj软件测出并计算其中压缩椎体的前后压缩比值(anterior/posterior compression ratio, APCR),前高度压缩百分比(anterior height compression percentage, AHCP),前后压缩比百分比(anterior/posterior compression ratio percentage, APCRP)作为椎体高度变化的衡量^[1]。通过SPSS软件绘制,注射过程中压缩椎体高度的变化趋势(图2),可见在注射过程中,椎体高度有明显下降。

讨论

骨质疏松性椎体压缩性骨折是骨质疏松症引起的骨密度下降,在低能量创伤下导致椎体压缩性骨折^[2]。目前PVP因其良好的止痛效果和稳定椎体高度使得骨质疏松性椎体压缩性骨折拥有高于保守治疗和手术治疗的预后效果,成为治疗骨质疏松性椎体压缩性骨折的首选治疗方式,在临床上得到了广泛的应用^[3-4]。经皮椎体后凸成形术(percutaneous kyphoplasty, PKP)是PVP的改良术式,相较于PVP最大的特点是能恢复椎体高度^[5],PVP能否具有恢复椎体高度的具有争议,李伟等^[6]研究显示PVP具有恢复椎体的效果,GARFIN等^[7]认为PVP不能有效恢复压缩椎体高度,因此PKP作为PVP的改良技术引入到骨质疏松性椎体压缩性骨折的临床治疗

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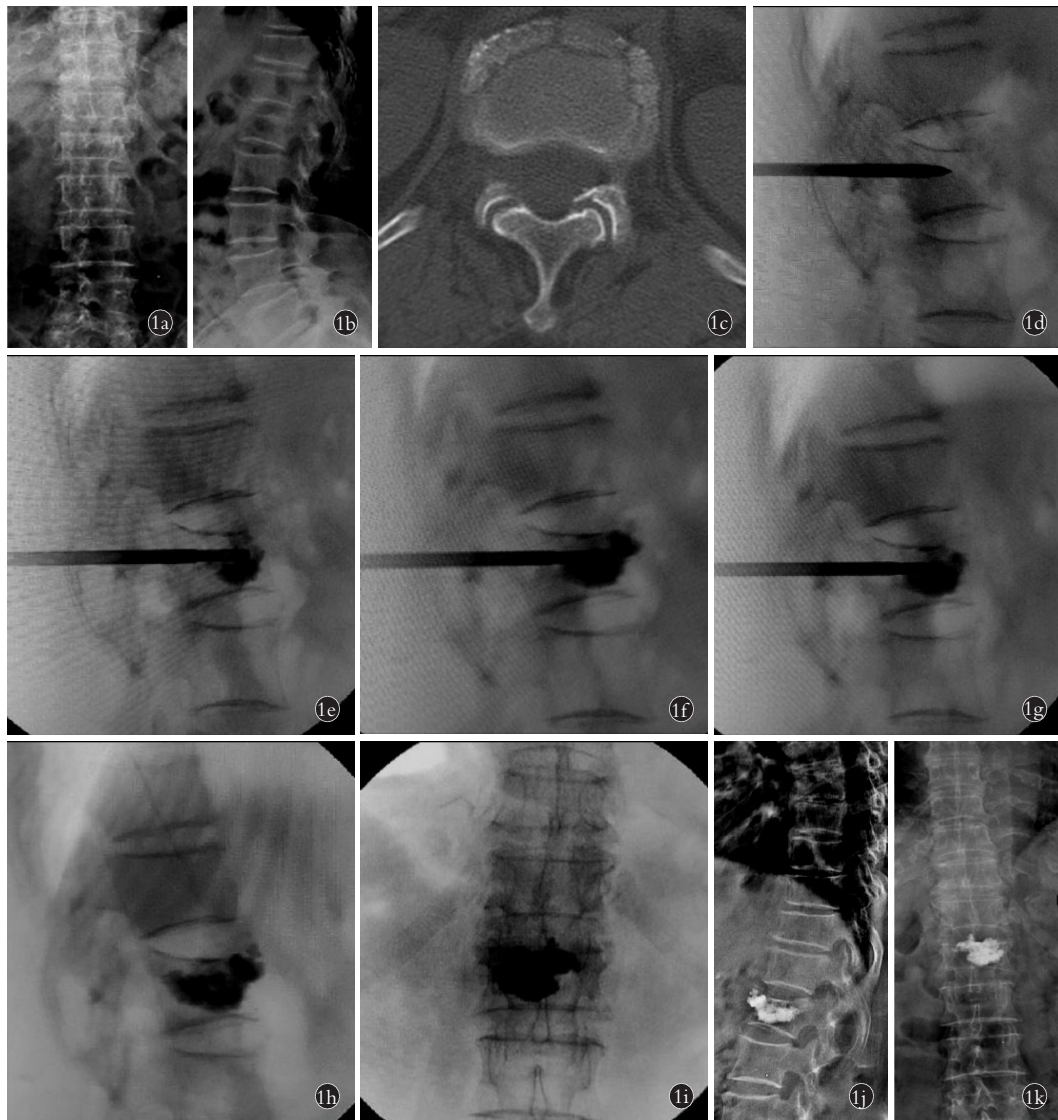


图 1 患者,女,81 岁。摔倒致腰背部疼痛 3 h 余 **1a,1b**. 术前腰椎正侧位 DR 检查,L₁ 椎体稍变扁,椎体上缘骨质稍凹陷。考虑 L₁ 椎体压缩性骨折 **1c**. 术前腰椎椎体平扫 CT 检查,L₁ 椎体稍变扁,椎体骨质不连续,考虑 L₁ 椎体压缩性骨折 **1d**. PVP 术中骨水泥注射过程中,穿刺针进入椎体位置 **1e,1f,1g**. 按骨水泥注射顺序排序的椎体情况 **1h,1i**. 骨水泥注射完成后的椎体情况 **1j,1k**. 术后腰椎正侧位 DR 检查示 L₁ 椎体骨折术后,L₁ 椎体稍变扁,其内可见骨水泥影

Fig.1 An 81-year-old female patient suffered low back pain for over 3 hours due to a fall **1a,1b**. Preoperative AP and lateral X-ray films showed that L₁ vertebral body slightly flattened, vertebral bone discontinuity, diagnosis of compression fracture of L₁ vertebral body **1c**. Preoperative CT showed L₁ vertebral body slightly flattened, vertebral bone discontinuity, diagnosis of compression fracture of L₁ vertebral body **1d**. During intraoperative cement injection in PVP, the position of the puncture needle into the vertebral body **1e,1f,1g**. The condition of the vertebral body in order of cement injection **1h,1i**. The condition of the vertebral body after completion of cement injection **1j,1k**. Postoperative AP and lateral X-ray films showed a slightly flattened lumbar 1 vertebral body after surgery for a fracture of the L₁ vertebral body, with a cemented shadow visible within it

中。但临床上都一致认为 PVP 与 PKP 都能防止压缩椎体高度再下降导致的脊柱后凸畸形恶化^[8-9]。如 SONG 等^[10]研究 PVP 注射不同的骨水泥,骨折的椎体高度有明显改善。FIRANESCU 等^[11]进行的 Vertos 试验(是一种随机对照试验)也得出了 PV 防止渐进椎体高度损失的结论。

目前尚无关于 PVP 术中注射骨水泥时发生椎体高度下降的报道和研究。本病例报道了世界首例

PVP 术中注射骨水泥时出现了椎体高度下降的病例。在对该患者行 PVP 术时,术中影像资料提示存在 PVP 术中注射骨水泥时存在骨折椎体高度下降的可能。为避免透视影像带来的误差,影像资料均选取骨水泥注入过程中所拍摄,C 形臂 X 线机及患者都没有移动。同时没有单纯根据伤椎高度判断是否出现椎体高度下降,而是根据 APCR、AHCP、APCRP 的变化趋势从判断该患者的确存在注射骨水泥时骨

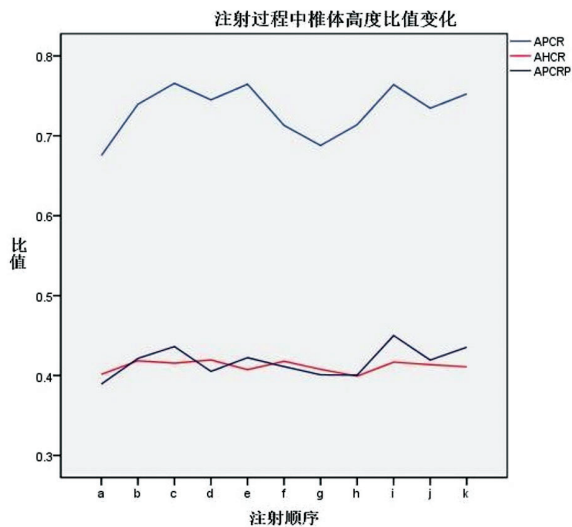


图2 注射过程中压缩椎体高度的变化趋势。注射过程中椎体高度有明显下降,前后压缩比值(anterior/posterior compression ratio,APCR)表现得最明显,前高度压缩百分比(anterior height compression percentage,AHCP)与前后压缩百分比(anterior/posterior compression ratio percentage,APCRP)也呈现相应的下降趋势

Fig.2 Trends in the height of the Vertebral compression during the injection process. There was a significant decrease in vertebral body height during the injection. The anterior/posterior compression ratio (APCR) showed the most pronounced decrease, and the anterior height compression percentage (AHCP) and anterior/posterior compression ratio percentage (APCRP) also showed a corresponding decrease

折椎体高度的下降。

关于 PVP 术中注射骨水泥时椎体高度再下降的原因,有以下推测:(1)可能与患者注射骨水泥时的体位和搬动有关,在 PVP 的术前术后的搬动患者和摆体位,使得压缩椎体在打骨水泥时易发生椎体高度下降。(2)PVP 是高压注射^[12-13],对骨质疏松的骨质是具有潜在性的损伤作用的。可能再注射骨水泥时发生微骨折等导致压缩椎体在注射骨水泥时椎体高度再下降。(3)骨水泥的注入影响了椎体骨折的病变结构,使得其骨折椎体再次压缩导致在 PVP 术中的椎体高度下降。(4)骨水泥在未塑形之前润滑性和塑性之中的放热,使得压缩椎体高度进一步下降。也或许是多因素导致,有以上两种以上的原因共同参与形成。

综上所述,该例确实存在 PVP 术中椎体高度的丢失情况。造成这一情况的具体原因目前仍不清楚,所推测原因均需要相应的临床研究证明。此外,虽然该患者术后预后良好,但仍然相信这一现象对 PVP 和其相关衍生治疗技术的术后预后也有影响。对此相关的研究还很缺乏,希望能有更多的医学工作者关注。

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