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· 病例报告 ·

股骨转子下骨折内固定术中并发股深动脉第 1 穿动脉损伤 2 例报告

严朝浪¹, 梁卫东², 杨风云², 龚剑斌²

(1. 江西中医药大学, 江西 南昌 330004; 2. 江西中医药大学附属医院, 江西 南昌 330006)

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Injury of the first perforating artery of deep femoral artery during internal fixation of subtrochanteric fracture of femur: 2 cases report YAN Chao-lang, LIANG Wei-dong, YANG Feng-yun, and GONG Jian-bin. *Affiliated Hospital of Jiangxi University of Traditional Chinese Medicine, Nanchang 330004, Jiangxi, China*

KEYWORDS Femoral subtrochanteric fracture; Intraoperative complications; Artery injury

患者 1, 男, 42 岁, 体力劳动者, 平素身体状况良好, 因高处坠落致左髋部疼痛, 伴下肢功能障碍 4 h 急诊送入我院。行 X 线检查确诊为左股骨转子下骨折, Seinsheimer II 型。术前方案为股骨重建钉并辅助钢丝环扎。术中以骨折端为中心切开于股后区臀肌粗线区域骨剥骨膜下剥离组织时不慎损伤血管出现活动性出血。立即予纱布填塞压迫止血, 顺利完成钢丝环扎固定及股骨重建钉手术。手术操作过程中损伤的血管因纱布填塞压迫无明显出血, 患者生命体征也保持平稳。但再取出填塞的纱布后, 又活动性出

血。患者血压当即下降, 出现失血性休克。遂继续予纱布填塞, 予输血扩容, 扩大手术切口暴露断裂血管予以缝扎。通常股骨转子下骨折有限切开复位髓内钉内固定术失血量约 800 ml, 而该患者术中失血量达 3 000 ml, 因该血管断裂造成的失血量约 2 200 ml。术后该患者血压稳定, 伴有重度贫血, 经输血及营养支持治疗, 1 周后贫血症状改善; 随访 8 个月, 患者血流动力学稳定, 骨折断端愈合可(见图 1)。

患者 2, 男, 75 岁, 既往有心脏病及高血压病史, 平素身体状况一般, 因在家行走时不慎摔伤致左股骨转子下骨折, Seinsheimer III 型。入院后予以胫骨结节牵引, 完善相关检查及相关科室会诊后于入院后第 7 天在骨科手术牵引床下行加长型 PFNA 内固定

通讯作者: 龚剑斌 E-mail: 57516566@qq.com

Corresponding author: GONG Jian-bin E-mail: 57516566@qq.com



图 1 患者,男,42 岁,左股骨转子下骨折 1a,1b。术前正侧位 X 线片示左股骨转子下骨折,Seinsheimer II 型 1c。术后 3 d 正位 X 线片示股骨重建钉并钢丝固定,对位满意,固定良好;X 线等比例,标尺 1 格为 10 mm;通过影像阅片软件(PacsViewer)画线测得 7 格距离为 69.8 mm,证明软件测量长度为实际长度 1d。术后 3 d 影像阅片软件(PacsViewer)测得小转子与骨折端中心距离 54.6 mm 1e,1f。术后 8 个月正侧位 X 线片示骨折基本愈合,前方皮质愈合稍差

Fig.1 A 42-year-old male patient with left subtrochanteric fracture, type of Seinsheimer II 1c. Postoperative AP X-ray with scale label of 10 mm per segment showed a fracture was fixed with reconstruction interlocking nail and steel wire with good reduction and fixation for 3 days. The length of seven segments of scale label measured by the image viewing software (PacsViewer) was 69.8 mm that means the length measured by our hospital's software equal the actual length 1d. The length

measured at 3 days after operation by the image viewing software (PacsViewer) was 54.6 mm between lesser trochanter and centre of fracture region 1e,1f. At 8 months after operation AP and lateral X-rays showed fracture achieved bony union besides anterior bone cortex

术。术中行导针置入时反复从粉碎骨折端穿出,遂行断端切开复位辅助钢丝固定以利于导针置入。当于股后区臀肌粗线处骨剥钝性剥离组织时不慎损伤血管,出现活动性出血。因之前操作患者已失较多血量,患者当即血压下降,失血性休克;立即予纱布填塞,补液、输血扩容维持血压。扩大手术切口后见血管断端回缩至肌肉内,虽最终将破裂血管予以结扎,但寻找血管断端过程中造成了较多失血。根据当时术中情况,将手术方式改为钢板固定(见图 2)以尽快结束手术减少出血。该患者术中失血量达 3 800 ml,术后转入 ICU 治疗,但因多脏器功能衰竭于术后半个月在 ICU 内死亡。

讨论

小转子下至峡部的骨折为股骨转子下骨折^[1]。股骨转子下区域应力相对集中,肌肉附着多,骨折后易发生牵拉畸形,临床上通过闭合方法很难取得良好复位^[2];而内侧皮质复位对恢复股骨转子下骨折生物力学及其预后具有重要意义^[3]。所以为了更好

地维持内侧皮质复位,临床上常有限切开复位辅助钢丝、钢缆环扎固定。文献报道髁部骨折术中血管损伤发生率 0.2%~0.49%^[4]。以转子间骨折行 DHS、髓内钉内固定术损伤股深动脉最为多见,主要为术后形成假性动脉瘤^[5-10]。损伤的最常见原因为钻孔过深、螺钉过长,其次为尖锐的骨块(主要是移位的小转子)刺破血管壁^[11],此外不正确的拉钩位置^[12]、金属导针穿出髓腔损伤血管^[9]也有报道。本文为 2 例转子下骨折有限切开后行钢丝或钢缆环扎辅助固定,于臀肌粗线区域骨剥分离软组织致股深动脉第 1 穿动脉断裂并失血性休克。笔者查阅相关文献未见相关报道。

股深动脉第 1 穿动脉的解剖特点:股深动脉从股动脉的后壁或后外侧壁发出,于小转子下后内侧与股动脉分开并向内下行经股内侧肌与内收肌群之间,逐步接近股骨体后内侧面。其沿途发出旋股内、外侧动脉及 3~4 支穿动脉,而穿动脉常横穿大收肌止于股外侧肌或横穿股骨干为滋养动脉^[8,13]。陈秀清



图 2 患者,男,75 岁,左股骨转子下骨折 **2a.** 术前正位 X 线片示左股骨转子下骨折,Seinsheimer III 型 **2b.** 术后 3 d 侧位 X 线片示股骨近端外侧解剖板固定,对位满意,固定良好;红色标记为远端骨折线,靠近螺钉 **2c.** 术后 3 d 正位 X 线片示股骨近端外侧解剖板固定,对位满意,固定良好;红色标记为近端骨折线;X 线片等比例,标尺 1 格为 10 mm,通过影像阅片软件(PacsViewer)画线测得 14 格距离为 139.9 mm,证明软件测量长度为实际长度 **2d.** 影像阅片系统(PacsViewer)测得小转子与骨折端中心距离 45.8 mm

Fig.2 A 75-year-old male patient with left subtrochanteric fracture **2a.** Preoperative AP X-ray showed left subtrochanteric fracture, type of Seinsheimer III **2b.** Postoperative lateral X-ray showed a fracture was fixed with anatomical locking plates of the proximal femur with good reduction and fixation for 3 days and the distal fracture line adjacent to screw pointed out by the red arrow **2c.** Postoperative AP X-ray with scale label of 10 mm per segment showed a fracture was fixed with anatomical locking plates of the proximal femur with good reduction and fixation for 3 days and the proximal fracture line pointed out by the red arrow. The length of fourteen segments of scale label measured by the image viewing software (PacsViewer) was 139.9 mm that means the length measured by software equal the actual length **2d.** The length measured by the image viewing software (PacsViewer) was 45.8 mm between lesser trochanter and centre of fracture region

等^[14]的一项解剖研究指出,股深动脉在小转子下方(4.6±1.0)cm 处发出第 1 穿动脉。王剑利等^[15]报道股深动脉第 1 穿动脉的起始位置位于小转子下缘(4.29±0.40) cm 处。故股深动脉第 1 穿动脉起始位置相对恒定。此外,王剑利等^[15]指出第 1 穿动脉由股骨干内侧缘经臀大肌下约 2 cm 部位穿出大收肌,而第 2 穿动脉在距小转子(9.99±0.73) cm 发出。经我院影像阅片软件(PacsViewer)测量,此 2 例患者小转子与骨折端中心的距离分别为 5.46、4.58 cm,范围符合第 1 穿动脉起始位置。该 2 例患者经不同高年资医师术中以骨折端中心切开,均于臀肌粗线附近进行骨剥离组织时致血管损伤。虽此 2 例患者未行血管造影,但据上所述,推测为股深动脉第 1 穿动脉损伤。

转子下骨折第 1 穿动脉易损伤的原因:股深动脉的解剖因素与其在髋部骨折中易损伤有一定的联系。Patelis 等^[16]认为股深动脉及其穿动脉紧邻股骨粗线,易遭受创伤性或医源性损伤。Yang 等^[17]指出下肢中立位时,股深动脉主干与股骨干距离为 2 cm,在下肢内收至 40°时距离为 0.95 cm。因此过深钻孔或过长螺钉是损伤股深动脉的主要原因^[9],患肢内收内旋时风险增加。本文 2 例患者均于臀肌粗线附近进行骨剥离组织时致股深动脉第 1 穿动脉损

伤,损伤血管及原因均与既往报道^[5-12,17-18]不同。根据股深动脉及其穿动脉的解剖特点,股深动脉主干有内收肌群保护,并与股骨干有一定距离;但其穿动脉常横穿股骨干为滋养动脉或横穿大收肌止于股外侧肌^[8,13],且第 1 穿动脉经臀大肌下缘穿出^[15]。笔者认为,在转子下骨折行断端切开复位、或辅助钢丝、钢缆固定行软组织剥离时穿动脉较股深动脉主干更易损伤,尤其是在臀肌粗线附近极易损伤股深动脉第 1 穿动脉。如骨剥滑脱至股骨粗线内侧则有损伤股深动脉主干的风险。

术中第 1 穿动脉损伤治疗方法选择:对髋部骨折术后股深动脉假性动脉瘤,首选动脉造影栓塞治疗^[7],亦可超声引导下凝血酶注射^[19],但合并大腿骨筋膜室综合征应切开减压^[7]。本文为股骨转子下骨折术中医源性损伤股深动脉第 1 穿动脉断裂出血致患者失血性休克。因为在术中,文献^[7,19]报道相关血管内止血方法国内大多数医院难以实施。扩大手术切口缝扎止血也是可选择的方法。患者 1 随访 8 个月,血流动力学稳定,示缝扎止血效果可靠。但显露血管断端过程中会造成一定失血。此过程中需要团队技术、经验及密切配合,否则会造成更多失血。患者 2 在牵引床下手术,血管相对紧张,断裂后可能因自身弹性回缩造成出血点显露困难导致进一步失

血。术中输血维持血压是必须的,2 例患者均输血 8 单位以上。而国内大多基层医院,临时并快速调配血源有一定难度。回顾病例,2 例患者行纱布压迫血管断端过程中未出现明显的出血,并且患者 1 在纱布填塞压迫止血下完成手术。故笔者建议应及时和患者家属沟通,将纱布留在体内以压迫止血,避免进一步失血及输血,术后进行血管栓塞后再行取出。

综上所述,总结经验教训:(1)股深动脉第 1 穿动脉于小转子下 4~6 cm 从股深动脉发出;对髋部骨折,于臀肌粗线区域(小转子下 4~6 cm)手术操作时应小心,严格遵守骨膜下剥离,避免损伤股深动脉第 1 穿动脉;在牵引床下操作时更应注意。(2)股深动脉第 1 穿动脉损伤后出血量较大,进行缝扎止血效果可靠;缝扎过程会进一步造成失血,为避免进一步失血及输血,笔者认为应及时和患者家属沟通,特别是年龄大,机体耐受性差的患者,将纱布留在体内以压迫止血,术后进行血管栓塞后再行取出。

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