

# 桡骨远端骨折术后拇长屈肌腱断裂 2 例

谈伟健, 李雄峰

(湖州市中心医院创伤骨科, 浙江 湖州 313000)

关键词 桡骨; 骨折术后; 肌腱断裂

中图分类号: R686.1

DOI: 10.12200/j.issn.1003-0034.2023.12.014

开放科学(资源服务)标识码(OSID):



## Rupture of flexor pollicis longis tendon after distal radius fracture: two cases report

TAN Wei-jian, LI Xiong-feng (Department of Orthopaedics and Traumatology, Huzhou Central Hospital, Huzhou 313000, Zhejiang, China)

KEYWORDS Radius; Postoperative fracture; Tendon rupture

病例 1, 患者, 男, 75 岁, 因“左桡骨远端骨折术后 7 年, 左拇指屈曲受限 2 周”于 2022 年 1 月 10 日入院。近期无外伤史, 无类风湿关节炎、关节结核等病史。查体发现左腕活动功能良好, 左拇指指间关节伸直位, 屈曲受限。X 线片示骨折已愈合, 根据 SOONG 等<sup>[1]</sup>制定的 Soong 分级为 2 级(图 1), 诊断为左拇长屈肌腱断裂, 予手术取出钢板并探查修复拇长屈肌腱, 术中发现远端断端缩入腕管, 无法直接缝合, 遂取掌长肌腱移植修复拇长屈肌腱, 术后休息位石膏固定 4 周, 拆除石膏后进行康复锻炼。术后随访 16 个月, 患者主观感觉满意, 拇指指间关节活动度为 80°, 臂、肩、手功能障碍(disabilities of the arm, shoulder, and hand, DASH)评分为 32 分。

病例 2, 患者, 女, 69 岁, 因“右桡骨远端骨折术后 2 年, 右拇指屈曲受限 8 d”于 2022 年 2 月 15 日入院。近期无外伤史, 无类风湿关节炎、关节结核等病史。查体发现右腕活动功能可, 右拇指指间关节伸直位, 屈曲受限。X 线片示骨折已愈合, 内固定在位, Soong 分级 3 级(图 2), 诊断为右拇长屈肌腱断裂, 予手术取出钢板并探查修复拇长屈肌腱, 术中探查见拇长屈肌腱自钢板远端水平处断裂, 略微回缩, 直接拉拢缝合发现拇指过度屈曲, 遂取掌长肌腱移植修复, 术后休息位石膏固定 4 周, 拆除石膏后进行康复锻炼。术后随访 15 个月, 患者主观感觉满意, 拇指指间关节活动度为 85°, DASH 评分为 33 分。

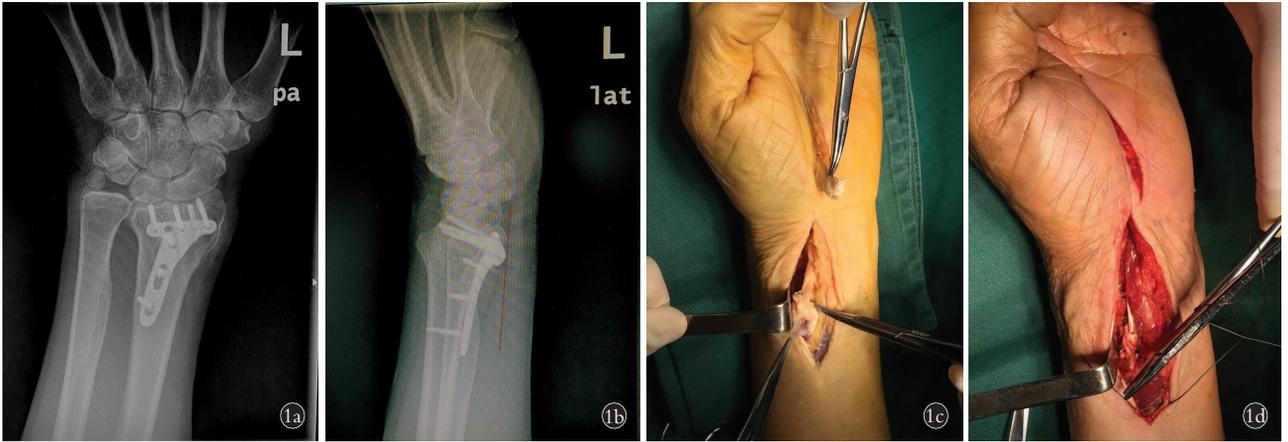
## 讨论

桡骨远端骨折是最常见的四肢骨折, 骨折类型包括背侧(Colles)或掌侧(Smith)关节外骨折, 关节

内(Barton)骨折以及粉碎性复杂关节内骨折。桡骨远端骨折的这些类型可能需要不同的内固定装置, 如钢板、外固定架、克氏针或各种螺钉, 目前掌侧锁定钢板已经被广泛使用。无论是掌侧还是背侧钢板固定, 最常见的术后晚期并发症与肌腱有关, 掌侧钢板肌腱并发症主要是拇长屈肌腱及指深屈肌腱的磨损, 发生率为 0.5%~2.2%<sup>[2]</sup>。

桡骨远端骨折目前绝大多数情况都可以通过掌侧钢板固定来解决, 可以很好地固定关节面及背侧的骨折块, 并且有助于恢复掌倾角, 但也带来了一定的并发症风险, 如屈肌腱的损伤、正中神经压迫等, 拇长屈肌腱断裂较为罕见。有文献<sup>[3]</sup>报道保守治疗后拇长屈肌腱断裂发生率为 0.18%, 而掌侧钢板固定后拇长屈肌腱断裂的发生率升高至 12%, 主要原因可能是钢板的位置超过“分水岭”和旋前方肌无法覆盖远端钢板, 导致拇长屈肌腱磨损<sup>[4]</sup>。也有学者<sup>[5]</sup>认为手术破坏了拇长屈肌腱的血供, 导致肌腱变性。但是解剖稳定的固定优先于理想的钢板位置<sup>[6]</sup>。DBEIS 等<sup>[7]</sup>报道了 1 例桡骨远端骨折掌侧钢板固定术后 7 年的患者出现拇指狭窄性腱鞘炎, 准备手术前超声发现拇长屈肌腱断裂, 认为狭窄性腱鞘炎可能是拇长屈肌腱断裂的信号。

“分水岭”线可能在术中不容易找到, 它对应于掌侧桡骨外侧半部旋前窝的远端边缘, 以及内侧半部远端线和近端线之间的假设线, 但变异性较大。有研究发现<sup>[8]</sup>尺骨突起平均位于旋前方肌远侧边缘 7.2 mm 处, 尺骨切迹桡侧 8.3 mm 处。然而, 在放置掌侧板时, 应记住桡侧突起, 位于“分水岭”线上的另一个相关点平均比尺侧突起近 2.0 mm。国外有学者结合术后钢板位置提出 Soong 分级, 在腕关节侧位 X 线片中把掌侧钢板掌侧缘做与桡骨掌侧皮质的平行



**图 1** 患者,男,75 岁,左桡骨远端骨折术后拇长屈肌腱断裂 **1a,1b**.腕关节正侧位 X 线片示骨折愈合,侧位 X 线片中红线为钢板掌侧与桡骨轴线的平行线,与桡骨最掌侧缘的平行线重叠,Soong 分级为 2 级 **1c,1d**.术中见拇长屈肌腱断端增粗,明显短缩,手掌做辅助切口寻找肌腱远端,予掌长肌腱移植调整适宜张力

**Fig.1** A 75-year-old male patient with flexor pollicis longus tendon rupture after left distal radius fracture **1a,1b**. AP and lateral X-rays of wrist joint showed fracture healing, the red line in lateral X-ray was parallel line between volar side of plate and axis of radius, which overlapped with the parallel line of the most volar edge of the radius and classified to Song's grade 2 **1c,1d**. During operation, stump of flexor pollicis longus tendon was thickened and significantly shortened. The palm was used as an auxiliary incision to find distal end of tendon, and palmaris longus tendon was transplanted to adjust the appropriate tension



**图 2** 患者,女,69 岁,右桡骨远端骨折术后拇长屈肌腱断裂 **2a,2b**.腕关节正侧位 X 线片示骨折愈合,侧位 X 线片中红线为钢板掌侧与桡骨轴线的平行线,黄线为桡骨最掌侧缘与桡骨轴线的平行线,红线超出黄线,Soong 分级为 3 级 **2c,2d**.术中见拇长屈肌腱断裂回缩,断端略增粗,无法直接缝合,予掌长肌腱移植调整适宜张力

**Fig.2** A 69-year-old female patient with flexor pollicis longus tendon rupture after right distal radius fracture **2a,2b**. AP and lateral X-rays of wrist joint showed fracture healed, the red line in lateral X-ray was parallel line between volar side of plate and axis of radius. The yellow line was parallel line between the most volar edge of radius and axis of radius. The red line exceeded the yellow line, and classified to Song's grade 3 **2c,2d**. During operation, flexor pollicis longus tendon was broken and retracted, and the broken end was slightly thickened, which could not be directly sutured. The palmaris longus tendon transplantation was performed to adjust the appropriate tension

线跟桡骨最掌侧缘的平行线比较分为 3 级:1 级为钢板掌侧缘线未超过后者,2 级为与后者重叠,3 级为超过后者。有文献<sup>[9]</sup>采用此分级发现 2-3 级的患者出现肌腱并发症的概率明显高于 1 级的患者。较高的 Soong 分级是屈肌腱问题的危险因素<sup>[10]</sup>。因此,笔者建议钢板放置在内侧骨性凸起的近端。

相对复杂的 AO 分型的 C2、C3 型骨折需要切开旋前方肌显露关节面进行复位,但是对于是否需要

修复旋前方肌一直存在争议。有文献<sup>[11]</sup>使用超声检查术后钢板与拇长屈肌腱的平均距离为 1.3 mm,他们均修复了旋前方肌,但是旋前方肌远端的筋膜切开很难完美地缝合包裹钢板,容易形成裸露区,长期摩擦可导致拇长屈肌腱炎症甚至断裂。笔者认为修复旋前方肌是必要的,尤其是覆盖钢板远端,可以增加钢板与肌腱的垂直距离,减少肌腱与钢板的接触。拇长屈肌腱的血液供应来自骨间前动脉和桡动

脉的分支。在掌侧钢板固定的手术中,桡动脉的最远端分支经常会受损。骨间前动脉的最远端分支位于旋前方肌的近端边缘附近,建议小心分离旋前方肌以减少损伤该血管的风险<sup>[5]</sup>。随着微创理念的流行,术中尽量避免切开旋前方肌近端,通过插板的方式放置钢板,可能会减少对拇长屈肌腱血供的影响。拇长屈肌腱断裂往往通过查体就可诊断,贾小超等<sup>[12]</sup>提出可以通过超声检查明确拇长屈肌腱断裂,同时可以标记断端位置,为手术提供充分的准备。本研究病例中可以观察到术后 X 线片中钢板的位置偏远端,属于 Soong 2、3 级,肌腱损伤的风险较高,术后均未取出钢板,最终导致拇长屈肌腱断裂。断裂的位置均在“分水岭”远端、关节面近端,处于钢板掌侧缘最顶端的位置,长时间的活动,肌腱与钢板的物理接触导致肌腱断裂,尤其是伸腕时肌腱与钢板几乎直接接触。因此,许多文献<sup>[8,11,13]</sup>建议取除肌腱断裂风险高的钢板。

桡骨远端骨折在临床上非常常见,目前手术治疗采用切开复位掌侧钢板内固定,手术时应注意钢板的放置,术中正确识别“分水岭”及尺侧骨性凸起,当骨折复位较为容易时可保留近端 1/3 的旋前方肌,可以保留拇长屈肌腱的血供。笔者认为修复旋前方肌也很重要,为钢板与拇长屈肌腱之间提供了空间,减少物理上的接触;其次,在骨折愈合后建议尽早取出钢板,减少肌腱断裂的发生。

#### 参考文献

- [1] SOONG M, EARP B E, BISHOP G, et al. Volar locking plate implant prominence and flexor tendon rupture[J]. J Bone Joint Surg Am, 2011, 93(4): 328-335.
- [2] BROWN D J, ORMSBY N, BROWN O C, et al. Incidence of tendon ruptures after locking plate fixation of distal radial fractures; are the cited rates still accurate[J]. J Hand Surg Eur Vol, 2021, 46(2): 167-171.
- [3] IMAO K, MIWA H, WATANABE K, et al. Investigating the minimum distance between the finger flexor tendons and distal radius during wrist and finger positions in healthy people[J]. J Med Ultra-son, 2019, 46(3): 353-359.
- [4] ZELENSKI N A, SCHMIDT E, CHIN M, et al. Flexor pollicis longus tendon wear associated with volar plating: a cadaveric study[J]. J Hand Surg Am, 2021, 46(2): 106-113.
- [5] KIKUCHI Y, SATO K, DOITA M. An anatomical study of flexor pollicis longus blood supply with specific reference to volar locking plate surgery[J]. J Orthop, 2020, 20: 119-121.
- [6] BERGSMA M, DOORNBERG J N, BORGHORST A, et al. The watershed line of the distal radius: cadaveric and imaging study of anatomical landmarks[J]. J Wrist Surg, 2020, 9(1): 44-51.
- [7] DBEIS A, NGO J, CHIANG E, et al. Trigger thumb preceding flexor pollicis longus tendon rupture after distal radius volar plate fixation: a case report[J]. Int J Surg Case Rep, 2022, 94: 107050.
- [8] CROSS A W, SCHMIDT C C. Flexor tendon injuries following locked volar plating of distal radius fractures[J]. J Hand Surg Am, 2008, 33(2): 164-167.
- [9] BERGSMA M, BROWN K, DOORNBERG J, et al. Distal radius volar plate design and volar prominence to the watershed line in clinical practice: comparison of soong grading of 2 common plates in 400 patients[J]. J Hand Surg Am, 2019, 44(10): 853-859.
- [10] VASARA H, TARKIAINEN P, STENROOS A, et al. Higher Soong grade predicts flexor tendon issues after volar plating of distal radius fractures—a retrospective cohort study[J]. BMC Musculoskelet Disord, 2023, 24(1): 271.
- [11] KARA A, CELIK H, OC Y, et al. Flexor tendon complications in comminuted distal radius fractures treated with anatomic volar rim locking plates[J]. Acta Orthop Traumatol Turc, 2016, 50(6): 665-669.
- [12] 贾小超, 周威力, 陈延超. 超声在评估桡骨远端骨折掌侧锁定板内固定术后拇长屈肌腱损伤中的应用[J]. 中国骨与关节损伤杂志, 2022, 37(1): 98-100.
- [13] JIA X C, ZHOU W L, CHEN Y C. Application of ultrasound in evaluating the injury of flexor pollicis longus tendon after palmar locking plate internal fixation for distal radius fracture[J]. Chin J Bone Jt Inj, 2022, 37(1): 98-100. Chinese.
- [13] FLOQUET A, DRUART T, LAVANTES P, et al. Flexor tendon rupture after volar plating of distal radius fracture: a systematic review of the literature[J]. Hand Surg Rehabil, 2021, 40(5): 535-546.

(收稿日期: 2023-06-11 本文编辑: 朱嘉)