

## · 技术创新 ·

屈肌腱松解移位治疗儿童先天性指屈肌腱短缩<sup>△</sup>

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**摘要:** [目的] 介绍指屈肌腱移位术治疗儿童先天性指屈肌腱短缩的临床技术和初步临床结果。[方法] 对2例儿童先天性指屈肌腱短缩者行上述治疗。完善术前准备, 在患指掌侧腕部正中做纵行小切口, 保护血管神经, 显露患指的指深屈肌和指浅屈肌腱性部分, 判断整体肌腱短缩程度。适当位置分别离断指浅屈肌腱和指深屈肌腱, 在休息位, 将指浅屈肌腱近端与指深屈肌腱远端移位吻合牢固, 利用指浅屈肌为动力肌屈伸患指, 实现改善屈曲指外观和功能的目的。[结果] 2例患者各患指均顺利完成手术, 术中无血管、神经损伤。指近端指间关节 (proximal interphalangeal, PIP) 屈伸度术前 0°~30°, 术后1年随访时为 0°~100°, 指畸形外观改善显著, 肌力无减弱。[结论] 指屈肌腱移位术治疗儿童先天性指屈肌腱短缩操作简单、疗效确切, 术后患指功能、外观均显著改善。

**关键词:** 先天性指屈肌腱短缩, 屈肌腱移位术, 近端指间关节, 疗效

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**Flexor tendon release and transposition for congenital flexor tendon shortening in children** // GAN Yong-qiao, YU Song, HUANG Hui, XU Yan-peng, ZHANG Tian-jiu. Department of Pediatric Orthopaedic Surgery, Affiliated Hospital, Zunyi Medical University, Zunyi, Guizhou 563003, China

**Abstract:** [Objective] To introduce the surgical technique and preliminary clinical outcomes of flexor tendon release and transposition in the treatment of congenital flexor tendon shortening in children. [Methods] Two children with congenital flexor tendon shortening were treated surgically. After preoperative preparation, a small longitudinal incision was made in the middle of the palm wrist corresponding to the affected finger to expose the superficial and deep flexor tendons of the involved fingers with protection of the blood vessels and nerves, and judging the overall extent of tendon shortening. As the superficial and deep tendons were cut in proper level, the proximal end of the superficial flexor tendon was firmly sutured with the distal end of the deep flexor tendon of the finger under proper tension in the rest position. The superficial flexor muscle of the finger was used as the power muscle to flex the affected finger, so as to improve the appearance and function of the flexor finger. [Results] The operation was successfully completed in each affected finger of the 2 patients, without vascular or nerve injury during the operation. The range of motion of the proximal interphalangeal (PIP) joint improved from 0°~30° before operation to 0°~100° 1 year postoperatively, with significant improvement in the appearance of the deformity and no decline in muscle strength. [Conclusion] This tendon release and transposition in the treatment of congenital flexor tendon shortening in children is simple and effective, and the function and appearance of the affected finger are significantly improved after operation.

**Key words:** congenital flexor tendon shortening, flexor tendon transposition, proximal interphalangeal joint, clinical outcome

儿童先天性指屈肌腱短缩<sup>[1]</sup>, 临床罕见, 病因不明, 临床表现主要是屈曲指畸形, 以指近端指间关节 (proximal interphalangeal, PIP) 屈曲为主<sup>[2]</sup>, 伴手指活动功能障碍。本病临床罕见, 目前缺乏其病因、诊治相关详细文献报道。有学者认为可能是伸、屈肌力量失衡导致<sup>[3]</sup>, 有文献报道, 通过肌腱转位术将第三

指深屈肌腱转移到第四指深屈肌腱治疗本病<sup>[4]</sup>, 也有文献报道, 采用指浅屈肌移位术治疗屈曲指畸形<sup>[5]</sup>, 而非治疗先天性屈肌腱短缩症。本文介绍的屈肌移位术是将指浅屈肌腱近端和指深屈肌腱远端移位并吻合, 治疗儿童先天性屈肌腱短缩。通过研究本院既往收治的2例患儿发现, 本病常并发肌腱短缩、肌腱细

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小、肌力较弱等发育异常，目前比较认同的治疗是行肌腱延长术，但术中若遇到指屈肌腱发育细小，行肌腱延长术将面临操作困难，且进一步削弱屈肌肌力，导致术后患指活动功能差。另外，行肌腱延长术对腱膜的破坏较多，也可能导致术后肌腱粘连、屈曲指复发等并发症。基于以上问题，笔者采用屈肌腱移位、延长术治疗本病，重建近端指间关节屈伸功能、改善患指畸形，随访取得良好疗效。现就具体技术操作及疗效报道如下。

## 1 手术技术

### 1.1 术前准备

仔细询问病史、认真查体，鉴别引起屈曲指的其他疾患，明确诊断指屈肌腱短缩。完善术前相关检查，排除手术禁忌证，测量并记录术前患指活动度及力量。

### 1.2 麻醉与体位

全麻，仰卧位，患肢外展置于外展台。

### 1.3 手术操作

常规消毒铺无菌巾，于患肢近端使用止血带，在掌侧腕部正中行纵行小切口约 2.0 cm，逐层分离皮肤及皮下组织，避免损伤前臂正中神经、正中静脉及尺桡动静脉，保护屈肌支持带，显露患指相应的指深屈

肌、指浅屈肌肌腱，用止血钳挑起腱性部分，通过主动屈伸患指远端指间关节和近端指间关节，精准定位患指的指深屈肌和指浅屈肌肌腱，并标记清楚；于指深屈肌腱性部分近端处离断，以保证离断后指深屈肌远端保留足够长的腱性部分。牵拉离断后的近端指深屈肌，仔细查看有无纤维化挛缩，可进一步帮助排除缺血性肌挛缩导致的屈曲指畸形，确认无指深屈肌肌挛缩后使其自然回缩。牵拉探查时保持屈腕、屈指，有利于肌肉显露。过度屈曲腕关节和患指，将指浅屈肌腱性部分拉出切口足够长，在靠近切口远端处离断并钳夹固定，使离断后的远端指浅屈肌自然回缩，并查看有无肌挛缩。此时，残留离断后的指浅屈肌腱近端和指深屈肌腱远端显露于切口外。将屈曲指伸直并保持腕关节背伸，修剪残留的指浅屈肌腱近端和指深屈肌腱远端多余肌腱，使之保持适当张力吻合牢固，即完成指深、浅屈肌移位和短缩肌腱延长。术中注意保护腱膜，以促进术后肌腱愈合及减少肌腱粘连发生。吻合肌腱可根据术者习惯选用 Kessler 缝合<sup>[6]</sup>、Bunnell 缝合法<sup>[7]</sup>及其他改良的肌腱吻合技术，根据肌腱发育情况选择粗细适中的无损伤可吸收线缝合肌腱。冲洗术区，逐层缝合切口，无菌敷料包扎，石膏托或支具超腕关节固定患指于伸直位。肌腱移位术示意图见图 1。

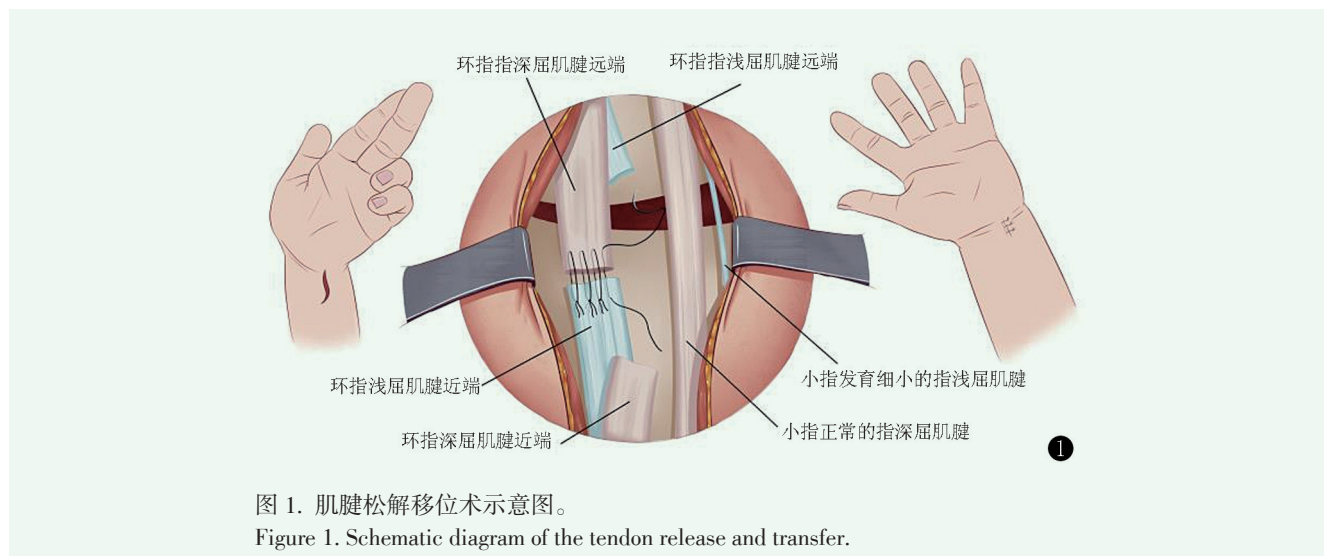


图 1. 肌腱松解移位术示意图。

Figure 1. Schematic diagram of the tendon release and transfer.

### 1.4 术后处理

术后密切观察指端血运、感觉情况，若出现缺血、手指麻木等，及时松解绷带固定，必要时将患指处于屈曲位；腕部手术切口每 3~5 d 换药 1 次，直至愈合。手指、腕关节伸直位石膏或支具固定制动 4~6 周，拆除外固定后即行患指屈伸活动训练，可使用健

侧肢体协助训练。

## 2 临床资料

### 2.1 一般资料

2018 年 1 月—2019 年 1 月本院收治 2 例明确诊

断为先天性指屈肌腱短缩症患者，其中1例4岁6个月男患儿，左手环、小指2个手指受累，合并屈指肌腱发育不良、形如细线状；另1例10岁男患儿，左手中、环、小指3个手指受累。2例均表现为重度畸形，患指呈屈曲指畸形，不能伸直，否认外伤史，局部皮肤无挛缩、瘢痕等。腕关节背伸位时屈曲指畸形加重，腕部触及紧张的肌腱，腕关节极度屈曲时患指基本伸直，触及患指肌力较正常手指减弱。随年龄增加，家属发现手指外观屈曲加重，以近端指间关节屈曲明显。术前X线片未见指骨畸形及指间关节脱位

等。本研究经本院伦理委员会批准（批准号：KLL-2023-598），患者及家属均知情同意并签署知情同意书。

## 2.2 初步结果

2例5个手指均顺利完成手术，术中无血管、神经损伤，术后无切口感染等并发症，切口均一期正常愈合。PIP屈伸度术前 $0^{\circ}\sim 30^{\circ}$ ，术后1年随访时为 $0^{\circ}\sim 100^{\circ}$ （图2），根据中华医学会手外科学会上肢部分功能评定标准<sup>[8]</sup>，患指PIP伸屈度评价结果优。屈曲指畸形外观改善显著，肌力无减弱。

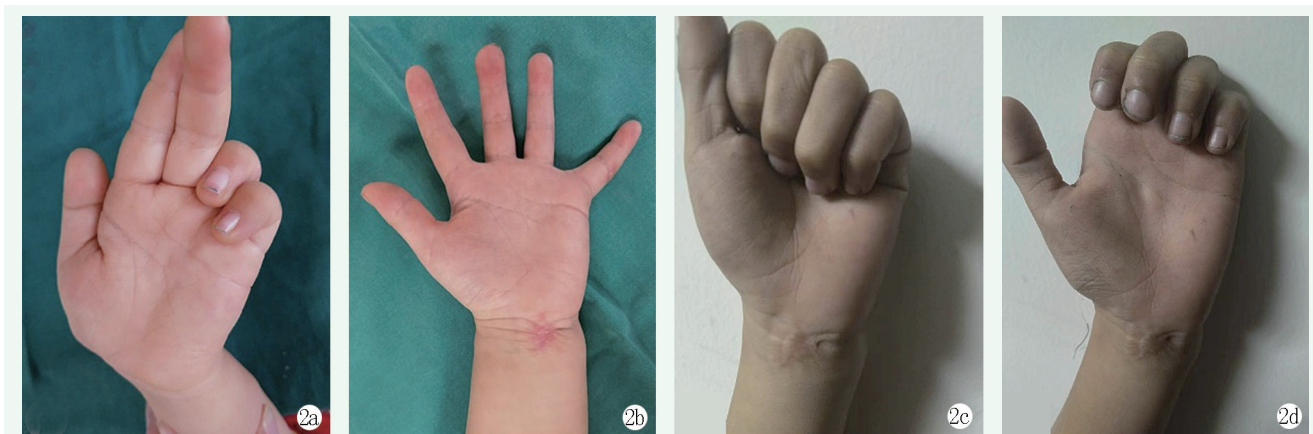


图2. 患儿男性，4岁6个月，左手环、小指屈曲畸形，不能伸直，术中发现指屈肌腱发育细小、肌力弱。2a: 术前外观；2b~2d: 术后手指屈伸外观。

Figure 2. A 4-year and 6-month-old boy suffered from left hand ring and little finger flexion deformity, was unable to straighten, and found to have underdeveloped flexor tendons with weak muscle strength during surgery. 2a: Preoperative appearance of the left hand; 2b~2d: Postoperative functional appearance revealed perfect recovery of the hand.

## 3 讨论

引起儿童手指屈曲畸形的疾病较多，术前需排除肌腱起源异常<sup>[9]</sup>、指骨及指间关节畸形、皮肤瘢痕挛缩<sup>[10]</sup>等，本病常见于示中环指，拇指、小指少见。拇指屈曲畸形要重点鉴别狭窄性腱鞘炎、拇指远端指节挛缩<sup>[11]</sup>、先天性拇指屈曲<sup>[12]</sup>及缺血性肌挛缩<sup>[13]</sup>；系统性疾病需鉴别类风湿关节炎、神经系统及遗传因素等<sup>[14]</sup>。本研究患儿无外伤史，查体患指无皮肤挛缩、瘢痕等，手部X线片指间关节未见畸形、脱位等，无扳机指体征。据此容易排除以上引起屈曲指的常见疾病。另外需警惕缺血性肌挛缩引起的爪形手畸形<sup>[15]</sup>及肌肉适应性短缩<sup>[16]</sup>等疾患，结合术中探查情况，牵拉指深、浅屈肌弹性好，无纤维化改变，探及屈肌腱变短，可进一步排除缺血性肌挛缩。明确诊断为先天性屈肌腱短缩<sup>[17]</sup>。

常见的治疗方法采用指深屈肌、指浅屈肌肌腱延长术，该术式不改变手部肌力的平衡。临床报道

肌腱延长术多为治疗屈曲指畸形而非明确诊断的先天性屈肌腱短缩<sup>[18]</sup>。本研究术中探查发现屈肌腱短缩可能合并屈肌腱发育异常、肌力差，行常规肌腱延长术会进一步削弱屈肌肌力，影响患指活动功能。本研究中1例患儿屈肌腱发育差、腱性部分细小，类似细线状，行肌腱延长术操作困难，吻合不牢固，可能发生术后肌腱不愈合、吻合处断裂等并发症，屈肌力也大大减弱。另外，肌腱延长势必游离较多的腱性部分，也会导致腱膜破坏，影响其愈合，后期可能出现肌腱粘连等导致屈曲指复发、手指活动受限。

屈肌腱移位延长术具有以下优势：（1）若术中探查发现屈肌腱发育细小、肌力弱，施行肌腱延长术操作困难，无法达到预期手术效果者，选择肌腱移位延长，术操作简单、疗效确切；（2）屈肌腱延长术纵行破坏较多屈肌腱腱膜，而指屈肌腱移位术可最大程度保护腱膜，利于术后愈合，同时减少术后肌腱粘连等并发症；（3）儿童先天性屈肌腱短缩合并肌腱发育差、肌力弱等异常，常规肌腱延长术



使肌腱变细, 会进一步削弱屈肌肌力, 而指屈肌腱移位延长术, 操作简单, 术后疗效显著, 能为此类患儿提供不错的治疗选择。

需要注意的是, 指深、浅屈肌腱移位术, 破坏了腕部肌力平衡, 利用近端指浅屈肌作为屈曲指的动力肌。术前需仔细沟通, 取得家属知情同意。目前持续随访暂未发现相关不良并发症。同时, 由于疾病罕见, 病例量少, 缺乏相关病例对照。

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