

· 技术创新 ·

卵圆钳辅助小切口治疗急性跟腱断裂

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摘要: [目的] 介绍卵圆钳辅助小切口治疗急性跟腱断裂的手术技术和初步临床结果。[方法] 本院使用这种技术治疗急性跟腱断裂患者 23 例。术中触及断端, 行纵向小切口, 用卵圆钳分别深入近侧与远侧腱鞘, 夹持跟腱断端, 腰穿针经皮穿过跟腱和卵圆钳, 从对侧穿出皮外, 然后将缝线穿过腰穿针, 于不同平面各缝合 3 针, 所有缝线置入成功后, 抽出卵圆钳, 将缝线两端引入小切口。跖屈位, 使跟腱断端对合, 打结完成缝合, 最后闭合小切口。[结果] 所有患者均顺利手术, 均无腓肠神经损伤。手术时间 (42.82±6.88) min。所有患者伤口均一期愈合。术后均无跟腱再断裂。AOFAS 评分由术后 3 个月 (91.57±4.22) 分, 增加至术后 6 个月的 (97.22±2.32) 分; ROM 由术后 3 个月 (32.57±2.46)° 增加至术后 6 个月 (43.13±2.94)°。[结论] 卵圆钳辅助小切口治疗急性跟腱断裂的技术微创、安全、可靠, 并易于学习。

关键词: 跟腱, 断裂, 微创, 卵圆钳

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Oval forceps assisted repair of acute Achilles tendon rupture through a small incision // ZHAO Yan-ru, LIU Yang, YIN Bo, LI Yi-han, GUO Meng, ZHOU Jun-lin. Department of Orthopedics, Beijing Chaoyang Hospital, Capital Medical University, Beijing 100020, China

Abstract: [Objective] To introduce the surgical technique and preliminary clinical results of oval forceps assisted repair of acute Achilles tendon rupture through a small incision. [Methods] A total of 23 patients underwent abovementioned surgical treatment for acute Achilles tendon in our hospital. During operation, the ruptured gap was located by palpation, and a small longitudinal incision was made. An oval forceps was inserted into the tendon sheath through the incision to catch the ruptured ends proximally and distally respectively. Spinal needles were placed percutaneously to penetrate the tendons between the oval holes of the forceps on both sides to the opposite side. After that, sutures were introduced through the spinal needles and the needles were removed. As the forceps was pull out, the sutures were introduced out the incision. The ankle was placed plantar flexion extremely, the ends of ruptured Achilles tendon were closed to each other, and then corresponding sutures were tied to finish the repairing. Finally, the incision was closed in layers. [Results] All patients had operation performed successfully without sural nerve injury intraoperatively, with operation time of (42.82±6.88) min. The incisions healed well in all the patients, whereas no re-rupture of tendon happened in anyone of them during the follow-up period. The AOFAS score increased from (91.57±4.22) at 3 months to (97.22±2.32) at 6 months postoperatively, while the ankle flexion-extension range of motion increased from (32.57±2.46)° at 3 months to (43.13±2.94)° at 6 months postoperatively. [Conclusion] This oval forceps assisted repair of acute Achilles tendon rupture through a small incision is minimally invasive, safe, reliable and easy to learn.

Key words: Achilles tendon, rupture, minimally invasive surgery, oval forceps

跟腱是人体中最强的肌腱, 并将力量从比目鱼肌和腓肠肌传递到跟骨, 从而实现跳跃, 行走和奔跑^[1]。跟腱急性断裂很常见, 特别是在 30~49 岁的运动员中, 男女比例为 3:1^[2]。2014 年的一项基于人群的研究报道, 急性跟腱断裂的发生率不断上升, 尤其是在 49~60 岁年龄段的人群中^[3]。跟腱急性断

裂的年发生率高达 21.1~24.0/10 万^[4, 5]。对其治疗仍存在很多争议。治疗选择包括非手术或通过微创或传统开放技术进行手术。传统的开放式修补最常用的技术是使用 Krackow 锁定缝合线将跟腱进行断端吻合^[6]。但是, 感染和伤口愈合并发症的发生率高达 2.4%~4.7%, 在有吸烟、糖尿病或激素使用等危险

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因素的患者中,感染率和伤口愈合并发症的发生率高达10.4%^[7-9]。近年来,微创治疗急性跟腱断裂逐渐兴起,但是治疗效果不是很理想。本研究在Elton和Bluman^[10]的基础上做了一些改进,使用卵圆钳辅助小切口治疗急性跟腱断裂获得满意疗效,现报道如下。

1 手术技术

1.1 术前准备

术前完善常规检查及患侧软组织超声、X线片及MRI检查,排除手术禁忌,签署手术知情同意书,术前禁食8h,禁水4h,完成手术侧及部位标记。

1.2 麻醉与体位

患者取俯卧位,患肢大腿根部放置气囊止血带。采用腰硬联合麻醉或者连续硬膜外麻醉。

1.3 手术操作

(1)触诊跟腱断裂部位的间隙,并以受伤部位为中心的跟腱上偏近端切一个2~3cm的纵向切口(图1a,1b)。

(2)清除血肿,修剪断端,然后用血管钳将其拉出,使用卵圆钳或大血管钳在腱周膜和跟腱之间创建

皮下隧道。在远端重复此操作,以使卵圆钳穿过跟腱的外侧和内侧(图1c)。

(3)将卵圆钳沿两侧皮下隧道插入,并轻轻夹持住跟腱,以确保孔眼环之间的密闭。通过触诊确定卵圆钳孔眼的位置(图1c)。

(4)将腰穿针依次穿过外侧皮肤,卵圆钳外侧环,跟腱,卵圆钳内侧环和内侧皮肤。然后将0#可吸收缝合线穿过腰穿针。拔出腰穿针,将带有缝合线的卵圆钳拔出切口。所有缝合线末端均应小心分开,做好内外侧标记。通过缓慢牵引缝合线,确保缝合效果和足够的强度。在跟腱近端重复此过程共3次,每个缝线之间的距离约为0.8cm。其中中间缝线使用2#不可吸收缝线。在跟腱远端重复相同的过程(图1c)。

(5)跖屈踝关节,将缝合线牢固扎紧。距断端最近的缝合线首先扎紧,然后是中间的缝合线,最后是最远的缝合线。为防止缝合线结集中且突出,先将同一根缝线的一侧打结,然后轻轻牵引缝线的末端以将线结隐藏在皮下隧道内,然后再打结另一侧。最后也是最重要的是缝合跟腱外膜以覆盖切口处的线结(图1d,1e)。

(6)逐层缝合关闭切口,踝关节跖屈位超膝长腿石膏外固定。

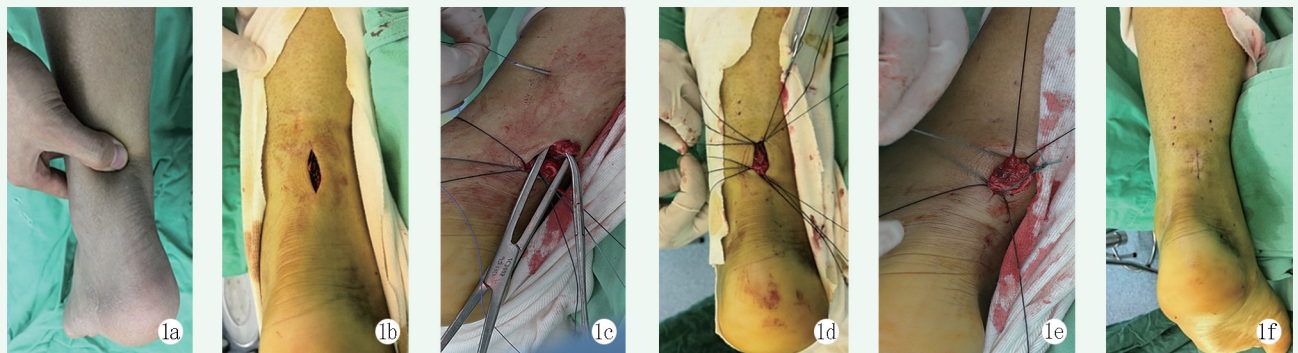


图1 卵圆钳辅助小切口修复跟腱的手术过程 1a:触诊断端 1b:行纵向小切口 1c:用卵圆钳深入腱鞘,夹持近侧端跟腱,腰穿针经皮穿过跟腱和卵圆钳,从对侧穿出皮外,然后将缝线穿过腰穿针,于不同平面缝合3针 1d:所有缝线置入成功后,抽出卵圆钳,将缝线两端引入小切口,末端小心分开,做好标记。同样方法行跟腱远端缝合,将缝线两端引入小切口 1e:跖屈位,使跟腱断端对合,先将同一根缝线的一侧打结,然后轻轻牵引缝线的末端以将线结隐藏在皮下隧道内,然后再打结另一侧,完成缝合 1f:最后闭合小切口

1.4 术后处理

术后使用超膝长腿石膏,屈膝30°和跖屈30°固定2周,再换短腿石膏固定2~4周,然后换跟腱靴固定4~6周,并负重走路。每3~5d去除一块垫片,共10~12片。所有垫片去除后,穿普通鞋行走。4周内使用依诺肝素(40mg/d,皮下注射)预防深静脉

血栓形成。

2 临床资料

2.1 一般资料

2017年1月—2019年12月使用卵圆钳辅助小切

口治疗急性跟腱断裂患者共23例，其中男19例，女4例；年龄 (37.52 ± 11.26) 岁。受伤原因均为运动伤，其中羽毛球伤12例，篮球伤6例，足球伤4例，跑步伤1例。该研究经过北京朝阳医院伦理委员会批准，所有患者均签署手术知情同意书。

2.2 初步结果

本组23例，术前超声、MRI均显示完全跟腱断裂，跟腱断端距跟骨结节距离为 (49.91 ± 9.79) mm。手术时间为 (42.82 ± 6.88) min。所有患者伤口均一

期愈合，无切口感染或切口裂开、皮肤坏死和深层感染发生；仅1例患者术后5个月发生迟发感染，患者患有牛皮癣，考虑缝线排异反应可能，进行清创、缝线切除后治愈，术中见跟腱完全愈合，连续性完好。无跟腱再断裂和腓肠神经损伤并发症发生。AOFAS评分术后3个月为 (91.57 ± 4.22) 分，6个月时为 (97.22 ± 2.32) 分；ROM术后3个月为 $(32.57 \pm 2.46)^\circ$ ，6个月ROM为 $(43.13 \pm 2.94)^\circ$ 。术后情况见图2。



3 讨论

Cretnik等^[12]报道经皮修复和开放性修复跟腱断裂的并发症发生率分别为9.7%和21%。Wren等^[13]报道，经皮微创方法可导致较高的腓肠神经损伤率，为0~10%。另一篇文章报道，经皮跟腱修复病例的腓肠神经损伤率高达9%~18%^[14]。然而，本研究中，23例患者中无1例发生腓肠神经损伤。由于大多数手术是在直视下进行的，卵圆钳插入在腱周膜和跟腱之间的鞘管内，因此腓肠神经损伤的发生率非常低。

有文献报道，传统手术发生皮肤坏死、浅表感染和深部感染等并发症的发生率为11%~34.1%^[15]，通过使用本方法，软组织并发症的发生率显著降低，仅1例患者术后5个月发生迟发感染，考虑缝线排异反应可能，进行清创、缝线切除后治愈，术中见跟腱完全愈合，连续性完好。传统手术中发生软组织并发症的主要原因是切口大、创伤大、血运破坏严重，以及

缝合后皮肤褶皱卡压等。

另外，一项生物力学研究报道，与传统修复手术相比，使用经皮微创修复的机械阻力降低了50%^[16]，跟腱再断裂风险极高^[17]。主要原因是因为撕裂的部位通常没有被发现^[18]。但是，随着手术技术的发展，微创手术的跟腱再断裂率与传统开放手术相当^[19]。本研究中没有跟腱再断裂发生。

本研究发现跟腱断裂与体育活动特别是羽毛球活动(52%)以及年龄<55岁高度相关。这些发现与Raikin的报告相似，但他报道最常见的活动是篮球(48%)^[20]。大多数跟腱断裂患者是在周末进行运动引起的，这可能与患者通常缺乏运动以及周末突然进行剧烈运动有关。

总的来说，卵圆钳辅助小切口治疗急性跟腱断裂的技术安全、可靠，并发症发生率极低；此外，该技术易于学习，使用简单的仪器并具有成本效益，是一种值得推广的治疗方法。

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