

带蒂比目鱼肌瓣修复前足软组织缺损

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【摘要】 目的: 探讨腓动脉为蒂逆行外侧半比目鱼肌瓣修复前足软组织缺损的临床疗效。方法: 自 2005 年 1 月至 2013 年 1 月, 采用腓动脉为蒂逆行外侧半比目鱼肌瓣修复前足软组织缺损患者 8 例, 其中男 6 例, 女 2 例; 年龄 16~48 岁, 平均 26.8 岁。逆行外侧半比目鱼肌瓣转移至前足软组织缺损区, 在肌瓣表面行 I 期中厚网状游离植皮, 供区直接缝合。术后观察肌瓣修复前足后成活情况。结果: 肌瓣全部成活, 术后没有发生血管危象, 其中 1 例受区术后发生轻微的表浅感染, 1 例发生肌瓣远端小的植皮坏死, 经 2 周换药处理自然愈合。术后随访 2.5~5.5 年, 平均 3.5 年。受区外形较好。踝关节功能按 Cedell 标准评定, 良 6 例, 可 2 例。结论: 当局部带蒂皮瓣或肌瓣应用受限时, 外侧半比目鱼肌瓣修复后肌瓣成活较满意, 很适宜修复前足软组织缺损。

【关键词】 软组织损伤; 外科皮瓣; 修复外科手术

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Repair soft-tissue defect in forefoot with reversed lateral soleus muscle flap ZHANG Gong-lin*, ZHEN Ping, CHEN Ke-ming, ZHAO Lai-xu, YANG Jun-lin, ZHOU Jan-hua, and XUE Qin-yi. *Institute of Army Orthopaedics, Lanzhou General Hospital of Lanzhou Military Area, Lanzhou 730050, Gansu, China

ABSTRACT Objective: To summarize clinical application results of repair soft tissue defect in forefoot with a reversed lateral soleus muscle flap on peroneal artery pedicle. **Methods:** From January 2005 to January 2013, 8 patients with soft-tissue defect on forefoot were underwent reconstruction with a reversed lateral soleus muscle flap on peroneal artery pedicle. There were 6 males and 2 female, aged from 16 to 48 years with an average of 26.8 years old. The reversed lateral soleus muscle flap was transposed to the forefoot defect area, then immediate coverage of the muscle flaps were performed by a meshed split-thickness free skin graft. The donor site was closed directly. The muscle flap survey was observed after the repair of the forefoot. **Results:** All muscle flaps had survived completely. No clinical vascular deficiency was found on muscle flaps postoperatively. One case occurred recipient area sustained insignificant superficial infection, one patient developed distal muscle flap small skin graft necrosis, and spontaneous heal by 2 weeks' change dressing. Follow-up period was ranged form 2.5 to 5.5 years with an average of 3.5 years postoperatively. A good contour was confirmed at the recipient area. According to Cedell questionnaire, 6 patients obtained good results and 2 fair. **Conclusion:** When the local skin flap or muscle flap application is limited, lateral soleus muscle flap survey is satisfactory after repair and very suitable for repair of soft tissue defect of forefoot.

KEYWORDS Soft tissue injuries; Surgical flaps; Reconstructive surgical procedure

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比目鱼肌分为内侧半与外侧半, 分别由胫后动脉与腓动脉的分支供给血供。应用内侧或外侧半比目鱼肌瓣行顺行或逆行带蒂转移是常用的术式, 是临床上修复小腿与足踝部软组织缺损常用的肌瓣供区, 国内已有报道^[1-5]。自 2005 年 1 月至 2013 年 1 月, 应用腓动脉为蒂逆行外侧半比目鱼肌岛状肌瓣转移修复前足软组织缺损, 取得满意效果, 现报告如下。

1 临床资料

本组 8 例, 男 6 例, 女 2 例, 年龄 16~48 岁, 平均 26.8 岁。损伤原因: 交通事故伤 5 例, 重物砸伤 2 例,

机械伤 1 例。软组织缺损部位: 跖跗关节处 4 例, 1~4 跖骨中部 3 例, 1、2 跖骨间联合足底部 1 例。左侧 5 例, 右侧 3 例。软组织缺损创面均有骨或肌腱外露, 创面有不同程度的污染和炎性肉芽与坏死组织。创面大小: 3.5 cm×5.5 cm~6 cm×15 cm。体检: 患侧小腿主要血管无损伤 (胫后动脉在内踝后和胫前在足背手指可触及正常搏动)。行血管通畅试验患足末梢循环无障碍。损伤至手术时间: 6 h~18 d, 平均 12 d。其中, 急症手术 2 例, 择期 6 例。

2 治疗方法

2.1 手术方法

采用腰硬联合麻醉, 取俯卧位, 在充气止血带下手术。先行受区创面清创术, 去除创面失活与炎性组

织。然后,行腓骨后缘 1 cm 纵行切口,显露腓骨长肌与比目鱼肌间隙,将比目鱼肌从腓骨的起点分离后,向后牵开腓肠肌外侧头,保护好腓动脉至外侧半比目鱼肌的血管分支,比受区创面稍大切取外侧半比目鱼肌。然后,行腓动脉阻断试验^[6],观察患足末梢循环无障碍后,将腓动脉、静脉在腓动脉至外侧半比目鱼肌肌瓣的血管分支稍近侧结扎切断。从近向远侧将切断的腓动、静脉连带外侧半比目鱼肌岛状肌瓣向下游离,仔细结扎沿途细小分支,直至肌瓣远端蒂部无张力能宽松到达受区创面。用肌瓣充填受区死腔并覆盖前足创面后,肌瓣四周与创面皮缘行间断缝合固定。腓动脉、静脉血管蒂采用切开隧道方法。从对侧股外侧取中厚游离皮片,行肌瓣表面网孔状植皮,松散包扎,不行常规植皮打包。供区创面 I 期缝合,供区与受区均留置负压引流。

2.2 术后处理

术后按常规应用抗生素,不应用抗凝药。抬高患肢 30°左右,有利于减轻局部肿胀与改善静脉回流。术后 48 h 内拔除引流管。1 周内局部用烤灯适当保温。应用小腿后侧石膏托固定踝关节 2 周。拆线后依伤口愈合情况,逐渐行伤肢康复训练。

3 结果

本组患者手术顺利,肌瓣未发生血管危象,8 例

肌瓣全部成活,其中 1 例术后发生轻微表浅感染,1 例发生肌瓣远端小片植皮坏死,经 2 周换药处理自然愈合。所有患者随访 2.5~5.5 年,平均 3.5 年。供区和受区愈合满意,受区外形最初 6 周有臃肿,但 6 周后臃肿逐渐改善,至半年后臃肿基本消失,没有因肌瓣修复后外形臃肿而需要行修薄以改善外观的病例。踝部功能基本恢复。供区外形良好,仅在同侧小腿内侧遗留线形切口痕迹,小腿运动功能无明显影响。踝关节功能按 Cedell^[7]提出的踝关节疗效标准评定,良:完全康复,可以从事各种工作和运动,仅有轻微关节活动受限、疼痛、肿胀或过度锻炼后疲劳感。可:有轻度关节活动受限、中度疼痛和肿胀,劳累后有疲劳感,但可以正常工作,能进行正常锻炼和从事大多数运动。差:有明显关节活动受限、严重疼痛、肿胀和疲劳感。尤其是在用力活动以后劳动能力下降。本组良 6 例,可 2 例。典型病例见图 1。

4 讨论

4.1 腓动脉为蒂逆行半比目鱼肌瓣解剖学基础

比目鱼肌位于腓肠肌深层,由胫后神经支配,参与足的跖屈运动,起点有内外两个头,两头之间有腱弓相连,外侧头起自腓骨头和腓骨的上 1/3,肌腹平均长度(30.7±2.3) cm,占腓骨长度的 85%。内侧头起自胫骨的比目鱼肌缘和内缘上部,肌腹分为内外侧



图 1 患者,男,36 岁,右前足大面积软组织缺损伴足背动脉损伤,用腓动脉为蒂逆行外侧半比目鱼肌瓣带蒂移植修复,肌瓣表面行网孔状游离植皮 1a. 术前创面情况 1b,1c. 术中显示已切取的外侧半比目鱼肌瓣 1d. 术中网孔状游离植皮后的外形 1e,1f. 术后 1 年前足受区外形(背侧和跖侧观)

Fig.1 A 36-year-old male patient with large area soft tissue defects on the right forefoot with dorsalis pedis artery injury were underwent reconstruction with a reversed lateral soleus muscle flap on peroneal artery pedicle. The coverage of muscle flap was performed by meshed split-thickness free skin graft 1a. Preoperative view of wound 1b,1c. Intraoperative view of the harvested lateral soleus muscle flap 1d. Intraoperative appearance of a meshed free skin graft 1e,1f. Postoperative appearance at the recipient site of the forefoot at 1 year(dorsum and plantar view)

两部分,在小腿中部比目鱼肌腱膜与腓肠肌相混合形成的小腿三头肌,向下移行为跟腱止于跟骨结节。腓动脉经比目鱼肌弓深面向下延续为胫后动脉,沿途向比目鱼肌发出多个血管分支供应内侧半比目鱼肌。腓动脉从胫后动脉发出,起始部外径(0.37±0.13) cm,逐渐靠近腓骨内侧,继而在其后下走行于拇长屈肌深面。在进入该肌前发出节段性血管和轴形肌内血管进入外侧半比目鱼肌,该支位于腓骨头(6.4±1.7) cm,胫前动脉下(2.2±1.1) cm。向外侧半肌腹纵向走行。文献研究表明^[8],只要比目鱼肌外侧半肌瓣连带节段性或轴向血管,就能保证岛状肌瓣的成活。腓动脉除有恒定的分支进入比目鱼肌外侧半上部外,还发出腓骨滋养动脉,并在下胫腓联合平面有多个横支与胫后动脉相吻合,还有分支穿过骨间膜到达踝关节前面,与胫前动脉有吻合,形成外踝上分支与跗骨窦处和足背动脉的跗外侧动脉形成吻合。腓动脉的终末支为足跟外侧动脉,在足跟与踝部形成丰富的吻合支。腓动脉有 2 条伴行静脉(平均外径 3.5 mm),逆行旋转肌瓣时可形成迷宫式静脉回流。由于腓动脉在下胫腓联合平面与胫后、胫前动脉以及踝部血管形成丰富的吻合,所以,切断腓动脉近端,保留腓动脉至外侧半比目鱼肌近端的血管分支,就可形成以腓动脉为蒂逆行外侧半比目鱼肌岛状肌瓣,行带蒂转移修复前足软组织缺损,这是该术式的解剖学基础^[8-11]。

4.2 该术式的优缺点

该术式优点如下:(1)比目鱼肌肌纤维呈双羽状排列,有利于术中辨认内外侧肌腹,因而切取外侧肌腹不会损伤内侧肌腹,能顺利地将其分开。(2)比目鱼肌内外侧肌腹有各自独立的血供系统和神经,切取外侧肌腹不会影响内侧肌腹的血运和神经^[9]。(3)比目鱼肌肌腹内血管呈纵向走行,有利于纵向劈开肌腹,而且切取的肌组织量较大,适宜对有死腔的创面行填塞修复。笔者认为当前足软组织缺损面积较大,且需较多组织瓣充填死腔,局部带蒂皮瓣或肌瓣应用受限时,应用该术式是较好的选择。(4)比目鱼肌是前足重要的跖屈肌,只利用半侧比目鱼肌,对侧一半肌腹保留原位不受损,保护了比目鱼肌的跖屈功能和行走时稳定踝关节的作用;本组患者经 2.5~5.5 年随访,没有发现术后影响踝关节功能者。(5)供应比目鱼肌血供的腓动脉分支在肌腹近端,连同腓动脉切断后向远端逆行翻转的蒂较长,其蒂的长度等于肌腹长度+腓动脉向下翻转的长度,旋转弧度较大,根据笔者应用的体会,可逆行翻转最远可达足跖趾关节处,这是该术式的独到之处。(6)腓动脉解剖恒定,血管变异少,血管蒂粗,血供丰富,肌瓣的

抗感染作用好^[12]。本组创面均有不同程度的感染和炎性肉芽与坏死组织,经细致清创,肌瓣移植后受区愈合均较满意。(7)根据受区创面缺损形状,在保护好穿支血管的前提下,可对肌腹修剪成不同形状,用于不同形状软组织缺损的修复。(8)供区缺损可 I 期缝合,外形好,仅在小腿外侧留有一线形切口线,外形优于腓肠肌内侧头肌皮瓣移植的手术方法。(9)该术式以腓动脉为蒂,血管蒂部可不连带比目鱼肌,增加了血管蒂的有效长度,扩大了修复创面的范围。利用血管蒂长的优点,很适合行带蒂移植修复前足软组织缺损。也有可能用于桥式带蒂移植修复对侧小腿软组织缺损^[5,13]。(10)无须吻合血管,与吻合血管的皮瓣相比,不需要特殊的设备与显微外科技术,大大简化了手术操作,缩短了手术时间,减轻了手术创伤,手术操作相对简单与安全可靠,成功率高^[14-16]。本组病例术中操作顺利,没有因操作困难而改为其它术式者,术后经过顺利,均未出现动脉或静脉血管危象。

该术式缺点有:腓动脉有缺如时,为该手术禁忌证;损伤了一条非主要动脉也是本术式的不足。

4.3 操作注意事项

(1)采用同侧小腿腓骨后缘纵行切口时,其下端在内踝后邻近小隐静脉与腓肠神经,应防止损伤。(2)注意辨认腓肠肌与比目鱼肌之间的间隙。向后牵开腓肠肌时,可发现纵行向下走行的跖肌腱,该肌腱是腓肠肌与比目鱼肌之间的分界,其下便是比目鱼肌。(3)要明确腓动脉供应比目鱼肌外侧肌腹的血管分支位置并加以保护,防止在操作过程中误扎或牵拉伤。进入外侧半比目鱼肌的段性血管和轴形肌内血管,发出点位于腓动脉进入拇长屈肌深面之前,腓动脉进入后者之后就没有穿支血管至比目鱼肌^[8],掌握这一解剖特点对寻找和保护供应比目鱼肌外侧肌腹的血管分支很重要。(4)位于近端的血管分支要注意保护,在肌瓣转移过程中防止蒂部血管受牵拉形成张力而影响肌瓣血运。(5)注意皮片呈网孔状移于肌瓣之上后,不用常规加压打纱布包的方法,仅用碎纱条紧贴在植皮上行松散包扎就行,以免加压打纱布包的方法压迫肌瓣影响血运。(6)比创面稍大从远向近切取比目鱼肌瓣过程中。向近侧的长度要能使肌瓣到达患侧创面,比目鱼肌瓣远端稍带部分腱性组织,便于肌瓣向患侧小腿创面行牵拉固定。(7)供应比目鱼肌外侧肌腹的血管在肌内呈纵向走行,两头正中无血管走行,这是操作的安全区,利用这一特点,可将内外侧肌腹从正中纵向远侧劈开。笔者的体会是从近侧向远侧切肌瓣操作较为方便,且不易损伤近端血管蒂。(8)腓动脉有缺如的可能,对

这种变异应保持警惕,因腓动脉缺如可出现异常走行的胫后动脉,其行程与腓动脉相似,故在切断腓动脉之前应行阻断试验,前足血运无障碍后再行切断^[6]。(9)操作时应注意血管蒂周围组织不要剥的太多,以免影响肌瓣静脉回流或损伴行静脉。(10)关于手术体位:由于腓动脉位于腓骨的内后方,笔者体会,采用俯卧位更有利于腓动脉血管蒂的游离与肌瓣的切取。(11)腓动脉在下胫腓联合平面有多个横支与胫后动脉相吻合,为保证逆行供血的效果,向下翻转勿损伤该分支或不超过该平面。(12)转移时勿使血管蒂部有张力或锐性成角对手术的成功较为重要^[17-18]。

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