

# 不同形状蒂部减张瓣在逆行皮神经营养血管皮瓣中的应用

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**【摘要】 目的:**探讨 3 种不同形状蒂部减张瓣在皮神经营养皮瓣逆行转移术中的应用及其疗效。**方法:**自 2006 年 1 月至 2012 年 1 月, 皮瓣坏死患者 21 例, 男 15 例, 女 6 例; 年龄 14~58 岁, 平均 35 岁; 应用三角形、椭圆形或圆形蒂部减张皮瓣改善逆行皮神经营养皮瓣转移后的血运, 三角形瓣 10 例, 圆形瓣 8 例, 椭圆形瓣 3 例。手部软组织缺损 5 例, 面积为 5.0 cm×2.0 cm~8.0 cm×5.0 cm; 足部、踝周及小腿下段软组织缺损 16 例, 面积 6.0 cm×4.0 cm~13.0 cm×7.0 cm; 均伴有肌腱及骨骼等深部组织外露。采用足背皮神经营养皮瓣 5 例, 腓浅神经营养血管皮瓣 4 例, 腓肠神经营养血管皮瓣 4 例, 隐神经营养血管皮瓣 3 例, 桡神经浅支营养血管皮瓣 2 例, 前臂外侧皮神经营养血管皮瓣 3 例, 均为逆行转移。观察术后皮瓣成活, 外观及感觉恢复情况。**结果:**1 例逆行腓肠神经营养皮瓣远端坏死, 经换药愈合, 其余皮瓣全部成活, 供区植皮均 I 期愈合。术后患者随访 3 个月~2 年, 平均 7 个月, 皮瓣质地良好, 外形平整美观, 恢复痛温觉。**结论:**蒂部减张皮瓣能改善远端蒂皮神经营养血管皮瓣的血运, 促进其成活, 并改善修复创面外观。

**【关键词】** 软组织损伤; 外科皮瓣; 修复外科手术; 皮肤移植

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**Application of the tension skin flap with different shapes in the pedicle of the reverse neurocutaneous island flap** LI Meng, LAN Xu, ZHENG Ping, LIU Xing-yan, GAO Qiu-ming, and SONG Ming-jia. Department of Orthopaedics, Lanzhou General Hospital, Lanzhou 730050, Gansu, China

**ABSTRACT Objective:** To investigate the effects of the tension skin flap with different shapes on the transplantation of the reverse neurocutaneous island flap. **Methods:** From January 2006 to January 2012, there were 21 patients in the study (including 15 males and 6 females), and aged from 14 to 58 years old (35 years old on average). Tension skin flaps with different shapes (triangle, round and ellipse) were used to improve the blood supply of the reverse neurocutaneous island flap. The tension skin flaps in the pedicle were designed triangularly (10 patients), spherically (8 patients) or elliptically (3 patients). There were 5 patients with defects in the hand (the size from 5.0 cm×2.0 cm to 8.0 cm×5.0 cm), and 16 patients with defects in the foot and inferior segment of leg, or around the ankle (the size from 6.0 cm×4.0 cm to 13.0 cm×7.0 cm). And all the patients were with the tendon and bone exposed. All the flaps were reversal transplanted, including 5 dorsal neurocutaneous flaps of foot, 4 superficial peroneal neurocutaneous flaps, 4 saphenous neurocutaneous flaps, 3 sural neurocutaneous flaps, 2 superficial radial neurocutaneous flaps, 3 lateral neurocutaneous flaps of forearm. And the survival rate, appearance and sensory recovery of the flaps were analyzed. **Results:** The distant part of the reversed sural neurocutaneous island flap in 1 case necrosized and healed after dressing change. The other flaps survived entirely, and the donor site all healed primarily. The follow-up time was from 3 months to 2 years (averaged 7 months), and all the flaps had recovered pain and warm sensation with perfect appearance. **Conclusion:** The tension skin flap in the pedicle can enhance the blood supply and promote survival rate of the reverse neurocutaneous island flap, and can also improve its appearance.

**KEYWORDS** Soft tissue injuries; Surgical flaps; Reconstructive surgical procedures; Skin transplantation

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皮瓣坏死是临床上常见的疾病, 不仅给伤者造成痛苦和经济负担, 也给后续治疗带来困难, 处理较为棘手, 其中血液循环障碍是导致皮瓣坏死的主要原因, 而蒂部处理不当是导致皮瓣血液循环障碍不可忽视的重要原因<sup>[1]</sup>。特别是皮神经营养血管皮瓣,

坏死的主要原因之一即为蒂部处理不当致静脉回流障碍<sup>[2]</sup>。为此, 一些学者开始重视蒂部的处理技巧, 采用减张皮瓣是其中较为有效的方法之一, 2006 年 1 月至 2012 年 1 月采用 3 种减张真皮下血管网皮瓣进行蒂部处理 21 例皮瓣坏死患者, 报道如下。

## 1 临床资料

本组 21 例, 男 15 例, 女 6 例; 年龄 14~58 岁, 平

均 35 岁。致伤原因:车祸伤 8 例,机器伤 7 例,重物砸伤 4 例,肿瘤切除 2 例。修复部位:手部缺损 5 例,皮肤缺损面积 5.0 cm×2.0 cm~8.0 cm×5.0 cm;踝周及小腿下段皮肤软组织缺损 16 例,缺损面积 6.0 cm×4.0 cm~13.0 cm×7.0 cm。均不同程度伴有肌腱、神经、血管及骨骼等重要组织外露。皮瓣均行逆行转移,受伤至手术时间约 4~23 d,平均 9 d。临床应用足背皮神经营养皮瓣 5 例,腓浅神经营养血管岛状皮瓣 4 例,腓肠神经营养血管皮瓣 4 例,隐神经营养血管皮瓣 3 例,桡神经浅支营养血管皮瓣 2 例,前臂外侧皮神经营养血管皮瓣 3 例。蒂部减张瓣设计成锐角三角形、椭圆形或圆形,面积 1.0 cm×2.0 cm~5.0 cm×3.0 cm。

**2 手术方法**

**2.1 皮神经营养血管皮瓣设计** 根据创面情况,以“点、线、面”原则设计皮瓣切口及蒂的宽度;并在蒂部根据皮瓣旋转角度设计两种不同形状的蒂部减张瓣;当皮瓣转移接近 180°时设计成锐角三角形减张

瓣,宽度等于或略小于筋膜蒂宽度 0.5 cm,减张瓣蒂部设计于近心端,整个皮瓣位于蒂部远端;当为其他旋转角度时设计成圆形或椭圆形减张瓣,位于远端蒂皮瓣旋转点稍上方,直径为皮瓣蒂宽或略大,设计成椭圆形时其长轴与皮瓣旋转后的长轴平行,便于旋转后缝合(见图 1)。

**2.2 皮瓣切取及修复** 按照设计切取皮瓣,皮瓣在深筋膜下掀起时将皮肤与深筋膜缝合,保证其血管网完整性。三角形减张瓣将其底边部位作为蒂部,其余部分于真皮下脂肪层切开。圆形或椭圆形皮瓣中心部分约整个面积的 1/2 左右不切开,其余均自真皮下脂肪层切开。放松止血带,观察皮瓣血运良好后,经皮下隧道或明道移位皮瓣至受区。三角形减张瓣旋转 180°后,将其锐角部分插至蒂部切开皮肤中,边缘与切开皮肤相缝合;圆形或椭圆形小皮瓣利用皮肤延展性作延伸及旋转,使其长轴与皮瓣长轴一致,并保证蒂部完全覆盖且不缩窄,完全覆盖皮瓣蒂部组织后缝合。皮瓣蒂部浅静脉干常规结扎处理。

**3 结果**

术后皮瓣均成活。其中 1 例逆行腓肠神经筋膜蒂岛状皮瓣肿胀较明显,并且出现皮瓣远端青紫,表皮坏死,经换药后愈合。其余病例均 I 期愈合。本组患者平均住院时间 13 d。所有患者获随访 3 个月~2 年,平均 7 个月,移位皮瓣无磨损及溃烂,色泽、质地良好,外形平整美观,恢

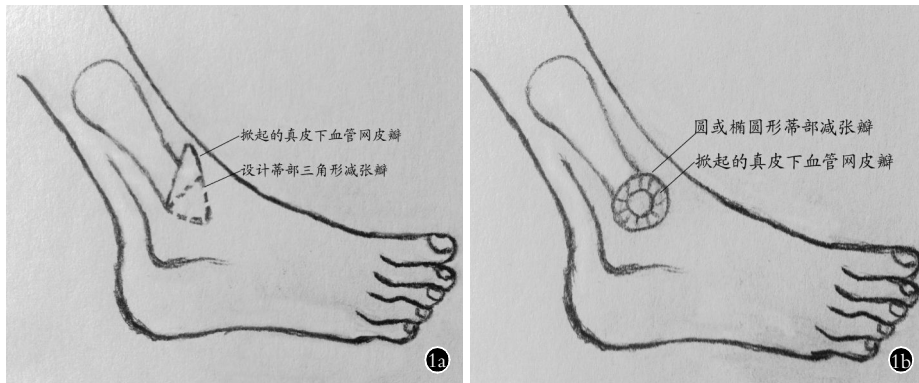


图 1 皮瓣设计线条图 1a. 三角形减张瓣 1b. 圆或椭圆形减张瓣

Fig.1 Scheme of the flap design 1a. Triangle tension flap 1b. Round and ellipse tension flap

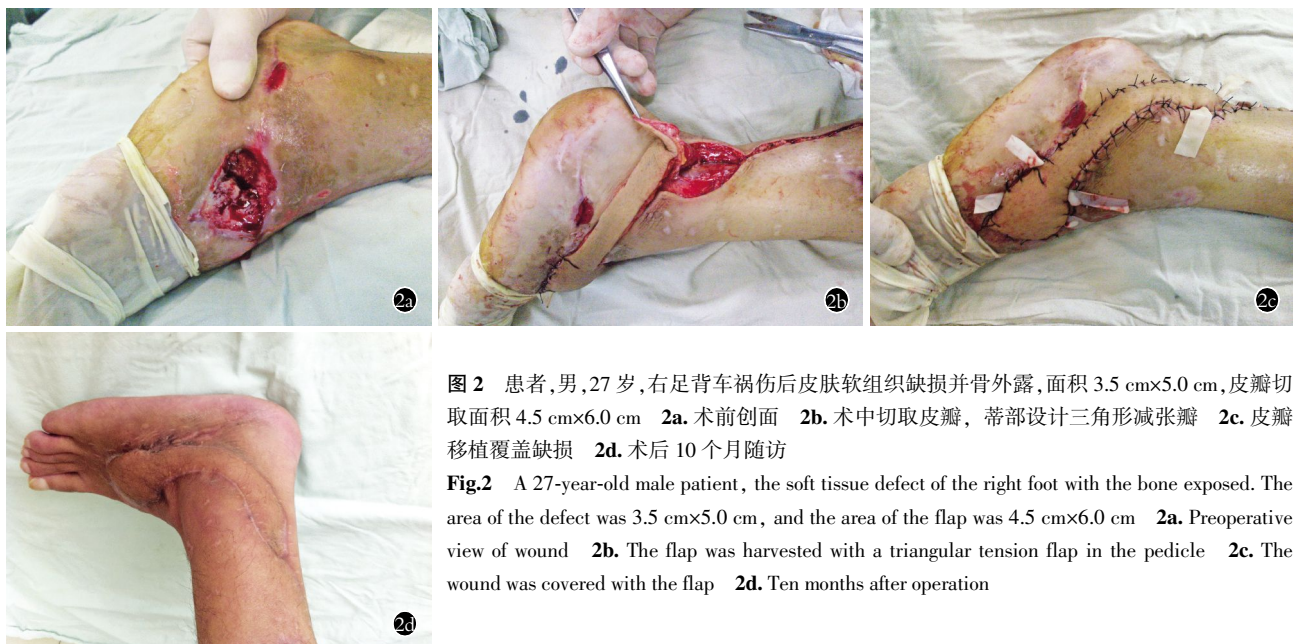


图 2 患者,男,27 岁,右足背车祸伤后皮肤软组织缺损并骨外露,面积 3.5 cm×5.0 cm,皮瓣切取面积 4.5 cm×6.0 cm 2a. 术前创面 2b. 术中切取皮瓣,蒂部设计三角形减张瓣 2c. 皮瓣移植覆盖缺损 2d. 术后 10 个月随访

Fig.2 A 27-year-old male patient, the soft tissue defect of the right foot with the bone exposed. The area of the defect was 3.5 cm×5.0 cm, and the area of the flap was 4.5 cm×6.0 cm 2a. Preoperative view of wound 2b. The flap was harvested with a triangular tension flap in the pedicle 2c. The wound was covered with the flap 2d. Ten months after operation

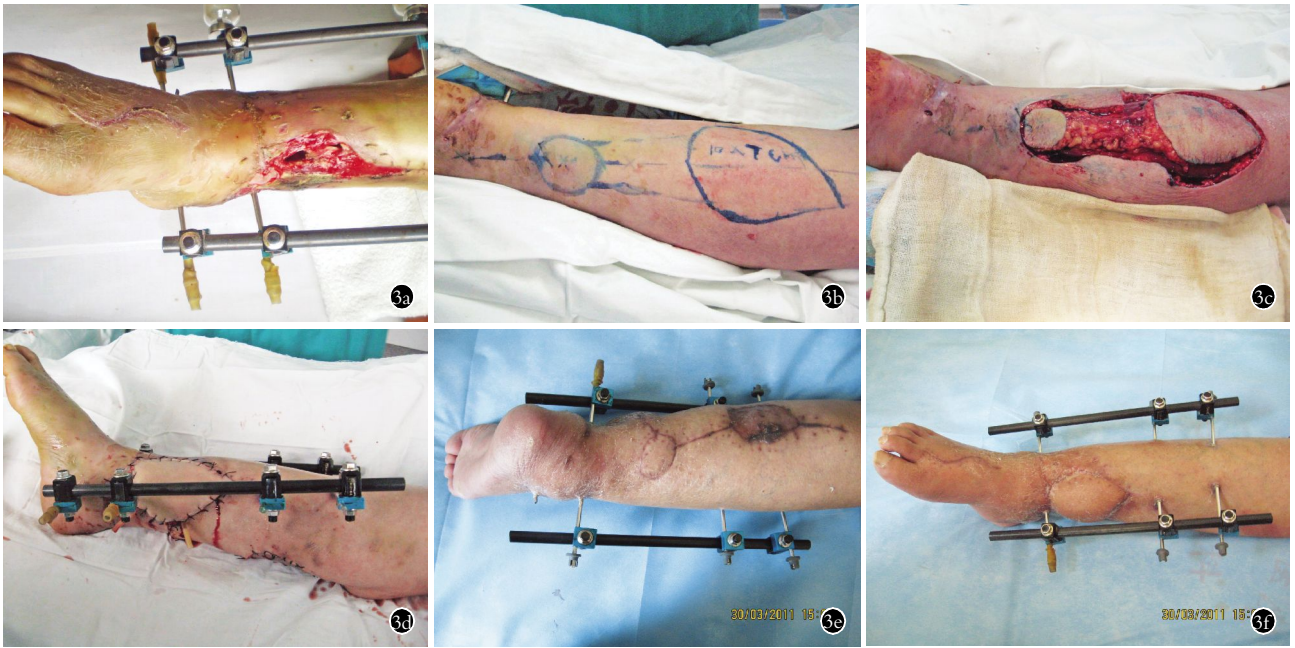


图 3 患者,女,34 岁,右小腿压砸伤后软组织并骨缺损,面积 8 cm×6 cm,皮瓣切取面积 10 cm×7 cm 3a. 术前创面 3b. 皮瓣设计,于旋转点处设计椭圆形减张皮瓣 3c. 皮瓣切取完成 3d. 皮瓣移植术后情况 3e,3f. 术后 4 个月随访

Fig.3 A 34-year-old female patient with the soft tissue and bone defect of the right leg. The area of the defect was 8 cm×6 cm, and the area of the flap was 10 cm×7 cm 3a. Preoperative view of wound 3b. The flap was designed with an elliptic tension flap in the pedicle 3c. The flap was harvested 3d. The wound was covered with the flap 3e, 3f. Four months after operation



图 4 患者,女,31 岁,右踝前外伤后感染创面并肌腱外露,面积 9 cm×6 cm,皮瓣切取面积约 11 cm×8 cm 4a. 术前创面 4b. 皮瓣设计,于旋转点处设计圆形减张皮瓣 4c. 皮瓣切取完成 4d,4e. 皮瓣移植术后情况 4f. 术后 7 个月随访

Fig.4 A 31-year-old female patient, the soft tissue defect of the right ankle with the tendon exposed. The area of the defect was 9 cm×6 cm, and the area of the flap was 11 cm×8 cm 4a. Preoperative wound 4b. The flap was designed with a round tension flap in the pedicle 4c. The flap was harvested 4d, 4e. The wound was covered with the flap 4f. Seven months after operation

复痛温觉。典型病例见图 2-4。

#### 4 讨论

随着逆行皮神经营养皮瓣的开发,对四肢末端软组织缺损修复提供了极好的解决方案。皮神经营养皮瓣的动脉主要靠沿皮神经走营养血管供应,并

可将穿支血管包含于蒂部,故其供血较确切,一般较少发生供血障碍。逆行皮神经营养皮瓣静脉回流主要依靠营养血管伴行静脉、深筋膜浅面的静脉网及穿支伴行静脉经静脉旁路及交通支回流入深静脉网。另外瓣膜失效也是其静脉回流的主要途径。两种

回流方式是相辅相乘,在不同情况下有所偏重。目前对瓣膜失效机制尚不清楚,大多数手术者较稳妥地尽量保留血管蒂周围疏松组织,以促进静脉回流。这样使蒂部较为宽大,旋转皮瓣时易致蒂部扭转,不仅外观不佳,并常引起静脉回流障碍。有报道采用远端蒂皮瓣临床应用时易出现皮瓣远端部分坏死<sup>[1]</sup>,特别是皮神经营养皮瓣,其血循障碍发生率更高,而血循障碍是导致远端蒂皮瓣坏死的主要原因,蒂部处理不当是导致皮瓣坏死不可忽视的重要原因<sup>[2-3]</sup>。

多数学者采用不同的蒂部处理方法来尽量减少皮瓣的蒂部扭转,促进其血液供应及回流。应用最多的是改进皮瓣蒂部的设计,如将皮瓣蒂部设计成鼠尾样或慧尾样,保留蒂部三角形皮肤,或将整个皮瓣设计成水滴样,保留蒂部表面宽 2 cm 左右的皮条,旋转后将皮条与周边皮肤相缝合<sup>[4-5]</sup>。但最终仍不可避免的使蒂部扭转,或不能充分的使蒂部减压;同时其蒂部皮下筋膜蒂有时仍会有部分裸露,需采用植皮修复,而蒂部植皮不能打包,有坏死可能,另外也欠美观。近年来,有学者开始采用蒂部减张皮瓣来更好的解决此问题,如在蒂部稍偏上方设计一个圆形或梭形减张真皮下血管网皮瓣,错位旋转后与周边皮肤相缝合,有效地使蒂部旋转后减压,促进了远端蒂皮瓣的成活,并明显改善其外观<sup>[3,6]</sup>。

笔者在此基础上进行改进,设计了 3 种不同形状的减张瓣。对于旋转接近 180°的,采用三角形蒂部减张瓣,其余的运用圆形或椭圆形减张瓣。临床结果表明,三角形皮瓣在旋转 180°时较圆形减张瓣可更好地利用蒂部皮肤软组织。文献研究亦表明通过皮瓣设计形状的改变,可增加皮瓣移动性及动员更多可利用的皮瓣组织,并可最大程度地增加皮瓣的利用率<sup>[7-8]</sup>;对于其到底可节省多少皮肤组织仍有待进一步研究。当皮瓣旋转为其他角度时,笔者一般采用圆形减张瓣,因为有时皮瓣解剖完毕后,蒂部减张瓣到底需旋转多少角度不易在术前设计中精确计算,此时形成圆形皮瓣可任意旋转,更有助于蒂部减张缝合。但在能有效控制减张旋转角度时,笔者更倾向于设计成椭圆形减张瓣,使其长轴与皮瓣旋转后轴线一致后缝合,这样可更有效地增加蒂部轴线长度,加强减张的效果。

总之,通过不同形状蒂部减张皮瓣设计与应用,可有效地进行皮神经营养皮瓣旋转时蒂部减压,促进皮瓣成活,并能明显改善皮瓣转移后蒂部外观。

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