

指动脉穿支筋膜瓣联合人工真皮 I 期修复 手指背侧皮肤缺损

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【摘要】 目的: 探讨指动脉穿支筋膜瓣联合人工真皮 I 期修复手指中节背侧皮肤缺损的临床疗效。方法: 自 2019 年 1 月至 2020 年 5 月对 21 例 27 指中节背侧皮肤缺损的患者采用指动脉穿支筋膜瓣联合人工真皮 I 期进行修复, 均为急诊病例, 均伴有骨肌腱外露及骨膜、肌腱膜缺损。其中男 11 例, 女 10 例; 年龄 18~66(39.00±8.01) 岁; 示指 10 指, 中指 9 指, 环指 8 指; 皮肤缺损面积为 (2.5~3.5) cm×(1.5~3.0) cm, 骨肌腱外露面积 (1.5~2.0) cm×(1.0~2.0) cm, 伤后就诊时间 1~6 h, 受伤至手术时间 3~8 h。观察术后创面愈合情况, 并采用中华医学会手外科学会上肢部分功能评定试用标准进行临床疗效评价。结果: 所有患者获得随访, 时间 6~12(9.66±1.05) 个月。手术时间 45~60 min。26 指术后 4~6 周后创面完全愈合, 1 指创面感染, 真皮未完全上皮化, 经过创面换药, 8 周后达到创面愈合。所有指体外观饱满、瘢痕小, 愈合创面平于周围皮肤, 与周围皮肤色泽质地相近, 耐磨性、柔韧性良好, 手指活动度正常。按照中华医学会手外科学会上肢部分功能评定试用标准评定, 本组总分 72~100 分; 优 26 指, 良 1 指。结论: 指动脉穿支筋膜瓣联合人工真皮 I 期修复手指中节背侧皮肤缺损简便易行, 创伤小, 指体外观功能恢复满意, 为治疗伴有肌腱骨外露的手指皮肤缺损提供了一种有效的手术方式。

【关键词】 人工真皮; 筋膜瓣; 中节背侧; 骨肌腱外露

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One-stage repair of full-thickness skin defect at dorsal skin of middle phalanx fingers using artificial dermis combing with digital artery perforator fascial flaps

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ABSTRACT Objective To explore clinical effects of the stage I repair of full-thickness skin defect at dorsal skin of middle phalanx fingers using artificial dermis combing with digital artery perforator fascial flaps. **Methods** From January 2019 to May 2020, 21 patients (27 middle phalanx fingers) with full-thickness skin defect were repaired at stage I using artificial dermis combing with digital artery perforator fascial flaps. All patients were emergency cases, and were accompanied by the exposure of bone tendon and the defects of periosteum and tendon membrane. Among patients, including 11 males and 10 females aged from 18 to 66 years old with an average age of (39.00±8.01) years old; 9 index fingers, 10 middle fingers and 8 ring fingers; range of skin defect area ranged from (2.5 to 3.5) cm×(1.5 to 3.0) cm; range of exposed bone tendon area was (1.5 to 2.0) cm×(1.0 to 2.0) cm. The time from admission to hospital ranged from 1 to 6 h, operation time started from 3 to 8 h after injury. **Results** All patients were followed up from 6 to 12 months with an average of (9.66±1.05) months. The wounds in 26 cases were completely healed at 4 to 6 weeks after operation. One finger has changed into wound infection with incompletely epithelialized dermis, and achieved wound healing at 8 weeks after dressing change. All fingers were plump with less scars. The healed wound surface was similar to the color and texture of the surrounding skin. These fingers have excellent wearability and flexibility. According to the upper limb function trial evaluation standard of Hand Surgery Society of Chinese Medical Association, the total score ranged from 72 to 100. 26 fingers got excellent result and 1 good. **Conclusion** Stage I repair of full-thickness skin defect at dorsal skin of middle phalanx fingers using artificial dermis combing with digital artery perforator fascial flaps is easy to operate with less trauma. It has made satisfactory recovery of appearance and function of fingers. It could provide an effective surgical method for clinical treatment of full-thickness skin loss of fingers with tendon and bone exposure.

KEYWORDS Artificial dermis; Fascial flap; Dorsal skin of middle phalanx fingers; Tendon and bone exposure

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各种创伤引起的指体皮肤缺损常伴有骨肌腱外露,当骨膜-肌腱膜缺损时,创面往往不能愈合;或通过长期换药,达到瘢痕愈合,但瘢痕易增生或挛缩,易破溃,常需要手术治疗。手术方法主要以各种带蒂、游离皮瓣移植和 I 期人工真皮、II 期自体皮片移植为主^[1-7],但这些方式仍存在外观差、瘢痕大、手术次数多、供区损伤大等不足之处。自 2019 年 1 月至 2020 年 5 月,笔者将手术方式进行了改良, I 期采用指动脉穿支筋膜瓣联合人工真皮移植修复伴有肌腱骨外露的 21 例(27 指)手指中节背侧皮肤缺损,现报告如下。

1 临床资料

本组病例 21 例 27 指,男 11 例,女 10 例;年龄 18~66(39.00±8.01)岁;示指 10 指,中指 9 指,环指 8 指。指体中节背侧皮肤缺损面积(2.5~3.5) cm×(1.5~3.0) cm,骨肌腱外露面积(1.5~2.0) cm×(1.0~2.0) cm,伤后就诊时间 1~6 h,受伤至手术时间 3~8 h。

2 治疗方法

2.1 手术方法

创面彻底清创,在指体近节背侧设计切口,在浅筋膜表面分离皮肤及筋膜,取指动脉穿支筋膜瓣。点:以指体侧中线与近侧指间(proximal interphalangeal, PIP)关节指横纹的交点为筋膜蒂旋转点。线:旋转点与受区创面间距为筋膜蒂部的长度;面:以指体轴线为中心,筋膜瓣切取不超过掌指关节近端及近节双侧中线。切取筋膜瓣后,将其逆行翻转至皮肤缺损处。用 5-0 可吸收线将筋膜瓣与创缘的皮肤缝合。在一定张力下,将双层人工真皮(Lando[®],由深圳齐康医疗有限公司提供)与创面缝合固定,人工真皮与筋膜瓣表面贴服,不留空隙。用尖刀片在人工真皮的硅胶膜面切数个孔,以利创面渗液引流。

2.2 术后处理

间隔 2~3 d 换药 1 次,若人工真皮硅胶层下有较多积液,可再次于硅胶层面切数个孔以利于引流。术后应用抗生素预防感染 3~5 d,根据肉芽组织生长情况,于术后 2~3 周去除人工真皮的硅胶层。若未上皮化,无须植皮,以湿盐水纱布覆盖创面以保持创面湿润促其上皮化。

3 结果

所有病例获得随访,时间 6~12(9.66±1.05)个月。手术时间 45~60 min。26 指 4~6 周后创面完全愈合,愈合时间(4.71±0.27)周;1 指创面感染,真皮未完全上皮化,经换药 8 周后愈合,创面愈合后指体饱满,无明显瘢痕增生挛缩,与周围皮肤色泽质地相近,与周围皮肤齐平,无臃肿及凹陷,耐磨性、柔韧性良好,手指活动度正常。按照中华医学会手外科学会

上肢部分功能评定试用标准^[8]从手指总主动活动度(total active movement, TAM)、日常生活活动(activity of daily living, ADL)、感觉恢复、血液循环状态、外观、恢复工作情况方面进行评定,满分 100 分;100~80 分为优,79~60 分为良,59~40 为差,<40 分为劣。本组总分 72~100 分,优 26 指,良 1 指。见表 1。典型病例图片见图 1。

4 讨论

近年来随着人工真皮的广泛应用,使得很多原来只能通过带蒂、游离皮瓣修复的皮肤缺损有了良好的替代方法,如 I 期人工真皮移植、II 期自体皮片移植,并取得了令人满意的效果。而笔者利用人工真皮的优越性,结合以往指动脉穿支皮瓣治疗手指皮肤缺损的临床经验,设计了另一种有效的手术治疗方式。

4.1 本手术设计的理论基础及适应证

选择人工真皮的理论基础:人工真皮上层的硅胶膜主要起保护创面和防止水份过度蒸发的作用;下层的胶原蛋白海绵层是多孔的三维支架结构^[9]。人工真皮具有良好的生物相容性、可降解性及抗菌性,为创面提供再生支架,调控和诱导细胞与组织的分化,3 周左右可诱导构建出血运良好的类真皮组织,具有一定的弹性、耐磨性和柔韧性,可替代人体真皮结构,覆盖外露的骨及肌腱^[10]。

选择筋膜瓣修复的理论基础:陈欣等^[11]对人工真皮修复骨外露创面机制的研究中发现,人工真皮的血管化有赖于移植床的血运,血运越丰富人工真皮血管化越快,在骨膜缺损的骨质上移植,血管化过程明显延迟,移植后 4 周,骨膜缺损组生长的组织薄,血管化组织的推进长度仅为 0.5 cm。临床中也发现,面积>0.5 cm×0.5 cm 并伴有骨膜及腱膜缺损的骨肌腱外露,直接人工真皮移植,创面无法愈合,或愈合时间长,肉芽组织薄,瘢痕不耐磨,反复破溃。而指动脉背侧穿支为蒂的指背皮瓣是修复手指缺损的常用方法^[3],切取其血运丰富的筋膜瓣,来做为血运丰富的移植床,然后移植人工真皮,从而顺利达到创面 I 期愈合。

本方法适用于伴有骨肌腱外露的手指背侧皮肤缺损,创面面积>1 cm×1 cm,骨肌腱外露面积>0.5 cm×0.5 cm。皮肤缺损<2 个指间关节,不超过双侧中线。

4.2 本手术方式的优点

(1)易获取所需长度的筋膜蒂。筋膜瓣无皮肤覆盖,扩展性大,蒂可直接翻转至创面,无须扭转后再翻转蒂部,减小了蒂部无效长度及张力。关节表面的皮肤完整,无瘢痕,不影响活动,因此可切取关节表

表 1 手指背侧皮肤缺损 21 例 27 指术后手指功能评定
Tab.1 Postoperative evaluation of finger function of 21 patients 27 fingers with dorsal skin defect

患者序号	性别	年龄/岁	指别	中华医学会手外科学会上肢部分功能评定试用标准/分						总分
				TAM	ADL	感觉恢复	血液循环	外观	恢复工作情况	
1	男	45	环指	16	20	20	10	20	10	96
2	女	35	示指	18	18	16	10	20	10	92
3	女	39	中指	15	20	20	10	20	10	95
4	女	40	示指	16	17	20	10	20	10	93
5	男	66	示指	18	15	20	10	20	7	90
6	男	40	中指	16	16	20	10	20	7	89
7	女	40	示指	15	18	20	10	20	7	90
8	女	39	中指	18	19	20	10	20	10	97
9	男	41	中指	20	16	20	10	20	10	96
10	男	36	环指	20	16	20	10	20	10	96
11	男	37	示指	19	17	20	10	20	10	96
12	女	38	中指	17	19	20	10	20	10	96
13	女	18	环指	15	18	20	8	16	7	84
14	女	39	环指	20	20	20	10	20	10	100
15	女	38	环指	15	10	16	8	16	7	72
16	男	38	环指	16	20	16	10	20	10	92
			示指	15	16	16	10	20	10	87
17	男	33	中指	17	17	20	10	20	10	94
			环指	18	17	20	10	20	10	95
18	女	40	示指	19	18	20	10	20	10	97
			中指	16	19	20	10	20	7	92
19	男	39	环指	15	15	20	10	20	10	90
			示指	18	20	20	10	20	10	98
20	男	40	示指	20	18	20	10	20	10	98
			中指	19	19	20	10	20	10	98
21	男	38	示指	15	17	20	10	20	10	92
			中指	19	19	20	10	20	10	98

面的筋膜瓣来增加长度。(2)手术操作简单、风险小、病程短。术中无须分离指动脉,解剖简单,无须显微操作,近节背侧指动脉穿支筋膜瓣血供稳定,术后易成活。手术操作简单,无须二次手术,减少麻醉次数及风险,术后无须特殊用药及护理,病程短,可早期出院门诊随访,减轻了患者的经济负担。(3)组织创伤小。保留了指体表面皮肤的完整性,未增加额外的皮肤供区,未损伤指动脉,低气温下,指体不发冷^[12-13]。(4)外观功能良好。人工真皮形成的类真皮组织具有一定的弹性、耐磨性和柔韧性,外观质地色泽与周围皮肤相似,无色素沉着,无臃肿或凹陷,瘢痕小,不影响关节活动,可早期进行功能锻炼,不影响指体功能。

4.3 与传统手术方式比较

本术式与传统手术方式比较结果如下:(1)与皮瓣修复术、指动脉穿支皮瓣、指背筋膜皮瓣比较。本

术式未损伤指动脉,可切取相对长的蒂,能覆盖跨远侧指间(distal interphalangeal, DIP)关节的皮肤缺损。无须自体取皮,减少创伤;与腹部皮瓣、邻指皮瓣比较,本术式无须二次手术断蒂,无蒂部撕脱风险,无关节固定引起的不适,无晚期功能锻炼导致的关节僵硬;与游离皮瓣比较,游离皮瓣需要显微操作技术,术后需卧床静养。对于老年性患者,不宜长期卧床,血管质量差;对于年幼患者,术后易哭闹。这些因素都易导致血管危象,可能需再次手术探查、血管移植。而切取筋膜瓣操作简单,手术时间短,术后无须特殊护理。(2)与 I 期筋膜瓣联合自体皮片移植术比较。本术式增加了手术部位,植皮后易出现植皮色素沉着、植皮周围瘢痕增生,外观臃肿。(3)与 I 期人工真皮移植、II 期自体皮片移植术比较。本术式增加了手术次数,需自体取皮。另外,人工真皮能促进胶原组织的合成分布,防止瘢痕过度增生,相对于植皮术



图 1 患者,男,41 岁,右示指中节背侧皮肤缺损 **1a**. 右示指背侧皮肤缺损 **1b**. 急诊手术清创后,皮肤缺损面积 2.0 cm×2.0 cm、骨肌腱外露面积 1.5 cm×1.5 cm **1c**. 在近节背侧设计切口 **1d**. 皮下分离筋膜瓣 **1e**. 扭转筋膜瓣覆盖皮肤缺损区,蒂部旋转点位于近端指间关节近端约 0.5 cm **1f**. 将人工真皮覆盖在筋膜瓣表面 **1g**. 术后 2 周拆除硅胶膜,肉芽组织生长良好 **1h**. 术后 4 周外观照示创面基本愈合 **1i**. 术后 6 个月创面愈合后无明显瘢痕增生挛缩,愈合创面与周围皮肤色泽相同,质地相近,耐磨性、柔韧性良好,感觉与周围皮肤相近 **1j,1k**. 术后 6 个月功能图示手指屈伸良好

Fig.1 Patient, male, 41 years old, skin defect on the dorsal side of the middle segment of right index finger **1a**. Dorsal skin defect of right index finger **1b**. Skin defect area ranged 2.0 cm×2.0 cm after debridement in emergency operation, exposed area of bone tendon was 1.5 cm×1.5 cm **1c**. Design of incision on the dorsal side of proximal segment **1d**. Subcutaneous fascial flap **1e**. Flip the fascia flap covers the skin defect area, and the pedicle rotation point was about 0.5 cm near proximal interphalangeal joint **1f**. Artificial dermis was covered on the surface of fascia flap **1g**. Postoperative appearance at 2 weeks showed the granulation tissue grew well after remove of silica gel membrane **1h**. Postoperative appearance at 4 weeks showed wound healed **1i**. Postoperative appearance at 6 months showed wound healed without obvious scar hyperplasia contracture, the healed wound was similar to surrounding skin in color and texture with good abrasion resistance and flexibility, and the similar feeling with surrounding skin **1j, 1k**. Postoperative functional diagram at 6 months showed well flexion and extension

后创缘周围易形成瘢痕组织有其优越性^[4]。

4.4 注意事项

本方法需筋膜瓣和人工真皮 I 期成活, 才能达到创面 I 期愈合, 任何导致筋膜瓣坏死和人工真皮

未上皮化的因素都可致手术失败。其难点是人工真皮植入后无法观察筋膜瓣血运, 若发现创面未完全上皮化, 需换药至创面自然上皮化, 导致治疗时间延长。急诊创面大部分污染严重, 清创不彻底或筋膜瓣

坏死都可引起感染,将导致创面难以愈合。皮肤缺损及骨肌腱外露面积越大,所需筋膜瓣蒂部血液供应越多,创面愈合时间越长,感染概率越大。因此,手术时需要注意以下几点:(1)彻底清创,可将人工真皮置入庆大霉素盐水稀释液内浸泡 1 min。(2)蒂部不能过窄,不能<1 cm,观察筋膜瓣边缘渗血情况,如渗血明显,表明筋膜瓣血运存在。(3)缝合筋膜瓣时张力不能过大,蒂部表面的皮肤需疏松缝合,防止卡压筋膜蒂。(4)为了防止加压过度,影响筋膜瓣血运,未予打包加压,可缝合真皮时,保持一定的张力,使人工真皮能更好地贴附筋膜瓣,术后敷料适当加压包扎。(5)硅胶面打孔时避免损伤下方的筋膜瓣,术后观察硅胶膜下积液情况,可再次于硅胶膜切数个孔或按压人工真皮排除积液。(6)术后根据颜色变化和国内最新《双层人工真皮临床应用专家共识(2019 版)》^[15]提出的“三看一压”来判断其血管化的程度。

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