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胫后动脉穿支皮瓣与吻合皮下静脉的带蒂皮瓣对四肢皮肤及软组织缺损的应用效果对比*

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摘要 目的:对比胫后动脉穿支皮瓣与吻合皮下静脉的带蒂皮瓣对四肢皮肤及软组织缺损的应用效果。**方法:**选取2017年3月到2022年3月68例四肢皮肤及软组织缺损患者,各组均为34例。所有患者均采取皮瓣修复手术,对照组患者采取胫后动脉穿支皮瓣治疗,观察组采取吻合皮下静脉的带蒂皮瓣治疗。对比临床疗效,术中出血量、等指标,最后对两组患者进行1年随访,对比其并发症发生率及1年内术后二次修复情况。**结果:**观察组治疗总有效率较对照组高($P<0.05$);两组患者术中出血量、手术时间、术后VAS评分对比无明显差异,观察组住院时间、创面愈合时间明显低于对照组($P<0.05$);两组患者术后感觉功能恢复S3级、S2级、S1级、S0级人数对比无明显差异($P>0.05$),观察组术后感觉功能恢复S4级人数明显高于对照组($P<0.05$);与对照组相比,观察组出现的并发症发生率、术后二次修复率低($P<0.05$)。**结论:**吻合皮下静脉的带蒂皮瓣修复与胫后动脉穿支皮瓣修复术相比可进一步改善疗效,缩短住院时间,有利于创面愈合、感觉功能恢复,降低远期并发症发生率及术后二次修复率,值得临床应用推广。

关键词:胫后动脉穿支皮瓣;吻合皮下静脉的带蒂皮瓣;四肢皮肤;软组织缺损

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Comparison of the Application Effects of Posterior Tibial Artery Perforator Flap and Pedicle Skin Flap Anastomosed with Subcutaneous Vein on Limb Skin and Soft Tissue Defects*

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ABSTRACT Objective: To compare the application effect of the posterior tibial artery perforator flap and the pedicled skin flap anastomosing subcutaneous veins on skin and soft tissue defects in the limbs. **Methods:** 68 patients with limb skin and soft tissue defects admitted to our hospital from March 2017 to March 2022 were selected as the study subjects, with 34 cases in each group. All patients underwent flap repair surgery, while the matched group received treatment with the posterior tibial artery perforator flap, while the observation group received treatment with a pedicle skin flap anastomosing the subcutaneous vein. Compare the clinical efficacy, intraoperative bleeding volume, surgical time, hospital stay, wound healing time, postoperative pain level, and sensory function recovery between the two groups of patients. Finally, conduct a one-year follow-up of the two groups of patients to compare their incidence of complications and secondary repair within one year. **Results:** The total response rate was higher in the observation group than in the matched group ($P<0.05$); There was no difference in intraoperative bleeding volume, surgical time, and postoperative VAS score between the two groups of patients. The observation group had lower hospital stay and wound healing time than the matched group($P<0.05$); There was no difference in the number of patients with postoperative sensory function recovery at S3, S2, S1, and S0 levels between the two groups ($P>0.05$). The number of patients with postoperative sensory function recovery at S4 level in the observation group was higher than that in the matched group ($P<0.05$); The rate of postoperative complications and the rate of postoperative secondary repair in the observation group were significantly lower than that in the matched group ($P<0.05$). **Conclusion:** Compared with the repair of skin and soft tissue defects in the limbs using the posterior tibial artery perforator flap, the repair of pedicle skin flap with subcutaneous vein anastomosis can further improve the treatment effect, shorten the hospitalization time of patients, promote wound healing, improve postoperative sensory function recovery level, reduce the incidence of long-term complications and secondary repair rate, and is worthy of clinical application and promotion.

Key words: Posterior tibial artery perforator flap; Pedicled skin flap anastomosing subcutaneous veins; Skin of limbs; Soft tissue defects

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前言

四肢皮肤及软组织缺损患者多伴随肌腱、骨关节外漏等,组织血供遭受损伤,且四肢皮肤及软组织缺损患者极可能会发生局部皮肤、软组织坏死^[1]。针对四肢皮肤及软组织缺损的修复较为复杂,不仅要促进皮瓣存活,而且需要尽可能的恢复感觉神经^[2]。当前临床上针对四肢皮肤及软组织缺损多采取常规清创、换药、自体皮抑制修复治疗,传统操作技术较成熟,但据报道,其存在易感染、修复时间长等缺点,并易导致皮瓣远端坏死,影响患者预后水平^[3]。随着临床医学发展,研究发现^[4,5],胫后动脉穿支皮瓣隐蔽,血管变异少,关系恒定,对于失智皮肤及软组织缺损进行皮瓣修复效果显著,可提升皮瓣成活率。另外还有研究发现^[6],吻合皮下静脉的带蒂皮瓣能够将肌腱及神经放

置在含有血运的脂肪层内,并对血管进行吻合,有助于创面愈合的同时,改善皮瓣血运,易于术后功能锻炼,减少患者多次手术的痛苦。但当前临床上针对四肢皮肤及软组织缺损患者采取胫后动脉穿支皮瓣与吻合皮下静脉的带蒂皮瓣哪种治疗效果更优,尚无确切定论。因此,本研究对比胫后动脉穿支皮瓣与吻合皮下静脉的带蒂皮瓣对四肢皮肤及软组织缺损的应用效果。

1 资料与方法

1.1 一般资料

选取中国人民解放军联勤保障部队第910医院2017年3月到2022年3月68例四肢皮肤及软组织缺损患者,各组均为34例。经伦理委员会批准。患者一般资料对比无差异($P>0.05$),见表1。

表1 一般资料
Table 1 General Information

Groups	n	Gender (male/female)	Age(year)	Injury to repair time(d)	Damaged area (cm ²)	Damaged area	
						Ankle and foot	Hand
Observation group	34	23/11	41.53± 4.63	3.73± 1.15	31.53± 4.26	16	18
Matched group	34	21/13	40.67± 6.75	3.71± 0.17	31.82± 5.11	15	19
t/χ^2	-	0.250	0.664	0.588	1.203		0.210
<i>P</i>	-	0.617	0.509	0.578	0.234		0.648

1.2 纳排标准

纳入标准:由交通事故、工业机械导致为四肢皮肤及软组织缺损,且符合皮瓣移植术治疗指征^[7];为双手或双脚皮肤及软组织缺损者;患者生命体征稳定;知情同意。

排除标准:合并中枢神经系统功能紊乱者;损伤后合并全身性并发症者;合并严重肝肾功能不全者;四肢均出现肌腱、皮肤缺损者;合并营养不良者;不能配合研究或中途退出者;进行其他影响创面愈合的治疗者;术前创面周围软组织出现严重炎症形成及显著坏死者。

1.3 方法

所有患者术前均进行创面清理,对于出现骨折的患者骨折断端固定采用克氏针,对神经受损部位、肌腱进行缝合,在进行清创后,实施常规换药,并在3~5 d创面清理干净后,进行皮瓣修复手术。

对照组:胫后动脉穿支皮瓣修复术:所有患者均采取仰卧位,双下肢外展,进行采取全身静脉复合麻醉,设计皮瓣,并从外侧、下方切开,内向上游离,将蒂部组织切开并对于1.5 cm皮下蒂进行保留,实施结扎,对穿支血管进行切断,观察皮瓣血运,选择胫后动脉穿支点作为蒂,移植到受区后缝合处理,显微镜下进行断层植皮。

观察组:吻合皮下静脉带蒂皮瓣修复术:患者在术前准备中取仰卧位,并保持双下肢外展的姿势,对患者行全身静脉复合麻醉,消毒皮瓣供区皮肤及创面四周皮肤(使用0.5%强力碘溶液)。彻底清创创面皮肤,在整个操作中,应当尽可能保留撕脱神经纤维。接下来进行皮下静脉带蒂皮瓣设计,长、宽约为1.5~3:1,与四肢伤区比较,需要大出0.5~1.5 cm。旋转点选择动

脉穿支,设计带蒂皮瓣,切开皮瓣外缘、远端,深度到达浅筋膜深层,掀起远端到近端皮瓣,保留皮瓣远端皮下静脉。皮瓣吻合受区皮下静脉和皮瓣远端保留的皮下静脉后,缝合皮瓣并引流。

所有患者术后均需注意观察皮瓣血运状况,行抗生素抗感染,并静脉滴注低分子肝素钠。术后抗血管痉挛治疗采取罂粟碱。

1.4 观察指标与疗效判定标准

(1)疗效判定标准:显效为治疗3个月后皮瓣修复处血运良好,组织器官正常,组织质地柔软且有弹性,皮瓣成活面积为90%以上为;有效为皮瓣修复处血运良好,不对机体组织器官正常功能产生影响,质地柔软且有弹性,皮瓣成活面积超过85%;无效为:未达到上述标准且皮瓣区出现恶化。总有效率=(显效人数+有效人数)/总人数×100%。

(2)观察并记录术中出血量、手术时间、住院时间、创面愈合时间,并采用VAS评分评价术后3 d皮瓣处疼痛情况,分数与疼痛成正比^[8]。

(3)6个月后对患者皮瓣区域感觉功能恢复情况进行评价,其中包括S4级:两点辨别、痛觉、触觉完全恢复;S3级:神经支配区触觉、痛觉完全恢复;S2级:神经支配区触觉、痛觉恢复,但存在一定感觉过敏;S1级:神经支配区深痛觉恢复;S0级:神经支配感觉丧失。

(4)对所有患者进行术后1年门诊随访,观察术后出现并发症及术后二次修复。

1.5 统计学方法

采取SPSS 23.0,计数资料以(n%)表示, χ^2 检验;计量资料用($\bar{x} \pm s$)表示,t检验;以 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 临床疗效对比

表2。

与对照组相比,观察组治疗总有效率较高($P < 0.05$),见

表 2 临床疗效对比(n,%)
Table 2 Clinical efficacy comparison (n, %)

Groups	n	Apparent effect	Effective	Invalid	Total effective rate
Observation group	34	18(52.94%)	14(41.18%)	2(5.88%)	32(94.12%)
Matched group	34	14(41.18%)	10(29.41%)	10(29.41%)	24(70.59%)
χ^2	-	-	-	-	6.480
P	-	-	-	-	0.011

2.2 围术期情况对比

明显差异,观察组住院时间、创面愈合时间明显低于对照组

两组患者术中出血量、手术时间、术后 VAS 评分对比无 ($P < 0.05$),见表 3。

表 3 围术期情况对比($\bar{x} \pm s$)
Table 3 Comparison of perioperative conditions ($\bar{x} \pm s$)

Groups	n	Intraoperative bleeding		Operative time		Hospital stay(d)		Postoperative VAS		Wound healing	
		volume(mL)		(min)				score(score)		time(d)	
Observation group	34	314.34±	35.58	221.15±	20.28	20.15±	3.47	5.82±	1.08	21.43±	3.53
Matched group	34	317.54±	34.52	220.76±	26.31	26.95±	3.34	5.35±	1.12	25.84±	4.36
t	-	4.607		9.236		5.785		6.219		4.584	
P	-	0.001		0.001		0.001		0.001		0.001	

2.3 感觉功能恢复水平对比

数对比无明显差异($P > 0.05$),观察组术后感觉功能恢复 S4 级

两组患者术后感觉功能恢复 S3 级、S2 级、S1 级、S0 级人数明显高于对照组($P < 0.05$),见表 4。

表 4 感觉功能恢复水平对比(n,%)
Table 4 Comparison of sensory function recovery levels (n, %)

Groups	n	S4	S3	S2	S1	S0
Observation group	34	29(85.29%)	2(5.88%)	2(5.88%)	1(2.94%)	0(0.00%)
Matched group	34	21(61.76%)	6(17.65%)	4(11.76%)	2(5.88%)	1(2.94%)
χ^2	-	4.840	2.270	0.730	0.350	1.010
P	-	0.028	0.132	0.395	0.555	0.314

2.4 并发症发生率及预后情况对比

率较低($P < 0.05$),见表 5。

与对照组比较,观察组术后并发症发生率、术后二次修复

表 5 并发症发生率及预后情况对比(n,%)
Table 5 Comparison of incidence and prognosis of complications (n, %)

Groups	n	Complication					Total	Postoperative secondary repair rate
		Effusion	Wound infection	Wound necrosis	Cicatricial contracture			
Observation group	34	1(2.94%)	1(2.94%)	0(0.00%)	1(2.94%)	3(8.82%)	5(14.71%)	
Matched group	34	3(8.82%)	2(5.88%)	2(5.88%)	3(8.82%)	10(29.41%)	14(41.18%)	
χ^2	-	-	-	-	-	4.660	5.920	
P	-	-	-	-	-	0.031	0.015	

3 讨论

当前临床上,手部及足踝部相关四肢皮肤及软组织缺损修复是当前研究热点,该区域皮肤软组织修复要求较高,主要涉

及皮肤耐磨性和功能,同时该部位皮下组织少,局部血运差,因此手术方法较复杂,术后要求较高^[9,10]。但是传统自体皮肤移植虽然可以对创面进行修复,但是由于软组织缺损较大,植皮难以全部成活,且耐磨性较差^[11]。研究发现^[12],足踝部皮肤及软组织缺损游离皮瓣植皮不易成活,即便成活术后由于皮片收缩增加与深部组织粘连发生率,影响关节功能。因此,对于四肢皮肤及软组织缺损修复原则上用皮瓣来进行修复,可尽快恢复局部血液循环,降低深部感染发生率,降低肌腱粘连和关节僵硬情况的发生^[13,14]。因此,本研究针对临床上两种皮瓣修复术,即吻合皮下静脉的带蒂皮瓣修复与胫后动脉穿支皮瓣进行分析。

本研究表明,与对照组相比,观察组治疗总有效率较高($P<0.05$),与 Appukuttan A 等^[15]研究结果相符。这是因为,四肢皮肤及软著修复是在前期选择特异性方案,并对患者创面、缺损进行最大程度修复填补,恢复肢体功能。且吻合皮下静脉的带蒂皮瓣修复会出现皮瓣坏死现象^[16]。此外,该技术具有损伤小、减少麻醉剂手术次数等优势,有利于提升预后水平。并在设计时需注意:皮瓣足够大,皮蒂足够宽,进而降低术后皮瓣张力及坏死发生率^[17]。有研究发现^[18],采取吻合皮下静脉的带蒂皮瓣修复选择胫后动脉穿支皮瓣进行移植效果较差。这主要是因为,胫后动脉血管口径较粗,吻合存在一定困难,可能对治疗效果产生影响。因此,本研究在吻合皮下静脉的带蒂皮瓣修复过程中供区皮瓣选择受损邻近区域,可更好的进行血管吻合,改善术后皮瓣血运,提升治疗性效果。本研究表明,与对照组相比,观察组住院时间、创面愈合时间低($P<0.05$)。提示采取吻合皮下静脉的带蒂皮瓣修复可促进患者创面愈合缩短住院时间,与 Koster ITS 等^[19]研究相符。Koster ITS 等研究发现,对于足踝部皮肤及软组织缺损患者采取胫后动脉穿支皮瓣修复术为了进一步提升术后皮瓣成活率,皮瓣组织切取较深,增加对患者造成的损伤,住院时间较长。而采取吻合皮下静脉的带蒂皮瓣可进行特异性设计,进而减少额外损伤^[20]。且该技术使环境处于低氧,在手术的同时提升创面皮肤皮化速度,进而有利于创面愈合^[21,23]。本研究结果表明,两组患者术后感觉功能恢复 S3 级、S2 级、S1 级、S0 级人数对比无明显差异($P>0.05$),观察组术后感觉功能恢复 S4 级人数明显高于对照组($P<0.05$)。证明采取吻合皮下静脉的带蒂皮瓣修复有利于感觉神经的恢复,与 Gakis C 等^[24]研究相符。这主要是因为,吻合皮下静脉的带蒂皮瓣修复可降低机体损伤,有益于皮瓣愈合,促进感觉功能恢复^[25]。本研究结果表明,观察组术后感觉功能恢复 S4 级人数明显高于对照组($P<0.05$);观察组术后出现并发症、术后二次修复率明显低于对照组($P<0.05$),与 Bruin LL 等^[26]研究相似。这也是因为,吻合皮下静脉的带蒂皮瓣可最大限度的恢复肢体功能,修复受损的神经和肌腱,吻合皮下静脉恢复皮瓣血运,可促进患者皮肤早期愈合,降低术后并发症发生率及二次修复率^[27-29]。但注意在手术过程中要进行彻底清创,从而减少术后感染情况发生^[30]。

综上所述,吻合皮下静脉的带蒂皮瓣修复与胫后动脉穿支皮瓣修复术相比可进一步改善四肢皮肤及软组织缺损疗效,缩短住院时间,有利于创面愈合、感觉功能恢复,降低远期并发症发生率及术后二次修复率,值得临床应用推广。

参考文献(References)

[1] Suijker J, Zheng KJ, Pijpe A, et al. The Skin-Sparing Debridement

- Technique in Necrotizing Soft-Tissue Infections: A Systematic Review[J]. *J Surg Res*, 2021, 264(11): 296-308.
- [2] Shimbo K, Okuhara Y, Yokota K. Closure of a free osteofasciocutaneous fibula flap donor site using local skin grafts or flaps: A systematic review and meta-analysis[J]. *Microsurgery*, 2022, 42(2): 192-198.
- [3] da Costa Vieira RA, de Oliveira-Junior I, Branquinho LI, et al. Modified External Oblique Myocutaneous Flap for Repair of Postmastectomy Defects in Locally Advanced Breast Tumors: A Cohort Series Associated with a Systematic Review of Literature[J]. *Ann Surg Oncol*, 2021, 28(6): 3356-3364.
- [4] Salloum A, Bazzi N, Squires S, et al. Comparing the application of various engineered xenografts for skin defects: A systematic review [J]. *J Cosmet Dermatol*, 2023, 22(3): 921-931.
- [5] Lucattelli E, Brogi M, Cipriani F, et al. Oromandibular reconstruction with double-skin paddle fibular free flap: A systematic review and meta-analysis[J]. *Microsurgery*, 2021, 41(7): 676-687.
- [6] 杨光,帖成章,胡洋,等.吻合皮下静脉的带蒂皮瓣修复四肢皮肤软组织缺损的效果分析 [J]. *现代生物医学进展*, 2022, 22(14): 2718-2721, 2757.
- [7] 何悦,蒋灿华,侯劲松,等.穿支皮瓣修复口腔颌面-头颈部缺损专家共识[J]. *中国口腔颌面外科杂志*, 2020, 18(5): 385-389.
- [8] 吕晨,邹建玲,沈淑华,等.视觉模拟量表和语言评价量表用于术后疼痛评估的比较[J]. *全科医学临床与教育*, 2004, 2(4): 214-219.
- [9] Veldhuizen IJ, Budo J, Kallen EJJ, et al. A Systematic Review and Overview of Flap Reconstructive Techniques for Nasal Skin Defects [J]. *Facial Plast Surg Aesthet Med*, 2021, 23(6): 476-481.
- [10] Janik S, Marijic B, Faisal M, et al. Using the serratus anterior free flap for dynamic facial reanimation: Systematic review [J]. *Head Neck*, 2023, 45(1): 266-274.
- [11] Shimbo K, Okuhara Y, Yokota K. The use of ipsilateral skin grafts or local flaps for the closure of a free radial forearm flap donor site: a systematic review[J]. *J Plast Surg Hand Surg*, 2021, 55(5): 261-267.
- [12] Somasundaram J, Wallace DL, Cartotto R, et al. Flap coverage for necrotising soft tissue infections: A systematic review [J]. *Burns*, 2021, 47(7): 1608-1620.
- [13] Troisi L, Berner JE, West EV, et al. Medial Plantar Flap for Hand Reconstruction: A Systematic Literature Review and Its Application for Post-Sarcoma Excision[J]. *Ann Plast Surg*, 2019, 82(3): 337-343.
- [14] Mangialardi ML, Baldelli I, Salgarello M, et al. Thoracodorsal Artery Perforator Flap in Partial Breast Reconstruction: A Systematic Review[J]. *Plast Reconstr Surg Glob Open*, 2020, 8(10): e3104.
- [15] Appukuttan A, Loh CYY, Puente MM, et al. Reverse Superficial Palmar branch of Radial artery pedicled flap for Palmar and Digital reconstruction: A systematic review of literature with a retrospective case review[J]. *JPRAS Open*, 2021, 29(3): 144-156.
- [16] Kauke M, Safi AF, Zhegibe A, et al. Mucosa and Rejection in Facial Vascularized Composite Allotransplantation: A Systematic Review [J]. *Transplantation*, 2020, 104(12): 2616-2624.
- [17] Tong X, Lu J, Zhang W, Wang S, et al. Efficacy and safety of external tissue expansion technique in the treatment of soft tissue defects: a systematic review and meta-analysis of outcomes and complication rates[J]. *Burns Trauma*, 2022, 10(4): tkac045. (下转第 2322 页)

- [7] 郭力, 胡燕, 邹旋. 超声引导下多神经阻滞麻醉在老年踝关节骨折手术中的应用效果[J]. 中国老年学杂志, 2021, 41(14): 2991-2993.
- [8] 陈默曦, 许涛, 高晓云, 等. 超声引导下臂丛复合肋间臂神经阻滞在肱骨远端骨折手术中的镇痛效果观察[J]. 上海交通大学学报(医学版), 2022, 42(5): 624-628.
- [9] 王丽, 袁梦琦, 西志梦, 等. 超声引导下腹股沟韧带上髂筋膜阻滞对老年患者股骨转子间骨折闭合复位预后的影响[J]. 临床麻醉学杂志, 2020, 36(10): 966-970.
- [10] 中华医学会麻醉学分会老年人麻醉学组, 中华医学会麻醉学分会骨科麻醉学组. 中国老年髋部骨折患者麻醉及围术期管理指导意见[J]. 中华医学杂志, 2017, 97(12): 897-905.
- [11] 吴泽昊, 王云. 髂筋膜间隙阻滞的研究进展[J]. 国际麻醉学与复苏杂志, 2020, 41(10): 996-1002.
- [12] Wang X, Sun Y, Wang L, et al. Femoral nerve block versus fascia iliaca block for pain control in total knee and hip arthroplasty: A meta-analysis from randomized controlled trials [J]. *Medicine (Baltimore)*, 2017, 96(27): e7382.
- [13] 孙倩倩, 余健, 程震. 连续髂筋膜间隙阻滞对老年患者髋部手术后认知功能及应激反应的影响 [J]. 临床麻醉学杂志, 2021, 37(6): 603-606.
- [14] EHSANI R, DJALALI MOTLAGH S, ZAMAN B, et al. Effect of general versus spinal anesthesia on postoperative delirium and early cognitive dysfunction in elderly patients [J]. *Anesth Pain Med*, 2020, 10(4): e101815.
- [15] 孟波, 翟晓杰, 李晓瑜, 等. 腰麻与全麻对老年患者髋关节置换术后早期认知功能影响的比较 [J]. 中华麻醉学杂志, 2019, 39(7): 797-800.
- [16] 董强, 刘冲. 老年骨科手术患者术后认知功能障碍的危险因素分析[J]. 医学临床研究, 2020, 37(11): 1717-1719.
- [17] 吴丽珍, 陈紫玫, 黄春行, 等. 老年股骨颈骨折术后认知功能障碍的危险因素分析及预测模型构建[J]. 护理研究, 2022, 36(1): 22-27.
- [18] HUGHES C G, MORANDI A, GORARD T D, et al. Association between endothelial dysfunction and acute brain dysfunction during critical illness[J]. *Anesthesiology*, 2013, 118(3): 631-639.
- [19] 史炯, 何平, 赵翠党, 等. 老年患者应用右美托咪定联合椎管内麻醉的镇静效果及影响患者术后认知功能障碍的危险因素分析[J]. 国际老年医学杂志, 2021, 42(3): 158-162.
- [20] Hovens IB, van Leeuwen BL, Nyakas C, et al. Prior infection exacerbates postoperative cognitive dysfunction in aged rats[J]. *Am J Physiol Regul Integr Comp Physiol*, 2015, 309(2): 148-159.
- [21] 周莹, 陈磊, 董瑞, 等. miR-146a 在术后认知功能障碍小鼠海马炎症反应中的作用[J]. 中华麻醉学杂志, 2021, 41(2): 159-164.
- [22] 王冬婷, 杨彪. 血清 S100 β 蛋白, NSE, CRP 及 IL-6 水平与老年术后认知功能障碍的关系分析 [J]. 海南医学院学报, 2019, 25(13): 1016-1020.
- [23] Xu KL, Liu XQ, Yao YL, et al. Effect of dexmedetomidine on rats with convulsive status epilepticus and association with activation of cholinergic anti-inflammatory pathway [J]. *Biochem Biophys Res Commun*, 2018, 495(1): 421-426.
- [24] 李静, 董补怀, 蔡文博, 等. 连续腰丛阻滞降低老年患者髋关节置换术后早期认知功能障碍的发生[J]. 中南大学学报: 医学版, 2018, 43(8): 858-863.
- [25] 刘涛, 刘兆东. 超声引导下腰骶丛神经阻滞对老年髋关节置换术后认知功能及血清应激, 炎症指标的影响[J]. 国际精神病学杂志, 2023, 50(1): 128-131.
- (上接第 2287 页)
- [18] Mabvuure NT, Pinto-Lopes R, Iwuagwu FC, et al. A systematic review of outcomes following hand reconstruction using flaps from the superficial palmar branch of the radial artery (SUPBRA) system [J]. *J Plast Reconstr Aesthet Surg*, 2021, 74(1): 79-93.
- [19] Koster ITS, Borgdorff MP, Jamaludin FS, et al. Strategies Following Free Flap Failure in Lower Extremity Trauma: A Systematic Review [J]. *JPRAS Open*, 2023, 36(5): 94-104.
- [20] Patel NK, Tipps JA, Bartlett SP, et al. Expanding Indications of the Medial Femoral Condyle Free Flap: Systematic Review in Head and Neck Reconstruction[J]. *Plast Reconstr Surg Glob Open*, 2023, 11(4): e4925.
- [21] Roberts JM, Carr LW, Haley CT, et al. Venous Flaps for Revascularization and Soft-Tissue Coverage in Traumatic Hand Injuries: A Systematic Review of the Literature [J]. *J Reconstr Microsurg*, 2020, 36(2): 104-109.
- [22] da Costa Vieira RA, de Oliveira-Junior I, Branquinho LI, et al. Modified External Oblique Myocutaneous Flap for Repair of Postmastectomy Defects in Locally Advanced Breast Tumors: A Cohort Series Associated with a Systematic Review of Literature[J]. *Ann Surg Oncol*, 2021, 28(6): 3356-3364.
- [23] Escandón JM, Ciudad P, Mayer HF, et al. Free flap transfer with supermicrosurgical technique for soft tissue reconstruction: A systematic review and meta-analysis [J]. *Microsurgery*, 2023, 43(2): 171-184.
- [24] Gakis C, Chrysikos D, Samolis A, et al. Anatomical variations of the vascular supply of the cutaneous component of the serratus anterior myocutaneous flap: a systematic review [J]. *Folia Morphol (Warsz)*, 2022, 81(4): 834-842.
- [25] Griep DW, Shah NV, Scollan JP, et al. Outcomes of gracilis free-flap muscle transfers and non-free-flap procedures for restoration of elbow flexion: A systematic review [J]. *J Plast Reconstr Aesthet Surg*, 2022, 75(8): 2625-2636.
- [26] Bruin LL, Hundepool CA, Duraku LS, et al. Higher incidences of neuropathic pain and altered sensation following radial forearm free flap: A systematic review [J]. *J Plast Reconstr Aesthet Surg*, 2022, 75(1): 1-9.
- [27] Shimbo K, Okuhara Y, Yokota K. Closure of a free osteofasciocutaneous fibula flap donor site using local skin grafts or flaps: A systematic review and meta-analysis[J]. *Microsurgery*, 2022, 42(2): 192-198.
- [28] Shimbo K, Kawamoto H, Koshima I. Muscle/musculocutaneous versus fasciocutaneous free flap reconstruction in the lower extremity: A systematic review and meta-analysis[J]. *Microsurgery*, 2022, 42(8): 835-847.