

带蒂组织瓣在头颈部肿瘤术后缺损修复重建中的应用研究进展



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【摘要】 目的 对带蒂组织瓣在头颈部肿瘤术后缺损修复重建中的应用现状进行综述,并展望其应用前景。方法 查阅国内外相关文献,阐述带蒂组织瓣在头颈部肿瘤术后缺损修复重建中的地位变迁,并回顾常用的新型和传统组织瓣的发展历史,总结其解剖学基础、适应证、优缺点和改进方法。结果 颞下动脉岛状皮瓣、锁骨上动脉岛状皮瓣、面动脉颊肌黏膜瓣和颌下腺瓣等新型组织瓣,在特定患者中表现出与游离皮瓣相似甚至更优的修复效果。而目前临床对鼻唇沟皮瓣、胸大肌肌皮瓣、背阔肌肌皮瓣、颞肌筋膜瓣以及颞顶筋膜瓣等传统带蒂组织瓣的制备技术也进行了诸多改良,进一步拓宽了各自适应证,尤其适用于自身条件不佳的患者。结论 带蒂组织瓣在头颈部肿瘤缺损修复重建中仍然发挥着重要作用,在特定的患者甚至展现出切取更便捷、术后恢复快、治疗花费少、修复效果好的优势。

【关键词】 带蒂组织瓣; 头颈部缺损; 创面修复

Research progress of pedicled flaps for defect repair and reconstruction after head and neck tumor resection

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【Abstract】 Objective To summarize the current status of pedicled flaps for defect repair and reconstruction after head and neck tumor resection, and to present its application prospects. **Methods** Related literature was reviewed, and the role evolution of pedicled flaps in the reconstruction of head and neck defects were discussed. The advance, anatomical basis, indications, advantages, disadvantages, and modification of several frequently used pedicled flaps were summarized. **Results** The evolution of pedicled flaps application showed a resurgence trend in recent years. Some new pedicled flaps, e.g., submental artery island flap, supraclavicular artery island flap, submandibular gland flap, and facial artery musculomucosal flap, can acquire equivalent or even superior outcome to free flaps in certain cases. Technological modification of some traditional pedicled flaps, e.g., nasolabial flap, pectoralis major myocutaneous flap, latissimus dorsi musculocutaneous flap, temporalis myofascial flap, and temporoparietal fascial flap, can further broaden their indications. These traditional flaps still occupy an irreplaceable role, especially in patients with poor condition and institution with immature microsurgical techniques. **Conclusion** The pedicled flaps still plays an important role in head and neck reconstruction after tumor resection. In certain cases, they demonstrate some advantages over free flaps, e.g., more convenient harvest, more rapid recovery, less expenditure, and better functional and aesthetic effect.

【Key words】 Pedicled flap; head and neck defects; wound repair

Foundation items: National Key Research and Development Plan of China (2016YFC1302500); Natural Science Funds of Hubei Province (2017CFB458); Applied Basic Research Program of Wuhan Science and Technology Bureau (2017060201010157)

DOI: 10.7507/1002-1892.201710098

基金项目: 国家重点研发计划(2016YFC1302500)、湖北省自然科学基金(2017CFB458)、武汉市科技局应用基础研究计划(2017060201010157)

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头颈部癌 (head and neck cancer, HNC) 是临床常见恶性肿瘤, 发病部位包括涎腺、鼻腔、鼻窦、口腔、口咽、下咽、喉和颈段食管等^[1]。手术在头颈部良性肿瘤或瘤样病变切除、早期 HNC 根治性治疗和中晚期 HNC 综合治疗中具有重要地位^[1-2]。但肿瘤切除后常导致畸形缺损或功能障碍^[2], 缺损类型包括软组织缺损、骨缺损和器官缺失等, 需要选择合适术式进行修复重建, 以改善患者生活质量和预后。临床用于修复 HNC 术后缺损的传统带蒂组织瓣包括胸大肌肌皮瓣 (pectoralis major myocutaneous flap, PMMF)、背阔肌肌皮瓣 (latissimus dorsi musculocutaneous flap, LD MF)、鼻唇沟皮瓣 (nasolabial flap, NLF)、颞肌筋膜瓣 (temporalis myofascial flap, TMF)、颞顶筋膜瓣 (temporoparietal fascial flap, TPF) 等。但随着显微血管吻合和数字化外科等技术的发展, 游离组织瓣已成为绝大多数 HNC 术后大中型缺损的首选修复手段, 该皮瓣术后成活率达到 95% 以上, 可获得满意的外形重塑和功能重建效果^[3-6]。但游离组织瓣以及衍生的穿支皮瓣仍具有一定局限性, 如手术时间长、对显微外科和术后监测技术要求高、术后常出现血管危象等并发症、部分患者 (如高龄、营养状况差、伴随疾病多、多次手术或放疗后等) 不适用等^[3,7]。

近年来, 随着对一些知名血管分支解剖认识的深入, 涌现出许多新型组织瓣, 例如颞下动脉岛状瓣 (submental artery island flap, SMAIF)、锁骨上动脉皮瓣 (supraclavicular artery island flap, SCAIF)、面动脉颊肌黏膜瓣 (facial artery musculomucosal flap, FAMMF)、颌下腺瓣 (submandibular gland flap, SMGF)、腭黏骨膜岛状瓣 (palatal island mucoperiosteal flap, PIMPF) 等, 展现出接近甚至优于游离组织瓣的外形修复和功能重建效果, 且具有切取方便、缩短手术时间并间接降低医疗费用和麻醉并发症、不需吻合血管、成活率更高、对患者营养状况和颈部血管条件要求相对较低等优点, 受到临床关注^[8-9]。现对临床常用的新型和传统带蒂组织瓣在 HNC 术后缺损修复重建中的应用进展作一综述。

1 SMAIF

1990 年 Martin 等首先用法语报道了 SMAIF, 1993 年该团队又用英语详细介绍了 SMAIF 的解剖学研究结果以及临床应用修复 8 例口面部缺损的疗效^[10]。我国于 1995 年由吴跃煌等首先应用该皮瓣,

经过 20 余年发展, 已成为修复 HNC 术后缺损的常用皮瓣^[11]。

SMAIF 由颞下动脉供血, 该分支起始点常位于面动脉自颈外动脉发出后约 6 cm 处, 距下颌骨下缘约 5 mm, 起始处直径约 1.5 mm; 颞下动脉发出后, 向前内走行于颌下腺内侧沟及下颌舌骨肌表面, 终止于二腹肌前腹及下颌骨, 沿途发出多个小分支至颌下腺、下颌舌骨肌和皮肤等部位; 两侧在中线处有丰富吻合^[10,12]。颞下动脉有 1~2 支伴行颞下静脉回流, 常汇入面前静脉, 汇入点直径约 2 mm^[10,12]。因此, 临床上可将 SMAIF 分别制作为带蒂或游离的单纯皮瓣、肌皮瓣、筋膜瓣和骨皮瓣等^[10,12]。目前, SMAIF 被广泛用于修复口腔和口咽部、颜面部、上颌骨、下咽、喉、颈段食管和颅底等部位肿瘤切除后的缺损或瘘管等^[10-11,13-15]。

大量临床应用证实^[10-11,13-15], SMAIF 修复重建 HNC 术后缺损的主要优势为: ① 切取方便快捷、不需血管吻合; ② 与颜面部颜色相似, 术后可获得较满意的美容效果; ③ 可制作大小、厚薄不一的组织瓣用于修复多种缺损; ④ 术后供区多可直接或皮下游离后拉拢缝合、瘢痕隐蔽, 对外观影响较小; ⑤ 血供较可靠, 用于高龄、营养状态较差、放疗后等合并高危因素患者也能达到较高成活率。有研究表明, 与前臂等部位的游离皮瓣相比, SMAIF 修复各类 HNC 术后缺损所需手术和麻醉时间更短、术中出血量更少、术后恢复更快、住院时间和花费更少、坏死等并发症风险更低; 而在复发和功能恢复等方面并无差异^[14,16-17]。

SMAIF 也存在诸多问题, 可采取相应的处理措施降低其影响。① 颞下血管解剖存在一定变异, 颞下动脉相对恒定^[10,12], 而颞下静脉回流变异较多^[15], 因此熟悉解剖特点并在手术过程中确保供血动脉、回流静脉及其来源血管的完整性是皮瓣成活的关键。② HNC 常潜在 I 区淋巴结转移, 导致复发概率增加, 因此一般不建议使用伴有淋巴结转移的 SMAIF^[13]。为避免选用伴有淋巴结转移的 SMAIF, 有学者建议行前哨淋巴结活检^[15,18]。然而, 有研究认为, 通过完整清除皮瓣区淋巴结等措施, 即便应用伴有淋巴结转移的 SMAIF, 也不增加复发风险^[19-20]。③ 部分男性患者有大量胡须, 从而限制其在口内等特殊部位的应用^[10-11]。实践证明, 去除表皮、二次手术、脱毛、激光等可以有效解决该问题^[13,21]。④ 血管蒂长度有限, 限制其用于面中部及以上区域缺损的修复。采用向血管蒂部解剖游离、面静脉与颈外静脉交通支 Y-V 推进、离断面静脉后

与缺损位置附近静脉吻合,以及逆行 SMAIF 等方案,可适当增加血管蒂长度^[22]。⑤传统的 SMAIF 常带有颈阔肌和二腹肌等结构,导致蒂部较为臃肿,旋转幅度受限。研究发现,在下颌角和颏下连线的中点附近有 1~2 支较为恒定的颏下动脉穿支进入皮下,以此设计颏下动脉穿支皮瓣可减少对供区损伤,并避免蒂部臃肿等问题^[23-24]。此外,采用预扩张技术^[25]、双层折叠^[26]、联合其他组织瓣^[27]和数字化技术^[28],可进一步扩大 SMAIF 的适应证,并改进修复效果。

2 SCAIF

由于存在远端坏死率较高等严重并发症,SCAIF 在问世后一直未得到重视。直至 1997 年, Pallua 等^[29]对 SCAIF 的血供进行了深入研究,并改进了制作方法,大幅降低了并发症的发生率,从而受到临床关注。早期 SCAIF 主要用于修复烧伤等引起的头颈部创面或瘢痕挛缩^[29-30]。2009 年, Chiu 等^[31]首先报道 SCAIF 在 HNC 术后缺损修复中的优良效果。之后, SCAIF 被广泛用于头面部、颅底、腮腺区、口腔、咽喉和颈部肿瘤术后缺损或瘘口的修复,并成为各类游离皮瓣失败后的补救修复手段^[31-36]。

SCAIF 的血供来源于颈横动脉分支锁骨上动脉,大多起源于锁骨中 1/3 上方,起始点常位于颈外静脉、胸锁乳突肌和锁骨形成的三角形区域内,起点处的外径平均约 1.1 mm;一般有两条伴行回流静脉,分别回流至颈横静脉和颈外静脉^[29, 32, 37-38]。然而,锁骨上动脉的来源、起点位置、走行和静脉回流等存在较大变异。因此,需常规在术前行超声或血管成像检查,明确颈横动脉和锁骨上动脉的走行;皮瓣制备过程中,将颈阔肌保留在蒂部并保证蒂部 3 cm 以上的宽度;淋巴结清扫时注意保护颈外静脉下段等,以利于提高 SCAIF 的成活率^[31-33]。

SCAIF 易于切取,绝大多数可在 1 h 内完成制备^[31-32, 34, 36]。切取宽度不超过 8~10 cm 时,供区可向两侧潜行分离后直接拉拢缝合,对供区损伤和外观影响较小^[31-36]。一项前瞻性研究结果也表明, SCAIF 切取后对肩部功能影响极小^[39]。SCAIF 可提供纤薄、柔软、与头颈部颜色相似的组织,而且没有毛发,适合于口腔颌面颈部缺损的修复^[31-36]。大量研究表明, SCAIF 与各类游离组织瓣的修复效果相似,而且表现出手术时间短、术后恢复快、治疗花费较低、供区损害小等优势^[40-43]。因而,部分学者推荐其作为修复 HNC 术后缺损的首选皮瓣^[35, 43]。

由于解剖变异等因素的影响,虽然 SCAIF 发生

完全坏死的比例较低,但发生远端坏死比例较高^[31-34]。此外,虽然有研究认为侧颈淋巴结清扫和既往颈部放疗对 SCAIF 皮瓣成活影响较小^[44],但对于此类患者,更需做好术前评估和术中保护,最大程度避免血管因素带来的不良影响。

近年来, SCAIF 的制备技术不断改进,比如采用预扩张^[35, 45]、隧道皮瓣^[35]和穿支皮瓣^[45]等,进一步提升了修复效果、降低了供区损伤、扩大了修复适应证。

3 TMF 及 TPF

根据血供来源和切取层次的差异,颞区可制备成多种不同的轴型组织瓣,其中最具有代表性的轴型组织瓣是 TMF 和 TPF^[46]。

颞肌起源于上颞线,向下插入下颌骨喙突内侧,主要由颌内动脉的分支颞深动脉前后支供血,颞浅动脉分支颞中动脉也参与供血^[46]。在 TMF 制备过程中,根据血供走行纵行切开可同时用于修复不同部位的缺损^[46]。颞顶筋膜与颅顶的帽状腱膜延续,由颞浅动脉及其额顶分支供血,可制备成以颞浅血管为蒂的 TPF,该皮瓣纤薄、柔韧、可任意折叠^[46]。TMF 和 TPF 两者组织量差异较大,可分别用于修复口腔、眼眶、颜面部、颅底等缺损^[46],其中 TMF 在上颌骨缺损修复^[46-47]、TPF 在外耳再造、带毛发移植修复上唇和口腔内黏膜修复等方面具有优势^[46, 48]。

TMF 和 TPF 具有血供丰富、切取方便、供区损伤小等优点^[46]。有学者通过上移皮瓣上界^[46]、分离面神经及腮腺^[46]、制作游离瓣^[49]或逆行岛状瓣^[50]等措施突破血管蒂长度的限制,修复更远隔部位的缺损。通过联合其他组织瓣^[46]、预构皮瓣^[49]或钛网等生物材料^[51],修复更为复杂的组织缺损。此外,采用内镜辅助下皮瓣制备技术,可减少供区瘢痕及对毛发的损伤^[52]。

4 FAMMF

FAMMF 由 Pribaz 等于 1992 年首次报道;具有供区隐蔽、旋转弧度大、可提供带血管蒂的全层黏膜组织等优点,皮瓣宽度在 4 cm 以内时,供区多可直接拉拢缝合,在修复口腔、口咽、鼻腔等中小型黏膜组织缺损方面具有显著优势,尤其是近年来随着皮瓣制备技术的提高和经口手术(如经口机器人手术^[53])的普及,应用日益增多。

FAMMF 由面动脉分支作为血管蒂,根据面动脉终支走行和分布情况,可分为 5~6 种不同类型;

该皮瓣由黏膜、黏膜下组织、部分深层颊肌和口轮匝肌等组成,根据皮瓣切取后血供走向,可制备成上蒂型(逆流)和下蒂型(顺流)瓣^[54-55]。FAMMF的静脉回流不恒定,一般通过黏膜下层的静脉血管网汇集至面静脉,因此在皮瓣切取时一般尽量保留2 cm以上的血管蒂,以保证静脉回流畅通^[54-55]。此外,FAMMF还需与颊动脉为蒂的颊肌黏膜瓣区别,两者在旋转弧度和切取宽度等方面存在差异^[54]。

FAMMF的制备技术也在不断改进,如在修复口底缺损时,通过延长缺损部位切口或通过隧道转移能避免二期断蒂^[54,56]、多种方法扩大皮瓣切取面积^[54]、制备面动脉穿支黏膜瓣^[57]等,并将适应证扩大到下咽^[58]、鼻咽颅底^[59]等口外黏膜缺损修复手术。尽管FAMMF在口内缺损修复中展现出显著优势,但仍存在皮瓣坏死、充血等并发症,尤其是行颈淋巴结清扫术或放疗后患者^[54,60]。

5 SMGF

1999年,Mozolewski等^[61]首次报道了SMGF用于部分喉切除术后的喉重建,并取得了良好效果。但由于颌下腺内可能存在淋巴结组织、颌下腺受侵及颌下区淋巴结转移等^[62],SMGF的应用存在争议,影响其临床应用。但多项研究并未发现颌下腺内存在淋巴结组织,因而认为对没有颌下腺受侵或颌下区淋巴结转移的患者,颈淋巴结清扫同时保留颌下腺安全可行^[62]。近年,SMGF的临床应用呈上升趋势,表现出与SMAIF相似的优点,包括制备简便、耗时短、可在颈淋巴结清扫同时完成制备、损伤小、并发症少和血供可靠等^[62-64]。目前,对于颌下腺未受累且无颌下区淋巴结转移的患者,SMGF可用于修复喉、下咽、口咽、口腔等部位缺损或堵塞咽旁、乳突、颞下区等部位死腔^[61-64],尤其是在不能耐受较长时间手术或血管吻合的年老体弱患者中展现出良好前景。

面动脉在走行过程中发出至颌下腺的分支,血液由伴行面静脉回流至面总静脉,汇入颈内静脉。因此在SMGF制备过程中,需要保护好包裹颌下腺的颈深筋膜浅层,以免影响血供^[62-64]。虽然SMGF具有上述优点,但临床应用中存在如下不足^[62-64]: ①血管蒂长度受限,可将血管蒂解剖至面动脉自颈外动脉发出的起始部和面总静脉汇入颈内静脉处,以延长血管蒂长度;也可制备逆行皮瓣,增加修复距离。②由于颌下腺体积的限制,SMGF仅能修复中小型缺损,可通过保留周围筋膜、脂肪和肌肉组织或者联合其他组织瓣(如胸锁乳头肌瓣

等),扩大修复范围。③由于颌下腺具有分泌功能,可能引起术后皮瓣肿胀和疼痛。④目前SMGF的临床应用仍较少,随访时间较短,缺乏多中心和前瞻性研究,其肿瘤安全性有待进一步考证。

6 PIMPF

1977年,Millard等^[65]和Gullane等^[66]分别报道了PIMPF修复肿瘤术后口腔、鼻咽等部位缺损的成功经验。PIMPF由颌内动脉分支腭大动脉供血,具有切取方便、血供丰富、供区损伤小、不需特殊处理、术后2~3个月内可重新上皮化等优点^[67]。但该皮瓣蒂部长度和旋转弧度有限,仅能用于软腭、磨牙后区等邻近部位的修复^[68]。通过游离腭大神经血管束、向后凿开腭管等措施,可增加约1 cm长血管蒂,将PIMPF用于修复稍远隔部位缺损,如后侧口底、颊黏膜和口咽等部位^[8,69-70]。有学者甚至将血管蒂游离至翼腭窝,增加了3 cm左右的血管蒂,用于修复前颅底缺损^[71]。

7 NLF

NLF由鼻唇区组织设计而成的一种皮瓣,开始主要用于外鼻缺损重建,之后逐渐用于口腔和面部其他部位缺损修复,具有手术简便、可局部麻醉下手术、并发症少、瘢痕不明显等优点^[72]。随着对鼻唇沟区域血供解剖及皮瓣制备技术的不断改进,可制备成不同方向、包含不同组织层次的任意皮瓣、皮下蒂皮瓣、轴型皮瓣,甚至穿支皮瓣^[72]。

鼻唇沟区有多条知名血管支配,如面动脉、面横动脉、眶下动脉和内眦动脉等。这些血管在筋膜层形成皮下血管网,并进一步形成真皮下血管网,这是任意型NLF得以成活的解剖学基础^[72-73]。陈洁等^[73]采用共用蒂部的上下双翼改良NLF进一步拓宽了皮瓣长宽比,取得了满意的修复效果。以面动脉、眶下动脉等为蒂的轴型NLF血供可靠,增加了切取面积,但也可能存在携带组织量较多的问题^[72];鼻唇沟穿支皮瓣除具有常规轴型皮瓣的特点外,还具有转移范围大、皮瓣厚薄适宜、避免臃肿并减少二次修复的优点,在鼻部等缺损修复中取得良好效果^[74]。当前,NLF已广泛用于鼻面部(如鼻翼、鼻小柱、下睑、上下唇、口角)、口内(如颊黏膜、口底、舌、腭部、上下颌骨)等部位的中小型缺损的修复^[72-75]。

8 PMMF

1968年Hueston等首次报道了PMMF,1979年

Ariyan 等首次报道了临床应用 PMMF 修复 HNC 术后缺损。PMMF 具有可供组织量丰富、血供确切可靠、操作简单、易存活、抗感染能力强、并可根治性颈清扫术后的颈部大血管提供保护等优点，很快成为修复 HNC 术后缺损的常用皮瓣^[76-77]。但由于组织臃肿、供区损伤大、切取后影响上肢力量等缺点，尤其在游离皮瓣技术兴起后，临床不再将其作为常用修复方式^[76-77]。与游离皮瓣相比，PMMF 修复 HNC 术后缺损对供区的外形和功能影响大，而且患者吞咽、言语和进食功能等恢复较差^[78-79]。

胸大肌血供极为丰富，包括胸肩峰动脉的胸肌支和三角肌支、起源于腋动脉的胸外侧动脉、胸廓内动脉和肋间动脉的穿支等，这些血管在胸大肌的肌实质内存在丰富吻合，胸肩峰动脉的胸肌支是最主要的供应血管^[76]。近年来，学者们对 PMMF 的制备技术进行了诸多改良，比如向腋前线延伸^[80]、穿越锁骨下^[81]、结扎胸外侧动脉^[82]等以延长皮瓣修复半径，血管蒂骨骺化^[77,82]，保留乳头乳晕位置和乳房形态的改良方法^[83]，与其他皮瓣包括游离皮瓣联合^[84]、折叠双拼等^[82]用于修复大面积或洞穿性缺损，进一步扩大了该皮瓣的适应证，并降低了供区损伤和并发症发生风险。随着治疗水平的提高，一般状况较差、高龄、手术或放疗后失败、受区血管条件欠佳或缺如等不适合游离皮瓣治疗、游离皮瓣失败后需行挽救性修复、需要大型缺损修复以及大型咽痿缺损等患者数量逐步增加，改良 PMMF 的应用呈逐步上升趋势，在复杂疑难 HNC 患者修复中仍然发挥着重要作用^[76-77,82,85]。此外，对于显微外科技术条件较差的医疗机构，PMMF 仍是 HNC 术后缺损不可替代的修复手段^[86]。

9 LDMF

LDMF 被认为是文献记载最早的肌皮瓣，1978 年 Quillen 等^[87]首次将其用于修复头颈部缺损。带蒂 LDMF 具有血供恒定、可提供较大的组织量、供区可直接拉拢缝合等优点，上世纪 80 年代在 HNC 术后缺损，尤其是大型以及颅底、颌骨和咽部的复杂缺损修复中应用十分广泛^[88-92]。但 LDMF 位于背部，在修复头颈部缺损时常需更换体位、不能分两组同时操作，在股前外侧皮瓣等游离瓣和其他邻近组织瓣兴起后应用日益减少^[93]。

LDMF 血供丰富，主要由胸背动脉供血，与伴行静脉组成的血管蒂较为粗大，可作为理想的游离皮瓣；肋间动脉穿支也参与了内侧 1/3 部分供血，两者在背阔肌内有广泛的血管吻合^[94-95]。胸背神经

与血管伴行形成胸背血管束，移植或吻合后还可帮助重建受区运动功能^[94-95]。

与 PMMF 相比，LDMF 可切取面积更大、厚薄适中、质地更柔软、修复距离更长，尤其女性患者具有优势^[93]。近年来，通过制备带邻近骨组织的复合组织瓣^[96]、穿支皮瓣^[94,97]、经胸肌下隧道便于上下两组同时手术等^[93]改进，拓宽了手术适应证、对皮瓣血供了解更为深入、简化了手术操作，在特定患者的修复中起到了良好效果。

10 总结及展望

HNC 术后缺损的修复手段日益多样化，结合缺损大小、部位，从直接拉拢缝合到游离皮瓣，有多种方法可供选择。游离组织瓣已成为修复绝大多数 HNC 术后缺损的首选手段。近年来，SMAIF、SCAIF 等新型带蒂组织瓣展现出与游离组织瓣类似甚至更优的修复效果，还具有方便快捷的优势；而 NLF、LDMF、PMMF 等传统带蒂组织瓣制备技术不断改进，在特定患者的治疗中具有不可替代的地位。此外，额瓣^[98]、颈阔肌皮瓣^[99]和胸三角皮瓣^[100]等其他传统带蒂组织瓣也发挥着重要作用。因此，基于“用最小的供区损伤获得最佳的修复效果”这一理念，结合患者和自身单位特点，平衡修复效果和性价比，合理选用各类带蒂组织瓣修复手段，将成为未来的发展趋势。

参考文献

- Lo Nigro C, Denaro N, Merlotti A, et al. Head and neck cancer: improving outcomes with a multidisciplinary approach. *Cancer Manag Res*, 2017, 9: 363-371.
- Marur S, Forastiere AA. Head and neck squamous cell carcinoma: update on epidemiology, diagnosis, and treatment. *Mayo Clin Proc*, 2016, 91(3): 386-396.
- 毛驰, 彭歆, 张雷, 等. 简化的头颈显微重建外科技术及其临床应用. *中国耳鼻咽喉头颈外科*, 2016, 23(3): 127-130.
- Ragbir M, Brown JS, Mehanna H. Reconstructive considerations in head and neck surgical oncology: United Kingdom National Multidisciplinary Guidelines. *J Laryngol Otol*, 2016, 130(S2): S191-S197.
- Patel SA, Chang EI. Principles and practice of reconstructive surgery for head and neck cancer. *Surg Oncol Clin N Am*, 2015, 24(3): 473-489.
- Hanasono MM. Reconstructive surgery for head and neck cancer patients. *Adv Med*, 2014, 2014: 795483.
- 李晓明, 宋琦. 头颈肿瘤切除术后重要缺损的特点及修复与重建的原则和策略. *临床耳鼻咽喉头颈外科杂志*, 2015, 29(17): 1504-1507.
- Rigby MH, Hayden RE. Regional flaps: a move to simpler reconstructive options in the head and neck. *Curr Opin*

- Otolaryngol Head Neck Surg, 2014, 22(5): 401-406.
- 9 Patel UA, Hartig GK, Hanasono MM, *et al.* Locoregional flaps for oral cavity reconstruction: A review of modern options. *Otolaryngol Head Neck Surg*, 2017, 157(2): 201-209.
 - 10 Martin D, Pascal JF, Baudet J, *et al.* The submental island flap: a new donor site. Anatomy and clinical applications as a free or pedicled flap. *Plast Reconstr Surg*, 1993, 92(5): 867-873.
 - 11 吴跃煌, 唐平章, 祁永发, 等. 颏下岛状皮瓣应用结果回访. *中华口腔医学杂志*, 2002, 37(6): 418-420.
 - 12 王伯钧, 秦小云, 陆明琛. 带血管蒂颏下皮瓣的应用解剖学. *中华显微外科杂志*, 1996, 19(2): 125-127.
 - 13 Schonauer F, Di Martino A, Nele G, *et al.* Submental flap as an alternative to microsurgical flap in intraoral post-oncological reconstruction in the elderly. *Int J Surg*, 2016, 33(Suppl 1): S51-S56.
 - 14 Howard BE, Nagel TH, Barrs DM, *et al.* Reconstruction of lateral skull base defects: A comparison of the submental flap to free and regional flaps. *Otolaryngol Head Neck Surg*, 2016, 154(6): 1014-1018.
 - 15 Lin HC, Huang YS, Chu YH, *et al.* Vascular anatomy is a determining factor of successful submental flap raising: a retrospective study of 70 clinical cases. *PeerJ*, 2017, 5: e3606.
 - 16 Aslam-Pervez N, Caldrony SJ, Isaiah A, *et al.* A retrospective volume matched analysis of the submental artery island pedicled flap as compared to the forearm free flap: Is it a good alternative choice for the reconstruction of defects of the oral cavity and oropharynx? *J Oral Maxillofac Surg*, 2017.[Epub ahead of print]
 - 17 肇杨, 项敬周, 刘法昱. 前臂皮瓣、股前外侧穿支皮瓣及颏下岛状皮瓣修复舌癌患者术后生活质量评估. *上海口腔医学*, 2017, 26(1): 111-114.
 - 18 Husso A, Suominen S, Acarturk TO, *et al.* Submental artery flap with sentinel lymph node biopsy in the reconstruction of oral cancer. *J Reconstr Microsurg*, 2016, 32(2): 153-159.
 - 19 Sittitrai P, Srivanitchapoom C, Reunmakkaew D, *et al.* Submental island flap reconstruction in oral cavity cancer patients with level I lymph node metastasis. *Br J Oral Maxillofac Surg*, 2017, 55(3): 251-255.
 - 20 Kramer FJ, Böhrnsen F, Moser N, *et al.* The submental island flap for the treatment of intraoral tumor-related defects: No effect on recurrence rates. *Oral Oncol*, 2015, 51(7): 668-673.
 - 21 Rahpeyma A, Khajehahmadi S. A protocol for management of the hairs problem in oral cavity reconstruction by submental flap. *J Maxillofac Oral Surg*, 2017, 16(1): 108-112.
 - 22 Ferrari S, Copelli C, Bianchi B, *et al.* The submental island flap: pedicle elongation and indications in head and neck reconstruction. *J Craniomaxillofac Surg*, 2014, 42(6): 1005-1009.
 - 23 Ishihara T, Igata T, Masuguchi S, *et al.* Submental perforator flap: location and number of submental perforating vessels. *Scand J Plast Reconstr Surg Hand Surg*, 2008, 42(3): 127-131.
 - 24 Mutlu ÖÖ, Yasak T, Egemen O, *et al.* The use of submental artery perforator island flap without including digastric muscle in the reconstruction of lower face and intraoral defects. *J Craniofac Surg*, 2016, 27(4): e406-e409.
 - 25 Ma N, Li YQ, Tang Y, *et al.* Pre-expanded submental island flap for resurfacing middle and lower facial defect. *J Craniofac Surg*, 2016, 27(8): e739-e741.
 - 26 Chow TL, Choi CY, Ho LI, *et al.* The use of bipaddled submental flap for reconstructing composite buccal defect. *J Maxillofac Oral Surg*, 2014, 13(1): 75-77.
 - 27 Oseni OG, Fadare AE, Majaro MO, *et al.* Total reconstruction of the upper lip using bilateral nasolabial flaps, submental flap, and mucosa graft following complete resection for squamous cell carcinoma. *Case Rep Surg*, 2015, 2015: 782151.
 - 28 Wiedermann JP, Joshi AS, Jamshidi A, *et al.* Utilization of a submental island flap and 3D printed model for skull base reconstruction: Infantile giant cranio-cervicofacial teratoma. *Int J Pediatr Otorhinolaryngol*, 2017, 92: 143-145.
 - 29 Pallua N, Machens HG, Rennekampff O, *et al.* The fasciocutaneous supraclavicular artery island flap for releasing postburn mentosternal contractures. *Plast Reconstr Surg*, 1997, 99(7): 1878-1884.
 - 30 Pallua N, Demir E. Postburn head and neck reconstruction in children with the fasciocutaneous supraclavicular artery island flap. *Ann Plast Surg*, 2008, 60(3): 276-282.
 - 31 Chiu ES, Liu PH, Friedlander PL. Supraclavicular artery island flap for head and neck oncologic reconstruction: indications, complications, and outcomes. *Plast Reconstr Surg*, 2009, 124(1): 115-123.
 - 32 张森林, 白沙草, 曹罡, 等. 锁骨上动脉岛状瓣的解剖研究及其修复舌缺损的初步报告. *中华口腔医学杂志*, 2012, 47(5): 301-304.
 - 33 张大明, 陈伟良, 柴强, 等. 延长锁骨上岛状皮瓣在修复舌鳞状细胞癌术后缺损中的应用. *中华口腔医学杂志*, 2011, 46(1): 24-26.
 - 34 Giordano L, Di Santo D, Occhini A, *et al.* Supraclavicular artery island flap (SCAIF): a rising opportunity for head and neck reconstruction. *Eur Arch Otorhinolaryngol*, 2016, 273(12): 4403-4412.
 - 35 Granzow JW, Suliman A, Roostaean J, *et al.* The supraclavicular artery island flap (SCAIF) for head and neck reconstruction: surgical technique and refinements. *Otolaryngol Head Neck Surg*, 2013, 148(6): 933-940.
 - 36 Kokot N, Mazhar K, Reder LS, *et al.* The supraclavicular artery island flap in head and neck reconstruction: applications and limitations. *JAMA Otolaryngol Head Neck Surg*, 2013, 139(11): 1247-1255.
 - 37 Ross RJ, Baillieu CE, Shayan R, *et al.* The anatomical basis for improving the reliability of the supraclavicular flap. *J Plast Reconstr Aesthet Surg*, 2014, 67(2): 198-204.
 - 38 Lamberty BG. The supra-clavicular axial patterned flap. *Br J Plast Surg*, 1979, 32(3): 207-212.
 - 39 Herr MW, Bonanno A, Montalbano LA, *et al.* Shoulder function following reconstruction with the supraclavicular artery island flap. *Laryngoscope*, 2014, 124(11): 2478-2483.
 - 40 Welz C, Canis M, Schwenk-Zieger S, *et al.* Oral cancer reconstruction using the supraclavicular artery island flap: Comparison to free radial forearm flap. *J Oral Maxillofac Surg*, 2017, 75(10): 2261-2269.
 - 41 Kozin ED, Sethi RK, Herr M, *et al.* Comparison of perioperative outcomes between the supraclavicular artery island flap and fasciocutaneous free flap. *Otolaryngol Head Neck Surg*, 2016, 154(1): 66-72.
 - 42 Zhang S, Chen W, Cao G, *et al.* Pedicled supraclavicular artery island flap versus free radial forearm flap for tongue

- reconstruction following hemiglossectomy. *J Craniofac Surg*, 2015, 26(6): e527-e530.
- 43 Granzow JW, Suliman A, Roostaean J, *et al.* Supraclavicular artery island flap (SCAIF) vs free fasciocutaneous flaps for head and neck reconstruction. *Otolaryngol Head Neck Surg*, 2013, 148(6): 941-948.
- 44 Razdan SN, Albornoz CR, Ro T, *et al.* Safety of the supraclavicular artery island flap in the setting of neck dissection and radiation therapy. *J Reconstr Microsurg*, 2015, 31(5): 378-383.
- 45 Pallua N, Kim BS. Pre-expanded supraclavicular artery perforator flap. *Clin Plast Surg*, 2017, 44(1): 49-63.
- 46 Lam D, Carlson ER. The temporalis muscle flap and temporoparietal fascial flap. *Oral Maxillofac Surg Clin North Am*, 2014, 26(3): 359-369.
- 47 陈晓红,李志来,王明善,等.颌面肿瘤颞肌筋膜瓣修复唇部缺损一期重建. *中华耳鼻咽喉科杂志*, 2003, 38(1): 62.
- 48 Zuo KJ, Wilkes GH. Clinical outcomes of osseointegrated prosthetic auricular reconstruction in patients with a compromised ipsilateral temporoparietal fascial flap. *J Craniofac Surg*, 2016, 27(1): 44-50.
- 49 Cinpolat A, Bektas G, Coskunfirat OK. Complex partial nasal reconstruction using free prelaminated temporoparietal fascial flap. *Microsurgery*, 2013, 33(2): 156-159.
- 50 孔祥安,韩卉,张林.逆行颞顶筋膜瓣的解剖与临床应用. *中国临床解剖学杂志*, 2001, 19(4): 323-325.
- 51 Patel PA, Chen W, Wilkening MW, *et al.* Extended composite temporoparietal fascial flap: clinical implications for tissue engineering in mandibular reconstruction. *J Craniofac Surg*, 2013, 24(1): 273-277.
- 52 Helling ER, Okoro S, Kim G 2nd, *et al.* Endoscope-assisted temporoparietal fascia harvest for auricular reconstruction. *Plast Reconstr Surg*, 2008, 121(5): 1598-1605.
- 53 Bonawitz SC, Duvvuri U. Robotic-assisted FAMM flap for soft palate reconstruction. *Laryngoscope*, 2013, 123(4): 870-874.
- 54 Ayad T, Xie L. Facial artery musculomucosal flap in head and neck reconstruction: A systematic review. *Head Neck*, 2015, 37(9): 1375-1386.
- 55 Dupoirieux L, Plane L, Gard C, *et al.* Anatomical basis and results of the facial artery musculomucosal flap for oral reconstruction. *Br J Oral Maxillofac Surg*, 1999, 37(1): 25-28.
- 56 Duranceau M, Ayad T. The facial artery musculomucosal flap: modification of the harvesting technique for a single-stage procedure. *Laryngoscope*, 2011, 121(12): 2586-2589.
- 57 Baek CH, Kim BY, Park WR, *et al.* Modification of facial artery myomucosal flap: a novel perforator flap for upper aerodigestive tract reconstruction after head and neck cancer ablation. *Clin Otolaryngol*, 2017, 42(4): 880-885.
- 58 Frisch T. Versatility of the facial artery myomucosal island flap in neopharyngeal reconstruction. *Head Neck*, 2017, 39(2): E29-E33.
- 59 Xie L, Lavigne P, Lavigne F, *et al.* Modified facial artery musculomucosal flap for reconstruction of posterior skull base defects. *J Neurol Surg Rep*, 2016, 77(2): e98-e101.
- 60 van Weert S, Leemans CR. The facial artery musculomucosal flap revisited: surgical technique and critical functional appraisal: our experience in nine patients. *Clin Otolaryngol*, 2015, 40(1): 48-52.
- 61 Mozolewski E, Maj P, Kordowski J, *et al.* Vascular pedicle flap of the thyroid or submandibular gland in the reconstruction following partial laryngectomy. *Otolaryngol Pol*, 1999, 53(4): 387-396.
- 62 Zhang X, Liu F, Lan X, *et al.* Combined submandibular gland flap and sternocleidomastoid musculocutaneous flap for postoperative reconstruction in older aged patients with oral cavity and oropharyngeal cancers. *World J Surg Oncol*, 2014, 12: 259.
- 63 Yang B, Su M, Li H, *et al.* Use of submandibular gland flap for repairing defects after tumor resection in the infratemporal region. *J Craniomaxillofac Surg*, 2015, 43(1): 87-91.
- 64 Mashrah MA, Zhou SH, Abdelrehem A, *et al.* Oropharyngeal reconstruction with a pedicled submandibular gland flap. *Br J Oral Maxillofac Surg*, 2016, 54(4): 388-393.
- 65 Millard DR Jr, Seider HA. The versatile palatal island flap: its use in soft palate reconstruction and nasopharyngeal and choanal atresia. *Br J Plast Surg*, 1977, 30(4): 300-305.
- 66 Gullane PJ, Arena S. Palatal island flap for reconstruction of oral defects. *Arch Otolaryngol*, 1977, 103(10): 598-599.
- 67 梁青,杨建荣,朱道瑛,等.腭粘骨膜岛状瓣的应用解剖研究. *口腔医学*, 1991, 11(1): 1-3.
- 68 Genden EM, Lee BB, Urken ML. The palatal island flap for reconstruction of palatal and retromolar trigone defects revisited. *Arch Otolaryngol Head Neck Surg*, 2001, 127(7): 837-841.
- 69 Magdy EA. The palatal island mucoperiosteal flap for primary intraoral reconstruction following tumor ablative surgery. *Eur Arch Otorhinolaryngol*, 2011, 268(11): 1633-1638.
- 70 Gullane PJ, Arena S. Extended palatal island mucoperiosteal flap. *Arch Otolaryngol*, 1985, 111(5): 330-332.
- 71 Hackman T, Chicoine MR, Uppaluri R. Novel application of the palatal island flap for endoscopic skull base reconstruction. *Laryngoscope*, 2009, 119(8): 1463-1466.
- 72 Rahpeyma A, Khajehahmadi S. The place of nasolabial flap in orofacial reconstruction: A review. *Ann Med Surg (Lond)*, 2016, 12: 79-87.
- 73 陈洁,蒋灿华,陈立纯,等.改良鼻唇沟皮瓣修复前颊部黏膜缺损. *中国修复重建外科杂志*, 2015, 29(5): 582-585.
- 74 Prakash S, Panda R, Kumar V, *et al.* Nasolabial perforator flap for one-stage reconstruction of nasal defects. *J Cutan Aesthet Surg*, 2017, 10(1): 22-27.
- 75 胡小华,黄桂林,张霓霓,等.鼻唇沟岛状皮瓣在口底组织缺损修复重建中的应用. *中国修复重建外科杂志*, 2014, 28(6): 710-713.
- 76 Teo KG, Rozen WM, Acosta R. The pectoralis major myocutaneous flap. *J Reconstr Microsurg*, 2013, 29(7): 449-456.
- 77 Liu M, Liu W, Yang X, *et al.* Pectoralis major myocutaneous flap for head and neck defects in the era of free flaps: Harvesting technique and indications. *Sci Rep*, 2017, 7: 46256.
- 78 Nguyen S, Thuot F. Functional outcomes of fasciocutaneous free flap and pectoralis major flap for salvage total laryngectomy. *Head Neck*, 2017, 39(9): 1797-1805.
- 79 Li W, Zhang P, Li R, *et al.* Radial free forearm flap versus pectoralis major pedicled flap for reconstruction in patients with tongue cancer: Assessment of quality of life. *Med Oral Patol Oral Cir Bucal*, 2016, 21(6): e737-e742.
- 80 Chen WL, Zhang DM, Huang ZQ, *et al.* Comparison of outcomes with extensive segmental pectoralis major myocutaneous flap via the anterior axillary line and the conventional technique in oral and oropharyngeal cancer. *Head Neck*, 2018, 40(2): 349-354.

- 81 Poh EH, Xu LQ, Yin XL, *et al.* Extending the arc of rotation of the pectoralis major myocutaneous flap for orofacial reconstruction via a modified subclavicular route through the clavipectoral fascia. *J Oral Maxillofac Surg*, 2017, 75(1): 222.e1-222.e6.
- 82 田皞, 喻建军, 李赞, 等. 改良带蒂胸大肌皮瓣修复头颈部晚期恶性肿瘤术后复杂缺损的临床应用. *中国癌症杂志*, 2016, 26(2): 151-154.
- 83 Mehta S, Agrawal J, Pradhan T, *et al.* Preservation of aesthetics of breast in pectoralis major myocutaneous flap donor site in females. *J Maxillofac Oral Surg*, 2016, 15(2): 268-271.
- 84 Zhang C, Zhu M, Chen M, *et al.* Free flap combined with pectoralis major flap for reconstruction after total laryngopharyngectomy in patients with advanced hypopharyngeal carcinoma. *Acta Otolaryngol*, 2016, 136(8): 841-846.
- 85 Guimarães AV, Aires FT, Dedivitis RA, *et al.* Efficacy of pectoralis major muscle flap for pharyngocutaneous fistula prevention in salvage total laryngectomy: A systematic review. *Head Neck*, 2016, 38(Suppl 1): E2317-E2321.
- 86 Gadre KS, Gadre P, Sane VD, *et al.* Pectoralis major myocutaneous flap-still a workhorse for maxillofacial reconstruction in developing countries. *J Oral Maxillofac Surg*, 2013, 71(11): 2005.e1-2005.e10.
- 87 Quillen CG, Shearin JC Jr, Georgiade NG. Use of the latissimus dorsi myocutaneous island flap for reconstruction in the head and neck area: case report. *Plast Reconstr Surg*, 1978, 62(1): 113-117.
- 88 Schuller DE. Latissimus dorsi myocutaneous flap for massive facial defects. *Arch Otolaryngol*, 1982, 108(7): 414-417.
- 89 Ali S, Watson JS, Bihari J. Use of the latissimus dorsi myocutaneous flap for total pharyngeal reconstruction. *J Laryngol Otol*, 1982, 96(9): 837-846.
- 90 Maves MD, Panje WR, Shagets FW. Extended latissimus dorsi myocutaneous flap reconstruction of major head and neck defects. *Otolaryngol Head Neck Surg*, 1984, 92(5): 551-558.
- 91 Seckel BR, Upton J, Freidberg SR, *et al.* Pedicled myocutaneous flap of latissimus dorsi muscle for reconstruction of anterior and middle skull defects: an alternative. *Head Neck Surg*, 1986, 8(3): 165-168.
- 92 Chowdhury CR, McLean NR, Harrop-Griffiths K, *et al.* The repair of defects in the head and neck region with the latissimus dorsi myocutaneous flap. *J Laryngol Otol*, 1988, 102(12): 1127-1132.
- 93 Wilkman T, Suominen S, Back L, *et al.* The pedicled latissimus dorsi flap in head and neck reconstruction: an old method revisited. *J Reconstr Microsurg*, 2014, 30(3): 163-170.
- 94 王立宇, 崔英健, 范元军, 等. 背阔肌皮瓣的临床解剖学研究. *解剖学研究*, 2014, 36(3): 164-167.
- 95 el-Maasarany SH, Sharaf E, Moustafa F, *et al.* Anatomical basis of latissimus dorsi myocutaneous flap: clinical applications. *Surg Radiol Anat*, 1989, 11(3): 197-203.
- 96 Yamamoto Y, Nohira K, Yamashita T, *et al.* Combined V figure-shaped scapular osteocutaneous and latissimus dorsi myocutaneous flap for composite mandibular reconstruction. *Head Neck*, 1995, 17(3): 219-225.
- 97 Schaverien M, Wong C, Bailey S, *et al.* Thoracodorsal artery perforator flap and Latissimus dorsi myocutaneous flap-anatomical study of the constant skin paddle perforator locations. *J Plast Reconstr Aesthet Surg*, 2010, 63(12): 2123-2127.
- 98 Sanniec K, Malafa M, Thornton JF. Simplifying the forehead flap for nasal reconstruction: A review of 420 consecutive cases. *Plast Reconstr Surg*, 2017, 140(2): 371-380.
- 99 Mustafa el MA, Bhatia SK, Hammond DE. Platysma flap using dual skin paddles. *Br J Oral Maxillofac Surg*, 2016, 54(6): e59-e60.
- 100 Mir MA, Yaseen M, Khurram MF. A comparative study of lateral extension versus conventional deltopectoral flap in head and neck reconstruction after surgical extirpation of tumor. *Ann Plast Surg*, 2018, 80(2): 130-136.

收稿日期: 2017-10-25 修回日期: 2018-01-22

本文编辑: 刘丹