



図 14. 拡大耳下腺全摘。前方からのアプローチ
耳下腺前方辺縁を越えて、顔面神経の各分枝と Stenon 管を明示、
同定した後、摘出物を下顎後縁まで挙上していく。腫瘍の浸潤範囲
によっては咬筋も付けて挙上していく。



図 15. 拡大耳下腺全摘。下方からのアプローチ
下方からのアプローチは顎二腹筋後腹が見えてくるあたりまでは
頸部郭清術の切除標本挙上のような要領でおこなっていく。

明示されてくるあたり、すなわち顎二腹筋後腹が見えてくるあたりまでは頸部郭清術の切除標本挙上のような要領で問題ないことが多い。つまり、頸動脈鞘および深頸筋膜深葉から切除側を剥離するような要領である(図 15)。顎二腹筋や茎突舌骨筋も耳下腺と近接した筋であるため合併切除される機会が多い。

これに対して症例ごとにバリエーションがあって問題となるのは、後方と上方からのアプローチである。なぜなら、下顎、外耳道、乳様突起をどう処理するかという点と顔面神経の中核側の切除をどこで行うかという問題が関係してくるからである。

3 | 顔面神経中枢側の切除

拡大耳下腺全摘が適応になる症例でも茎乳突孔を出てからの顔面神経本幹で神経中枢側を切断できる症例も存在する。これらは、大抵耳下腺外に浸潤する比較的大きな高悪性度癌であってもその浸潤範囲が本幹から遠く十分にマージンがとれる例である。これらでは典型的な耳下腺手術における顔面神経本幹の求め方で問題ないし、乳様突起削開術も一般には不要である。しかし、耳垂付近の耳下部を中心に深く腫瘍が存在する例では、側頭骨外の本幹で神経を求め、ここで切除するのは癌の露出を

引き勧められない。大抵このような症例では術前より全枝の麻痺をきたしている例がほとんどである。このような例では乳様突起削開術を併施して、顔面神経の垂直部、しいては水平部までの追跡が必要になってくる(図 16)。

また、乳様突起そのものも癌の浸潤を受けることがあるが、その場合は浸潤範囲よりもさらに後方からの削開が必要である。顔面神経管は茎乳突孔はもちろん、上鼓室から乳突洞、外側半規管隆起をメルクマールにするとおおよその位置と深さが把握しやすい。意外に深い位置にあり、その深側の S 状静脈洞のすぐ直上にあること、茎乳突孔から鼓膜、中耳に近づくにつれて徐々に緩やかに外耳道後壁に後下方から近づいてくることを知っているのと迷いがなく手術時間短縮に貢献できる。なお削開操作の際、S 状静脈洞と硬膜の損傷には注意が必要である。顔面神経中枢側切除端に癌がないことを術中迅速病理で確認する(図 17)。特に腺様嚢胞癌では、予想以上に癌の浸潤が中枢側へ延びている場合がある。

4 | 下顎の処理

高悪性度耳下腺癌進行例であっても新鮮例で下顎骨を直接浸潤破壊するような症例は、ほとんど見受けられない。接することは多々あっても、骨膜止まりないしは骨膜を越えて皮質骨と癒着を認める程度にとどまるものが



図 16. 乳様突起削開および側頭骨内顔面神経の露出
茎乳突孔付近やそこから顔面神経管にまで入り込むような腫瘍を切除する場合は、乳様突起削開術を併施して、顔面神経の垂直部、
しいては水平部までの追跡をおこなう。



図 17. 顔面神経中枢側の切除
顔面神経中枢側切除断端(*)に癌がないことを術中迅速病理で必ず確認する。



図 18. 拡大耳下腺全摘。下顎の処理(骨膜切除)
この例では下顎は関節包が部分的に切除され、関節窩から脱臼してはいるものの骨膜切除のみで済んでいる。

ほとんどである。これらでは腫瘍の大きさと局在に応じて、また場合によっては原発巣切除に支障のない十分な術野を確保する必要性から、最小では骨膜を切除側に付けての下顎を保存する術式(図 18)から、最大でも下顎後方の辺縁切除までの術式(図 19-a、b)が選択される。

一方、稀ながら下顎骨に直接浸潤するような例や、関

節突起の骨頭部分(関節包)に腫瘍が浸潤しているような例では基本的には下顎区域切除が必要であり、下顎の連続性が絶たれるのも止むを得ない(図 20)。関節包自体は軟部組織であり、意外に浸潤を受けやすく、特に関節頭の後方で外耳道前壁との間隙に癌の浸潤が比較的多いことを覚えておくとよい。下顎区域切除の範囲に関する



図 19-a. 拡大耳下腺全摘。下顎の処理(下顎角切除)
本症例では下顎角部においてその角が切除されている。



図 19-b. 拡大耳下腺全摘。下顎の処理(後方辺縁切除)
本症例では下顎枝後方が辺縁切除されている。



図 20. 拡大耳下腺全摘。下顎の処理(下顎区域切除)
関節突起の骨頭部分(関節包)に腫瘍が浸潤しているような例では基本的には下顎区域切除が必要である。本症例では関節窩天蓋から関節円板ごと切除している。

規定はないが、皮質骨までの浸潤で骨髄に及んでいない場合や、関節包のみの浸潤であれば、術後の咬合機能を考慮して、腫瘍の露出を避けたいうえでできるだけ小さい骨切除でよいのではないかと考えている。上方は関節窩天蓋から関節円板ごと切除側を下方に落とし込む必要があるが、前方は少なくとも下顎角を越えてまで切除する必要はない場合がほとんどである。

5 外耳道の処理

外耳道は下顎枝関節突起のすぐ後方に存在し、特に軟骨部外耳道は比較的容易に癌の浸潤を受ける。一方、骨部外耳道は側頭骨に埋まり込んだ小孔であり、癌そのものの浸潤をきたすことは稀である。しかし、外耳道下壁直下まで癌が及ぶことは多々あり、上方マージンとして、また軟骨部外耳道に及んだ例での深部マージンとして外耳道下壁を切除ないしは外耳道を全摘する必要が生じる。

骨部外耳道前下壁、関節窩深部を形成しているのは側頭骨鼓室部であり、前後方向にも頭尾方向にも比較的長く、厚く、しっかりとした板状の骨壁である。筆者は後

方、下方からのアプローチを少しずつ進め、側頭骨鼓室部の深側にある頸動静脈ならびに下位脳神経(IX~XII)をしっかり明示し、これらの直上で骨との間にヘラを入れて保護しながら(特に迷走、舌下神経)この骨壁をマージンのために削除している。この部はいわゆる頸静脈孔近傍であり、前方には頸動脈管の入口部が、後方には頸静脈球が存在しており、手技上慎重操作を要する。

6 深葉から副咽頭間隙における切除

ここまでの切除が完成すれば、通常一気に視野は良好となり、下顎内側に位置する深葉から副咽頭間隙の前方に向かっての切除は容易になる。特に下顎を処理した例では、視野は既にかなりよくなっているため、この部分のアプローチを先におこなって、頸静脈孔付近に切除標本を最後に集めていってもよい。術前の画像所見を参考に指先でマージンを確かめながら翼突筋群を切除していく。

卵円孔周囲の翼突静脈叢からの静脈性出血は止血しづらく、溢出するかの如くに続くので、必要に応じてオキシセル綿などを用いて圧迫止血する。

2 再 建

1 術後の欠損部の再建

一般に耳下腺癌手術後の術創は、拡大全摘であっても口腔や鼻腔粘膜に欠損を生じることがまずなく、これらの再建は不要であるから、術後の瘻孔形成やそれに伴う感染に悩まされる機会はあまりない。

またこれらと交通が生じないため、基本的に清潔野のまま保たれる。したがって切除後にできた大きな欠損部を完全に止血してから、死腔を形成することなく十分に充填できればよいことになる。再建のポイントは、死腔を埋め、かつ整容的に許容できるボリュームのある皮弁を選択することと皮弁の縫合時に過緊張がかからないように留意することである。

この条件を満たす遊離皮弁として当科では、腹直筋皮弁か前外側大腿皮弁(ALT flap)を好んで用いている。下顎骨を切除したときのような比較的欠損が大きいときは腹直筋皮弁を、下顎は残り、死腔充填のみが主な目的のときはALT flapをある程度の筋体を付けて使用している。筋体は後に萎縮するものの厚い脂肪組織は欠損の充填に有利であるし、皮膚のカラーマッチが許容範囲である場合も少なくない。そして何より遊離皮弁であるため自由度が高く、縫合時に過緊張がかかる心配がない。

残存した骨にドリルで小孔をあけてそこに針糸を通して皮弁の深部と縫合し、皮弁の重みで緊張がかからないように配慮している(図21)。逆にあまりにボリュームが



図 21. 再建のポイント

再建では創底の止血、死腔の充填、皮弁縫合部の過緊張の回避が大切である。残存した骨にドリルで小孔をあけてそこに針糸を通して皮弁の深部と縫合し、皮弁の重みで緊張がかからないように配慮する。



a: 皮弁の移動



b: 終了時

図 22. 大胸筋皮弁での再建例

大き過ぎるときには筋体や脂肪を減じてボリュームを調節する。上顎部の適当な血管と血管吻合を行う。但し、血管吻合部が重い皮弁の真下に位置しないように注意しなければならない。遊離皮弁が使えないときの有茎皮弁には大胸筋皮弁(図 22-a、b)や広背筋皮弁などが用いられるが、欠損部の大きさと位置によっては茎の長さの制限から距離が足りなかったり、皮弁が創底と密着しなかったりする場合があり、死腔形成や縫合部の過緊張を招く原因となるので皮弁の選択、設計には十分注意が必要である。

2 | 下顎再建

一般にわずかな範囲の下顎枝の切除では再建は必ずしも必要とはいえない。このような小さな範囲の区域切除後では、骨欠損部に皮弁を滑り込ませて、よく充填し、下顎骨断端部の自由度を可能な限り小さくしてしまった方がよいと考えている(図 23)。

これに対し、若い患者に下顎角付近までの区域切除を施行した場合は下顎再建が必須となる。材料としては血行が良好であるという点から肩甲骨が遊離骨弁として、あるいは骨皮弁として選択されることが多い。関節突起が少しでも残存していれば両端にわたりプレートを架橋して補強することが可能であるが、関節窩から関節円板

ごと切除したような場合は、関節窩に再建骨の一方の断端を滑らせ、可能な限り周囲の軟部組織などと縫合し固定に努めている。先にも述べたが、血腫や死腔の形成は術後感染を惹起し、骨髄への感染から腐骨を生じ、後に移植骨を除去しなければならなくなるので注意が必要である。

3 | 顔面神経再建

① 動的再建

腫瘍の切除に伴う顔面神経の欠損に対して、これを架橋し神経の連続性を回復することを目的に神経を移植する。移植神経には頸神経叢を頸部郭清術野から採取し(図 24)、大きく広がった樹枝状の神経を用いて、顔面神経の各分枝と顔面神経の本管の残存端との欠損部に架橋する(図 25)。神経の縫合は手術用顕微鏡下に 8-0 ナイロン糸を用いておこなう。顔面神経は含まれる神経束が少なく、知覚神経との混在のない純粋な運動神経であることから、神経上膜縫合を用いている。縫合により神経束段端が神経上膜内に収まるようにすることが大切である。耳下腺悪性腫瘍に伴う神経移植の問題点として、腫瘍の腺外浸潤による広範な神経欠損や顔面神経への直接

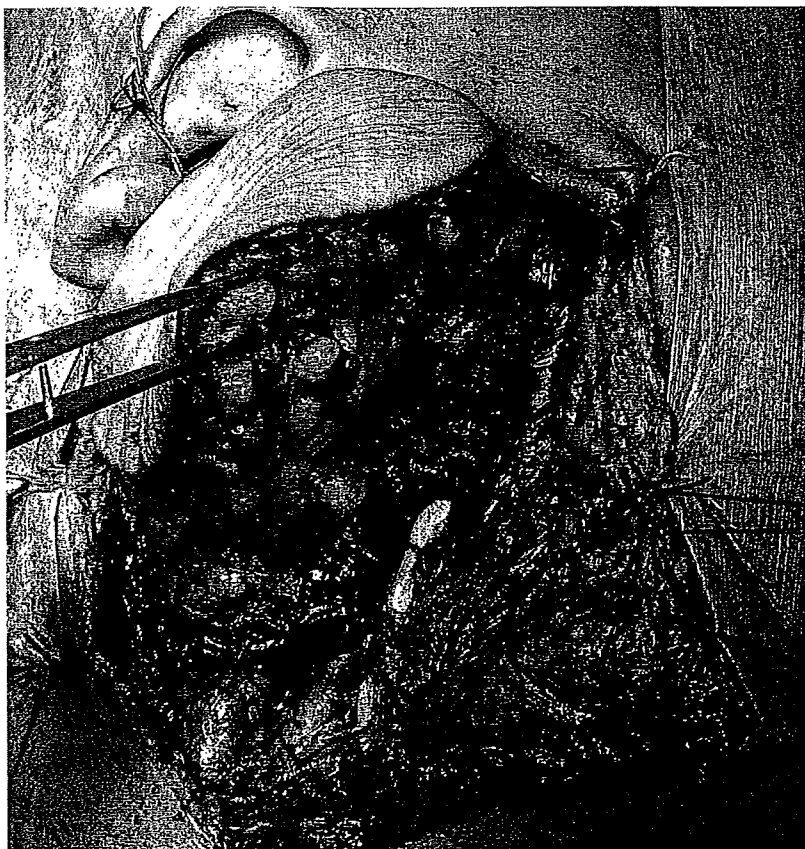


図 23. 下顎区域切除後の骨欠損部に腹直筋皮弁を滑り込ませてよく充填するようにしている



図 24. 顔面神経動的再建。頸神経の採取
頸部郭清術野から頸神経を根部まで追って採取し、神経再建に用いた。

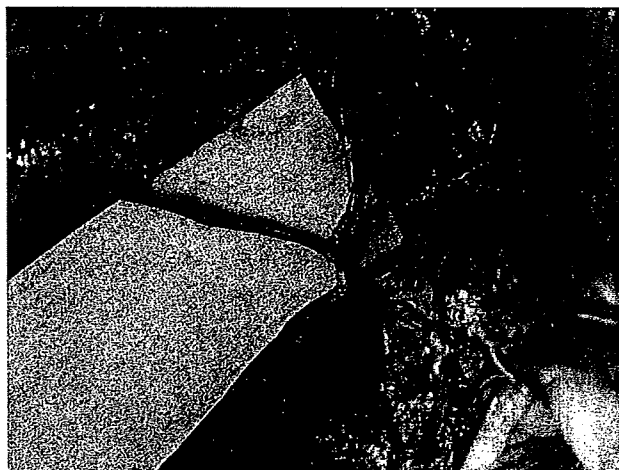


図 25. 顔面神経動的再建(神経吻合後)
頸神経の枝振りを利用して頬骨枝、下顎縁枝、側頭枝の3本を再建した。



図 26. 眉毛挙上術の皮膚切除



図 27. Lid loading 法に用いる金プレートと挿入位置

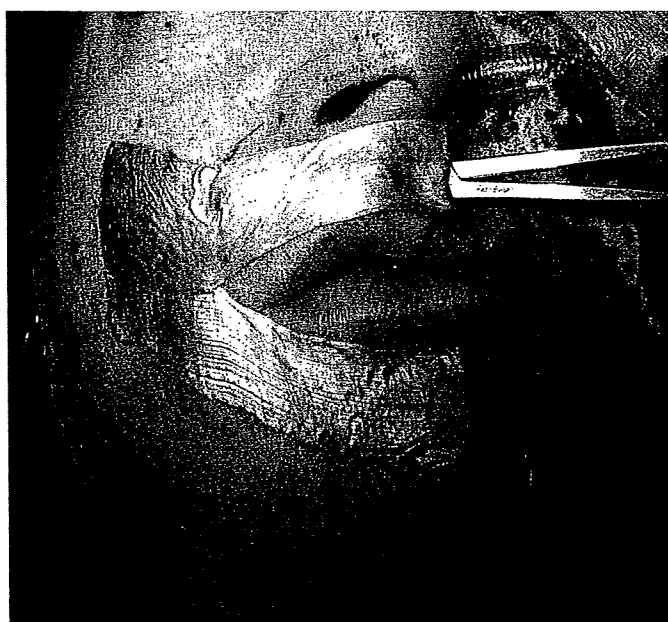


図 28. 大腿筋膜による口唇、口角の吊り上げ



図 29. 鼻唇溝、口角の吊り上げの程度

浸潤などにより、末梢の顔面神経を他の脳神経(神経交叉術; cross-over operation)や体側の顔面神経(顔面交叉神経移植術; cross-face nerve graft)に求めなければならない場合がある。いずれの方法も利点と欠点があり、病期と予後を踏まえたうえで慎重に適応を考慮する。

② 静的再建

a. 眉毛挙上術(Eyebrow lift)

眉毛上部に最大幅 8~10 mm の皮膚切除をおこない

(図 26)、頭側の皮膚切開線に添い眼窩上神経を避けて 2カ所の部分で前頭筋を分けて骨膜を露出し、ここに付属のドリルで骨孔を作成しアンカースーチャーを埋入する。次にアンカーの針糸で眉毛側切開縁の皮下を引き上げ固定する。さらに、真皮縫合と皮膚縫合を加える。挙上する眉毛の位置は仰臥位での判断となるが、眉毛下縁が眼窩上縁と一致する位置が目安となる。眉毛の大きさには個人差があるため術前に確認しておくことが望ましい。この方法は他の方法と比べ術後の再下垂が少なく、過矯正を必要としないことから術直後から対照的な眉毛の位置が得られやすい。また、眉毛上部の手術創は次第

に目立たなくなり問題とはならない。

b. 上眼瞼の閉瞼(Lid loading)

上眼瞼の皮下に重りを挿入することにより、閉瞼効果を向上させようとするのが lid loading 法である。具体的には 4 × 15 mm の長方形の金プレート(1.5~2.0 g)を用いる(図 27)。上眼瞼の重瞼線に相当する部位に 10 mm ほどの横切開を加え、眼輪筋を分けてその裏面の瞼板上に金プレートを挿入する。手術のコツとして、瞼板上でできるだけ瞼縁近くにプレートを固定することと、露出を防ぐために眼輪筋でプレートをしっかりと被覆することである。本法は手術侵襲が少なく、手術の熟練度にかかわらずある程度の満足度が得られるので、癌切除手術に引き続きおこなう同時再建には適した術式で

ある。

c. 鼻唇溝・口唇の吊り上げ

麻痺により鼻唇溝は消失するので術前にマーキングをおこなう。手術は鼻唇溝に添って 3 cm 大の皮切をおき、予め採取した大腿筋膜(図 28)を口唇側の真皮にしっかりと固定し、頬側皮下トンネルを作成して耳側方向へしっかりと吊り上げる。その程度は上下口唇の正中が患側へ引き寄せられ、口角部から健側より上方へ引き上げられていることが必要である(図 29)。吊り上げた筋膜の固定は、耳下腺腫瘍の手術創からも可能であるが、鼻唇口切開から上顎骨の内・外側支台の 2カ所にアンカースーチャーを埋入し、骨と筋膜をしっかりと固定することでより後戻りの少ない吊り上げをおこなっている。

Analysis of Salvage Treatments following the Failure of Free Flap Transfer Caused by Vascular Thrombosis in Reconstruction for Head and Neck Cancer

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Background: Few authors have reported the subsequent treatment for patients in whom free tissue transfers in the head and neck have failed as a result of vascular thrombosis.

Methods: Between 1993 and May of 2005, 502 free flaps were transferred after head and neck cancer ablation in the authors' hospital, 19 of which resulted in total necrosis caused by vascular thrombosis. The authors categorized these 19 cases into four groups and analyzed the salvage treatment.

Results: For failed free jejunal transfer, early initiation of oral intake was obtained when another free jejunum was transferred. For failed free soft-tissue transfer for intraoral defects, reconstruction with common free (first choice) or pedicled flaps was used: a voluminous musculocutaneous flap for extensive defects, forearm flap or pedicled pectoralis major flap for intermediate defects, and direct closure for small defects of the oral floor. For failed secondary soft-tissue transfer to improve a certain function, salvage flap transfer was not chosen in the acute setting. For failed secondary maxillary reconstruction, simple reconstruction using the rectus abdominis musculocutaneous flap combined with costal cartilage achieved stable results. The overall success rate of the repeated free flap was 89 percent (eight of nine patients).

Conclusions: When a free flap is judged unsalvageable, surgeons should determine subsequent treatments, considering the success rate as one of the most important factors. The authors believe that simple reconstruction using a common free flap is the first choice in most cases. When regional or general conditions do not permit further free flap transfer or when defects are comparatively small, reconstruction with a pedicled flap or direct closure of the defect may be considered. (*Plast. Reconstr. Surg.* 119: 1223, 2007.)

Over the past decade, free tissue transfer with microvascular anastomosis has progressed and is widely used for the reconstruction of defects following cancer ablation in the head and neck. The reported overall success rates remain at 95 to 97 percent,¹⁻⁴ although microvascular skills and instruments have im-

proved. Failure caused by vascular thrombosis is inevitable and frequently leads to devastating results. When vascular thrombosis is detected, prompt surgical reexploration is undertaken to salvage the free flap. However, successful salvage rates have been reported to range from 28 to 87.5 percent,^{1,3,5,6} and subsequent salvage reconstruction is required for unsalvaged cases. Salvage reconstruction is generally challenging and difficult because the most suitable flap has already been used in the first reconstruction and the available recipient vessels for microvascular free tissue transfer are limited. The risk of infection and delayed wound healing is high because of inflammation caused by leakage of saliva or digestive juices. Furthermore, repeated operations result in a poor general condition, which does not permit further surgery that involves

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considerable invasion or lengthy operating time. There have been many reports on the complications of free tissue transfers in the head and neck,^{1-3,5-8} but few have analyzed the subsequent treatment for cases that have failed because of vascular thrombosis. In this article, we analyze our cases with total flap necrosis caused by vascular thrombosis in the head and neck and discuss the optimal treatment according to the defect type.

PATIENTS AND METHODS

A retrospective chart review of 502 patients who had undergone free flap transfer after cancer ablation in the head and neck between 1993 and May of 2005 at the University of Tokyo Hospital identified 19 patients (3.8 percent) with total necrosis of the transferred flap caused by arterial [13 of 19 (68 percent)] or venous [six of 19 (32 percent)] thrombosis. In our series, both immediate and secondary reconstructions were included. There were four women and 15 men ranging in age from 30 to 80 years, with an average of 58 years. Reconstruction was immediate in 10 and secondary in nine. The average follow-up was 20 months (range, 3 to 66 months). These 19 patients were divided into the following four groups for the sake of convenient analysis:

Group I (*n* = 4): Patients who underwent free jejunal transfer following pharyngoesophagectomy for hypopharyngeal cancer.

Group II (*n* = 7): Patients who underwent immediate reconstruction using a free flap other than the intestines.

Group III (*n* = 2): Patients who underwent secondary soft-tissue reconstruction with a free flap to improve a certain function.

Group IV (*n* = 6): Patients who underwent secondary bony reconstructions with free vascularized bone or osteocutaneous flap transfer.

The age of the patients, disease, methods of cancer resection, flap used in the initial reconstruction, and thrombosed vessels (artery or vein) are listed in Table 1.

The validity of the treatments at flap loss was assessed based on the following parameters:

Group I: Time required by the initiation of oral intake, and quality of diet.

Group II: Time required by the initiation of oral intake, quality of diet (swallow function), and speech.

Group III: Functional improvement.

Group IV: Success rate of flap survival, control of

Table 1. General Summary of the Four Groups

Group	Sex	No.	Average Age (yr)	Disease	No.	Method of Cancer Ablation	No.	Flap Used	No.	Thrombosed Vessel	No.
I	F	1	62-80 (71)	Hypopharyngeal cancer	4	Pharyngolaryngoesophagectomy	4	Jejunum	4	Artery	2
	M	3									
II	F	1	48-74 (60)	Lingual cancer	4	Total glossectomy	1	RAMC	3	Artery	6
	M	6		Buccal mucosal cancer	1	Subtotal glossectomy	2	ALT	2	Vein	1
	M	6		Oral floor cancer	2	Hemiglossectomy	1	Forearm	1	Forearm	1
III	F	1	30, 56	Intraoral contracture	1	Marginal mandibulectomy	1	Upper arm	1	Artery	1
	M	1		Facial palsy, fistula	1	Local resection	2	Forearm	1	Vein	1
IV	F	2	42-58	Maxillary defect	4	Forearm-plus scapular osteocutaneous	2	Forearm with radius	2	Artery	4
	M	4		Mandibular defect	2						
I-IV	F	4	30-80 (58)					Scapular osteocutaneous	1	Artery	13
	M	15						Iliac bone	1		
								Fibular osteocutaneous	1		

RAMC, rectus abdominis musculocutaneous; ALT, anterolateral thigh; LDMC, latissimus dorsi musculocutaneous; M, male; F, female.
*Both the artery and vein were thrombosed in patient 2.

infection, aesthetic appearance, and smoothness of oral intake.

Statistical analysis was not performed because the sample sizes were small within the groups.

RESULTS

Patient summaries are listed in Tables 2 through 5.

Group I

In group I (Table 2), in two of four patients, another jejunal segment was harvested and transferred, and continuity of the esophagus was obtained successfully without leakage. Of these two patients, one commenced oral intake 10 days postoperatively and could eat normally, whereas in the other patient, the retransferred jejunum survived well without leakage but oral intake was started on postoperative day 50 because of serious cerebral infarction after the salvage operation. The patient had a soft diet.

In contrast, the other two patients underwent pharyngostoma and esophagostoma formation and coverage of the posterior wall of the pharyngoesophagus with a deltopectoral flap. Further reconstruction of the cervical esophagus was carried out with a pectoralis major musculocutaneous flap 63 days postoperatively in one patient and with pectoralis major musculocutaneous and deltopectoral flaps 154 days postoperatively in the other patient. Minor leakage occurred in these cases, and the initiation of oral intake occurred on postoperative days 108 and 197, respectively. These two patients could eat only gruel.

Group II

In group II (Table 3), in five patients whose defects were over half of the tongue or involved a mandibular bone, a free flap or pedicled musculocutaneous flap was used in the salvage reconstruction. Of these, one patient underwent a total glossectomy with laryngectomy for recurrent lingual cancer and immediate reconstruction with a rectus abdominis musculocutaneous free flap. Arterial thrombosis developed 3 hours postoperatively. Although thrombectomy and arterial anastomosis were achieved twice thereafter, the flap became unsalvageable. As thick scarring involved recipient vessels, we gave up on retransferring the free flap and chose reconstruction with a pedicled latissimus dorsi musculocutaneous flap. Leakage occurred postoperatively and took approximately 5 weeks to close with conservative treatment. The

Table 2. Patient Summary for Group I

Case	Age (yr)	Sex	History	Artery	Vein	Onset (POD)	Treatment at Thrombosis (TCA, IJV)	Course	Initiation of Diet (POD)	Result	Follow-Up (POM)
1	62	M	NP	TCA	IJV†	3	Free jejunum (TCA, IJV)	No complication	11	Early initiation of oral intake, normal diet Soft diet	15, death
2	68	M	Diabetes mellitus, arteriosclerosis obliterans, Y-graft for abdominal aortic aneurysm	STA*†	IJV†	3	Free jejunum (TCA, IJV)	No leakage, cerebral infarction (POD 6)	50		7, death
3	80	M	Diabetes mellitus, arteriosclerosis obliterans, myocardial infarction	STA†	IJV	8	DP, pharyngostomy, esophagostomy	PMMC, DP (POD 154), minor leakage	197	Gruel	8
4	74	F	Hypertension, cerebral infarction	STA†	IJV	2	DP, pharyngostomy, esophagostomy	PMMC (POD 68), minor leakage	108	Gruel	16

TCA, transverse cervical artery; STA, superior thyroid artery; IJV, internal jugular vein; EJV, external jugular vein; PMMC, pectoralis major musculocutaneous; DP, deltopectoral; POD, postoperative day; POM, postoperative month; NP, nothing particular; M, male; F, female.
*Both the artery and vein were thrombosed.
†Thrombosed vessel.

Table 3. Patient Summary for Group II

Case	Age (yr)	Sex	Disease (Preoperative RT)	Operation	Flap	Artery	Vein	Onset (POD)	Treatment at Thrombosis	Course	Initiation of Diet (POD)	Result	Follow-Up (POM)
5	74	M	Lingual cancer, PMMC	Total glossectomy	RAMC	TCA*	IJV	0	Pedicle LDMC	Minor leakage, healed conservatively (RT = 50 Gy)	45	Gruel, died as a result of cancer recurrence	11, death
6	52	F	Lingual cancer recurrence (70 Gy)	Subtotal glossectomy	RAMC	TCA*	IJV	1	RAMC	Subcutaneous infection, healed conservatively (RT = 50 Gy)	54	Misswallowing, gruel, died as a result of cancer recurrence	5, death
7	72	M	Lingual cancer	Subtotal glossectomy	RAMC	FA*	IJV	1	RAMC (necrosis again, arterial thrombosis)	PMMC and DP (POD 7), minor leakage	40	Almost normal diet	6
8	48	M	Lingual cancer	Hemiglossectomy	ALT	FA*	IJV	1	Forearm	No complication	15	Normal diet, acceptable speech	66
9	60	M	Buccal mucosal cancer	Marginal mandibulectomy	Forearm	STA	IJV*	4	ATL	No complication	35	Normal diet, acceptable speech	30
10	51	M	Oral floor cancer	Local resection (4 × 8 cm)	Upper arm	STA*	IJV	1	Debridement only	No complication	14	Normal diet, acceptable speech	36
11	65	M	Oral floor cancer	Local resection (4 × 8 cm)	ALT	STA*	IJV	2	Debridement only	No complication	20	Normal diet, slight speech intelligibility	27

TCA, transverse cervical artery; STA, superior thyroid artery; FA, facial artery; IJV, internal jugular vein; PMMC, pectoralis major musculocutaneous; RAMC, rectus abdominis musculocutaneous; ALT, anterolateral thigh; LDMC, latissimus dorsi musculocutaneous; DP, deltopectoral; POD, postoperative day; POM, postoperative month; RT, radiation therapy; M, male; F, female.
*Thrombosed vessel.

Table 4. Patient Summary of Group III

Case	Age (yr)	Sex	History	Disease	Flap	Artery	Vein	Onset (POD)	Treatment at Thrombosis	Course	Result	Follow-Up (POM)
12	56	M	Atrial fibrillation	Intraoral contracture, post-lingual cancer	Forearm	TCA*	EJV	0	Skin graft	Partial skin graft	Contracture, somehow released, reconstructure	15
13	30	M	NP	Facial palsy and fistula, post-osteosarcoma of the mandible	LDMC	STA	FV*	6	Debridement only	Local flap, skin graft	Fistula closed, facial palsy no change	8

TCA, transverse cervical artery; STA, superior thyroid artery; EJV, external jugular vein; FV, facial vein; LDMC, latissimus dorsi musculocutaneous; POD, postoperative day; POM, postoperative month; NP, nothing particular; M, male; F, female.
*Thrombosed vessel.

patient began to eat perorally on postoperative day 45 and had gruel.

In two patients who underwent subtotal glossectomy for lingual cancer and reconstruction with a rectus abdominis musculocutaneous flap, the contralateral rectus abdominis musculocutaneous flap was used for salvage reconstruction. In one patient, the reconstruction itself was successfully achieved with voluminous oral floor and root of the tongue, but the initiation of the peroral diet was postoperative day 54 because ingestion was difficult as a result of misswallowing. In the other patient, the flap degraded into total necrosis again because of arterial thrombosis. Reconstruction with a pedicled pectoralis major musculocutaneous and deltopectoral flap was performed. A peroral diet was initiated on postoperative day 40 and the patient could eat normal food.

One patient who underwent reconstruction with an anterolateral thigh flap following hemiglossectomy received a radial forearm flap transfer at salvage reconstruction. One patient who underwent reconstruction with a radial forearm flap following marginal mandibulectomy had anterolateral thigh flap transfer at salvage. In these two patients, no leakage occurred postoperatively, and both had acceptable speech and ate a normal diet.

In two patients with comparatively small defects (4 × 8 cm) of the oral floor, only debridement of the necrotic flap (anterolateral thigh, upper arm flap) and direct closure were selected. No leakage occurred postoperatively. These two patients could eat normally, although the restricted mobility of the tongue caused some speech ambiguity in one patient.

Group III

In group III (Table 4), one patient underwent free forearm flap transfer following release of the intraoral contracture. Arterial thrombosis occurred 8 hours postoperatively. Revascularization was achieved after reexploration. Thrombosis redeveloped after several hours and revascularization could not be achieved. We considered that the repeated arterial thrombosis might be associated with refractory atrial fibrillation with arrhythmia. We gave up on another free flap transfer and peeled the skin from the unsalvaged flap to use as a skin graft. The intraoral contracture was released incompletely.

One patient underwent functional reconstruction for facial palsy and orocutaneous fistula with a free latissimus dorsi musculocutaneous flap. On the first postoperative day, venous and arterial thrombosis developed. Revascularization using in-

Table 5. Patient Summary of Group IV

Case	Age (yr)	Sex	Disease (preoperative RT)	Flap	Artery (artery graft)	Vein (venous graft)	Onset (POD)	Treatment at Thrombosis	Course	Result	Follow-Up (POM)
14	42	M	Maxillary cancer maxillectomy, RAMC flap (FA, FV), parascapular OsC flap (LA, FV) (70 Gy)	Forearm with radius	STA (artery graft)	CFV* (venous graft)	5	Debridement of soft tissue, preserving bone	Removal of sequestrum, extracorporeal RAMC flap with costal cartilage graft (POD 350)	No fistula formation, acceptable appearance, smooth oral intake	38
15	58	F	Maxillary cancer maxillectomy (70 Gy)	Scapular osteodiposal	FA*	FV (venous graft)	Unraced	Debridement of soft tissue, preserving bone	Removal of sequestrum, RAMC flap with costal cartilage graft (POD 62)	No fistula formation, acceptable appearance, smooth oral intake	28
16	51	M	Maxillary cancer maxillectomy (40 Gy)	Forearm and scapular osteocutaneous	STA*	CFV	5	Debridement of soft tissue and bone	Observation	No change	3
17	50	M	Maxillary cancer maxillectomy (64 Gy)	Forearm and scapular osteocutaneous	STA*	EJV	4	Debridement of scapular flap, preserving FA flap and bone	Removal of sequestrum (POD 321)	No change	15
18	56	M	Mandibular defect, plate exposure (70 Gy)	Iliac bone	STA*	IJV	5	Debridement of soft tissue, preserving bone	Removal of sequestrum, fibular osteocutaneous flap (POD 150), venous thrombosis (POD 158), salvaged	No fistula formation, acceptable appearance, smooth oral intake, denture installed	25
19	57	F	Radiation necrosis of the mandible (70 Gy)	Fibular osteocutaneous	TCA	IJV*	1	Debridement of soft tissue, preserving bone, DP flap	Removal of sequestrum (POD 76)	No change	20

TCA, transverse cervical artery; STA, superior thyroid artery; FA, facial artery; LA, lingual artery; IJV, internal jugular vein; EJV, external jugular vein; FV, facial vein; CFV, common facial vein; RAMC, rectus abdominis musculocutaneous; POD, postoperative day; POM, postoperative month; RT, radiation therapy; OsC, osteocutaneous; M, male; F, female.
*Thrombosed vessel.

terposed arterial and venous grafts was achieved. The next day, arterial thrombosis occurred but revascularization was achieved again. On postoperative day 6, however, venous thrombosis occurred. Revascularization could not be achieved despite an emergent operation. Debridement of the necrotic tissue was selected because the patient did not want further surgery at that time. Local flap transfer with a skin graft closed an orocutaneous fistula, but facial palsy remained unchanged.

Group IV

In group IV (Table 5), all six patients had a history of preoperative irradiation (40 to 70 Gy) and underwent reconstruction with free vascularized bone or osteocutaneous flaps. When the transferred free flaps were judged unsalvageable, five patients were treated conservatively with only debridement, whereas one patient (patient 19) underwent bone coverage with a deltopectoral flap in addition to removal of necrotic soft tissue. All transferred tissue was removed in one (patient 16) of six patients, whereas only soft tissue was removed while preserving bone in five patients. In all of the latter five patients, however, the bone degraded into sequestrum and was subsequently removed. Further reconstructions were performed in three patients but not in another three patients because they did not want further surgery. Salvage reconstructions performed in the former three patients were as follows. One patient underwent transfer of an extracorporeal rectus abdominis musculocutaneous flap with costal cartilage graft after a year. Further surgery with a tensor fascia lata graft was also performed. One patient underwent the transfer of a rectus abdominis musculocutaneous flap with costal cartilage approximately 2 months postoperatively that survived completely. These two patients obtained acceptable appearance and regular oral intake without fistula formation. One patient (patient 18) underwent reconstruction with conjoined fibular osteocutaneous and forearm flaps on postoperative day 150. The flaps developed venous thrombosis 7 days postoperatively but were salvaged with thrombectomy and venous reanastomosis, and survived completely. In this patient, dentures were installed successfully afterward and an acceptable appearance with regular oral intake was achieved.

DISCUSSION

Group I

In patients with advanced hypopharyngeal cancer who have undergone a pharyngoesophagec-

tomy, the 2- and 5-year disease-specific survival rates are not high (72 and 52 percent, respectively).⁹ Postoperative irradiation therapy is occasionally added.^{10,11} Thus, in this group, early wound healing and early initiation of oral intake are in the patient's best interest. Free jejunal transfer is the most standard and reliable procedure of pharyngoesophageal reconstruction because of low complication rates and lower donor-site morbidity.^{8,12} In free jejunal transfers, however, once vascular thrombosis occurs postoperatively, salvage with thrombectomy and reanastomosis is difficult because more than 3 hours' ischemia causes irreversible damage to the jejunum.^{13,14} Because the jejunal graft with thrombosis quickly degrades into necrosis and infection spreads in the hypopharyngeal space, a salvage operation with removal of the necrotic graft should be performed as soon as possible. We believe that the best management for failed free jejunal transfer is another free jejunal transfer, as the harvest of a new jejunal segment is easy. Reconstruction using the intestines has significant advantages over cutaneous or musculocutaneous flaps,¹⁵ and this is also true in salvage reconstruction after initial graft loss.¹⁶ When a general or regional condition does not permit celiotomy, the radial forearm flap is a conceivable option because it is less invasive and allows early mobilization.^{8,17} Salvage reconstruction using a pedicled flap (e.g., pectoralis major musculocutaneous flap) should be used only in cases where recipient vessels are unavailable. In our two cases where free jejunal transfer was performed secondarily, we experienced little difficulty in harvesting the jejunum again. Boyd et al.¹⁸ reported after an anatomical study of three fresh cadavers that any part of the jejunum or ileum is suitable for transfer in terms of the ratio of chord to arc length. Conservative treatment with pharyngostoma and esophagostoma formation requires several further operations and a long time to the initiation of oral intake. Patients 3 and 4 are our early cases.

Group II

In this group, early initiation of oral intake, final swallow function, and speech were measured to assess the subsequent treatments. When a free flap transferred at the initial intraoral reconstruction fails, the optimal treatment should be determined depending on the size and location of the defects. When a defect is not less than half of the tongue, salvage reconstruction with either a cutaneous or musculocutaneous flap (pedicled or

free) should be performed as permitted by the patient's general condition. If conservative treatment with the debridement of necrotic tissue and formation of pharyngostomy are carried out, several further operations are required before the initiation of oral intake. Such conservative treatments often make the general condition worse because of lasting inflammation in the pharyngeal space, and exposure of the large vessels might result in their rupture.

When the defects are extensive (e.g., subtotal or total glossectomy, total glossectomy with laryngectomy), we believe that salvage reconstruction with a voluminous free musculocutaneous flap is the first choice, such as a (contralateral) rectus abdominis musculocutaneous flap. In our two cases that received a salvage free rectus abdominis musculocutaneous flap transfer because of a failed free rectus abdominis musculocutaneous flap transfer, we experienced little difficulty in reharvesting the rectus abdominis musculocutaneous flap. A weakened abdominal wall is a probable complication, for which reinforcement of the abdominal wall with a tensor fascia lata flap or artificial mesh is mandatory to prevent hernia. A free latissimus dorsi musculocutaneous flap is a possible alternative for such a large defect. In one series, one patient underwent pedicled latissimus dorsi musculocutaneous flap transfer as salvage reconstruction because the scar spread over the operating field and no appropriate recipient artery was available near the defect. End-to-side anastomosis to the external carotid artery or the use of the thoracoacromial artery as a recipient was a probable option, but we considered that the patient's general condition would not permit further surgery if thrombosis reoccurred.

When the defects are intermediate (e.g., hemiglossectomy), the use of a radial forearm flap is preferred to an anterolateral thigh perforator flap because the radial forearm flap is technically easier to transfer and has lower failure rates than the anterolateral thigh flap.¹⁹ Surgeons should consider the flap success rate as the most important factor in choosing the flap, especially after loss of the initial flap. In one patient, however, an anterolateral thigh flap was used in the salvage reconstruction because the left forearm flap had already been used and nutrient vessels of the right forearm were damaged by arterial and venous lines. Our two patients in this category experienced no complications after salvage operation and could eat normally and had acceptable speech. A pectoralis major musculocutaneous flap is a conceivable alternative for such defects. When

the defects are restricted for the most part to the oral floor, direct closure of the defect is possible,²⁰ although salvage reconstruction with a free flap or pedicled flap is better from a functional viewpoint.²¹ In two patients with a defect of the oral floor, direct closure of the defect was chosen at the time of flap loss. These two patients commenced oral intake by postoperative week 3 and ultimately ate normal food, although the speech of one patient could not be well understood.

Group III

Reconstructions performed in group III were secondary and were designed chiefly for the purpose of functional improvement. In such cases, flap loss means little change in the recipient between the preoperative and postoperative states, whereas another free flap transfer requires another donor-site sacrifice. Thus, in this group, consideration of the patient's opinion and the estimated rate of success determine whether salvage reconstruction should be performed in the acute setting soon after thrombosis. When the release of contracture is the chief objective of surgery, a skin graft using a portion of skin taken from the lost flap can provide some improvement. Because our patient 11 had refractory arterial fibrillation, which we consider a serious cause of arterial thrombosis, we rejected the retransfer of the free flap. When a free flap transfer failed because of arterial thrombosis in patients with refractory atrial fibrillation, the indication of another free flap transfer should be determined after due consideration because the previous arterial thrombosis might be associated with atrial fibrillation.

Group IV

Group IV comprised the most challenging cases because the reconstructions were secondary, preoperative irradiation had been performed, and bony reconstruction was required in all cases. In this group, the success rate of flap survival, control of infection, and the aesthetic appearance and smoothness of oral intake should be included to evaluate the salvage treatment. Nakatsuka et al.³ reported that the flap survival rate in secondary reconstruction was significantly lower than in immediate reconstruction because the available recipient vessels are limited and the risk of infection and delayed wound healing is predominantly attributable to scar formation and persistent inflammation caused by digestive juices. Furthermore, osteocutaneous flaps were almost five times more likely to fail than soft-tissue flaps.² In our series,

when the transferred osteocutaneous or osteoadiposal flap was judged unsalvageable, only the soft tissue was removed, preserving bone in five of six cases. However, postoperative follow-up revealed that the grafted bone degraded into the sequestrum and was subsequently debrided in all five cases. In regions other than the head and neck, a free (nonvascularized) bone graft is one option for bony reconstruction. However, in the nasopharyngeal space, nonvascularized bone can sustain infection and degrade into the sequestrum, especially in secondary cases. Successful reconstruction of maxillary defects with a free vascularized bone (osteocutaneous) flap has been reported, including fibular,²² scapular,²³ radial,²⁴ and iliac²⁵ bone or osteocutaneous flap. In general, however, osteocutaneous flaps (fibular, scapular, iliac) do not have a vascular stalk as long as that of the rectus abdominis musculocutaneous or the latissimus dorsi musculocutaneous flap. In our initial free flap transfer for maxillary reconstruction, venous and/or arterial interposition was used in two cases to obtain a long vascular pedicle, and a scapular osteocutaneous flap was used with a forearm flap in two cases. Flaps requiring a vein graft have a higher rate of flap loss than those that do not.² It may not be in the patient's best interest for a bone flap transfer such as a fibular flap to be repeated in the acute setting at the time of flap loss. When a secondary bony reconstruction fails because of vascular thrombosis, we consider that free rectus abdominis musculocutaneous or latissimus dorsi musculocutaneous flap transfer combined with costal cartilage or rib^{26,27} is the recommended option because latissimus dorsi musculocutaneous and rectus abdominis musculocutaneous flaps have long pedicles with large-caliber vessels that are technically easier to work with. These flaps can also be used in an extracorporeal manner. Extracorporeal transfer requires only minimal dissection in the recipient, which can avoid exposure of the great vessels and spread of infection. The use of a titanium mesh in combination with a rectus abdominis musculocutaneous flap²⁸ or simple maxillary reconstruction using a rectus abdominis musculocutaneous flap and prostheses²⁹ is an option to be considered. Salvage reconstruction using a common osteocutaneous flap with another flap or with a vein and/or arterial graft would result in a high rate of vascular thrombosis.

Once the free flap used in the immediate reconstruction is judged unsalvageable, salvage reconstruction should be performed as promptly as possible. Treatment delay causes the spread of infection and may result in exposure of the great

vessels, leading to rupture. Salvage treatment should be determined following the patients' wishes, considering many factors including regional and general conditions and existing complications, of which the success rate should be considered by surgeons as the most important factor. Even in salvage reconstruction after free flap loss, we believe that retransfer of the free flap is the best choice for large soft-tissue defects to the extent that general and regional conditions permit. In our series, the success rate of the repeated free flap was 89 percent (eight of nine patients): five of six patients (83 percent) who underwent soft-tissue reconstruction in the acute setting and three of three patients (100 percent) who underwent soft- and hard-tissue reconstruction in the late setting. Compared with the pedicled flap, free flap transfers have the advantage of a large degree of freedom for transfer and good blood supply throughout the flap. In free flap transfer in the head and neck, partial necrosis of the flap is rare,^{2,3} whereas the pedicle flap tends to sustain partial necrosis of the distal parts, especially in cases where a large flap is required. When regional and general conditions do not permit further free flap transfer or when defects are comparatively small, re-reconstruction with a pedicled flap should be considered. We occasionally have difficulty in selecting suitable recipient vessels for the retransfer of free flaps. When branches of the external carotid or subclavian artery are not available for the recipient, we prefer to apply end-to-side anastomosis directly to the external carotid artery.³⁰ The thoracoacromial artery is also usable. Regarding the recipient vein, at least one of the internal or external jugular veins is usable in most cases. When none is available, a turned-over cephalic vein or thoracoacromial system might be usable.¹⁴

CONCLUSIONS

When a free flap is judged unsalvageable, treatment should be determined on the basis of many factors, of which the success rate should be considered by surgeons as one of the most important. We believe that retransfer of the common free flap is the best choice for large soft-tissue defects at thrombosis. When the regional or general conditions do not permit further free flap transfer or when defects are comparatively small, re-reconstruction with a pedicled flap should be considered. For soft- and hard-tissue defects, simple reconstruction with a common free flap with a long vascular stalk such as the rectus abdominis musculocutaneous or latissimus dorsi musculocu-

taneous flap combined with costal cartilage or rib is the recommended option.

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頭頸部癌領域 移植組織の壊死

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● Key Words ● トラブル, 遊離組織移植, 血栓, 壊死 ●

はじめに

頭頸部領域の腫瘍切除後の組織欠損の再建には、古くより形成外科の手技が多用されてきた。再建方法としては、比較的小範囲の欠損であれば、植皮術や局所皮弁移動術が用いられ、欠損範囲が大きくなると有茎(筋)皮弁移植術や遊離(筋)皮弁移植術が適応となる。

これらは基本的に健常組織の移動・移植による欠損・変形部位の再建という形をとるため、単なる病変部の切除・縫合という基本的な外科手技とはいくつかの点で異なる。具体的には、組織採取部は本来病変とは関係のない健常部であり、そこに新たな瘢痕・変形を生じうること、また、組織移動の方法にはいくつかあるが、広範囲組織欠損に対する大きな組織の移動になればなるほど、合併症の発生率が高くなり、また移植する組織の血流循環不全による組織壊死が起こりうることである。

特に、頭頸部領域の癌切除後の広範囲組織欠損の再建例において、移植組織に壊死が生じると、致命的な合併症につながる危険性があり、早急な対応が必要となる。そこで本稿では、有茎(筋)皮弁や遊離(筋)皮弁移植における皮弁壊死の問題、特に後者に関する問題点を中心に述べる。

I. 移植組織の壊死

有茎(筋)皮弁は、移植組織の栄養血管の連続性を温存したまま、その血流支配領域の組織を欠損部に移植する方法であるが、問題点として血流の

もっとも少ない部分が欠損部に充填されるという欠点を有する。そのため、広範囲組織欠損などで皮弁に緊張がかかる場合などには部分壊死が生じやすくなる。また、放射線照射症例など移植床の血行状態が不良な場合には合併症の頻度が高くなりやすい。

そこで最近では、血流がより豊富で移植組織の自由度が高く、必要な組織を必要な量だけ移植できる遊離組織移植術が、有茎(筋)皮弁よりも術後合併症が少ないとの経験に基づき、多くの施設で第一選択として用いられている。そしてその結果、機能的にも形態的にも良好な術後成績が得られるようになってきている^{1,2)}。

しかし、遊離組織移植術の場合には、手術用顕微鏡下の血管吻合という特殊技術を要し、欠損部の近傍に健常な一対の動静脈が存在することが必要不可欠である。さらに、口径が1~3 mmの血管同士の吻合を行うため、血管の捻れ、圧迫、血管壁の変性、炎症の波及などによる吻合部血栓で容易に血管閉塞を生じ、皮弁壊死に陥ることがある。

頭頸部癌切除後の再建におけるこれまでの多数症例の解析では、皮弁壊死率は2~7%と報告されている²⁻⁵⁾。

なお、微小血管において吻合部閉塞をきたしやすい因子としては、高齢、喫煙、肥満、高血圧、糖尿病、術前放射線照射などが考えられる。しかし、諸家の報告によると、頭頸部再建においてはそれらの因子が皮弁壊死の直接原因とは必ずしも認められていない^{4,6)}。われわれの経験でも、高齢者であるだけで術後血管閉塞が起こりやすいとの明らかな結果は得られていない。ただ、一般論

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として高齢者ほど、また、多量の放射線照射が照射されているほど術後合併症を生じやすい傾向にはある⁵⁾。

上記のような術後早期の血管閉塞以外に、遅発性の血管閉塞も遊離組織移植の場合には問題となることがある。一般に遊離組織移植術を行った場合、移植された組織と移植床の組織との間には血管新生を伴う血行再開が確立され、移植組織の量・質および移植床の血行状態にもよるが、通常は2~3カ月もすれば、その時点で万が一吻合血管に閉塞が生じても移植組織の全壊死は起こらないと考えられている。しかし、広背筋皮弁移植後7カ月で栄養血管結紮により皮弁壊死に陥ったとの報告もある⁷⁾。また、まれではあるが、口腔内に移植した遊離皮弁が数カ月から数年の内に萎縮することを実際の臨床で経験したこともある。

この遅発性血管閉塞で特に問題となるのが、遊離空腸移植の場合である。空腸は外壁が漿膜のため、一般には移植床の組織から腸壁に侵入するような血管新生は起こりづらいと考えられている。したがって、その生着は半永久的に吻合血管からの血流に頼っていると考えられる。しかし、犬を用いた最近の実験では、臨床に近いモデルとして15 cmの遊離空腸を頸部に移植し、28日目に栄養血管を結紮しても空腸は100%生着し、周辺組織からの新生血管の侵入も認めたと報告されている⁸⁾。

このように遊離移植組織の長期的な変化に関しては、種々の報告があり、その栄養血管の遅発性閉塞がどのような影響を皮弁に及ぼすかは、症例ごとに判断しなければならないと考えられる。

II. 移植組織壊死を生じた場合の問題点

頭頸部癌切除後の再建例で、移植組織に壊死をきたした場合、部分壊死であれば局所の洗浄などの保存的治療で治癒を期待することも可能である。しかし、移植組織の全壊死となった場合は、壊死組織の除去と同時に、欠損部を何らかの形でできるだけ早く被覆する救済手術が必要となる。その理由としては、頭頸部領域は唾液にさらされるため、頸部郭清により剝離・露出された内外頸動脈・頸静脈に炎症が及ぶと、致命的な大出血を

きたすことがあるからである。そして、多くの場合壊死に陥った移植組織に代わる新たな組織の移植が必要となるが、救済手術の主眼はあくまで不良組織の除去と創被覆による炎症の沈静化になる。

上述したように、遊離組織移植での再建が現在では最も機能・形態とも良好な結果が得られるため、できる限り再手術も別の遊離組織移植を行うことが望ましいが、皮弁全壊死に陥った場合には、創部の感染や血栓形成などのため遊離組織の再移植が難しいことが多く、その場合には有茎(筋)皮弁を選択することとなる⁹⁾。いずれにしても、救済手術後の形態や機能は初期に予想された手術結果に比べ劣ることになりやすい。

III. 組織壊死の予防

遊離組織壊死の予防には、欠損部に適した移植組織の選択と正確なデザイン、愛護的な挙上手術、健全な移植床血管の選別、的確な吻合手術、吻合血管の捻れや圧迫の防止、吻合血管周囲への術後感染の波及防止、などが挙げられる。

特に、遊離組織移植を用いた頭頸部癌切除後の再建では、吻合血管の閉塞の約80%は術後3日以内に生じている³⁾。つまりその間は、移植組織自体の血流チェック(pin prick testによる出血の確認やcapillary refillingによる皮膚表面血流の消褪の有無)や超音波ドップラーによる吻合血管の血流音の確認を頻回に行っておくことが望ましいといえる。そして吻合血管の閉塞が疑われた場合には、直ちに再手術を行うことが肝要である。早期の発見であれば、血栓除去および血管再吻合で移植皮弁を十分に救済できるからである。

まとめ

頭頸部癌切除後の遊離組織移植術は、今や広範囲組織欠損例の第一選択とされ、良好な成績を収めているが、吻合血管の閉塞による移植組織壊死が3~4%の頻度で生じることも事実である。術前には、本法の有用性に加え、これらの危険性を十分に患者さんとその家族に説明を行っておくことが必要であると考えられる。