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The best salvage operation method after total necrosis of a free jejunal graft? Transfer of a second free jejunal graft

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Summary *Aim:* Transfer of a free jejunal graft is the first choice for reconstruction after total laryngopharyngo-oesophagectomy (TPLE). After total necrosis of a jejunal graft, possible salvage procedures include temporary external fistula formation and transfer of a second free jejunal graft. The present study determines the most appropriate salvage method.
Patients and methods: We have transferred over 600 vascularised free jejunal grafts during the past 22 years for reconstruction, immediately after TPLE, either at the National Cancer Center Hospital or at Okayama University Hospital. A second free jejunal graft was transferred to treat the first vascularised free jejunal graft that had undergone total necrosis in five of these patients. We reviewed the total number of operations, the interval between the operation and the start of oral feeding, the outcomes and the follow-up periods of the five patients.
Results: Each of the second free jejunal grafts was positioned without complications. All patients resumed postoperative oral food intake after a mean interval of 20.4 days. Four of the five patients remain free of tumour recurrence and in good health.
Conclusion: Our results suggest that the best salvage method after total necrosis of an initial free jejunal graft is to transfer a second jejunal graft. Therefore, the severity of contamination of the neck due to jejunal graft necrosis must be minimised at re-operation to transfer a second free jejunal graft using microvascular anastomosis.

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Table 1 Patients' characteristics.

Patient	1	2	3	4	5
Age (y)/sex	69/M	64/F	52/F	64/M	51/F
Primary disease	Hypopharyngeal ca.	Hypopharyngeal ca.	Hypopharyngeal ca.	Hypopharyngeal ca.	Cervical-esophagus ca.
Clinical staging	T4N2b	T4N0	T3N0	Recurrence	T4N2b
Radiation therapy	18 Gy	None	None	70 Gy	60 Gy
Recipient vessels	Lt.STA/Lt.IJV	Rt.STA/Rt. STA	Lt.SCA/Lt.IJV	Rt.STA/Rt.IJV	Lt.STA/Lt.IJV
Cause of flap necrosis	Venous thrombosis	Venous thrombosis	Venous thrombosis	Fistula + venous thrombosis	Arterial thrombosis
Flap necrosis POD	1	1	2	7	10
Salvage operation POD	1	1	3	7	11

IJV, internal jugular vein; POD, postoperative day; SCA, superficial cervical artery; STA, superior thyroid artery; STV, superior thyroid vein.

Methods of pharyngo-oesophageal reconstruction after total laryngopharyngo-oesophagectomy (TLPE) include gastric pull-up, colon or jejunal interposition[1–3] and transfer of a free radial forearm flap[4–6] or a free anterolateral thigh flap.[7] The most popular method at our institution is transfer of a free jejunal graft.[8–10] The advantage of this procedure is a decreased risk of fistula because the pharyngo-oesophagus is physiologically reconstructed with a pipe-shaped section of the bowel and jejunum, and unlike other flaps, a three-point suture is not required. Cervical dead space can be filled with the abundantly vascularised mesentery. Furthermore, because of flap atrophy over the long term, a wide flap (>9 cm) should be harvested, if dermal flaps are used for reconstruction. Thus, skin grafting is often needed to repair the flap donor site. This is a factor in the selection of free jejunum grafts as the flap of first choice for pharyngo-oesophageal reconstruction. A jejunal graft can also be used for reconstruction after partial hypopharyngeal resection.[11,12]

On the other hand, the disadvantage of free-tissue transfer is the risk of necrosis of the transferred tissue, due to impaired blood supply.[13–15] Compared with other types of flaps, jejunal flaps are more prone to blood-flow disorders, such as ischaemia and congestion. Thus, salvaging a thrombotic jejunal graft through microvascular re-anastomosis is difficult, even when a blood-flow disorder is detected via a monitoring flap[16–18] or by measuring venous pressure.[19]

For salvage surgery after total jejunal necrosis, the most common practice is conservative treatment, while waiting for the cervical inflammation and the infectious state to regress after external fistula formation, and then performing a secondary closure operation. However, such secondary closure after external fistula formation delays adjuvant treatment, such as chemotherapy or radiation. These situations adversely affect the overall status of the patient, induce mental anguish, delay postoperative recovery of eating and speech functions and often necessitate prolonged hospitalisation. Therefore, an alternative salvage method should be considered.

Here, we review patients in whom a second free jejunal graft was transferred after total necrosis of an initial graft, and examine outcomes.

Patients and methods

Among over 600 patients in whom vascularised free jejunal grafts were used for reconstruction immediately after TPLE either at the National Cancer Center Hospital or at the Okayama University Hospital over the past 22 years, 11 developed total necrosis. A second free jejunal graft was transferred in five (re-jejunum group) of these 11 patients, and an external fistula at the time of re-operation was formed in the other six patients (fistula group). We reviewed the total number of operations, the interval between surgery and the start of oral feeding, the outcome and the follow-up period of the re-jejunum group.

The re-jejunum group comprised two men and three women aged 51—69 (mean, 60.0) years at the time of surgery. The primary diseases, including recurrence, were hypopharyngeal cancer in four patients and cervical oesophageal cancer in one. One patient had undergone preoperative chemotherapy and three had received radiation therapy. We performed TPLE and free jejunal transfer for all five of these patients.

The superior thyroid and internal jugular were the recipient veins in one and four patients, respectively, and the superior thyroid and transverse cervical arteries were the recipients in three and two patients, respectively. The cause of the jejunal graft necrosis was arterial and venous thrombosis in one and three patients, respectively. One patient had both venous thrombosis and a bowel fistula.

A jejunal graft was harvested from each patient in the re-jejunum group with the second jejunal artery and vein as vascular pedicles at the initial operation. The length of the harvested jejunum was ~20 cm. In addition, a jejunal graft was harvested using the third jejunal artery and vein as vascular pedicles at the secondary operation. The re-jejunum group was treated by debridement of the necrotic initial graft and transfer of a second free jejunal graft