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Extension of the jejunum in the reconstruction of cervical oesophagus with free jejunum transfer using the thoracoacromial vessels as recipients

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Summary *Backgrounds:* The degree to which the jejunum can reach upward is a significant consideration in cervical oesophagus reconstruction with vascularised free jejunum transfer using the thoracoacromial vessels as recipient vessels. The present study aims to elucidate this issue. *Materials and methods:* In 30 fresh cadavers, the thoracoacromial vessels were dissected, and the jejunums were harvested, carrying the second branches of the superior mesenteric arteries and veins as their pedicles. After the mesenteric vessels were anastomosed to the thoracoacromial vessels, the jejunums were advanced to their maximum upward degree, and the positions of the oral ends were evaluated referring to the hyoid bone. The evaluation was performed under three conditions. In the first condition, the jejunums were simply advanced. In the second condition, tension of the mesenteriums was reduced by incising their serosa. In the third condition, mesenterial incision was also performed, and the anastomosed pedicles were placed under the clavicles.

Results: The jejunums can reach superior to the hyoid bone by 2.1 ± 1.5 SD cm for males and by 1.9 ± 1.5 SD for females. By incising the mesenteric serosa, these distances can be extended by about 2 cm for males and 1 cm for females. Further extension of 2 cm can be obtained for both sexes by placing the pedicle under the clavicle.

Conclusion: With patients whose neck regions lack vessels available for vascular anastomosis, the thoracoacromial vessels are used in free jejunum transfer for cervical oesophagus reconstruction. The findings of the present study are useful in planning this type of reconstruction.

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Defects of the cervical oesophagus remain after the removal of advanced cancers of the larynx or inferior pharynx. Free jejunum transfer is frequently used for the reconstruction of the cervical oesophagus.^{1–4} Because the jejunum is a tube, it is suitable for reconstructing whole-circular defects of the oesophagus.

Recipient vessels are needed for free jejunum transfer. Vessels of the neck region – such as the facial, superior thyroid, and transverse coli vessels – are popular choices as recipient vessels.⁵ However, in cases where radical neck lymph node dissections or radiation therapy were performed as previous treatments, these vessels are often damaged and unavailable.^{6,7} One solution to this problem is to use the thoracoacromial vessels as recipient vessels.⁸ The thoracoacromial vessels are usually available even in cases with previous histories of radical neck lymph node dissection or radiation to the neck. Furthermore, their diameters are large enough for vascular anastomosis.

Figure 1 presents a case of cervical oesophagus reconstruction where the thoracodorsal vessels were used as recipient vessels for free jejunum transfer. Because of previous radical neck lymph node dissection, no vessels were available for microvascular anastomosis in the neck region. Hence, the right thoracodorsal vessels were used as recipient vessels. Although the jejunum could be extended to the upper margin of the defect, considerable tension occurred at the junction between the jejunum and the upper margin of the defect, increasing the possibility of postoperative dehiscence of the junction. Fortunately, the junction did not develop dehiscence in the given case. However, this experience alerted the authors to the limitation of this reconstruction method.

The thoracoacromial vessels are located inferior to the neck region. Furthermore, the mesentery of the jejunum has limitations in length. Hence, the rotation arc of the jejunum is limited (Figure 2), and there can be cases where the transferred jejunums cannot reach the upper border of defects.

In performing free jejunum transfer using the thoracoacromial vessels as the recipient vessels, it is

necessary to evaluate the degree to which the jejunum can be advanced. The present study aims to elucidate this issue.

Materials and methods

Specimens and preparation

As many as 30 fresh cadavers (17 males and 13 females) of Asian persons were included in the study. The average heights for the males and females were 169 ± 4.0 SD cm and 158.5 ± 2.8 SD cm, respectively. For each cadaver, skin incision was made on the right neck and thoracic regions and the right major pectoral muscle was exposed. The major pectoralis muscle was split along its muscle fibres at the groove between its clavicular and pectoral parts. When the whole thickness of the major pectoral muscle is split, the pectoral branches of the thoracoacromial artery and vein are identified by surrounding fat tissue. The thoracoacromial vessels are usually found along the clavicle about two-thirds of the distance from the sternum-clavicle joint. Once the thoracoacromial vessels are found, the clavicular part of the major pectoral muscle is split along the vessels, in the direction crossing the muscle fibres. As the dissection proceeds to the subclavicular regions, the main trunks of the thoracoacromial artery and vein are identified. Usually, three branches – the deltoid, clavicular, and pectoral branches – come out of the main trunk. The deltoid and clavicular branches are ligated and severed to give positional freedom to the pectoral branch, which is used as the recipient vessel.

Then attention was moved to the abdominal region to harvest the jejunum. By choosing the second branches of the superior mesenteric artery and vein to be used as the pedicle of the jejunum, the mesentery was severed at the branching points of these vessels.

The harvested jejunum was transferred to the neck. The second branches of the mesentery arteries and veins were anastomosed to the thoracoacromial artery and

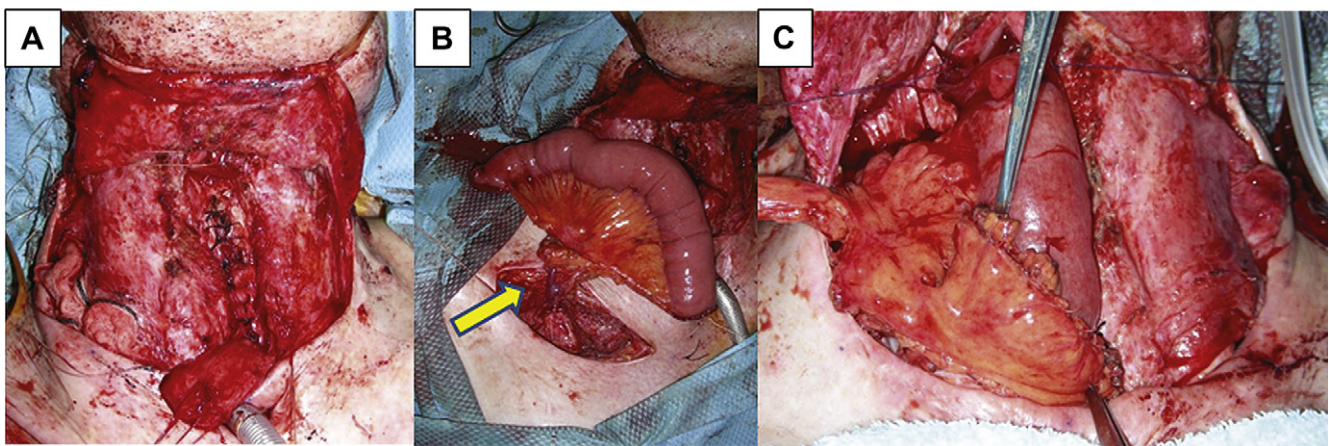


Figure 1 (A) A defect remained after the removal of cervical oesophagus cancer. (B) A vascularised free jejunum was transferred. The superior mesenteric arteries and veins are anastomosed to the thoracoacromial artery and vein, respectively (arrow). (C) The transferred jejunum was sutured to reconstruct the cervical oesophagus.

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