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Case Report

Deep inferior epigastric artery as a collateral pathway to the lower extremities: A case report

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ABSTRACT

We describe a patient in whom the deep inferior epigastric artery served as a collateral pathway to the lower extremities, and free latissimus dorsi myocutaneous flap transfer was successfully used for reconstruction instead of the originally planned free rectus abdominis myocutaneous flap. A 74-year-old woman underwent subtotal tongue resection, followed by free flap tongue reconstruction for tongue cancer. Reconstruction using a free rectus abdominis myocutaneous flap was considered; however, preoperative contrast-enhanced computed tomography revealed complete occlusion of the bilateral external iliac arteries. Doppler ultrasonography revealed retrograde blood flow via the deep inferior epigastric artery, and the internal thoracic artery–deep inferior epigastric artery pathway served as a collateral pathway that supplied the lower extremities. The patient underwent reconstructive surgery using a free latissimus dorsi myocutaneous flap, and the flap completely survived. The internal thoracic artery–deep inferior epigastric artery pathway serves as a critical collateral pathway to the lower extremities in patients with aortoiliac occlusive disease. Blockage of the deep inferior epigastric artery in patients in whom this vessel shows retrograde blood flow may result in lower extremity ischemia. Therefore, preoperative Doppler ultrasonography is warranted to confirm the direction of the blood flow, in

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addition to evaluation of the deep inferior epigastric artery and its perforators before planning rectus abdominis myocutaneous flap or deep inferior epigastric artery perforator flap surgery.

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Introduction

We describe a patient in whom preoperative evaluation revealed that the inferior epigastric artery served as a collateral pathway to the lower extremities, and free latissimus dorsi myocutaneous flap transfer was successfully used for reconstruction instead of a previously planned free rectus abdominis myocutaneous flap.

Case report

A 74-year-old woman with a history of appendicitis, gastric cancer surgery, and medical treatment for hyperlipidemia and hypertension presented with tongue cancer (T3N0M0). We planned to perform subtotal tongue resection with free flap reconstruction. A free rectus abdominis myocutaneous flap was originally considered for reconstruction because a thick flap could be harvested, and intra-operative repositioning was not necessary.

In view of the patient's history of abdominal surgery, we performed preoperative contrast-enhanced computed tomography (CT), which revealed a stenosis in the left common iliac artery and complete thrombotic occlusion of the bilateral external iliac artery (Fig. 1). Subsequent Doppler ultrasonography confirmed retrograde (craniocaudal) blood flow via the deep inferior epigastric artery (Fig. 2). Therefore, internal thoracic artery-deep inferior epigastric artery pathway was considered to serve as a collateral pathway to the lower extremities. In this case, there were no symptoms such as coldness of the feet or intermittent claudication associated with lower extremity ischemia.

We considered that elevation of the free rectus abdominis myocutaneous flap could cause lower extremity ischemia secondary to blockage of the critical collateral pathway to the lower extremities; therefore, we performed reconstruction using a free latissimus dorsi myocutaneous flap which can be elevated from the trunk rather than the extremities where vascular problems might occur. The facial or dorsal thoracic vessels used during the anastomosis were unremarkable, and blood flow to the flap was restored immediately after anastomosis. The patient's postoperative course was uneventful, and the flap completely survived.

Discussion

The Winslow's pathway¹ refers to a clinically important collateral pathway that connects the subclavian artery to the external iliac artery via the internal thoracic, deep inferior epigastric arteries. Reportedly, this pathway provides more than 40% of the arterial supply required for lower extremity perfusion in patients with aortoiliac occlusive disease.² Therefore, harvesting the internal thoracic or the deep inferior epigastric artery in patients with aortoiliac occlusive disease may precipitate critical lower extremity ischemia.

Several studies have reported lower extremity ischemia in patients in whom the internal thoracic artery was harvested for coronary artery grafting.^{3–6} Lower extremity ischemia is a known serious complication of internal thoracic artery harvesting⁷; studies have reported that lower extremity bypass surgery should be performed before harvesting the internal thoracic artery to prevent the aforementioned complication.^{8–10} To our knowledge, only a single report has described lower extremity



Fig. 1. Contrast-enhanced computed tomography revealed complete thrombotic occlusion (black arrows) of the bilateral external iliac arteries.

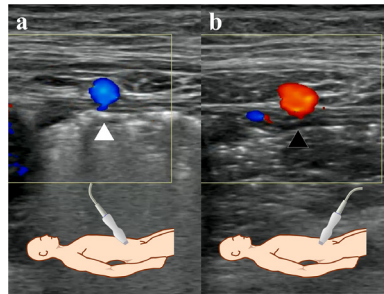


Fig. 2. Doppler ultrasonography confirmed retrograde blood flow via the deep inferior epigastric artery (2a: white arrow shows blue blood flow signal, 2b: black arrow shows red blood flow signal).

ischemia secondary to harvesting the deep inferior epigastric artery, which was used as a free rectus abdominis myocutaneous flap,¹¹ and lower extremity ischemia is not a known complication of inferior epigastric artery harvesting.

In view of the patient's history of abdominal surgery, we performed preoperative contrast-enhanced CT, which revealed aortoiliac occlusive disease and the possibility that the inferior epigastric artery served as a collateral pathway to the lower extremities. However, contrast-enhanced CT is sometimes not used for preoperative evaluation of free flaps. Because we could evaluate the direction of blood flow, Doppler ultrasonography is recommended to evaluate not only the location of the deep inferior epigastric artery and its skin perforators but also the direction of blood flow.² Elevation of the rectus abdominis myocutaneous flap is contraindicated in patients with retrograde (craniocaudal) blood flow.

The risk profile of the deep inferior epigastric perforator (DIEP) flap is similar to that of the rectus abdominis myocutaneous flap because it also includes deep inferior epigastric artery harvesting. Although the DIEP flap is primarily used for breast reconstruction and the target population is different from that of patients with aortoiliac occlusive disease, we cannot completely exclude the possibility that patients might have both breast cancer and aortoiliac occlusive disease. Ischemia of the lower extremities following deep inferior epigastric artery harvesting is rare; however, it is a serious complication, and microsurgeons should be mindful of this possibility.

In conclusion, preoperative Doppler ultrasonography is warranted to confirm the direction of the blood flow, in addition to evaluation of the deep inferior epigastric artery and its perforators before planning rectus abdominis myocutaneous flap or DIEP flap surgery especially in cases where preoperative contrast-enhanced CT has not been performed.

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Guidelines

This report was written in line with the STROBE guidelines.

Ethical approval statement

This study was conducted in accordance with the Standards of the Committee on Human Experimentation of the institution and was approved by the review board (approval No. 1786).

Conflict of interest

None of the authors have any conflict of interest in relation to this work.

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