

# Transillumination Instrument Facilitates Faster and More Accurate Dissection of Right Colon Segment for Oesophageal Reconstruction

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**BACKGROUND:** Venous insufficiency of a right colon interposition in oesophageal reconstruction can be a fatal complication. The right colon segment could allow restoration of swallowing and speech in reconstruction of the entire oesophagus. The right colon segment is a good choice because of the large middle colic artery and isoperistaltic direction. However, because of the anatomical variation of the veins and the tiny venous network of the right colon, its success rate is lower compared with that of the left colon segment. Therefore, we devised a simple instrument of transillumination that can provide an improved view during surgery of the venous network of the right colon and ileocecal region when dissecting this important structure.

**METHODS:** Thirty-six patients underwent oesophageal reconstruction with a right colon segment using the instrument. The instrument of transillumination was used in all cases while exploring the pedicle vessels and the venous network of the right colon.

**RESULTS:** No patients developed complications related to the use of the instrument.

**CONCLUSION:** The instrument of transillumination is a simple and useful tool for facilitating dissection of the right colon segment. In the future, the technique could be used for all types of bowel dissection. [*Asian J Surg* 2010;33(2):94-6]

**Key Words:** obesity, oesophageal reconstruction, right colon segment, transillumination, vascular pedicle

## Introduction

For reconstruction of the entire oesophagus, colon segment interposition based on the middle colic artery is considered a good option.<sup>1</sup> To date, the right colon segment has been employed for restoration of functions including swallowing and speech.<sup>2</sup> The vascular anatomy of the right colon, however, is remarkably variable, which leads to a lower success rate compared with the left colon.<sup>3</sup> Therefore, we devised a simple instrument of transillumination

to provide an improved surgical view and posture when dissecting the right colon segment. Technical details and our preliminary clinical experience are described below.

## Patients and methods

This study included 36 patients (28 men and 8 women; mean age: 48 years, range: 35–65 years). The indications for surgery included severe corrosive injury, malignant neoplasm of the head and neck, and oesophageal cancer.

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All patients underwent oesophageal reconstruction with the pedicle right colon segment. The instrument of transillumination was used in all cases while exploring the pedicle vessels and the venous network of the right colon.

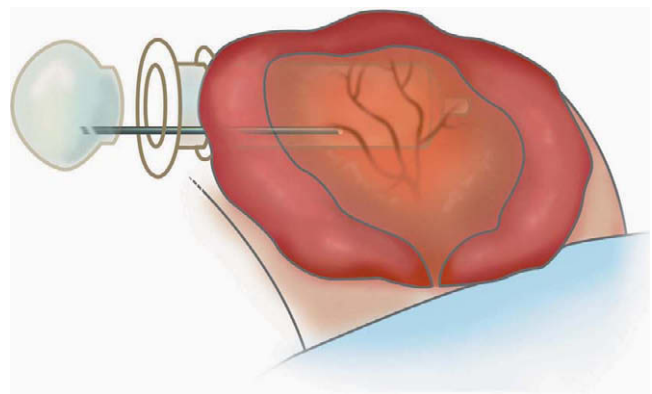
The technique was as follows. First, the bulb was disconnected from an irrigation bulb syringe. The operator then placed a light source into the irrigation syringe. The light source could be any calibre of sterile endoscope light source, or a fully charged penlight that was packed in a sterile glove. The dissection was performed above the syringe (Figure 1). The external wall of the syringe could exert a tenting effect that provided a horizontal plane to facilitate dissection. The transillumination effect offered a projected surgical field that allowed the vasculature to be seen much more clearly. The continuity of the venous channel was well preserved and the right colon was transposed successfully for reconstruction of the entire oesophagus.

## Results

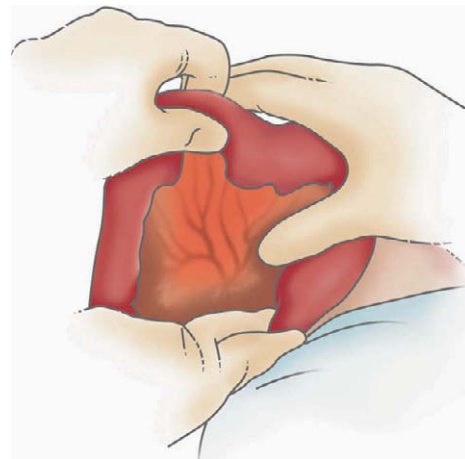
All patients underwent right colon transposition for oesophageal reconstruction using the instrument of transillumination while dissecting the right colon segment. The right colon could be transposed directly in all cases. In addition, vessel dissection, especially venous dissection, was identified clearly and quickly without any disruption. No patients developed complications that were related to use of the instrument. There were no complications of the donor site and no partial necrosis of the dissected right colon segment. The complications of the recipient site were the same as in our study of the conventional method.

## Discussion

Despite vascular flaws, the right colon segment remains a major substitute for oesophageal reconstruction, with good postoperative swallowing and speech.<sup>2</sup> When exploring this region, it should be kept in mind that the tiny venous network is dissected delicately and that the venous drainage system is highly vulnerable to damage. Otherwise, the failure rate will increase dramatically for vascular reasons that include insufficient blood supply, venous congestion, and postoperative partial necrosis of the right colon segment.<sup>4,5</sup> With the conventional method, the assistant surgeon should hold the right colon segment in his/her hands so that the operator can see the distribution of the supplying vessels and venous drainage system by the way



**Figure 1.** Dissection was performed above the glass syringe whose external wall exerted a tenting effect. The transillumination effect from the inner light source provided a projected surgical field in which we could see the vasculature much more clearly than is the case with the conventional method.



**Figure 2.** With the conventional method, the assistant surgeon held the right colon segment in his/her hands and the operator can see the distribution of the vascular system by the way in which it is illuminated by light.

in which it is illuminated by light (Figure 2). The conventional method has two drawbacks: (1) hand tremor can occur while the assistant surgeon holds the right colon segment, which leads to instability and incidental damage to the vessels; and (2) the operator is not in a good operating position while performing the precise dissection (Figure 3).

With the transillumination method, the external wall of the syringe exerts a tenting effect that makes the right colon segment lie horizontally. The dissection can take place horizontally in the surgical field and it is not necessary for the assistant to hold the right colon segment. As a result, it is tremor-free and provides safer dissection. Also, the operator can stand in an optimal position to operate more stably. There are more anatomical variations in the venous network in the right colon than in the



**Figure 3.** With the conventional method, the operator is in an unfavourable operating position while performing the precise dissection.

left, and its venous channels might not go side by side with the artery in some cases.<sup>3,4</sup> Our new method helps operators to preserve the continuity of the supplying artery and venous network more easily and quickly, especially when the mesentery is thick in obese patients, or when the incision is short, as requested by the patients (such as young women with corrosive oesophagitis).

This instrument saves time by providing clearer visualization of anatomical structures (especially veins) in the presence of a thick mesentery. If there are any anatomical variations in the branching pattern of the veins, dissection can be done accurately to avoid damage to the continuity of the venous network, and circulatory problems after surgery. To date, we have performed 36 procedures

using this instrument. More cases should be done in the future.

Our experience with the transillumination instrument shows that the clearer view of the vascular distribution can help to achieve less trauma and a shorter operative time. The instrument could also be a prototype for new devices that are designed for dissection of similar regions during microsurgery.

In conclusion, the instrument of transillumination presented here is a very simple and useful tool to facilitate safer and more accurate dissection of the right colon segment during oesophageal reconstruction, especially when the patients are obese or when a shorter incision is required. However, more procedures should be performed. This paper mainly describes the use of the instrument for better transillumination to avoid interruption of the venous network and associated complications. In future, however, this instrument could be used for all types of bowl dissection.

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