

Surgical Assistant-friendly Breast Reconstruction Using a Head-mounted Wireless Camera with an Integrated LED Light as an Educational Tool

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In breast reconstruction by a latissimus dorsi (LD) flap, a skin paddle is designed transversely so that the scar overlaps the bra line. Therefore, especially when dissecting the caudal end of the latissimus dorsi muscle, the assistants must always pull hooks blindly because they do it from the patient's caudal side (Fig. 1). A similar situation occurs when a tissue expander or a silicone breast implant is inserted under the pectoralis major muscle through a lateral thoracic incision because it is done from the contralateral side. These situations make it difficult for the surgeon to simultaneously share the surgical field with the assistants. As a result, the assistants just pull hooks to expand the surgical field without being motivated to understand the details of the surgery. To resolve this, breast reconstruction was performed for six Japanese women, with the surgeon wearing a head-mounted wireless camera with an integrated LED light, FM-105 (Faspro Systems Co., Ltd., Taipei, Taiwan) (Fig. 1); two were reconstructed by LD, three by tissue expander, and one by silicone breast implant. The camera cost approximately \$3650, and there were no other costs because we already had a laptop computer and an HDMI cable. The surgical field was projected to external large screen monitors in the operating room, as previously reported.¹ The camera actually weighed about 315 g, and it could be used without any physical discomfort for 2 hours, which is enough time to complete elevating the LD or inserting the implant. In addition, the focus was automatically adjusted, and the brightness of the LED light could be manually adjusted in three steps, according to the darkness of the surgical field. Although the camera does not have a zoom function, the image is easily visible by projecting it onto a large screen. The surgical view could be shared simultaneously with the assistants and observers via the monitor in all cases, and the image is shown. (See Video [online], which displays a scene of dissecting the caudal side of the LD muscle and the results of a questionnaire survey following a scene of dissecting the caudal side of the LD muscle.)

A questionnaire survey using a five-point scale (1 = unacceptable; 5 = excellent) was conducted among six assistants who participated in the surgery to assess the quality of the actual image and the educational usefulness of the head-mounted camera. All of them answered that it was a useful educational tool for breast reconstruction.

Recently, how to teach surgical techniques to junior doctors is becoming a focus of attention in plastic and reconstructive surgery. The use of AR technology^{2,3} and model surgery⁴ has resulted in remarkable progress, and these technologies have contributed greatly to providing images of the details of the operation for young surgeons before surgery. During the operation, by teaching techniques while sharing the operative field that the surgical assistant cannot see directly, they can be involved in surgery as not only workers, but also as trainees or learners.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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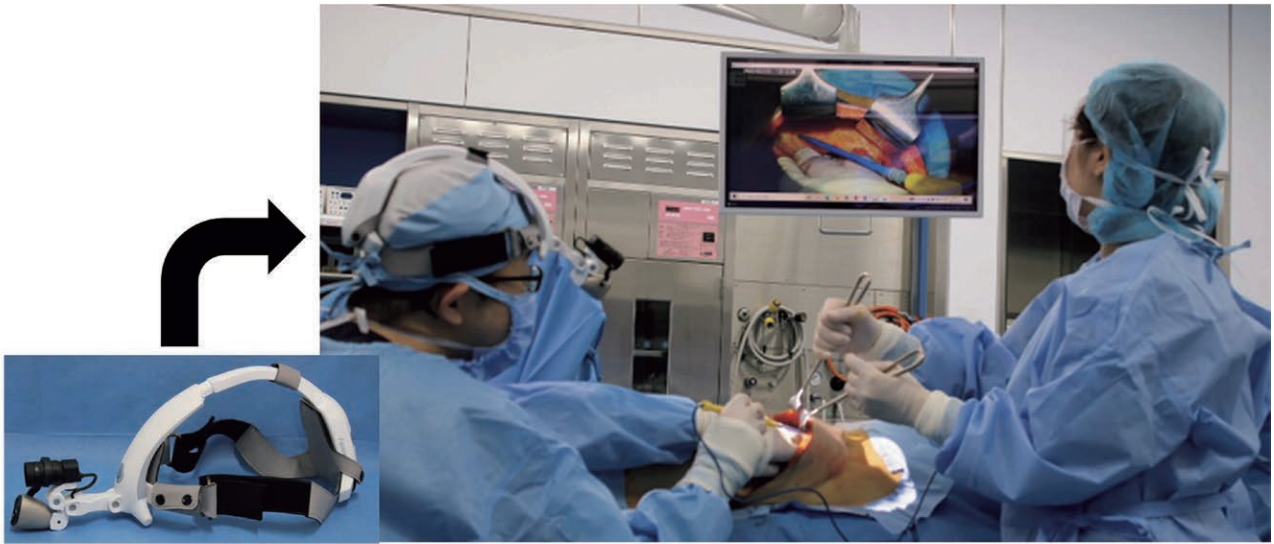
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A head-mounted wireless camera with an integrated LED light, FM-105 (Faspro Systems Co., Ltd., Taipei, Taiwan)

Fig. 1. The LD flap is elevated while the surgeon wears a head-mounted wireless camera with an integrated LED light, FM-105. The surgical assistant can assist from the caudal side while watching the surgical field via the screen in real time during the operation.