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VIEWPOINT

Microvascular Hepatic Artery Anastomosis in Living Donor Liver Transplantation for Erythropoietic Protoporphyria

Shuji Yamashita, MD, PhD*; Solji Roh, MD*; Yoshitsugu Hattori, MD*; Harufumi Maki, MD, PhD†; Nobuhisa Akamatsu, MD, PhD†; Junichi Kaneko, MD, PhD†; Kiyoshi Hasegawa, MD, PhD†; Mutsumi Okazaki, MD, PhD*

Sir,

Erythropoietic protoporphyria (EPP) is an inherited metabolic disorder of the heme biosynthesis caused by mutations in the gene encoding ferrochelatase that catalyzes ferrous iron incorporation into protoporphyrin IX. A progressive protoporphyrin-induced hepatotoxicity occurs frequently in patients with EPP due to accumulation of protoporphyrin in the liver. Although liver transplantation is the only lifesaving treatment for patients with EPP-induced end-stage liver disease, intraoperative light can also lead to phototoxic tissue injuries in 20%–25% EPP patients during surgery.[1] To prevent phototoxic damage, a special shading filter, which blocks the light near 400 nm in which protoporphyrin is activated, is indispensable. Although, TA-81, 61011 filter, and an isodine drape have been used for shielding the ceiling-mounted surgical light, they have not been standardized as light-blocking filters.[2] Furthermore, the details of microvascular hepatic artery anastomosis (MHAA) for EPP patients have not been reported yet.

Herein, we present a case in which a light filter film was applied to a surgical microscope during vascular anastomosis. A polyimide film (Kapton 200 H, Du Pont; Toray Co Ltd, Tokyo, Japan), blocking light at a wavelength of <480 nm, was used as a shading filter.[3] Filter transmittance of the surgical microscope (OPMI PENTERO 900; Carl Zeiss Co, Oberkochen, Germany) was measured by a spectrophotometer (IM-1000; Topcon Technohouse Corporation, Tokyo, Japan) (Fig. 1).

A 47-year-old man presenting with end-stage liver disease due to EPP was successfully treated with living donor liver transplantation using a polyamide filter. Before the operation, a yellowish polyimide film was attached to the usual ceiling-mounted surgical light and surgical microscope lamp. By turning off the room light, the hepatic artery anastomosis was performed under a selectively filtered beam of light emitted from the ceiling-mounted surgical light and microscope, transmitting only a wavelength longer than 480 nm. By blocking a short wavelength of the visible light, the orange-brownish light manipulated the 3-dimensional vascular structures to appear more as a planar object. Besides, monotonous light hinders surgeons from observing the tunica intima layer. To prevent anastomotic thrombi caused by accumulation of bile and blood in the lumen, the lumen was frequently irrigated with heparinized saline. After minimizing tunica intima damage, a back-wall microsurgical anastomosis technique was applied using interrupted 7-0 nylon sutures (Fig. 2).[4] (**See Video 1, [online]**, which demonstrates the MHAA procedure.) After arterial anastomosis, to confirm the patency of the hepatic arteries, hepatic arterial flow was monitored using color Doppler ultrasonography, which demonstrates that Doppler ultrasonography findings indicate a good arterial blood flow immediately and at least twice a day for 2 weeks. No associated hepatic artery thrombotic complications were observed at 15 months postoperatively.

Attaching a film to a microscope lamp and ceiling-mounted surgical light, we successfully performed hepatic artery anastomosis in living donor liver transplantation with a minimal phototoxic damage. We believe that the MHAA technique using a polyimide film could be a lifesaving tool for treating patients with the EPP-related end-stage liver disease.

Shuji Yamashita, MD, PhD
Department of Plastic and Reconstructive Surgery
Graduate School of Medicine
University of Tokyo
7-3-1, Hongo, Bunkyoku
Tokyo 113-8655, Japan
E-mail: yamashitas-pla@h.u-tokyo.ac.jp

DISCLOSURE

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

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*From the *Department of Plastic and Reconstructive Surgery, Graduate School of Medicine, University of Tokyo, Tokyo, Japan; and †Artificial Organ and Transplantation Division, Department of Surgery, Graduate School of Medicine, University of Tokyo, Tokyo, Japan.*

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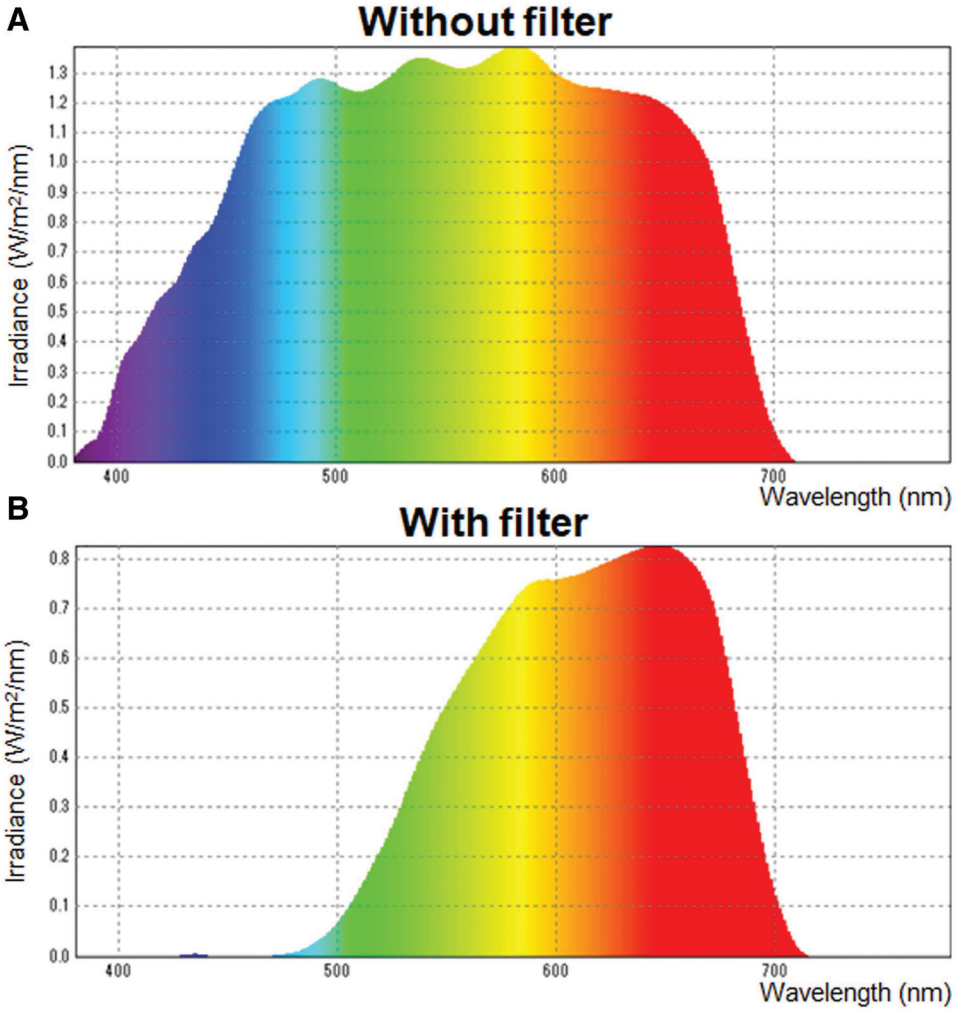

Fig. 1. Measurement of filter transmittance of the surgical microscope. The measurement was done with (A) and without (B) the polyimide film. The filter blocked light with a wavelength of less than 480 nm.

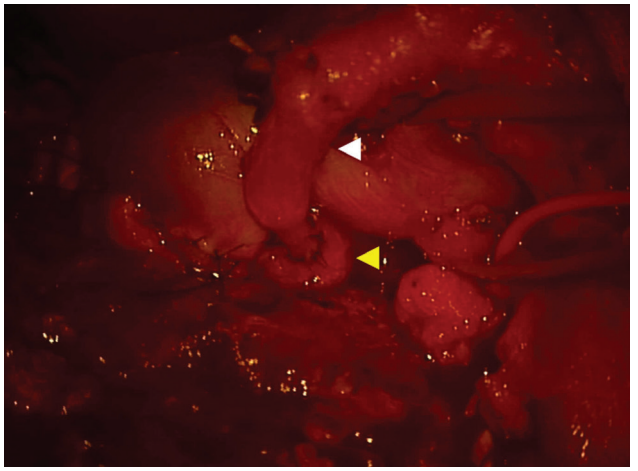

Fig. 2. Representative view of microvascular hepatic artery anastomosis. Microscopic view through the polyimide film was dim and lacking in a 3-dimensional effect. The yellow arrow denotes the donor right hepatic artery; the white arrow indicates the recipient middle hepatic artery.

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