Fiberoptic sensor for noninvasive measurement of variceal pressure

We present a new measuring probe based on a miniature fiberoptic pressure sensor that can measure esophageal variceal pressure. The probe consists of an outer flexible chamber filled with a pressure transmission medium, at the center of which is positioned the fiberoptic sensor with diameter of 0.5mm (FOP-F125, FISO Technologies Inc., Quebec, Canada) (Fig. 1). The single-column, flexible chamber has a 0.03-mm wall thickness and the chamber wall is made of polyurethane. The sensor within the medium is attached at one end to a connecting rod. When the membrane on the sensor chip is exposed to a rise in pressure in the surrounding medium, the light returning to the control unit is altered in accordance with the pressure deformations of the membrane and the altered interference conditions inside the cavity of the sensor [1]. The analog signals from sensor are transferred to both digital and analog values in the control unit and recorded with PC-based real-time data-acquisition hardware (Fig. 2, Fig. 3).

We used the new probe in three patients with cirrhosis after gaining approval from our institutional review board. Portal-azygous disconnection was carried out after measurement of the variceal pressure, and portal vein pressure was measured (model 90308-11-14, Space Labs Inc., Issaquah, Washington, USA) in the initial stages of surgery by directly catheterizing the right gastroepiploic vein with a PE-16 catheter. The variceal and portal vein pressure recordings in the three patients were 22mmHg and 22.5 mmHg, 18.5 mmHg and 19mmHg, and 20 mmHg and 20 mmHg, respectively. Compared with conventional technology used to measure variceal pressure [2–5], it is much easier to place the new probe (diameter 2mm) into the correct position in relation to the varices through the endoscopic biopsy channel (Fig. 4). We believe the new sensor can help determine variceal pressure in routine endoscopic examinations safely and effectively.

Competing interests: None
D.-R. Kong¹, B.-B. He², A.-J. Wu³, J.-G. Wang¹, F.-F. Yu¹, J.-M. Xu¹

¹ Department of Gastroenterology, Anhui Geriatric Institute, First Affiliated Hospital of Anhui Medical University, Anhui, China
² Department of Electronic Science and Technology, University of Science and Technology of China, Anhui, China
³ Department of Electronic Engineering, Anhui University of Architecture, Anhui, China

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Corresponding author

Professor J. Xu
Department of Gastroenterology
Anhui Geriatrics Institute
First Affiliated Hospital of Anhui Medical University
Jixi Road 218
Hefei 230022
China
kdr168@sohu.com