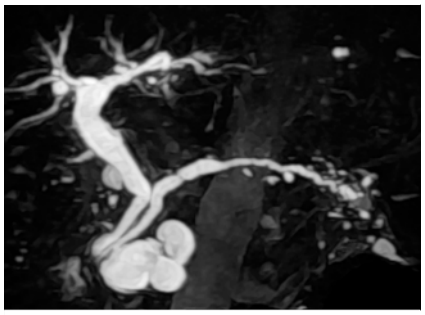
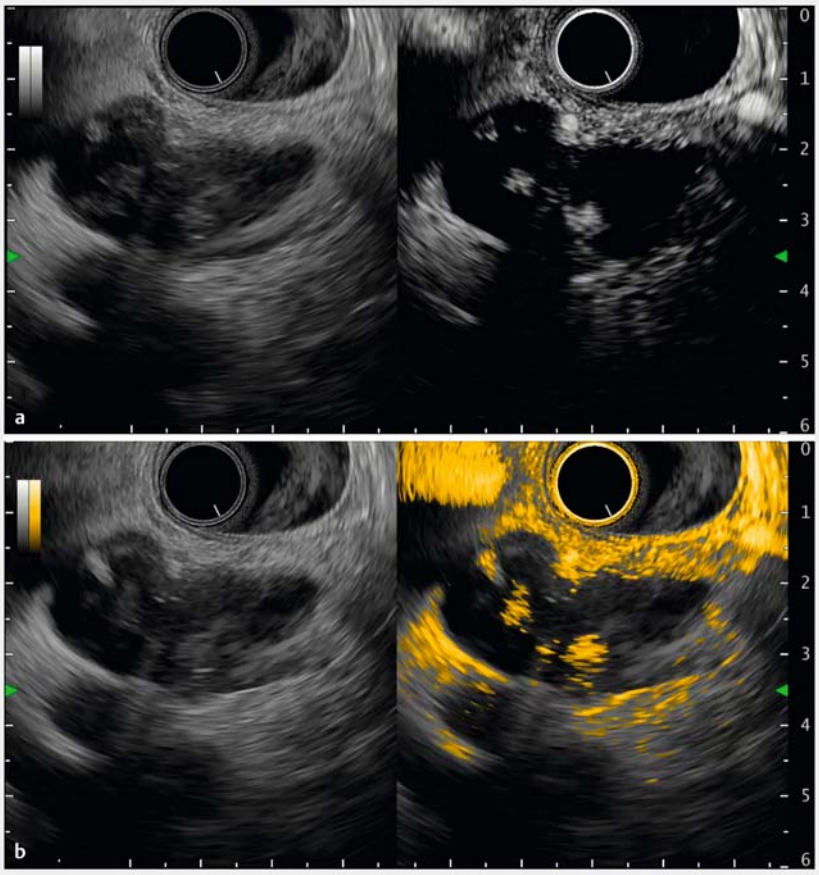
Article published online: 2023-10-06

Color overlay of contrast-enhanced endoscopic ultrasound for pancreaticobiliary disease

OPEN ACCESS



▶ **Fig. 1** Case 1: Magnetic resonance cholangiopancreatography image of a branch duct intraductal papillary mucinous neoplasm in the pancreatic head.



▶ **Fig. 2** Case 1: Contrast-enhanced endoscopic ultrasound indicated enhanced mural nodules in the branch duct intraductal papillary mucinous neoplasm. **a** Left: B-mode; right: normal contrast-enhanced mode. **b** Left: B-mode; right: color overlay mode.

Contrast-enhanced endoscopic ultrasound (CE-EUS) has been considered an important examination for visualization of blood flow and for its contribution to more accurate diagnosis in various conditions of the pancreaticobiliary region [1–5]. However, the conventional black and white mode may limit visual discernibility. A new EUS processor (EU-ME3; Olympus Co., Tokyo, Japan) has been equipped with a novel color overlay mode, which could potentially augment the perception of contrast agents, enhancing the utility of CE-EUS. We present three cases in which the color overlay mode of CE-EUS improved visualization during observation and tissue acquisition (▶ **Video 1**).

Case 1: CE-EUS was performed for a patient with intraductal papillary mucinous neoplasm with nodules (▶ **Fig. 1**). The color overlay mode offered a far clearer visualization of the contrast-enhanced nodules within the cyst, compared with the conventional mode (▶ **Fig. 2**, ▶ **Video 1**).

Case 2: A patient with intrahepatic cholangiocarcinoma whose lesion localization and boundaries were unclear with various imaging modalities underwent CE-EUS for observation. By utilizing color overlay mode, regions devoid of contrast agent within the tumor were better delineated, facilitating lesion localization (▶ **Fig. 3**).

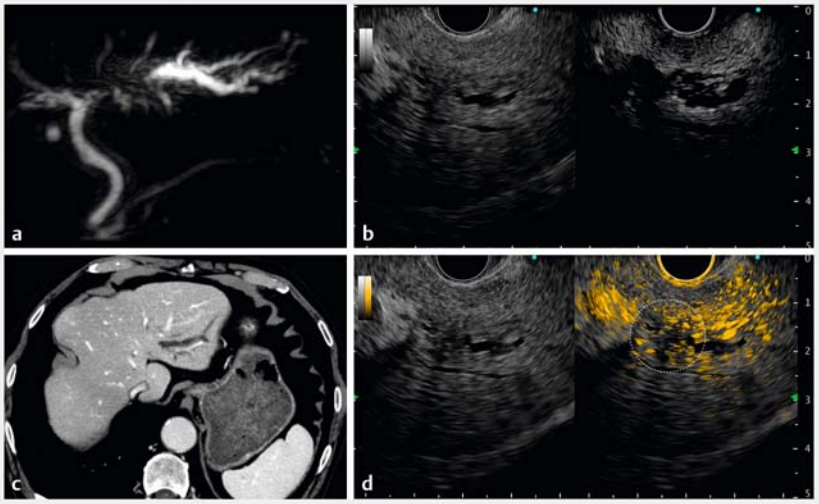
Case 3: A patient suspected of having an expansile necrotizing tumor in the head of the pancreas was scheduled for EUS-guided tissue acquisition (▶ **Fig. 4**). Viable tissue sampling is paramount to enhance diagnostic yield. However, discernibility was challenging on conventional CE-EUS. By applying color overlay mode, contrast particles were clearly identified, leading to efficient sampling (▶ **Fig. 5**).

Technological advances in endoscopic equipment allow endoscopists to perform the procedure more accurately. The newly introduced color overlay mode may increase accuracy and reduce endoscopists' stress during EUS procedures.

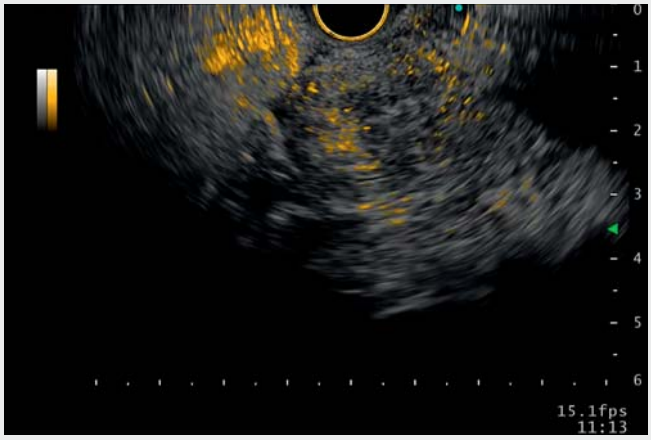
Endoscopy_UCTN_Code_TTT_1AS

Competing interests

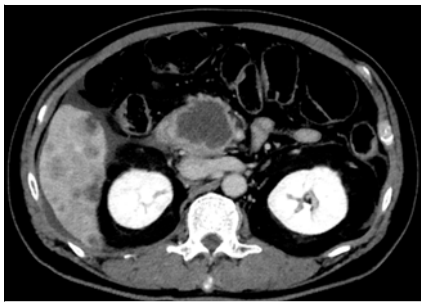
A. Katanuma has received honoraria as a lecture fee from Olympus Co., Tokyo, Japan. H. Toyonaga, T. Hayashi, M. Motoya, T. Kin, and K. Takahashi declare that they have no conflict of interest.



▶ **Fig. 3** Case 2: **a** Magnetic resonance cholangiopancreatography indicated left hepatic duct obstruction. **b** Contrast-enhanced computed tomography indicated obstruction and upstream dilation of the left hepatic duct; however, no obvious mass could be noted in the obstructed area. **c** Left: B-mode; right: normal contrast-enhanced mode. **d** Left: B-mode; right: color overlay mode. The numerous adjacent vessels and dilated bile ducts made it difficult to recognize the mass lesion in the conventional black and white contrast-enhanced endoscopic ultrasound mode. On switching to color overlay mode, hypovascular areas without orange contrast particles appeared and the lesions causing biliary obstruction could be identified (dashed circle).



Video 1 This video presents three cases in which the color overlay mode of contrast-enhanced endoscopic ultrasound improved visualization during observation and tissue acquisition.



▶ **Fig. 4** Case 3: Contrast-enhanced computed tomography image indicated a hypovascular pancreatic head tumor, 50 mm in diameter, with multiple liver metastases. It was suspected that the inside of the tumor was necrotic.

The authors

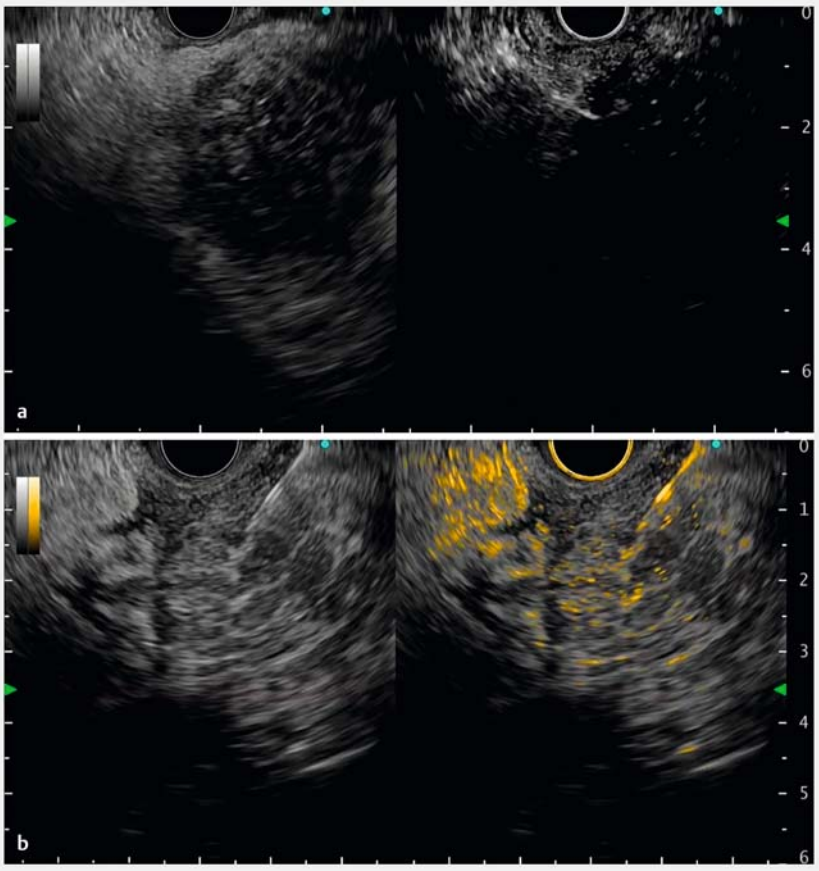
Haruka Toyonaga, Tsuyoshi Hayashi, Masayo Motoya, Toshifumi Kin, Kuniyuki Takahashi, Akio Katanuma
Center for Gastroenterology, Teine Keijinkai Hospital, Hokkaido, Japan

Corresponding author

Haruka Toyonaga, MD
Center for Gastroenterology, Teine Keijinkai Hospital, 1-40-1-12 Maeda, Teine-ku, Sapporo 006-8555, Hokkaido, Japan
toyonaga.pc@gmail.com

References

[1] Gincul R, Palazzo M, Pujol B et al. Contrast-harmonic endoscopic ultrasound for the diagnosis of pancreatic adenocarcinoma: a prospective multicenter trial. Endoscopy 2014; 46: 373–379
[2] Kamata K, Kitano M, Omoto S et al. Contrast-enhanced harmonic endoscopic ultrasonography for differential diagnosis of pancreatic cysts. Endoscopy 2016; 48: 35–41
[3] Yamamoto N, Kato H, Tomoda T et al. Contrast-enhanced harmonic endoscopic ultrasonography with time-intensity curve analysis for intraductal papillary mucinous neoplasms of the pancreas. Endoscopy 2016; 48: 26–34



▶ **Fig. 5** Case 3: **a** There was a large mass lesion in the pancreatic head, which was hypovascular, and no viable location could be recognized by conventional contrast-enhanced endoscopic ultrasound (EUS). **b** In the color overlay mode, the contrast color map was overlaid onto the B-mode, so the lesion and blood flow could be well recognized even after switching to single view. EUS-guided tissue acquisition from the viable area was performed.

[4] Krishna SG, Rao BB, Ugbarugba E et al. Diagnostic performance of endoscopic ultrasound for detection of pancreatic malignancy following an indeterminate multidetector CT scan: a systemic review and meta-analysis. Surg Endosc 2017; 31: 4558–4567

[5] Yamashita Y, Shimokawa T, Ashida R et al. Comparison of endoscopic ultrasonography with and without contrast enhancement for characterization of pancreatic tumors: a meta-analysis. Endosc Int Open 2022; 10: E369–E377

Bibliography

Endoscopy 2023; 55: E1111–E1113
DOI 10.1055/a-2164-0850
ISSN 0013-726X

Georg Thieme Verlag KG, Rüdigerstraße 14, 70469 Stuttgart, Germany