












## Review

# Proposal of classification and terminology of interventional endoscopic ultrasonography/endosonography

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Interventional endoscopic ultrasonography/endosonography (I-EUS) procedures have rapidly evolved since their introduction three decades ago; however, the classification and terminology for these procedures remain unstandardized. To address this, the Subcommittee for Terminology of I-EUS in the Japan Gastroenterological Endoscopy Society was established to define classifications and a glossary of I-EUS terms. They categorized I-EUS procedures into five types based on purpose and method: (i) EUS-guided sampling; (ii) EUS-guided through-the-needle examination; (iii) EUS-guided drainage/anastomosis (EUS-D/A); (iv) trans-endosonographically/EUS-guided created route (ESCR) procedures; and (v) EUS-guided delivery. EUS-guided sampling includes tissue acquisition and fluid sampling, classified by needle type into fine needle aspiration and fine needle biopsy. Through-the-needle examinations include imaging, measurements, and biopsies. EUS-D/A includes organ

drainage/anastomosis, fluid collection drainage, and digestive tract anastomosis. In the EUS-D/A route, “anastomosis” is used for organ-to-organ procedures, whereas “tract” is for fluid drainage. ESCR is a newly proposed term for procedures via anastomosis or tract, such as endoscopic necrosectomy and EUS-guided antegrade stenting. The term “trans-luminal drainage/anastomosis stent” is used for stents that maintain the ESCR rather than treating strictures. EUS-guided delivery involves the delivery of substances, such as fluids, drugs, medical devices, and energy. This proposed categorization and terminology aimed to clarify I-EUS procedures and will require updates as new techniques and concepts emerge.

**Key words:** endosonographically/EUS-guided created route (ESCR), EUS-FNA/FNB, EUS-guided drainage/anastomosis (EUS-D/A), interventional endoscopic ultrasonography/endosonography (EUS)

## INTRODUCTION

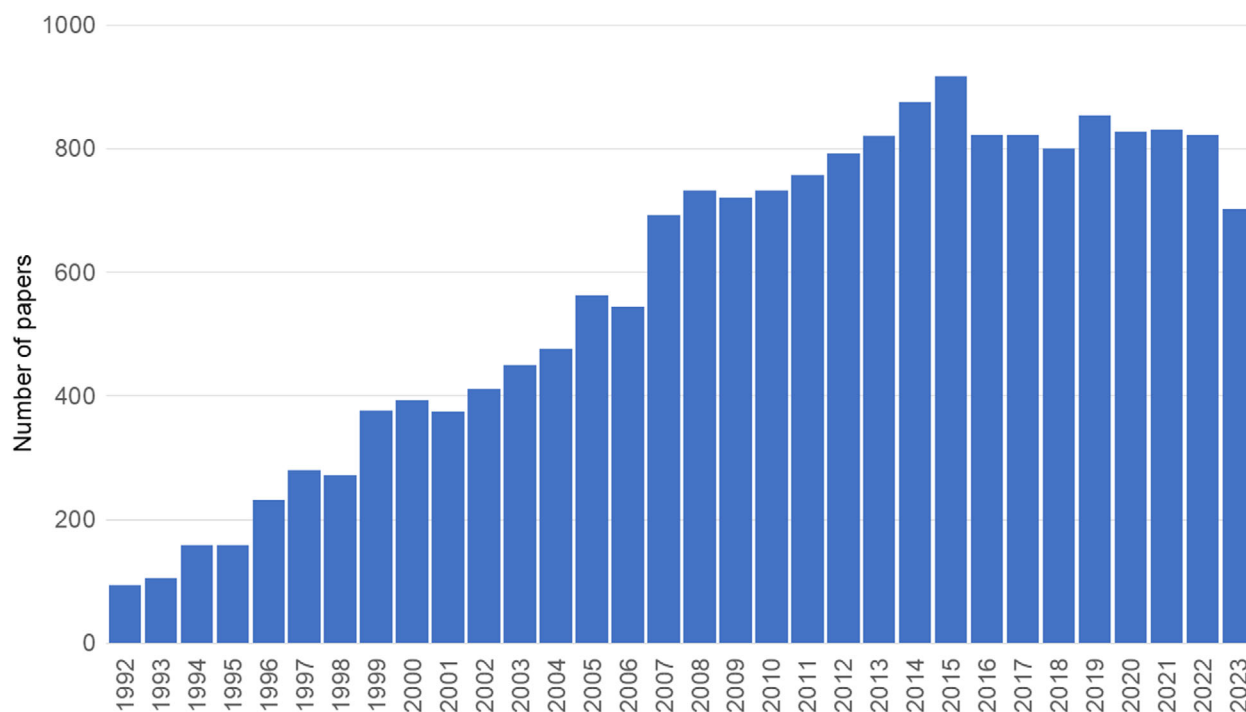
INTERVENTIONAL ENDOSCOPIC ULTRASONOGRAPHY/ENDOSONOGRAPHY (I-EUS) is a dynamic and rapidly advancing field within endoscopic procedures. Since its inception in 1992 with Vilman *et al.*<sup>1</sup> report on “EUS-guided fine needle aspiration biopsy” and Grimm *et al.*<sup>2</sup> “EUS-guided drainage of a pancreatic pseudocyst,” numerous I-EUS techniques have been developed. In 1997, Chang and Wiersema<sup>3</sup> coined the term “interventional EUS,” drawing an analogy to “interventional radiology” and “interventional cardiology,” which were becoming well-known during that period. Despite the increasing

number of studies on I-EUS (Fig. 1), the terminology remains inconsistent, complicating study interpretation and interstudy comparisons. To address this, the Committee for Terminology of the Japan Gastroenterological Endoscopy Society (JGES) has been working towards standardizing gastrointestinal endoscopy terminology. Thus, JGES organized the Subcommittee for Terminology of I-EUS to categorize I-EUS procedures and provide a comprehensive glossary of terms, including usage examples (Table 1).

Since its clinical introduction as EUS-guided fine needle aspiration biopsy by Vilman *et al.* in 1992,<sup>1</sup> various terms have been used, including EUS-guided fine needle aspiration biopsy, EUS-guided fine needle aspiration cytology, and EUS-guided fine needle aspiration (EUS-FNA). The term “EUS-FNA” has been widely used but does not fully represent the current scope and purpose of the procedure, which can be performed without “aspiration” and for obtaining “histology” rather than cytology. Additionally, the development of new needles designed to obtain

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**Figure 1** Year-by-year number of papers on interventional endoscopic ultrasonography/endsosonography in PubMed. Search query: “intervention” and “endoscopic ultrasonography/endsosonography.”

**Table 1** Composition of subcommittees for terminology of interventional endoscopic ultrasonography/endsosonography

JGES board member in charge	Hiro-o Yamano (Department of Gastroenterology and Hepatology, Sapporo Medical University School of Medicine)
Production committee	
Committee Chairperson	Hiroyuki Isayama (Department of Gastroenterology, Graduate School of Medicine, Juntendo University)
Vice-Committee Chairperson	Koji Matsuda (Department of Gastroenterology, National Hospital Organization Shizuoka Medical Center)
Committee members	Nobutsugu Abe (Department of Gastroenterological and General Surgery, Kyorin University Faculty of Medicine) Naoki Okano (Department of Gastroenterology and Hepatology, Toho University Omori Medical Center) Takeshi Ogura (Endoscopy Center, Osaka Medical and Pharmaceutical University Hospital) Akio Katanuma (Center for Gastroenterology, Teine-keijinkai hospital) Yoshihide Kanno (Department of Gastroenterology, Sendai City Medical Center) Masayuki Kitano (Second Department of Internal Medicine, Wakayama Medical University) Takayoshi Tsuchiya (Department of Gastroenterology and Hepatology, Tokyo Medical University) Yousuke Nakai (Department of Internal Medicine, Institute of Gastroenterology, Tokyo Women's Medical University) Kazuo Hara (Department of Gastroenterology, Aichi Cancer Center) Ichiro Yasuda (Third Department of Internal Medicine, University of Toyama)
Evaluation committee	
Evaluation Committee Chairperson	Naotaka Fujita (Miyagi Medical Check-up Plaza)
Evaluation members	Kazuo Inui (Department of Gastroenterology, Yamashita Hospital) Atsushi Irisawa (Department of Gastroenterology, Dokkyo Medical University School of Medicine) Toshiharu Ueki (Department of Gastroenterology, Fukuoka University Chikushi Hospital)

JGES, Japan Gastroenterological Endoscopy Society.

**Table 2** Classification of interventional endoscopic ultrasonography/endosonography (I-EUS)

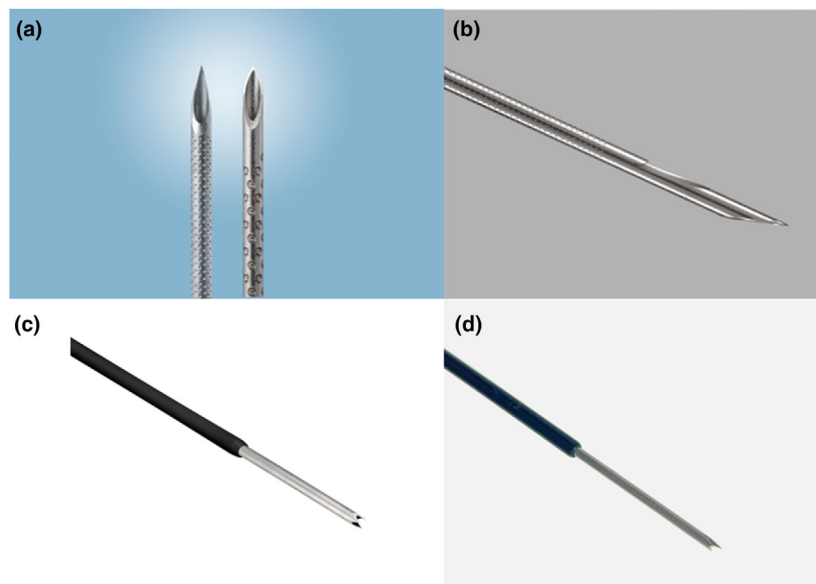
Category	Short name
EUS-guided sampling	EUS-sampling EUS-FNA (fine needle acquisition or aspiration)
EUS-guided through-the-needle examination	EUS-TTNE EUS-TTN examination
EUS-guided drainage/anastomosis	EUS-D/A EUS-drainage (EUS-D) EUS-anastomosis (EUS-A)
Trans-endosonographically/EUS-guided created route procedures	Trans-ESCR Trans-ESCR procedures
EUS-guided delivery	EUS-delivery

histological core tissue has led to the term “EUS-guided fine needle biopsy (EUS-FNB).” Therefore, “EUS-guided tissue acquisition” is increasingly used in the literature. As the field of I-EUS continues to expand, its terminology can change according to methodology, purposes, and devices. However, standardizing basic principles is essential for consistent terminology. Meanwhile, respecting the priority of terms describing new procedures is crucial. Commonly used clinical terms are listed in the glossary, along with our proposed terminology.

**Table 3** Classification of endoscopic ultrasonography/endosonography (EUS)-guided sampling

Classification by sampling type
Tissue acquisition (EUS-TA)
Histology
EUS-guided tissue acquisition (EUS-TA)
EUS-guided biopsy
EUS-guided fine needle biopsy (EUS-FNB)
Cytology
EUS-guided fine needle aspiration (EUS-FNA)
EUS-guided fine needle cytology (EUS-FNC)
EUS-guided fine needle aspiration cytology (EUS-FNAC)
Fluid sampling (EUS-guided fluid sampling)
Classification by needle types
EUS-FNA
EUS-FNB
EUS-guided Tru-cut needle biopsy (EUS-TCB, EUS-TNB)

The terminology and classification of the wide range of I-EUS procedures, such as tissue acquisition, drainage, stent placement, and injection, are not well organized. Furthermore, procedures using the route created by I-EUS, such as endoscopic necrosectomy for walled-off necrosis (WON), antegrade stenting, and stone extraction, should be included in the I-EUS classification. This problem of procedure



**Figure 2** Needles in endoscopic ultrasonography/endosonography (EUS)-guided sampling, fine needle aspiration (FNA), and fine needle biopsy (FNB). (a) EUS-FNA needle: EZ Shot 3 Plus (Menghini type, left) and EZ Shot 2 (Lancet type, right) (Olympus Medical, Tokyo, Japan). (b) EUS-FNB needle: EchoTip ProCore (Cook Medical Inc., Limerick, Ireland). (c) EUS-FNB needle: Acquire (Boston Scientific Japan, Tokyo, Japan). (d) EUS-FNB needle: Trident Needle Biopsy System (Micro-Tech, Nanjing, China).

**Table 4** Endoscopic ultrasonography/endosonography (EUS)-guided through-the-needle examinations (EUS-TTNE, EUS-TTN examinations)

EUS-guided through-the-needle imaging (EUS-TTN imaging)
EUS-guided confocal laser endomicroscopy (EUS-CLE)
EUS-guided cystoscopy
EUS-guided through-the-needle measurement (EUS-TTN measurement)
EUS-guided portal pressure gradient measurement
EUS-guided impedance measurement
EUS-guided through-the-needle biopsy (EUS-TTN biopsy, EUS-TTNB)

**Figure 3** Endoscopic ultrasonography/endosonography-guided through-the-needle biopsy. Microforceps (Moray micro forceps; STERIS Corp., Mentor, OH, USA) through a 19G fine needle aspiration needle.

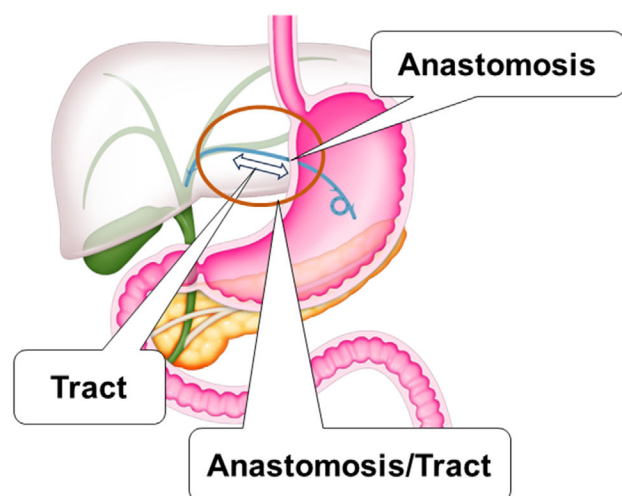
classification also arose when the first author, H.I., worked on the “clinical practice guidelines for safe performance of EUS-guided biliary drainage,” requiring extensive discussion among guideline committees.<sup>4</sup> To avoid further confusion, we recognized the necessity of classifying various I-EUS procedures.

Herein, we proposed a glossary for I-EUS, including both the classification and terminology of I-EUS procedures. We

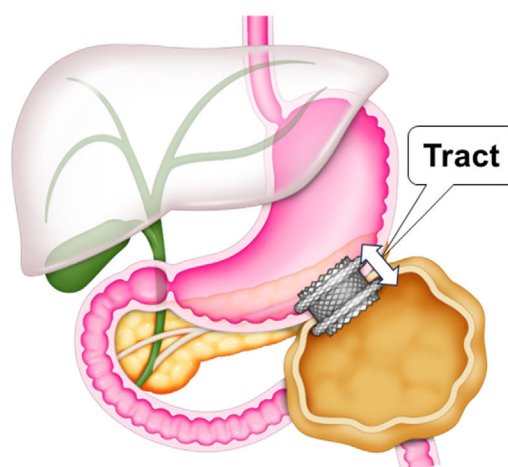
**Table 5** Endoscopic ultrasonography/endosonography (EUS)-guided drainage/anastomosis (EUS-D/A)

Drainage/anastomosis of organ
<i>Bile duct</i> : EUS-guided biliary drainage (EUS-BD)
EUS-guided hepaticogastrostomy (EUS-HGS)
EUS-guided hepaticojejunostomy (EUS-HJS)
EUS-guided hepaticoduodenostomy (EUS-HDS)
EUS-guided choledochoduodenostomy (EUS-CDS)
<i>Gallbladder</i> : EUS-guided gallbladder drainage (EUS-GBD)
EUS-guided cholecystoduodenostomy (EUS-CCDS)
EUS-guided cholecystogastrostomy (EUS-CCGS)
<i>Pancreatic duct</i> : EUS-guided pancreatic duct drainage (EUS-PDD)
EUS-guided pancreatogastrostomy (EUS-PGS)
EUS-guided pancreatojejunostomy (EUS-PJS)
EUS-guided pancreatoduodenostomy (EUS-PDS)
<i>Afferent loop</i> : EUS-guided afferent loop drainage (EUS-ALD)
EUS-guided jejunogastrostomy (EUS-JGS)
Drainage of fluid collection
<i>Peripancreatic fluid collection</i> : EUS-guided peripancreatic fluid drainage (EUS-PFD)
Pseudocyst: Transgastric/duodenal/jejunal EUS-PFD for pseudocyst
Walled-off necrosis (WON): Transgastric/duodenal/jejunal EUS-PFD for WON
Pancreatic leakage: Transgastric/duodenal/jejunal EUS-PFD for pancreatic leakage
<i>Cyst</i> : EUS-guided cyst drainage (EUS-CD)
Transgastric EUS-CD for liver cyst
Transgastric EUS-CD for symptomatic abdominal cyst
<i>Abscess</i> : EUS-guided abscess drainage (EUS-AD)
Liver abscess: Transgastric EUS-guided AD for liver abscess
Intra-abdominal abscess: Transgastric EUS-guided AD for intra-abdominal abscess
Pelvic abscess: Transcolonic EUS-guided AD for pelvic abscess
Anastomosis of digestive tracts
EUS-guided gastroenterostomy (EUS-GES)
EUS-guided gastrojejunostomy (EUS-GJS)
EUS-guided gastroduodenostomy (EUS-GDS)
EUS-guided gastrogastrostomy (EUS-GGS)
EUS-guided enteroenterostomy (EUS-EES)
EUS-guided colocolostomy (EUS-CCS)
EUS-guided enterocolostomy (EUS-ECS)
EUS-guided jejunocolostomy (EUS-JCS)
Endosonographically/EUS-guided created route: ESCR
EUS-D/A of organ-to-organ
EUS-guided anastomosis, anastomosis
EUS-guided anastomotic site, anastomotic site
EUS-guided tract, tract (means the part of liver/pancreas parenchyma)
EUS-drainage of acquired fluid collection
EUS-guided tract, tract
Completion of the ESCR
Established/matured anastomosis/tract
Stents for EUS-D/A
General term: Transluminal drainage/anastomosis stent (T-DAS)
Types of T-DAS
Plastic stent
Fully/partially covered self-expandable metallic stent (SEMS)
Lumen-apposing metal stent (LAMS)
Tubular type covered SEMS, Bi-flanged covered SEMS

(a) EUS-guided drainage/anastomosis for the organ



(b) EUS-guided drainage for acquired fluid collection



**Figure 4** Endoscopic ultrasonography/endosonography (EUS)-guided created route (ESCR). (a) EUS-guided drainage/anastomosis of the organs. Both the anastomosis and tract can be used for EUS-guided drainage/anastomosis of an organ and the tract is used specifically for the parenchyma in this route. (b) EUS-guided drainage for acquired fluid collection. Tract is available for use of ESCR in this situation because of the disappearance of fluid collection after drainage.

hope that this terminology and classification will improve the understanding and recognition of I-EUS procedures.

## METHODS

THIS SUBCOMMITTEE WAS established in April 2021. Committee members initially proposed the terminology and classification of I-EUS procedures based on a literature search. These proposals were then discussed in web-based meetings. Although we aimed to base our terminology on fundamental principles, decisions in inconclusive discussions were made by majority vote. Terms that received 80% or more votes in favor were officially adopted. If the 80% agreement threshold was not reached even after a second vote, we listed both terms in the glossary. Commonly used clinical terms were also included. Consequently, our glossary contains multiple terms for some procedures, reflecting this initial standardization effort. We plan to regularly revise this glossary, gradually unifying I-EUS terminology based on evolving trends.

Since April 2021, we have held five online meetings and exchanged numerous emails between meetings. The first draft of the glossary was developed in May 2023 and presented at a meeting of the World Endoscopy Organization Documentation and Standardization Committee on May 7, 2023, during Digestive Disease Week in Chicago. The first draft was revised according to the discussions in this meeting and discussed

again by the subcommittee members. Public comments on the revised draft were solicited for 3 weeks in October 2023 on the JGES website. Finally, the subcommittee finalized the I-EUS glossary by considering the public comments.

## CLASSIFICATION OF I-EUS

INTERVENTIONAL ENDOSCOPIC ULTRASONOGRAPHY/ENDOSONOGRAPHY procedures are classified into five categories based on their purpose and method: (i) EUS sampling; (ii) EUS-guided through-the-needle examination; (iii) EUS-guided drainage/anastomosis (EUS-D/A); (iv) trans-endosonographically/EUS-guided created route (trans-ESCR), and (v) EUS-guided delivery. Each category encompasses a specific group of procedures with distinct objectives (Table 2). The details and examples of these categories are provided in the following section.

### EUS-guided sampling

Endoscopic ultrasonography/endosonography-guided sampling involves obtaining samples for histology, cytology, or fluid analysis under EUS guidance. Initially termed “EUS-FNA,” the procedure’s scope has evolved, and the terminology no longer accurately reflects its current application, especially with the advent of FNB needles designed for histological core samples. Various terms, such



**Table 6** Classification of trans-endosonographically/endoscopic ultrasonography (EUS)-guided created route (trans-ESCR) procedures

EUS-guided trans-gastric/jejunal/duodenal antegrade interventions
Transgastric EUS-guided antegrade stone management
Transgastric EUS-guided antegrade stricture management
e.g. EUS-guided transgastric antegrade stenting at the distal stricture (Fig. 5a)
e.g. EUS-guided transgastric antegrade stenting across the hilar stricture (Fig. 5b,c)
EUS-guided trans-gastric/jejunal/duodenal antegrade intervention followed by EUS-D/A
Transgastric EUS-guided antegrade intervention followed by EUS-D/A
e.g. EUS-guided antegrade stone management followed by EUS-HGS with a plastic stent (Fig. 6)
EUS-D/A with antegrade stenting bridging (across, for) stricture/papilla/anastomotic stricture
e.g. EUS-HGS with antegrade stenting across the hepaticojejunostomy (Fig. 7a,b)
e.g. EUS-HGS with antegrade stenting bridging the hilar stricture
e.g. EUS-guided antegrade stenting across the pancreatojejunostomy followed by EUS-PGS with plastic stent (Fig. 7c,d)
One-step endoscopic intervention following EUS-D/A with T-DAS
e.g. One-step endoscopic necrosectomy following EUS-PFD with lumen apposing metal stent (LAMS) (Fig. 8)
e.g. One-step ERCP following EUS-guided gastrogastrostomy with LAMS
Endoscopic interventions via the T-DAS placed at EUS-D/A
e.g. (Two-step) endoscopic necrosectomy via LAMS placed at EUS-PFD tract (Fig. 9)
e.g. (Two-step) peroral cholangioscopy via fully-covered metallic stent placed at EUS-HGS
Endoscopic interventions via (established) EUS-anastomosis
e.g. Endoscopic bile duct stone extraction via established EUS-HGS followed by T-DAS placement (Fig. 10)
e.g. Endoscopic necrosectomy via established EUS-PFD tract
EUS-assisted rendezvous technique
EUS-assisted biliary rendezvous technique (Fig. 11a–d)
EUS-assisted pancreatic rendezvous technique (Fig. 11e–h)
Options of interventions
Contrast examinations
Cholangiography, pancreatography, cystography
Contrast injection
Stone management
Papillary/anastomotic balloon dilation
Stone removal/retrieval/extraction
Lithotripsy
Stricture management
Tissue sampling/brushing/cytology/biopsy
Balloon dilation
Radiofrequency ablation (RFA)
Stenting
Intraductal/cystic endoscopy
Cholangioscopy, pancreatoscopy, cholecystoscopy, cystoscopy
Endoscopic procedures
Necrosectomy, gastroduodenoscopy, EUS, ERCP

ERCP, endoscopic retrograde cholangiopancreatography; EUS-D/A, EUS-guided drainage/anastomosis; EUS-HGS, EUS-guided hepatico-gastrostomy; EUS-PFD, EUS-guided peripancreatic fluid drainage; EUS-PGS, EUS-guided pancreatogastrostomy; T-DAS, transluminal drainage/anastomosis stent.

as EUS-FNB, EUS-FNA using an FNB needle, and EUS-guided tissue acquisition (EUS-TA), have been used, creating confusion. Although EUS-TA encompasses both histological and cytological specimen sampling, it excludes fluid sampling. After discussion, we proposed the term “EUS-guided sampling” to include both tissue and fluid sampling. The term “EUS-FNA” remains widely used in clinical practice and literature; therefore, it can continue to be used. However, because aspiration (or suction) is not always applied during the procedure, we suggest using EUS-FNA as an abbreviation for EUS-guided fine needle acquisition and/or aspiration. We will describe this procedure as EUS sampling, EUS-FNA, or EUS-sampling/FNA.

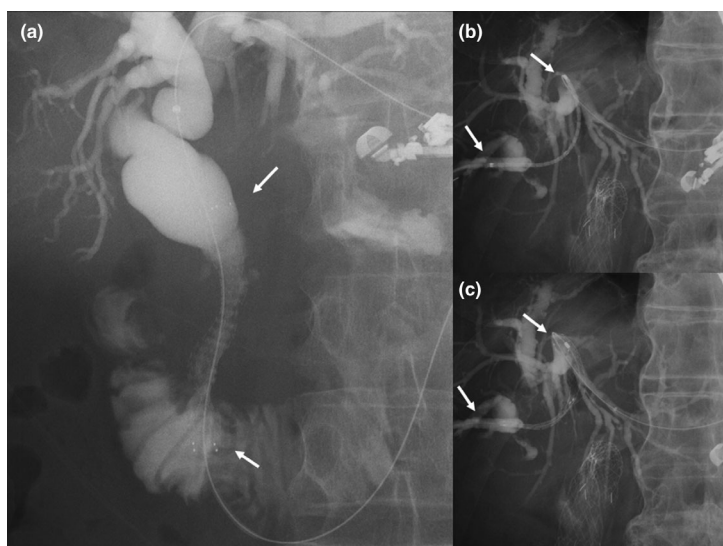
EUS-guided sampling includes various sampling procedures that can be classified by sample type or needle used (Table 3). Based on sample type, EUS sampling is divided into EUS-TA, which includes cytology and histology, and EUS-fluid sampling. For needle type classification (Fig. 2), we defined the needle type. FNA needles include traditional plain needles with “Lancet” or “Menghini” shapes. FNB needles are specially designed for tissue/core acquisition, such as “Franssen” and “Fork-tip” needles. Needles with a side hole are classified as FNA needles if the side hole lacks blades and FNB needles if the side hole has cutting blades. We also included Tru-Cut needles in another category, although they are not commonly used.

## EUS-guided through-the-needle examination

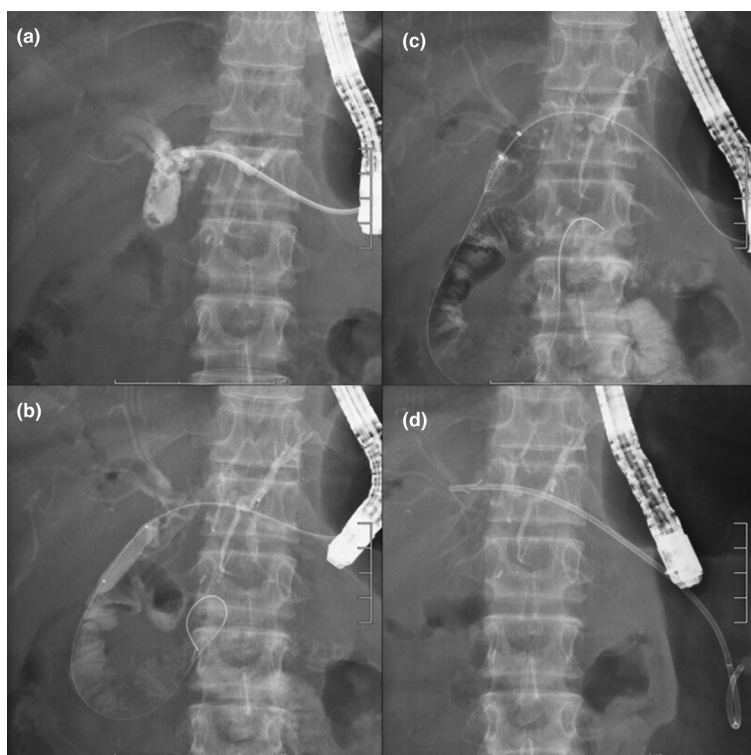
The recent development of miniature devices allows various diagnostic procedures to be performed through a needle. EUS-guided through-the-needle examination (TTN) is a diagnostic procedure that measures various parameters such as pressure and impedance and uses diagnostic devices through the needle. EUS-TTN examination is classified into three categories (Table 4): EUS-TTN imaging (imaging diagnosis using devices inserted through the needle),<sup>5,6</sup> EUS-TTN measurement (measurement using the needle itself or via the needle),<sup>7</sup> and EUS-TTN biopsy/EUS-TTNB (biopsy using forceps inserted through the needle; Fig. 3).<sup>5</sup>

## EUS-guided drainage/anastomosis

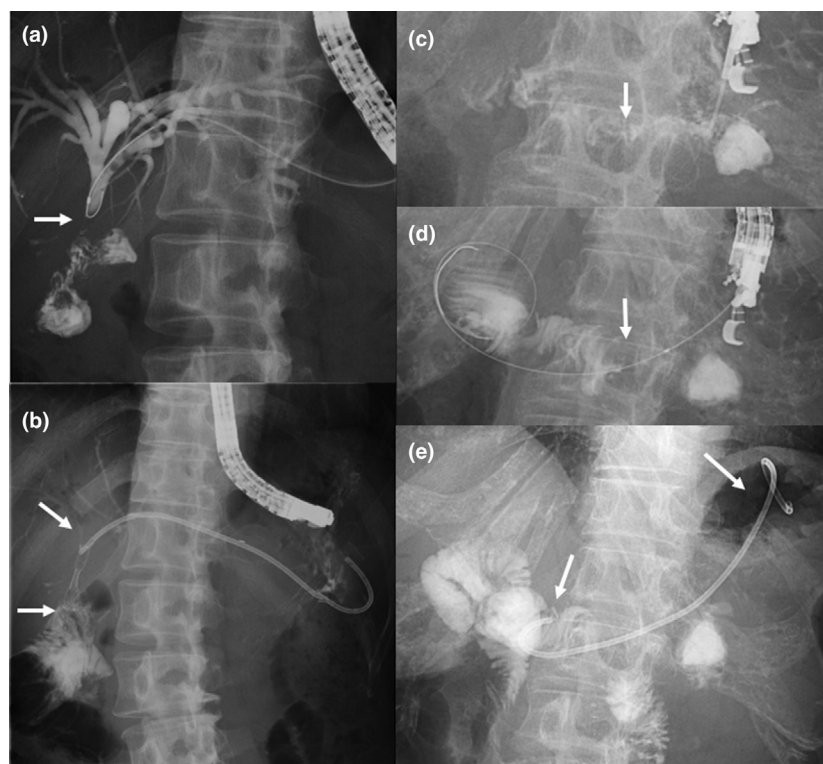
Endoscopic ultrasonography/endosonography-guided drainage/anastomosis refers to EUS-guided drainage or anastomosis of acquired fluid collections or fluid-filled organs. Historically, the term “EUS-guided fistuloplasty” was commonly used in Japan to describe these procedures. However, the term “fistuloplasty” may not accurately represent the intentional nature of these interventions because it typically implies unintended communications or



**Figure 5** Endoscopic ultrasonography/endosonography (EUS)-guided transgastric antegrade stenting. (a) EUS-guided transgastric antegrade stenting for distal biliary strictures. The stent is located between the white arrows. (b, c) EUS-guided transgastric antegrade stenting across the hilar biliary stricture. (b) The stent delivery system is placed across the hilar stricture (between the white arrows). (c) The covered self-expandable metallic stent was deployed (between the white arrows).



**Figure 6** Endoscopic ultrasonography/endosonography (EUS)-guided transgastric antegrade stone extraction followed by EUS-guided hepaticogastrostomy (EUS-HGS). (a) Cholangioscope insertion via EUS-HGS. (b) Balloon dilation of surgical hepaticogastrostomy stricture. (c) Antegrade stone extraction with a balloon catheter. (d) Plastic stent placement at EUS-HGS.



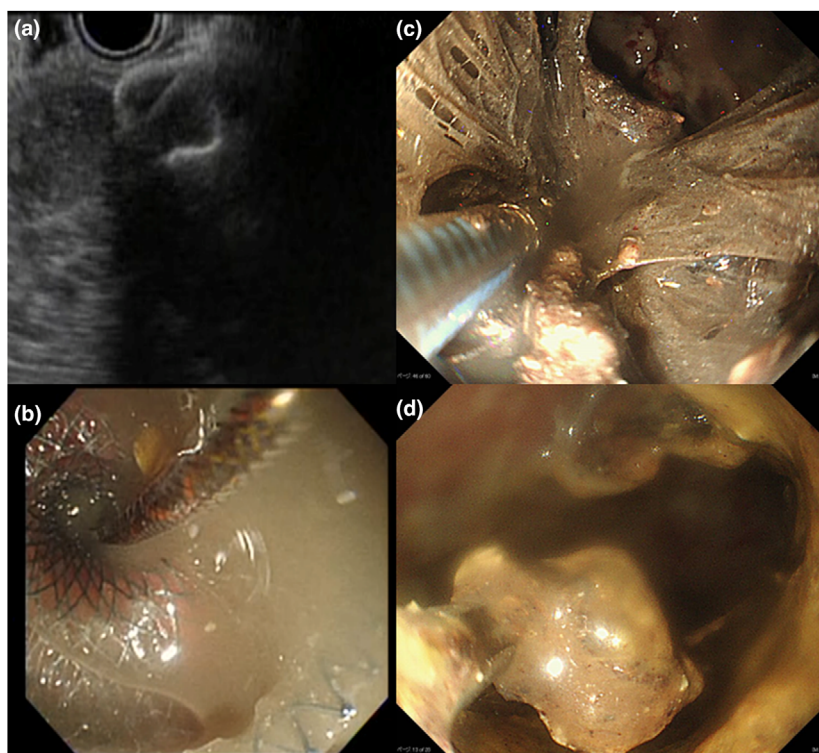
**Figure 7** Endoscopic ultrasonography/endosonography (EUS)-guided transgastric antegrade stenting followed by EUS-guided drainage/anastomosis. (a) EUS-guided biliary access in a patient with surgical hepaticojejunostomy stricture (white arrow). (b) EUS-guided antegrade metallic stent placement across the surgical hepaticojejunostomy stricture (between the white arrows), followed by EUS-guided hepaticogastrostomy with a plastic stent. (c) EUS-guided pancreatic duct access in a case with surgical pancreatojejunostomy stricture (white arrow). (d) Guidewire passage through the pancreatojejunostomy stricture (white arrow). (e) EUS-guided antegrade stent placement across the pancreatojejunostomy stricture (between the white arrows), followed by EUS-guided pancreatogastrostomy (EUS-PGS) with a plastic stent. EUS-PGS stent is placed between the stomach and the jejunum.

conduits. Additionally, the term “-plasty” suggests a procedure for repair or restoration, which may not align with the primary goal of creating new routes. Thus, after extensive discussion, the committee opted to introduce the term “EUS-D/A” to better reflect the purpose of these procedures in achieving drainage and/or creating anastomoses for subsequent interventions.

For the terminology of EUS-D/A procedures, we established two basic principles. The first principle is the use of “drainage” and “-stomy.” Although EUS-guided anastomosis is performed for the connection of two tubular or luminal organs, the target of EUS-guided drainage can be either the acquired fluid collection or the cavity (i.e., pancreatic fluid collections)<sup>2</sup> or the organ (i.e., gallbladder). When the target of EUS-D/A is one of the organs, the suffix “-stomy” is used. Meanwhile, only “drainage” is used when

the target is acquired fluid collection or cavity, not the organ. The authors thought that “anastomosis” is not suitable for the drainage of acquired fluid collection or cavity because it may disappear after successful drainage. The other principle is the order of the organs in the procedure for EUS-guided anastomosis. The order of the two organs is based on the flow of fluid or content, which has traditionally been used in surgical procedures. For example, in EUS-guided choledochoduodenostomy, bile flows from the common bile duct (choledocho-) into the duodenum (-duodeno-) through the anastomosis of the two organs (-stomy). In EUS-guided drainage, the access route and target lesion can be added before and after the drainage procedure to clarify the details. For example, transgastric EUS-guided peripancreatic fluid drainage for WON denotes drainage performed through the stomach for this specific





**Figure 8** One-step endoscopic necrosectomy following endoscopic ultrasonography/endosonography (EUS)-guided peripancreatic fluid drainage (EUS-PFD). (a) EUS-guided placement of a lumen-apposing metallic stent (LAMS). (b) Endoscopic image of LAMS placement. (c) Endoscopic image of necrotic tissue within walled-off necrosis using a forward-viewing endoscope inserted via LAMS for EUS-PFD. (d) Endoscopic necrosectomy following EUS-PFD.

purpose. Although “cystogastrostomy” is a common surgical procedure, we propose using EUS-guided trans-gastric drainage of the cyst instead of EUS-guided cystogastrostomy in EUS-D/A procedures in line with our established principles. The classification and procedure names of EUS-D/A are shown in Table 5.

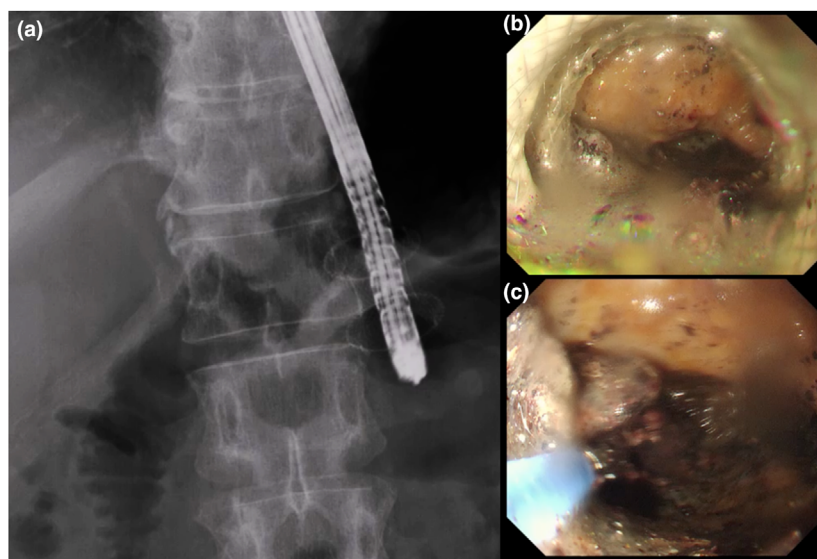
### Routes created by EUS-guided procedure

Endoscopic ultrasonography/endosonography-guided drainage/anastomosis can facilitate various interventions through newly created routes by EUS-guided puncture, dilation, transluminal drainage/anastomosis stents (T-DAS), and matured routes. Various terms have been used, such as fistulas, tracts, and routes. We propose “ESCR” as a general term that includes any route/tract, either mature or immature, created by EUS-guided procedure both for drainage of acquired fluid collection and anastomosis (Fig. 4). Although anastomosis can only be used to connect two organs, ESCR can include the liver/pancreatic parenchyma as well as the

drainage route for acquired fluid collection. Glossary terms related to ESCR are summarized in Table 6. For EUS-D/A between the organs, terms such as anastomosis, anastomotic site, EUS-guided anastomosis, and EUS-guided anastomotic site are used. Meanwhile, tract and EUS-guided tract refer to the parenchymal part of EUS-D/A. Matured or established anastomosis and tract signify the completion of the anastomosis/tract after the initial EUS-D/A procedure. In addition, the term of EUS-D/A procedures can be also used for the term of anastomosis similar to that of surgical procedures. For example, trans-ESCR procedure after performing EUS-guided hepaticogastrostomy (EUS-HGS) is described as follows: endoscopic bile duct stone extraction is performed via EUS-HGS.

### Stents used for EUS-D/A

No general term exists for the stents used during EUS-D/A. To differentiate from conventional pancreatobiliary or gastrointestinal stents often placed across strictures to



**Figure 9** Endoscopic necrosectomy via the trans-luminal drainage/anastomosis stent placed at endoscopic ultrasound/endosonography-guided peripancreatic fluid drainage tract. (a) Fluoroscopic image of forward-viewing endoscope insertion via indwelling lumen-apposing metallic stent (LAMS). (b) Endoscopic image of indwelling LAMS. (c) Endoscopic image within walled-off necrosis.

maintain luminal stent patency, we defined T-DAS as a general term (Table 5). The primary aim of the T-DAS is to maintain ESCR. T-DAS include both plastic and metallic stents, such as lumen-apposing metallic stents (LAMS) and tubular type metallic stents including bi-flanged covered self-expandable metallic stent.

### Trans-ESCR procedures

Trans-ESCR procedures are newly proposed for various procedures performed using ESCR (Table 6). Endoscopic necrosectomy after EUS-guided peripancreatic fluid drainage (PFD) for WON is one of the most common trans-ESCR procedures. Timing of trans-ESCR procedures varies; they can be conducted after the puncture/dilation in the initial EUS-D/A procedure, after T-DAS placement either in the initial or subsequent sessions, or after maturation of the anastomosis/tract. Trans-ESCR can be performed in a one- or two-step process. In a one-step method, T-DAS placement can be performed before or after completing the trans-ESCR procedure. However, some procedures do not place the T-DAS in the ESCR, and a description of the approach route is mandatory. In the two-step method, endoscopic interventions can be performed via EUS-D/A with either T-DAS or anastomosis.

Because the timing of anastomosis maturation is unclear, terminology has been established regardless of whether the

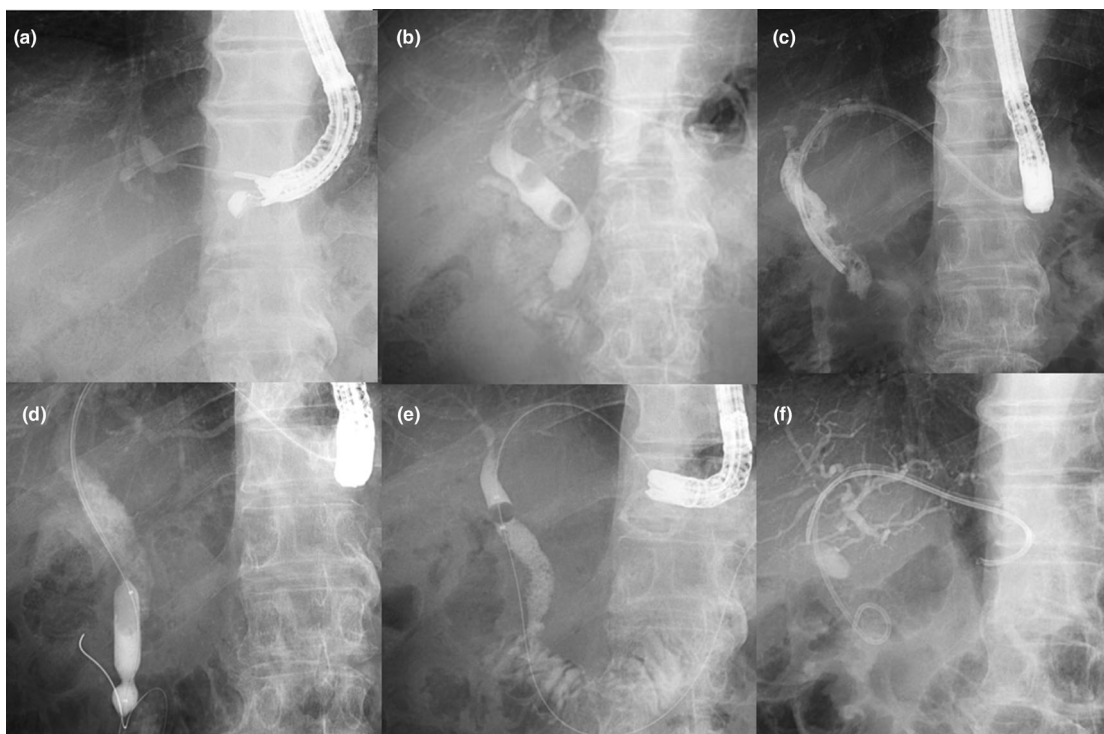
anastomosis is completed. Specific techniques mentioned in the intervention section should adhere to the classification outlined in “Options of intervention” (Table 6). The type of T-DAS can be described as “with a plastic stent,” “with a fully- or partially covered self-expandable metallic stent,” or “with LAMS.”

The EUS-assisted rendezvous technique, which requires scope exchange and performance of the procedure via the papilla, is separately classified. The puncture route can be described as transgastric, transduodenal, or transjejunal. As the number of trans-ESCR procedures expands, establishing basic principles for terminology and using appropriate terms accordingly is essential.

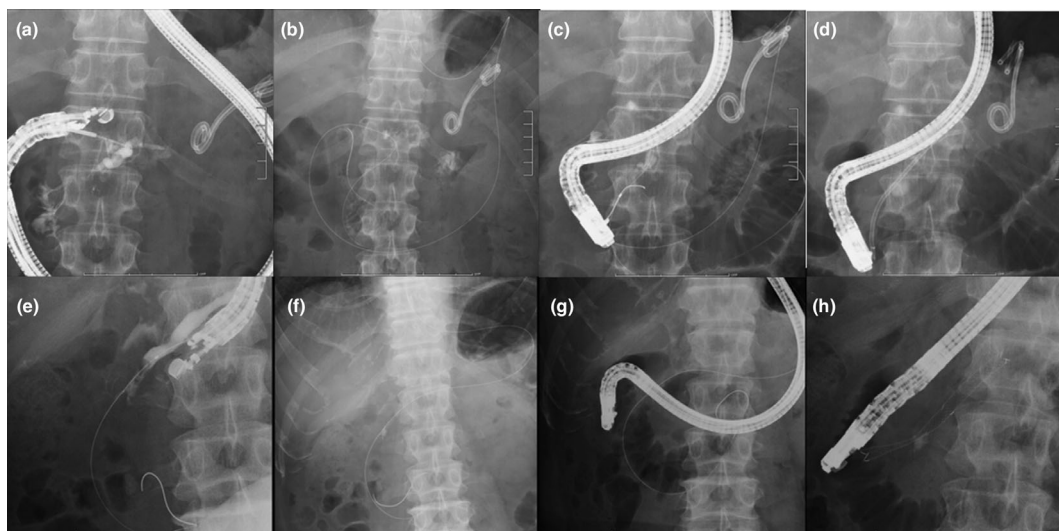
### EUS-guided delivery

“EUS-guided delivery” encompasses the technique of puncturing under EUS guidance and delivering substances, such as fluids, drugs, medical devices, and energy. We categorized EUS-guided delivery into two categories according to procedure type and treatment purpose, as various procedures are performed for one treatment purpose, and one procedure is also performed for multiple purposes.

In the classification by the procedure type (Table 7), terms like “EUS-guided injection,” “EUS-guided injection therapy,” and “EUS-guided fine needle injection” are interchangeable, all referring to the injection of pharmaceutical



**Figure 10** Endoscopic bile duct stone extraction via established endoscopic ultrasonography/endosonography-guided hepaticogastrostomy (EUS-HGS) followed by trans-luminal drainage/anastomosis stent placement. (a) EUS-guided biliary access of a left intrahepatic bile duct (B3). (b) EUS-HGS with a plastic stent. (c) Cholangioscope insertion via established EUS-HGS for intraductal lithotripsy. (d) Endoscopic papillary large balloon dilation via established EUS-HGS. (e) Endoscopic antegrade stone extraction with a balloon catheter via established EUS-HGS. (f) Two plastic stent placements at established EUS-HGS.



**Figure 11** Endoscopic ultrasonography/endosonography (EUS)-assisted biliary and pancreatic rendezvous technique. (a) EUS-guided puncture of the common bile duct. (b) Guidewire placement. (c) Duodenoscope insertion and rendezvous biliary cannulation along the placed guidewire. (d) Transpapillary biliary stent placement. (e) EUS-guided puncture of the main pancreatic duct. (f) Guidewire placement. (g) Duodenoscope insertion. (h) Transpapillary pancreatic stent placement.



**Table 7** Endoscopic ultrasonography/endosonography (EUS)-guided delivery

Classification by the procedure type
EUS-guided injection/injection therapy/fine needle injection (EUS-FNI)
EUS-guided chemotherapeutic agent injection
EUS-guided viral/immunological vector injection
EUS-guided ethanol injection
EUS-guided glue (cyanoacrylate, sclerosant) injection
EUS-guided dye (marking solution) injection
EUS-guided botulinum toxin injection, botulinum toxin A (Botox)
EUS-guided ablation
EUS-guided radiofrequency/microwave ablation
EUS-guided cryotherapy/cryoablation
EUS-guided irreversible electroporation
EUS-guided ethanol ablation
EUS-guided photodynamic therapy (PDT)
EUS-guided implantation/placement
EUS-guided fiducial marker implantation
EUS-guided radioactive agent implantation (brachytherapy)
EUS-guided coiling/coil embolization/coil implantation
Classification by the treatment purposes
EUS-guided oncological interventions/antitumor therapy
EUS-guided drug injection
EUS-guided ablation
EUS-guided radiotherapy/brachytherapy
EUS-guided neurological interventions/pain management
EUS-guided celiac plexus block/analgesia
EUS-guided celiac plexus block (EUS-CPB)
EUS-guided celiac plexus neurolysis (EUS-CPN)
EUS-guided celiac ganglia neurolysis (EUS-CGN)
EUS-guided botulinum toxin A (Botox) injection
EUS-guided vascular interventions
EUS-guided variceal/varix treatment
EUS-guided pseudo-aneurysm treatment
EUS-guided portal vein interventions
EUS-guided marking
EUS-guided tattooing
EUS-guided fiducial marker implantation

or chemical agents through a punctured needle. Although the term “fine needle” is essentially unnecessary, “EUS-guided fine needle injection” is included in this glossary because it is commonly used in the literature.<sup>8</sup> In the classification by the treatment purposes, the terms “EUS-guided oncological interventions” and “EUS-guided anti-tumor therapy” are interchangeable alternatives.

Although “EUS-guided neurological interventions” currently include only EUS-guided pain management, procedures within this classification will expand in the future because neurological interventions conceptually extend beyond pain management. The terminology surrounding

celiac plexus block and neurolysis can be confusing, as “celiac plexus block” is used both broadly for all EUS-guided celiac plexus pain treatment procedures and narrowly for EUS-guided injection for pain relief using reversible agents, in contrast to celiac plexus neurolysis, which involves irreversible degeneration. Terms such as chemical splanchnicectomy, neurolytic celiac plexus block, alcohol celiac plexus block, and neurolytic sympathetic plexus block, found in past literature and not commonly used in current literature, are not included in the glossary.

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