



Guidelines For Training in Endoscopic Ultrasound

GUIDELINES for Clinical Application

Performing endoscopic ultrasonography requires a high level of technical skill and an advanced knowledge of three dimensional anatomy. Training in endoscopic ultrasound should be reserved for those physicians who have attained competence in the standard routine endoscopic procedures by virtue of their training in a gastroenterology fellowship or surgical residency as described in the ASGE Statement on Endoscopic Training. The following guidelines are in addition to the previously published ASGE Guidelines for Advanced Endoscopic Training.¹

GUIDELINES FOR TRAINING IN ENDOSCOPIC ULTRASOUND

Objectives

Endoscopic ultrasound (EUS) is a relatively new imaging technique that, at present, is not universally available. EUS is an advanced endoscopic procedure that requires a level of training beyond that of basic endoscopy. The limited availability of EUS is largely due to the lack of skilled endosonographers. These guidelines are provided to assure that highly qualified and technically expert endosonographers will be trained. The ASGE's previously published guidelines for Advanced Endoscopic Training suggest that, in general, each program in advanced endoscopy should provide numbers of endoscopic procedures which substantially exceed the numbers of procedures required for minimal competency as proposed by the ASGE. In addition to a large procedural volume, advanced endoscopic training requires documentation of the gradual and progressive development of expertise in a particular proce-

dure. Such training is best accomplished by performing a large number of procedures under the direction of a highly skilled and competent instructor. Those individuals desiring advanced training in EUS are encouraged to acquire their training at institutions that can provide an acceptable level of training.

TRAINEE REQUIREMENTS

- 1) Trainees seeking to acquire skills in endoscopic ultrasound must have completed at least 24 months of a standard GI fellowship (or equivalent training) and have documented competence in general routine endoscopic procedures.
- 2) The trainee must devote a substantial portion of his/her training in EUS to developing skills in the cognitive as well as the technical components of the procedure, including understanding the appropriate indications for endoscopic ultrasound, managing patients through all aspects of their endoscopic care with particular emphasis on pre- and post-procedure evaluation and managing procedure related complications.
Trainees must keep a log of all EUS procedures performed under supervision to document comparison of their findings with an objective standard, whenever possible, or the findings of their instructor.
- 3) Trainees who become skilled in endoscopic ultrasound are encouraged to engage in clinical research and scholarly activities related to endoscopic ultrasonography.

ENDOSCOPIC ULTRASOUND TRAINING PROGRAM REQUIREMENTS

- 1) Each program wishing to offer endoscopic ultrasound training should have a minimum of one skilled endosonographer who is acknowledged as an expert by his/her peers and is committed to teaching EUS.

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Table 1.
Reported accuracy of EUS compared to histopathology for the local staging of esophageal carcinoma, gastric cancer, pancreatic cancer, carcinoma of the papilla of vater, and rectal cancer

Indication	n	T stage	N stage
Esophageal Cancer	739	85%	79%
Gastric Cancer	1163	78%	73%
Pancreatic Cancer	155	90%	-
Carcinoma of papilla of vater	94	86%	72%
Rectal Cancer	19	84%	84%

Data based on compilation of all studies previously reported and listed in the references.

- 2) Programs wishing to engage in training in endoscopic ultrasound should be in accordance with the previously developed ASGE guidelines for advanced endoscopic training.

ENDOSCOPIC ULTRASOUND TRAINING EXPERIENCE

To date, there have been few published reports regarding the training of individuals in EUS or the number of procedures required to attain competence in EUS. Several recent reports on inter- and intra-observer variation and reproducibility of endoscopic ultrasonography, suggests that three major factors can influence the interpretation of EUS. These are operator subjectivity, operator experience and machine-dependent factors which produce artifacts which interfere with image interpretation.²

Thus the minimum number of procedures required to achieve competency in EUS varies according to individual skills, knowledge of ultrasound principles, and overall quality of the training experience. Fockens et al., recently reported their experience in training in the endosonographic staging of esophageal cancer. The study suggested that at least 100 procedures were required before one would reach an acceptable level of accuracy for staging esophageal cancer. With respect to tumor staging, EUS requires subjective discrimination in order to differentiate potentially curable early-stage tumors from late-stage or unresectable tumors. Such discrimination is based upon an individual's perceptions, which are derived, in part, from previous experience and knowledge of basic endosonography. Therefore, in order to avoid those factors responsible for confounding the interpretation of EUS images, the trainee in endoscopic ultrasonography must be assured adequate exposure to all aspects of endosonography, particularly gastrointestinal tumor staging. Repeated performance of EUS, which can only be achieved through access to a large volume of cases, would substantially aid the trainee in becoming

competent in recognizing and interpreting normal anatomic structures and their variants, and distinguishing these from abnormal patterns. With increasing numbers of supervised procedures, accurate diagnoses can be consistently obtained.

In addition, the trainee must have knowledge and understanding of new diagnostic applications such as catheter based probes ("miniprobos") used for evaluating submucosal masses and pancreatic and biliary lesions; and newer interventional applications of endoscopic ultrasound such as EUS-guided fine needle aspiration. It is strongly advised that all trainees be skilled in diagnostic endosonography prior to undertaking training in the interventional aspects of endosonography, which includes the use of EUS-guided fine needle aspiration (FNA), since EUS-guided FNA requires considerably more training than purely diagnostic procedures.

Currently, EUS training is available at relatively few academic centers in the U.S. Formal supervised training in EUS should also include reviews of cross-sectional anatomy, atlases of endoscopic or abdominal ultrasonography, videotaped teaching cases and didactic courses in endoscopic ultrasonography. Previous training in standard extracorporeal ultrasound may be useful. The use of a combination of any/all of the above adjunctive training modalities are recommended.

It is recommended that those seeking training in endoscopic ultrasound develop their experience with the following objectives in mind:

1. Perform EUS based upon findings from a personal consultation/evaluation and considering other diagnostic and therapeutic alternatives available as well as understanding the risks and complications of the procedure.
2. Perform the procedure in a safe and efficient manner.
3. Interpret most EUS findings for a variety of indications.
4. Recognize and manage complications related to the procedure.

5. Integrate the endosonographic findings into the management plan for each patient.

The trainee must perform a volume of procedures substantially in excess of those required for training in routine endoscopic procedures and should perform a number of EUS examinations for each established indication sufficient to reliably and consistently interpret most EUS findings correctly. Therefore, at the completion of his or her training, the trainee should be able to perform all endosonographic procedures, including staging of gastrointestinal malignancies, with an accuracy similar to that found in published reports (Tables)³⁻²⁶. Training must include objective assessments of the accuracy of EUS in the hands of the trainee, especially for cancer staging. Generally, this involves the correlation of studies performed with the gold standard of operative and/or pathological findings. When such findings are not available, or in centers where patients with gastrointestinal malignancies routinely undergo neoadjuvant therapy after endosonographic staging and prior to surgical excision, it is understood that immediate assessment of endosonographic accuracy, based on surgical pathology, will be limited. In such cases, trainee competence should be based on comparison of the endosonographic assessment of the instructor, when the instructor's level of competence is known. This learning technique should be a formal part of any good training program.

REFERENCES

- Guidelines for advanced endoscopic training. The American Society for Gastrointestinal Endoscopy. Manchester, Massachusetts: 1994; ASGE Publication No. 1026.
- Catalano MF, Sivak MV, Bedford RA, et al. Observer variation and reproducibility of endoscopic ultrasonography. *Gastrointest Endosc* 1995;41:115-20.
- Fockens P, Van den Brande, Van Dullemen H, et al. Endosonographic T-staging of esophageal carcinoma: a learning curve. *Gastrointest Endosc* 1996;44:58-62.
- Gress F, Schmitt C, Savides T, Roubein N, et al. Interobserver agreement of endoscopic ultrasound (EUS) for evaluating submucosal masses. *Gastrointest Endosc* 1998;47:421A.
- Rösch T, Braig C, Gain T, Feuerbach S, Siewert J.R., Schudziarra V, Classen M. Staging of pancreatic and ampullary carcinoma by ultrasonography. *Gastroenterology* 1992;102:188-99.
- Palazzo L, Rousseau G, Gayet B, Vilgrain V, Belghiti J, Fekete, F, Paolaggi JA. Endoscopic ultrasonography in the diagnosis and staging of pancreatic adenocarcinoma. Results of a prospective study with comparison to ultrasonography and CT-scan. *Endoscopy* 1993;25:143-50.
- Grimm H, Maydeo A, Soehendra N. Endoluminal ultrasound for the diagnosis and staging of pancreatic cancer. *Bailliere's Clin Gastroenterol* 1990;4:869-87.
- Tio L, Tytgat GNJ, Cikot RJLM, Houthoff HJ, Sars PRA. Ampullopancreatic carcinoma; preoperative TNM classification with endosonography. *Radiology* 1990;175:455-461.
- Snady H, Cooperman A, Siegel J.H. Endoscopic ultrasonography compared with computed tomography and ERCP in patients with obstructive jaundice or small peripancreatic mass. *Gastrointest Endosc* 1992;38:27-34.
- Snady H, Bruckner H, Cooperman A, Siegel J, Kiefer L. Endoscopic ultrasonography criteria of vascular invasion by potentially resectable pancreatic tumors. *Gastrointest Endosc* 39, 1994, 69.
- Tio TL, Cohen P, Coene PP, Udding J, Den Hartog Jager FCA, Tytgat GNJ. Endosonography and computed tomography of esophageal carcinoma: preoperative classification compared to the new (1987) TNM system. *Gastroenterology* 1989;96:1478-86.
- Rösch T, Lorenz R, Zenker K, et al. Local staging and assessment of resectability in carcinoma of the esophagus, stomach and duodenum by endoscopic ultrasonography. *Gastrointest Endosc* 1992;38:460-7.
- Murata Y, Suzuki S, Hashimoto H. Endoscopic ultrasonography of the upper gastrointestinal tract. *Surg Endosc* 1988;2:180-3.
- Tio TL, Coene PPLO, den Hartog Jager FCA, Tytgat GNJ. Preoperative TNM classification of esophageal carcinoma by endosonography. *Hepato-Gastroenterol* 1990;37:376-81.
- Dittler HJ, Bollschweiler E, Siewert JR. Was leistet die Endosonographie im präoperativen Staging des Ösophaguskarzinoms? *Dtsch. med. Wschr.* 1991;116:561-6.
- Vilgrain V, Mompoin D, Palazzo L, Menu Y, Gayet B, Ollier P, Nahum H, Fakete F. Staging of oesophageal carcinoma: comparison of results with endoscopic sonography and CT. *AJR* 1990;155:277-81.
- Botet JF, Lightdale CJ, Zauber G, Gerdes H, Urmacher C, Brennan MF. Preoperative staging of esophageal cancer: comparison of endoscopic US and dynamic CT. *Radiology* 1991;181:419-25.
- Grimm H, Maydeo A, Hamper K, Maas R, Noar M, Soehendra N. Results of endoscopic ultrasound and computed tomography in preoperative staging of esophageal cancer: a prospective controlled study. *Gastrointest Endosc* 1991;37:279 (Abstract).
- Rösch T, Lorenz R, Zenker K, von Wichert A, Dancygier H, Siewert JR, Classen M. Local staging and assessment of resectability in carcinoma of esophagus, stomach and duodenum by endoscopic ultrasonography. *Gastrointest Endosc* 1992;38:460-7.
- Ziegler K, Sanft C, Zeitz M, Friedrich M, Stein H, Häring R, Riecken EO. Evaluation of endosonography in TN staging of oesophageal cancer. *Gut* 1991;32:16-20.
- Sugimachi K, Ohno S, Fujishima H, Kuwano H, Mori M, Misawa T. Endoscopic ultrasonographic detection of carcinomatous invasion and of lymph nodes in the thoracic esophagus. *Surgery* 1990;107:366-71.
- Rice TW, Boyce GA, Sivak MV Jr. Esophageal ultrasound and the preoperative staging of carcinoma of the esophagus. *Surgery* 1991;101:536-44.
- Heintz A, Hohne U, Schweden F, Junginger T. Endosonographie versus Computertomographie bei der präoperativen Stadienbeurteilung von Ösophaguskarzinomen. *Z Gastroenterol* 1991;29:49-52.
- Schuder G, Koch B, Seitz G, Hildebrandt U, Ecker KW, Feifel G. Endosonographisches staging beim Ösophaguskarzinom-Ein prospektiver Vergleich mit herkömmlichen bildgebenden Verfahren. *Z Gastroenterol* 1990;28:534 (Abstract).
- Date H, Miyashita M, Sasajima K, Toba M, Yamashita K, Takubo K, Onda M. Assessment of adventitial involvement of esophageal carcinoma by endoscopic ultrasonography. *Surg Endosc* 1990;4:195-7.
- Takemoto T, Itoh T, Fukumoto Y, Aibe T, Okita K. Endoscopic

- ultrasonography in preoperative staging of esophageal cancer. In Dancygier, H., Classen, M. (ed.): 5th International Symposium on Endoscopic Ultrasonography. Demeter Verlag, Munich (Z Gastroenterol suppl.) 1989 pp 34-38.
27. Caletti, GC, Brocchi, E, Gibilaro, M, Ferrari, A, Carfagna, L, Barbara, L.: Sensitivity, specificity and predictive value of endoscopic ultrasonography in the diagnosis and assessment of gastric cancer. *Gastrointest. Endosc.* (1990);36:194-195 (Abstract)
 28. Murata, Y, Suzuki, S, Hashimoto, H.: Endoscopic ultrasonography of the upper gastrointestinal tract. *Surg. Endosc.* (1988);2:180-183
 29. Grimm, H, Hamper, K, Maydeo, A, Maas, R, Noar, M, Soehendra, N.: Accuracy of endoscopic ultrasound and computed tomography in determining local/regional spread of gastric cancer: Results of a prospective controlled study. *Gastrointest Endosc* (1991);37:279 (Abstract)
 30. Akahoshi, K, Misawa, T, Fujishima, H, Chinjiwa, Y, Maruoka, A, Ohkubo, A, Nawata, H.: Preoperative evaluation of gastric cancer by endoscopic ultrasound. *Gut* (1991)32;479-482
 31. Tio, TL, Schouwink, MH, Cikot, RJLM, Tygat, GNJ.: Preoperative TNM classification of gastric carcinoma by endosonography in comparison with the pathological TNM system: A prospective study of 72 cases. *Hepato-gastroenterol.* (1989);36:51-56
 32. Sanft, C, Ziegler, K.: Die Bedeutung der Endosonographie für das präoperative Staging des Magenkarzinoms. *Endoskopie heute* (1989);2:30-33
 33. Aibe, T, Fujimara, H, Noguchi, T, Ohtani, T, Nakata, K, Ito, T, Fuji, T, Takemoto, T.: Endosonographic detection and staging of early gastric cancer. In Dancygier, H., M. Classen (eds): 5th International Symposium on Endoscopic Ultrasonography. Demeter Verlag, Munich (Z. Gastroenterol. suppl.) (1989); pp:71-78
 34. Rösch, T, Lorenz, R, Zenker, K, von Wichert, A, Dancygier, H, Siewert, JR, Classen, M.: Local staging and assessment of resectability in carcinoma of esophagus, stomach and duodenum by endoscopic ultrasonography. *Gastrointest. Endosc.* (1992) (in press)
 35. Botet, JF, Lightdale, CJ, Zauber, AG, Gerdes, H, Winawer, S J, Urmacher, C, Brennan, M.F.: Preoperative staging of gastric cancer: Comparison of endoscopic US and dynamic CT. *Radiology* (1991);181: 426-432
 36. Yoshimi, M, Kusuyama, A, Tashiro, H, Mitsumori, N, Nagayama, A, Ando, H, Istubo, K.: EUS approach to the regional lymph nodes in early gastric cancer. Abstracts of the World Congresses of Gastroenterology Sydney 1990, Abingdon: The Medicine Group (UK) (1990) abstr.no. FP 325 (Abstract)
 37. Saito, N, Takeshita, K, Habu, H, Endo, M.: The use of endoscopic ultrasound in determining the depth of cancer invasion in patients with gastric cancer. *Surg. Endosc.* (1991);5: 14-19
 38. Heintz, A, Junginger, T.: Endosonographisches Staging von Karzinomen in Spreiseröhre und Magen. *Bildgebung (Imaging)* (1991); 58: 4-8
 39. Ohashi, S, Nakazawa, S, Yoshino, J.: Endoscopic ultrasonography in the assessment of invasive gastric cancer. *Scand. J. Gastroenterol.* (1989);24:1039-1048
 40. Yasuda, K, Nakajima, M, Cho, E, Kobayashi, M, Kawai, K.: Benign versus malignant gastric ulcers: A role for endoscopic ultrasonography? In Dancygier, H., M. Classen (eds.): 5th International Symposium on Endoscopic Ultrasonography. Demeter Verlag, Munich (Z. Gastroenterol. suppl.) (1989); pp:50-56
 41. Fujino, MA, Morozumi, A, Ikeda, M, Yamamoto, Y, Nakamura, T, Kawai, T, Sato, T, Suzuki, H.: Diagnosis of carcinoma of the major duodenal papilla by endoscopic ultrasonography. *Gastroenterology* 100 (1991);316 (Abstract)
 42. Mukai, H, Cho, E, Yasuda, K, Nakajima, M.: Evaluation of endoscopic ultrasonography in the diagnosis of cancer extension of the papilla of Vater and common bile duct. *Gastrointest. Endosc.* (1990);36: 201 (Abstract)
 43. Rösch, T, Braig, C, Gain, T, Feuerbach, S, Siewert, JR, Schudziarra, V, Classen, M.: Staging of pancreatic and ampullary carcinoma by endoscopic ultrasonography. *Gastroenterology* (1992);102:188-199
 44. Mitake, M, Nakazawa, S, Tsukamoto, Y, Naitoh, Y, Kimoto, E, Hayashi, Y.: Endoscopic ultrasonography in the diagnosis of depth invasion and lymph node metastasis of carcinoma of the papilla of Vater. *J. Ultrasound. Med.* (1990); 9:645-650
 45. Tio, TL, Tytgat, GNJ, Cikot, RJLM, Houthoff, HJ, Sars, PRA.: Ampullopneumatic carcinoma: Preoperative TNM classification with endosonography. *Radiology* (1990);175:455-461
 46. Barkun, AN, Jones, S, Bowie, J, Nickl, N, Affronti, J, Cotton, PB.: The assessment of ampullary tumors by endoscopic ultrasonography. *Gastrointest. Endosc.* (1990);36: 207 (Abstract)
 47. Yasuda, K, Mukai, H, Fujimoto, S, Nakajima, M, Kawai, K.: The diagnosis of pancreatic cancer by endoscopic ultrasonography. *Gastrointest. Endosc.* (1988);34:1-8
 48. Rösch, T, Braig, C, Gain, T, Feuerbach, S, Siewert, JR, Schudziarra, V, Classen, M.: Staging of pancreatic and ampullary carcinoma by endoscopic ultrasonography. *Gastroenterology* (1992);102:188-199
 49. Palazzo, L, Roseau, G, Gayet, B, Vilgrain, V, Belghiti, J, Fekete, F, Paolaggi, JA.: Endoscopic ultrasonography in adenocarcinoma of the pancreas. Results of a prospective study with comparison to ultrasonography and CT scan. *Endoscopy*;1992 (in press)
 50. Sugiyama, S, Asada, M, Fujita, R, Sugata, F.: Endoscopic ultrasonography for the diagnosis of pancreas carcinoma. *Endoscopy* (1988);20:94 (Abstract)
 51. Amouyal, P, Amouyal, G, Mompoin, D, Gayet, B, Palazzo, L, Ponsot, P, Vilgrain, V, Flejou, JF, Paolaggi, JA.: Endosonography: promising method for diagnosis of extrahepatic cholestasis. *Lancet II* (1989);1195-1198
 52. Snady, H, Cooperman, A, Siegel, JH.: Assessment of vascular involvement by pancreatic disease - a comparison of endoscopic ultrasonography to computerized tomography and angiography. *Gastrointest. Endosc.* (1990);36:197 (Abstract)
 53. Beynon, J, McC Mortensen, NJ, Foy, DMA, Channer, JL, Rigby, H, Virjee, J.: Preoperative assessment of mesorectal lymph node involvement in rectal cancer. *Br.J. Surg.*(1989); 76: 276-279
 54. Akasu, T, Sunouchi, K, Sawada, T, Tsioulis, GJ, Muto, T, Morioka, Y.: Preoperative staging of rectal carcinoma: Prospective comparison of transrectal ultrasonography and computed tomography. *Gastroenterology* (1990);98:268 (Abstract)
 55. Beynon, J, McC Mortensen, NJ, Foy, DMA, Channer, JL, Virjee, J, Goddard, P.: Pre-operative assessment of local invasion in rectal cancer: Digital examination, endoluminal sonography or computed tomography? *Br. J. Surg.* (1986);73:1015-1017
 55. Kramann, B, Hildebrandt, U.: Computed tomography versus endosonography in the staging of rectal carcinoma: A comparative study. *Int. J. Colorect. Dis.* (1986);1:216-218
 56. Pappalardo, G, Reggio, D, Frattaroli, FM, Oddi, M, Mascagni, D, Urciuoli, P, Ravo, B.: The value of endoluminal ultrasonog-

raphy and computed tomography in the staging of rectal cancer: A preliminary study. *J. Surg. Oncol.* (1990);43: 219-222

57. Rotte, KH, Klühs, L, Kleinau, H, Kriedemann, E.: Computed tomography and endosonography in the preoperative staging of rectal carcinoma. *Europ. J. Radiol.* (1989); 9:187-190
58. Ruf, G, Kohlberger, E, Räddecke, J, Lausen, M, Wimmer, B, Kirchner, R.: Präoperatives Staging des Rektumcarcinoms: Endosonographie versus Computertomographie. *Langenbecks Arch. Chir.* (1989);374
59. Rifkin, MD, SM Ehrlich, G Marks: Staging of rectal carcinoma: prospective comparison of endorectal US and CT. *Radiology* (1989);170:319-322
60. Waizer, A, Zitron, S, Ben-Baruch, D, Daniel, J, Wolloch, Y, Dintsman, M.: Comparative study for preoperative staging of rectal cancer. *Dis. Colon. Rectum.* (1989);32:53-56
63. Strunk, H, Zocholl, G, Schweden, F, Schild, H, Heintz, A, Braunstein, S.: Hochauflösende Dünnschicht-CT zum präoperativen Staging beim Rektumtumor: Vergleich mit der endoluminalen Sonographie und der Histologie. *Fortschr. Röntgenstr.* (1990);153: 591-594

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