Teaching and learning EUS

Marc Barthet,
Hôpital Nord, Marseille, France

2nd European meeting EGEUS
Turin 14-15 September 2007
Why do we have to develop EUS learning and teaching?

Number of indications of EUS investigations still growing up:
- France 50,000/year 1999
- 113,000/year 2003

Number of articles devoted to EUS:
- 1225 papers (2002-2007)

Lowest number of EUS procedures per year requested for accurate diagnosis:
- 200-250/year

Endoscopy units performing EUS have to be increased
Training programs for EUS have to be increased

_Fusaroli Endoscopy 2002; Ainsworth Endoscopy 2002_
Why do we have to develop EUS learning and teaching?

- Value of EUS directly proportionnal to the training, skill experience of the operator
- Training required: 6 months minimum in a center performing > 300 EUS/year

Ainsworth Endoscopy 2002; Sivak Gastroinest Endosc 2002
Why EUS learning and teaching?

EUS learning curve

• Achieving competence for mucosal or submucosal anomalies: minimum 125 procedures (ASGE guidelines)
• Achieving competence for EUS: minimum 150 EUS supervised proc.
  75 for pancreatico-biliary diseases
  50 for FNA
• American survey:
  115 respondents performed a median number of 200 procedures/year, 40% with an average of 0.4 advanced fellow
  53% thought formal training necessary for a 6 month period and 100 procedures

_Eisen ASGE Gastrointest Endosc 2001; Savides Gastrointest Endosc 2000_
Why EUS learning and teaching?
Impact of EUS training on EUS accuracy

- Short training (2 months) improved FNA accuracy in pancreatic masses from 33% to 91%.
- Significant increase in sensitivity after 30 cases for FNA in pancreatic masses.
- Following a Third-tier training (300 procedures divided in 3 groups over a 3 years period) decrease the median number of passes and the overall complications but not changes in diagnostic accuracy.

*Schlick T Surg Endosc 1999; Harewood Gastrointest Endosc 2002; Mertz H Gastrointest Endosc 2004; Eloubeidi Gastrointest Endosc 2005*
Why EUS learning and teaching?
Impact of EUS training on EUS accuracy

- Training improved accuracy of EUS staging for esophageal cancer for T staging from 64% to 90% but not for N staging.
- Esophageal cancer: Practicing in low volume centers (50 EUS/endoscopist/year) decrease the accuracy for T1T2 stages but not for N stages and T3 stage sensitivity.
- Survey sent to 1400 physicians:
  
  Significant association with higher volume of EUS and higher training volumes.

Schlick T Surg Endosc 1999; Van Vliet EP; GI endosc 2006; Wasan Gastrointest Endosc 2005
Therefore …

- EUS training is required to improve the accuracy of EUS
- The availability for EUS training is weak requiring large centers and long period training

But how to teach and learning EUS?
How to learn EUS?
Spreading of EUS learning

• International survey:
  18% > 6 months dedicated hands-on EUS training
  one third learned to perform EUS

• US survey:
  14% EUS trained during GI fellowship;
  67% during advanced endoscopy fellowship

Das Gastrointest Endosc 2004; Wasan Gastrointest Endosc 2005
How to learn EUS?  
Ways to learn throughout the world

- Portland, Oregon, USA:
  
  One year of intensive training that is a one year of additional training

  Trainees are required to perform 400-500 procedures and to learn all aspects of diagnostic and therapeutic EUS

- Germany:

  Regional working groups suggested trainees to carry out at least 200 procedures, 150 out of them being done primarily by the trainees

*Faigel Endoscopy 2006; Rösch Endoscopy 2006*
How to learn EUS?
Ways to learn throughout the world

- **University of Alabama, USA:**
  Third-tier year (4th year after a 3-year GI fellowship program)
  Trainees required to perform at least 150 procedures; thought to be comfortable with at least 1000 procedures

- **Asia-Pacific region:** mail survey to 87 EUS performers
  49% were self-taught; 22% formal fellowship > 6 months
  56% involved in EUS teaching; thought a minimum number of 100 supervised EUS required

*Eloubeidi GI endoscopy 2007; Ho KY J Gastroenterol Hepatol 2006*
How to teach EUS?
Educationnal tools for EUS hands-on

- Theoretical courses for diagnostic and therapeutic aspects of EUS are previously required
- Available models:
  - EUS-guided FNA box,
  - EUS mentor (computer-based simulator),
  - EUS RK model,
  - live pigs

Matsuda K Endoscopy 2006
How to teach EUS?
Assessment of different simulators for EUS hands-on

- EUS-guided FNA box, EUS mentor (computer-based simulator), EUS RK model, live pigs were recently assessed by 8 experts.
- Scores for realism and ordered ranking were provided.
- Live pig: highest score for pancreatic anatomy, scope manipulation, FNA.
- EUS mentor: highest score teaching EUS alone, anatomy of mediastinum.

Matsuda K Endoscopy 2006
How to teach EUS?
Assessment of different simulators for EUS hands-on

• Live pig:
  highest score for overall simulation realism and for utility as an educational tool
  not easy to use in training program

• EUS mentor: in association with swine pig

• Conclusion: live pig recommended by experts but diffusion is difficult because of ethical considerations, costs, need for accredited laboratory

Matsuda K Endoscopy 2006
How to teach EUS?
Assessment of live pig model for EUS hands-on

• Live pig: survey after training program in 1997 and 2000
  1997: 95% thought the overall course useful
  85% valued the hands-on portion
  2000: 90% thought the course enhanced EUS skills

• Live animal model is a useful adjunctive method for learning EUS skills
Teaching interventional EUS on animal model (pig)

- One day session, sub group of < 6 fellows
- Faculty laboratory (experimental surgical room)

approval of the ethical committee (animal laboratory investigation)

*Bhutani Gastrointest Endosc 2000; Matsuda Endoscopy 2004; Barthet Endoscopy 2007*
Teaching interventionnal EUS on animal model (pig)

- Session program:
  To follow anatomical structures: mesenteric and portal vein, vena cava, mesenteric artery and celiac tree, pancreatic gland, bile duct
  To perform FNA on lymph nodes in the liver hilum
  To perform celiac neurolysis
  To perform cyst drainage
- Evaluation: pre and post test

Following SMV, PV SV

Significant improvement:

- **SMV**: 1.1 vs 1.94; \( p = 0.01 \)
- **VC**: 1.1 vs 1.7; \( p = 0.003 \)
- **SMA, CT**: 0.8 vs 1.8; \( p = 0.008 \)
- **pancreas**: 0.7 vs 1.8; \( p = 0.001 \)
- **bile duct**: 1 vs 1.5; \( p = 0.04 \)
Lymph node FNA

Significant improvement pre/post test:

- % of technical error: 29% vs 6% ; NS
- Time: 84 s vs 60 s; p=0.01
- Precision: 4.2 vs 1.8 mm; p=0.009
Celiac neurolysis

Significant improvement pre/post test:

% of technical error: 6% vs 6% ; NS

Time: 150 s vs 84 s; p=0.003

Precision: 4.2 vs 2.8 mm; NS
EUS pseudocyst drainage
How to teach EUS?  
The French experience

• What is the number of EUS practionners?

  - Number of center/ EUS practitioners
    215

  => 355 EUS practitioners

Thus 11% of the 3159 french gastroenterologists

French EUS club investigation 2004
EUS credentialing in France

Which credentialing?
- 36%: Faculty qualification
- 63%: No qualification of a licensed practitioner

When did they learn EUS?
- 33%: During the GI fellowship
- 66%: During their professional activity

Godchaux JM and the French Club of EUS 2004
Characteristics of the first EUS course

- Started in 1993
- To give practical and theoretical EUS procedural data for providing good images and accurate EUS diagnosis
- About 20-30 students each year
- The duration of the formation was 2 years:
  - 4 weeks of theoretical teaching
  - 20 one-day sessions/year for practicing with an EUS experiment teacher and to realize an EUS clinical study
Credential Evaluation in 2000

- Over the years 1995-1999; 57 respondents over 147 questionnaires

- 2/3 had done EUS before the diploma
- More useful for the trainee:
  Theoretical courses, videosession, clinical practice
- Would want: simulator, video library
- 91% would recommend the diploma
Credential evaluation in 2000

- Evaluation of EUS activity after diploma:
  - 22% → no activity or < 5 procedures / month
    Main reasons: economic (too expensive) or insufficient number of indications
  - 23% → between 5 and 10 procedures / month
  - 55% → > 10 procedures / month
New EUS course since 2005

• Aim: practical and theoretical learning of EUS anatomy
  pathology
clinical / radiological features of digestive diseases
oncological classifications
practical stages and learning with Simbionix simulator model and animal model (pig)
For Who?

- Devoted to qualified gastroenterologists:
  at least two years after GI standard fellowship
  with EUS equipment available
  speaking/understanding French (people: Canadian, Belgium, Romania, Morocco, Tunisian...)
Who are the teachers?

- Gastroenterologists well-known for their competence, interest, experience in the field of EUS
- Pathologists
- Anatomists, surgeons, radiologists
Teaching organisation

• 3 weeks of theoretical formation emphasizing the role of EUS images (DVD, videotape…)
• 1 week of practical learning with virtual model (symbionix simulator model, live animal model (interventional EUS), hands-on EUS training
• Participation to the French annual congress of EUS
• Participation to live demonstration of EUS
Conclusion

- Training improved the EUS accuracy and skill of EUS performer
- Only one third of the EUS practitioners got a university credentialing
- University diploma is required to standardize EUS procedures and increase the EUS accuracy
- What about an EUS European teaching course?
- Benign and malignant disease
- Submucosal and mucosal tumor of the digestive wall
- Pancreatic and biliary disease (chronic and acute pancreatitis, biliary lithiasis, cholangitis, tumor)
- Non neoplastic ano-rectal diseases: incontinence and constipation, perianal abscesses and fistulas
- Future of EUS: 3D, high frequencies, therapeutic EUS