Training in Interventional Endoscopy
- Where are we and where should we head to?

Juergen Hochberger

Hôpitaux Universitaires de Strasbourg - NHC, IRCAD, IHU
STRASBOURG
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Strasbourg, Hilton Hotel, May 10th 2013

Training in Interventional Endoscopy - Where are we and where should we head to?

Juergen Hochberger

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STRASBOURG
Endoscopic Learning Pyramid in 2013

**Learning Progress**
- Clinical Experience
- Manual Skills

**Special Interventional Techniques**
- ESD, complex ERCP
- PTCD, transgastric EUS
- Enteral stents, capEMR

**Advanced Interventional Techniques I**
- Band & Snare EMR, Pancreatic ERCP, EUS drainages, cholangioscopy, perfor. closure

**Advanced Interventional Techniques II**
- Needle knife EST, mechanical lithotripsy, biliary dilatation, metal stents, perforation closure

**Emergency Hemostasis & Basic ERCP**
- ERCP cannulation & drainages, EST, endoscopy, laparoscopy

**Polypectomy + Basic EMR, Hemostasis, diag. EUS**
- Under supervision: bouginage, balloon dilatation of GI stenoses, APC

**Diagnostic EGD & Colonoscopy, recto-proctoscopy, PEG**

**Experimental Endoscopic Research**
- New Techniques & Instruments

Hochberger J et al 2000-2013

Endoscopic Anatomy & Path.
Endoscopic Learning Pyramid in 2013

**SPECIAL INTERVENTIONAL TECHNIQUES**
- ESD, complex ERCP
- PTCD, transgastric EUS
- Enteral stents, capEMR

**ADVANCED INTERVENTIONAL TECHNIQUES I**
- Needle knife EST, mechanical lithotripsy
- Biliary dilatation, metal stents, perforation closure

**ADVANCED INTERVENTIONAL TECHNIQUES II**
- Band & Snare EMR, Pancreatic ERCP
- EUS drainages, cholangioscopy, perfor. closure

**EMERGENCY HEMOSTASIS & BASIC ERCP**
- ERCP cannulation & drainages, EST, enteroscopy, laparoscopy

**POLYPECTOMY & BASIC EMR, HEMOSTASIS**
- Under supervision: bouginage, balloon dilatation of GI stenoses, APC

**EXPERIMENTAL ENDOSCOPIC RESEARCH**
- New Techniques & Instruments

**ASSISTANCE IN EGD, COLONOSCOPY, PEG**
- Study of GI ANATOMY & PATH.

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**Current Clinical Situation**

- Life threatening situations
- No realistic training option for the beginner
- Try it for the first time during night when the consultant is not there?
How to train interventional gastroenterologists?

Current Clinical Situation

- EMERGENCIES
  - Life threatening situations
  - No realistic training option for beginners
  - Try it for the first time during night when the consultant is not there?

- New Instruments
  - No possibility to get a feeling in a close-to-reality environment
  - outside the patient
  - using a proper endoscope
  - No systematic education for new devices obligatory so far
**ESD pour AdenoCa sur EBO**

_Hochberger 2010_

How to train interventional gastroenterologists?

**Current Clinical Situation**
ESD oesophage 22 cm – Cancer épidermoide + HGIN mf.

How to train interventional gastroenterologists?

Current Clinical Situation

- EMERGENCIES
  - Life threatening situation
- New Instruments
  - No possibility to get a feeling in a close-to-reality

Complication Training
- Master teach beginner!
How to train interventional gastroenterologists?

Complication Management

Candidates for interventional GI endoscopy training

1. Trainees at levels II and III of UEMS
2. Postgraduate teaching and training of private and hospital gastro-enterologists
3. Experts searching access to new techniques
Interventional EUS

New Way: EUS Guided Biliary Access

- Sector scan
- Therapeutic Channel (3,7 - 3,8 mm)
- Elevator (Albarran)

z.B. Fujinon EG-530UT
Hitachi/Pentax 3830-UT
Olympus GF-UCT160-AT8, GF-UCT160P-OL5

Interventional EUS

EUS Guided Biliary Drainage
What needs to be taught?

1. The technique itself
2. Indication and contraindication, findings, outcomes, alternatives
3. Environment (preparation of the patient, anesthesia, hygiene, handling of specimen etc.)
4. Materials (accessories)
5. Management of complications
OTSC 'Bear Trap'

Over-The-Scope-Clipping system for
Organ wall closure
in the gastrointestinal tract.
How to teach interventional endoscopy?

1. Current tools

2. Future concepts

Training in Endoscopy
Recommendations of Scientific Societies

<table>
<thead>
<tr>
<th>Organisation</th>
<th>ÖGD</th>
<th>Coloscopie ERCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Society for Gastrointestinal Endoscopy</td>
<td>100</td>
<td>100</td>
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<tr>
<td>British Society for Gastroenterology</td>
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<td>100</td>
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<tr>
<td>Conjoint Committee for Recognition of Training in Gastrointestinal Endoscopy (Australia)</td>
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<td>100</td>
</tr>
<tr>
<td>European Diploma of Gastroenterology</td>
<td>300</td>
<td>100</td>
</tr>
</tbody>
</table>

mod. nach Hochberger et al. in Tylgat Classen, Ligldale 2010
Overall Motor and Cognitive Skill Curves

Number of Procedures Performed

Average MCSAT Score

Overall Motor Score

Overall Cognitive Score

Training ERCP – Learning Curves
Simulation und Training
1929 Flight Simulation Link-Trainer


What are the current tools?

Limoges - September 2001 to June 2002
How to train interventional gastroenterologists?

**Plastic Phantoms**

**Erlangen Plastic Phantom of Classen and Ruppin (1974) etc.**

**Plus**
- useful for first steps in handling an endoscope
- Ø useful for first steps in handling an endoscope
- Ø rigidity
- Ø no realistic environment
- Ø no natural wall structure
- Ø no mucosa to lift or treat, no interventions

**Minus**
- Ø realistic for complex interventions
- Ø too simple ?!

---

**Computer Simulators**

**PLUS (+++)**
- external scope movements
  => a virtual reality
- training of hand-brain-coordination
- various grades of difficulty
- ++ for the beginner

**MINUS (--)**
- unrealistic for complex interventions

Basic prospective rand. studies

- Simulators are capable to discriminate different levels of training for colonoscopy and sigmoidoscopy (beginners vs. experts)
- Intensive training increases skills of the beginner in the simulator

Influence on Clinical education

- training in the simulator enhances learning curve in colonoscopy
- reduces pain and discomfort in the patient if used even for sigmoidoscopy training


**Cohen J, S. Cohen, NYSGE StGr et al: Randomized controlled trial of virtual reality simulator training in acquisition of competency in colonoscopy. DDW 2003. S1492**

**Ahmad A et al: Endoscopic simulator enhances training of coloscopy in a randomized prospective blinded trial. DDW 2003. S1499**

Overall Motor and Cognitive Skill Curves

Mayo Colonoscopy Skills Assessment Tool (MCSAT)

- Time (Start, Cecum, Stop)
- 14 Survey Items:
  - Core Motor Skills
    - Scope Advancement
    - Mucosal Visualization
    - Cecal Intubation
    - Loop Reduction
    - Therapy Application
    - Depth of Intubation
  - Core Cognitive skills
    - Indication
    - Pain Management
    - Sedation
    - Landmark Recognition
    - Pathology Identification
    - Tool Selection
  - Overall Motor and Cognitive competence
Computer-Simulatoren - Stellenwert

Vorteile u.a.
- Multimediale Übungsbibliothek hinterlegbar
- Lernkurven abrufbar

3-D Simulation with anatomic reference
EUS meets VOXEL-MAN
Burmester 2007
How to train interventional endoscopists?

Animal Courses

**Plus**
- similar structure of the Gut
- perfused tissue with natural elasticity and mucosa especially for ERCP- and EMR-training

**Minus**
- Limited special training facilities (surgical institutes etc.)
- Ethical concerns
- ‘Dirty stomachs’, long snout and long endoscope way for ERC
- Bleedings not reproducible for emergency endoscopy training

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Tierpräparate – EASIE Modell

- Realitätsnähe des Gewebes
- zahlreiche Techniken
- durch Verwendung gefrorener Präparate für Kurse gut handhabbar
How to train interventional endoscopists?

EASIE Erlangen Active training Simulator for Interventional Endoscopy

EASIE for Educating Fellows

EASIE-Pilot-Project

J. Hochberger, J. Cohen, K. Matthes
J. Maiss, E.G. Hahn
NYSGE Study Group

Department of Medicine I
(Chairman Prof. E.G. Hahn)
Friedrich-Alexander-University of ERLANGEN
Germany
## How to train interventional endoscopists?

### EASIE Project - NYSGE Study Group

<table>
<thead>
<tr>
<th>Tutors</th>
<th>Hospitals</th>
<th>Fellows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jonathan Cohen, M.D.</td>
<td>NYU Bellevue Hospital</td>
<td>5</td>
</tr>
<tr>
<td>Gerry Villanueva, M.D.</td>
<td>Montefiore Hospital</td>
<td>4</td>
</tr>
<tr>
<td>David Greenwald, M.D.</td>
<td>Beth Israel Hospital</td>
<td>3</td>
</tr>
<tr>
<td>Seth Cohen, M.D.</td>
<td></td>
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<tr>
<td>Franklin Kasmin, M.D.</td>
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<tr>
<td>Peter Stevens, M.D.</td>
<td>Columbia University Hospital</td>
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<tr>
<td>Ellen Scherl, M.D.</td>
<td>Mount Sinai Hospital</td>
<td>1</td>
</tr>
<tr>
<td>David Jaffe, M.D.</td>
<td></td>
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<tr>
<td>Maurice Cerulli, M.D.</td>
<td>Brooklyn Hospital</td>
<td>4</td>
</tr>
<tr>
<td>Edmund Bini, M.D.</td>
<td>Manhattan VA Hospital</td>
<td></td>
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<tr>
<td>Hans Gerdes, M.D.</td>
<td>Memorial Sloan Hospital</td>
<td>2</td>
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</table>

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### How to train interventional endoscopists?

**EASIE Project - New York 2001**

Montefiore Medical Center, NY
**How to train interventional endoscopists?**

**EASIE NY - Project Outline**

- First evaluation (group A & B)
- Intermediate evaluation (group B)
- Final evaluation (group A & B)

**Evaluated Techniques**

- **Manual Skills**
- **Ulcer Bleeding**
  - Injection
  - Bipolar Electrocoagulation
  - Hemoclip-Application
- **Variceal Multiple Band Ligation**


EASIE-Pilot-Project - M & Methods

1) Manual Skills

✓ Technique

Coagulation 1

2cm

Coagulation 2

Coagulation 4

Coagulation 3

HEMOSTASIS TECHNIQUE

INITIAL Evaluation | FINAL Evaluation | Significance (p)

"MANUAL SKILLS*" | Median** | Median** | 0.065
Overall Performance* | (4.0 – 6.0)* | (7.0 – 8.0)* |

"INJECTION & ELECTROCOAGULATION*" | Median** | Median** | 0.168
Overall Performance* | (4.0 – 6.0)* | (5.0 – 7.6)* |

"HEMOCCLIP APPLICATION*" | Median** | Median** | 0.109
Overall Performance* | (1.0 – 1.0)* | (1.0 – 2.2)* |

"VARICEAL BAND LIGATION*" | Median** | Median** | 0.025
Overall Performance* | (1.0 – 7.0)* | (6.0 – 9.3)* |

*ordinal log scale: 1=worst 10=best performance  **median and interquartile distance

### EASIE Pilot Project

**Intensive Group - Blinded**

#### Results

<table>
<thead>
<tr>
<th>HEMOSTASIS TECHNIQUE</th>
<th>Median** EVALUATION</th>
<th>Median** EVALUATION</th>
<th>Significance (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUAL SKILLS</strong></td>
<td>4.5 (3.0 – 6.0)*</td>
<td>8.0 (7.0 – 9.0)*</td>
<td>0.004</td>
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<tr>
<td>Overall Performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**INJECTION &amp; ELECTRO-</td>
<td>4.3 (3.8 – 5.2)*</td>
<td>7.0 (6.6 – 7.7)*</td>
<td>0.002</td>
</tr>
<tr>
<td>COAGULATION**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Overall Performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HEMOCLIP APPLICATION</strong></td>
<td>1.0 (1.0 – 1.0)*</td>
<td>7.6 (6.0 – 8.4)*</td>
<td>0.001</td>
</tr>
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<td></td>
<td></td>
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<tr>
<td><strong>VARICEAL BAND LIGATION</strong></td>
<td>1.0 (1.0 – 1.0)*</td>
<td>8.3 (7.9 – 8.8)*</td>
<td>0.002</td>
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<td>Overall Performance</td>
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*ordinal log scale: 1=worst 10=best performance **median and interquartile range

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**How to train interventional endoscopists?**

**EASIE Pilot Project NY - Hemoclip**

![Graph showing performance scores](image)

1013 1013 1414

EASIE NY - Final evaluation, April 28/29th, 2001

EASIE France - Ligature de Varices -

EASIE France - Hemoclip -


EASIE France - Injection & Sonde bipolare

National EASIE - Training-Project
France 09-2001 bis 06-2002


What needs to be taught?

1. The technique itself
2. Indication and contraindication, outcomes, alternatives
3. Environment (preparation of the patient, anesthesia, hygiene, handling of specimen etc.)
4. Materials (accessories)
5. Management of complications
Practical Training – Dental Medicine

- Practical training from the 1st year on aside theoretical education
- Practical exam part of board exam (‘practical week’)

Qualification in endoscopy in analogy?

Training

Menke 2005
EASIE 'Team Training Concept'

EASIE Team-Training usually
- 3 physicians
  - 3 nurses
- per workstation
- per day

Simulation Center in the Hospital

MAYO CLINIC
Simulation Center in the Hospital
Simulation Center in the Hospital

ENDOSCOPIC LEARNING PYRAMID IN 2013

Learning Progress
Clinical Experience
Manual Skills

EXPERIMENTAL ENDOSCOPIC RESEARCH
New Techniques & Instruments

EASIE (-R) + Animal Lab
EASIE (-R)

ERCP cannulation & drainage, EST, enteroscopy, laparoscopy?

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POLYPECTOMY + BASIC EMR, HEMOSTASIS, diag. EUS

Under supervision: bouginage, balloon dilatation of GI stenoses, APC

Diagnosis EGD & COLONOSCOPY, recto-proctoscopy, PEG

ASSISTANCE IN EGD, COLONOSCOPY, PEG; Study of GI ANAT & PATH.

Hochberger J et al. 2000-2013

EASIE (-R) + Animal Lab

- EASIE (-R)
- EUS
- Computer

Computer
Simulator
PlasticPhantom
EASIE (-R)
University Hospital of Strasbourg and ....

Nouvel Hôpital Civil de l’Université de Strasbourg
Dans le coeur de l’Alsace

IRCAD Institute
How to train interventional endoscopists?

EASIE ESD-Training
Rektum-ESD 16 x 13 cm - fokal HG-IEN

Rektum-ESD 16 x 13 cm
Merci!