

The future of surgery: The „*Natural Orifice Surgery*“ Concept

The New European Surgical Academy

19th Century

First successful laparotomy performed longitudinally



Ephraim McDowell 1771 - 1830

First transverse laparotomy



Johannes Pfannenstiel 1862-1909

ABDOMINAL WOUND DEHISCENCE (vertical vs. Pfannenstiel)

| | Vertical | Transverse |
|------------|----------|------------|
| No. | 1635 | 540 |
| Dehiscence | 48 | 2 |
| Rate | 2,94 % | 0,37 % |

Mowat J, Bonnar J. Br Med J 1971; 2 (756): 256-257

Endoscopy



Georg Kelling
1866-1945



Kurt Semm
1927-2003

Quo vademus?



NOS

The use of natural openings to
perform surgical procedures



Peritoneoscopy and liver biopsy were performed via a transgastric pathway.

Kaloo AN et al: Flexible transgastric peritoneoscopy: a novel approach to diagnostic and therapeutic interventions in the peritoneal cavity.
Gastrointest Endosc 2004; 60 (1): 114-7

In 9 female animals, transgastric operations were performed.

In 6 cases, oophorectomy and partial hysterectomy was performed.

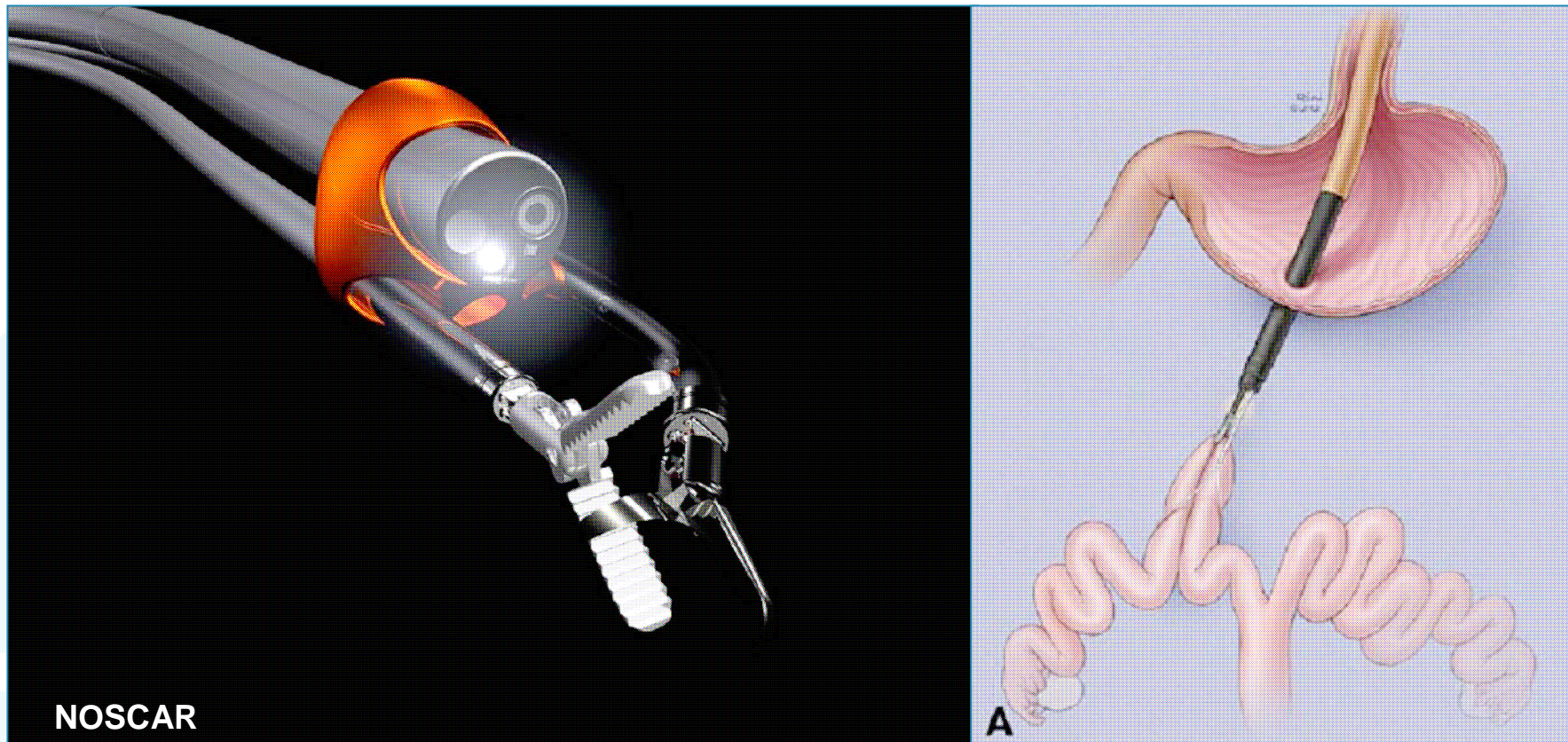
Wagh MS et al: Endoscopic transgastric abdominal exploration and organ resection: Initial experience in a porcine model.
Clin Gastroenterol Hepatol 2005; 3 (9): 892-6

Instruments used:

single and double channel gastroendoscopes (GIF Q 140 and GIF 2T 100, Olympus), re-usable endoscopic forceps, esophageal overtube, snares, endoloops (Olympus), dilatation balloons (microinvasive CRE balloon, Boston Scientific / Microinvasive, Natrick, MA), needle knives (Huibregtse RAMP needle-knife, Wilson-Cook Winston-Salem, NC), endoclips (Olympus)



Conventional instruments, adapted to NOS



Transoral-transgastric - Experimental

Jagannath SB et al. [Ligation of fallopian tubes](#)

Gastrointest Endosc 2005; 61: 449-453

Kantsevov SV et al. [Gastro-entero-anastomosis](#)

Gastrointest Endosc 2005; 62: 287-292

Kantsevov SV et al. [Splenectomy](#)

Surg Endosc 2006; 20: 522-525

Transoral-transgastric

Park PO et al. Cholecystectomy and cholecysto-gastrostomy

Gastrointest Endosc 2005; 61: 601-606, experimental

Venkat Rao (Hyderabad, India) Transoral-transgastric appendicectomy

Not published, human application

Lee Swanstrom (Oregon, USA) Transoral-transgastric cholecystectomy

July, 2007 (+3 Trocars!), not published, human application

N.O.T.E.S

VS.

N.O.S



„The term difference is not accidental. “T” in NOTES stands for transluminal. NOS includes NOTES because it refers to *all* surgical procedures performed through natural openings, such as the mouth, nose, urethra, and vagina.“

Stark M, Benhidjeb T. Transcolonic endoscopic cholecystectomy: a NOTES survival study in a porcine model. In: Gastrointest Endosc. 2007 Jul;66(1):208-9.

The Transdouglass Surgical Approach



First successful performance of incidental vaginal appendectomy at the time of vaginal hysterectomy

Bueno B. Primer caso de apendicetomia por via vaginal. Tokoginecol
Pract (Madrid) 1949; 8: 152-154

8 cases of incidental vaginal appendectomy following vaginal hysterectomy.

McGowan L. Incidental appendectomy during vaginal surgery. Am J Obstet Gynecol. 1966; 95 (4): 588

The Douglas pouch was used to extract a gallbladder removed endoscopically.

Delvaux G, Devroey P, De Waele B, Willems G. Transvaginal removal of gallbladders with large stones after laparoscopic cholecystectomy. Surg Laparosc Endosc. 1993; 3 (4): 307-9

NOS – Human application

Marc Bessler (New York, USA)

→ Transvaginal cholecystectomy, March 2007 (+3 Trocars!)

Jacques Marescaux (Strasbourg, France)

→ Transvaginal cholecystectomy, April 2007 (+1 Trocar!)

What are the challenges to realise Transdouglass Operations?



- Develop adapted instruments and revise operative methods
- Re-learn anatomy
- Develop patient biosimulation software for training and development
- Gain surgical experience

The Transdouglass Endoscopical Device



The **TED** is a multichannel, flexible endoscope. It can be S- or U-shape.

The **S-shape** TED is adapted to the pelvic anatomy and designed to perform all upper abdominal operations.

The **U-shape** TED allows to perform all operations in the pelvis.

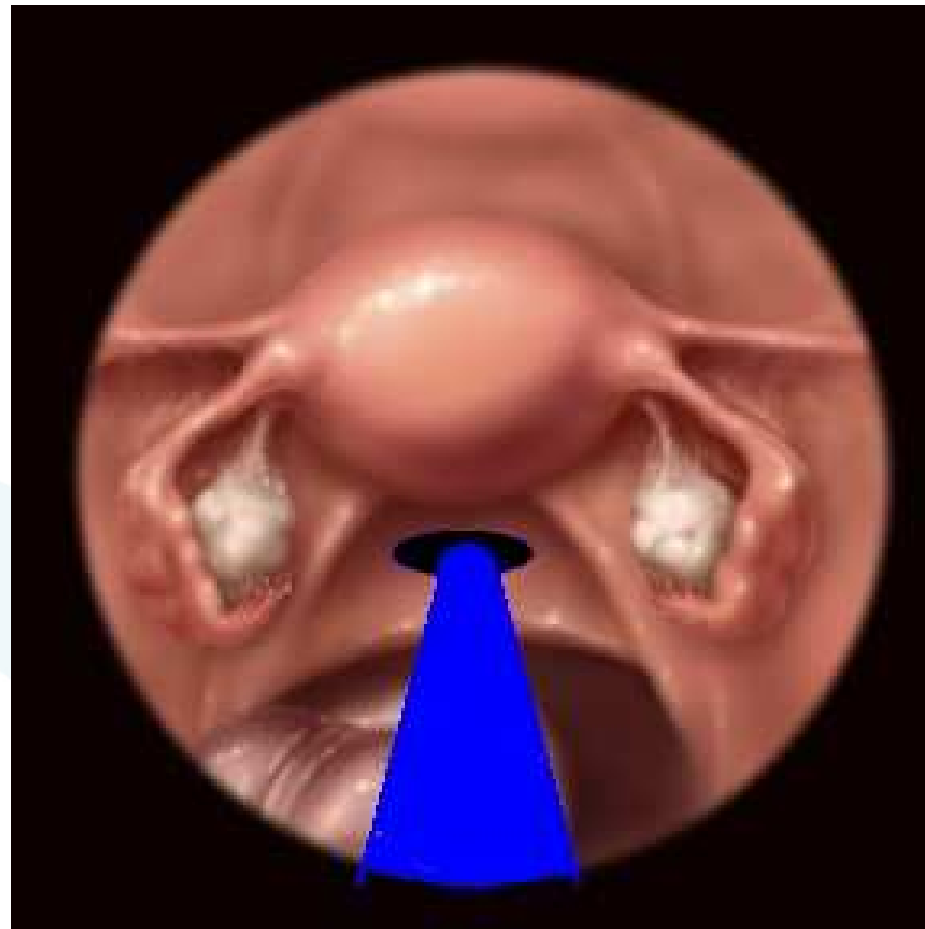
**A short introduction of
Trans-Douglas Endoscopical Surgical Device (TED)**

by Prof. h.c. Dr. Michael Stark



First European working group on Natural Orifice Surgery

View of the pelvic organs through the U-shape TED



Intraoperative


- Introduction of instruments under vision and parallel rather than perpendicular to major blood vessels
- Lower CO₂ pressure needed, peridural anesthesia possible
- Improved ergonomics (one-man [woman] show)
- Single entry procedures

Postoperative

- No risk for herniation or eventration
- Lower risk for wound infection and adhesions
- Less pain
- Early mobility
- No scar
- Very short hospital stay

As surgical procedures are to be performed through a „gynecological pathway“, **interdisciplinarity** is the key to realise successful NOS operations.

The interdisciplinary NOS working group of the NESA



Members of the working group



General surgery

Eckhard Bärlehner, Tahar Benhidjeb, *Germany*;
Moshe Zvi Papa, *Israel*; Sebastian Roka, *Austria*,
Svend Schulze, *Denmark*; Kai Witzel, *Austria*

Urology

Jacques Corcos, Harold Drutz, *Canada*

Gynecology

Ciro Luise, *Italy*; Farr Nezhat, *USA*; Liselotte Mettler,
Irmgard Posch, Marc Possover, Achim Schneider,
Michael Stark, *Germany*; Antoine Watrelot, *France*

Anaesthesiology

Peter Biro, *Switzerland*; Gerald Burgard, Jochen Strauss, *Germany*

Pharmacology

Petra Thuermann, *Germany*

Physiology

Peter Reeh, *Germany*

Scientific Counsellors

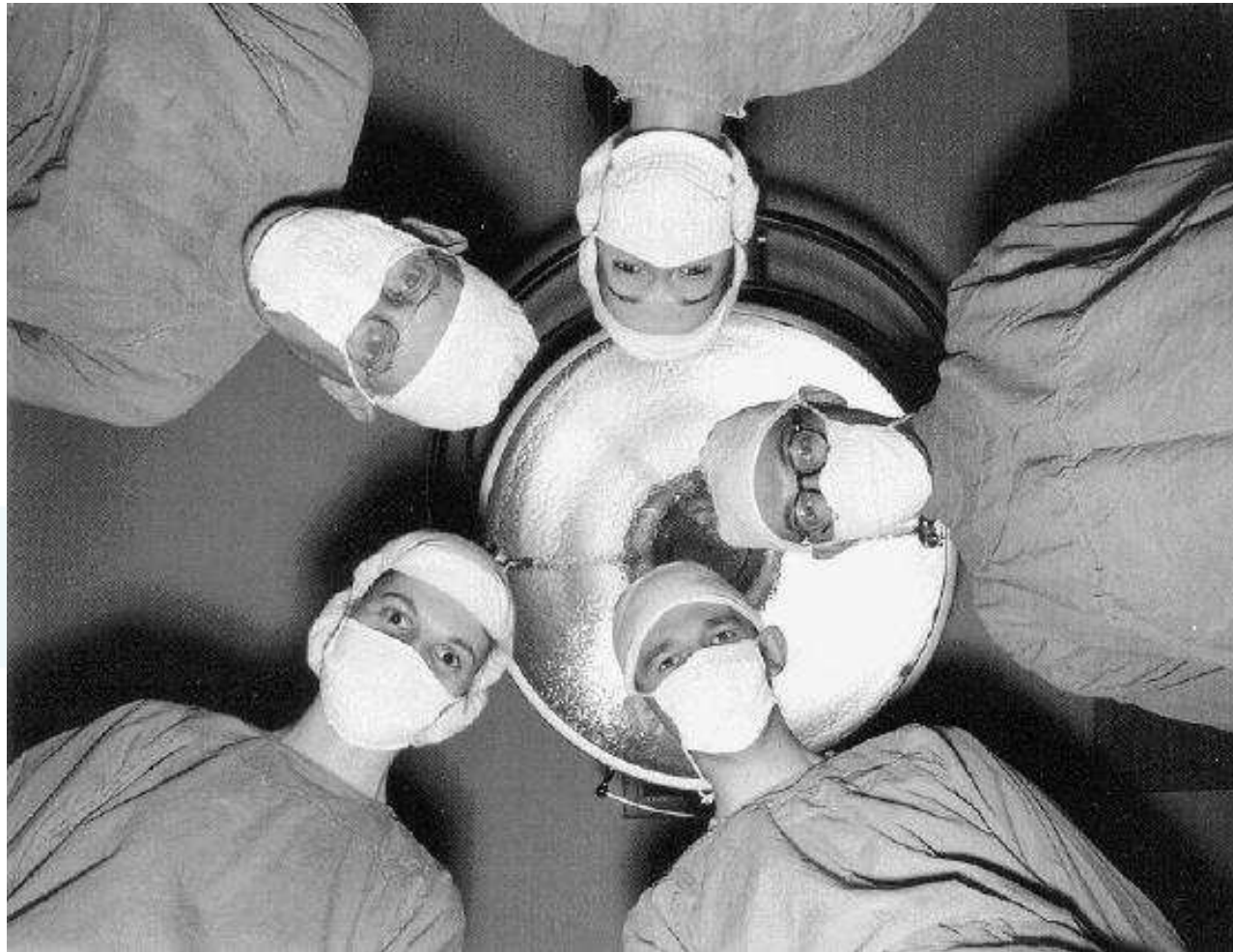
Parwis Fotuhi, Joachim Linke, Manfred Ottow, *Germany*

In Dec. 2006, the NESA and the Society of Laparoendoscopic Surgeons (SLS) signed an agreement to cooperate in clinical studies concerning NOS.

- **NOS interdisciplinary team working in designed surgical departments based mainly on day care basis or short hospital stay**
- **NOS training programmes using biosimulators, certifying surgeons prior to actual operation**
- **Reduction of absence from work, thus minimizing economic costs.**



Occam's razor (ca. 1285-1349)
Lex parsimoniae



Thanks for your attention.