NOTES
Natural Orifices Transluminal Endoscopic Surgery
DEFINITION

NOTES is scar less abdominal surgery with an endoscope passed through a natural orifice (MOUTH, URETHRA, ANUS, VAGINA) then through an internal incision in the stomach, vagina, bladder or colon, thus avoiding any external incisions or scars.
1901 – Dmitri Ott from St. Petersburg from Russia called Ventroscopy. He used transvaginal inspection of the peritoneal cavity.
HISTORY

NOTES was originally described in animals by researchers at Johns Hopkins University by Dr. Anthony Kalloo and on human by Dr. G.V. Rao and Dr. N. Reddy

June 20th 2007
ACCEPTANCE IN INDIA

Famous bollywood actress SHILPA SHETTY and South Indian actress KHUSBOO undergone Transgastric Appendicectomy
VISION


**NOTES as the possible convergence of laparoscopic surgery and therapeutic endoscopy**
INSTRUMENT
MINIMALLY INVASIVE SURGERY: NOTES

World Laparoscopy Hospital
INTERNAL INCISION
**POTENTIAL BENEFITS**

- Postoperative abdominal wall pain ↓↓↓↓
- Wound infections ↓↓↓
- Adhesions ↓↓↓
- No hernias
- Possibly non-impaired immune function ↓↓↓↓
- ‘Scarless’ surgery
- Morbidly obese patients (?)
- High risk patients (?)
SCAR COMPARISON
POTENTIAL BARRIERS

- Access to peritoneal cavity
- Gastric (intestinal) closure
- Prevention of infection
- Development of suturing device
- Development of anastomotic (nonsuturing) device
- Development of a multitasking platform to accomplish procedures
- Control of intraperitoneal hemorrhage
- Management of iatrogenic intraperitoneal complications
- Physiologic untoward events
- Compression syndromes
- Training other providers
NOTES: TRANSVAGINAL APPENDECTOMY

Sergey Baido MD, PhD, Personal communications
NOTES: TRANSVAGINAL APPENDECTOMY
NEEDLE-SCOPE VIEW
SILS VERSUS NOTES

NOTES is Dying, SILS is progressing due to high patient Acceptance.
Access to the peritoneal cavity through the incision of the gastric wall.
PROCEDURE
NOTES/ TEM

- Natural Orifice Translumenal Endoscopic Surgery (NOTES)
  - Use of flexible endoscopy to perform surgery through natural orifices (rectum, vagina, stomach)

- Transanal Endoscopic Microsurgery (TEM)
  - First attempt at minimally invasive surgery through, and in, a natural orifice
  - Use laparoscopic instruments through a rigid operating proctoscope
TEM

- Developed by Professor Gerhard Buess
  From Tuebingen, Germany
- Became available for widespread use in 1983
- One of the first methods of endoluminal surgery
- Uses the view of a proctoscope and the instruments of laparoscopy

Professor Gerhard Buess
USE OF TEM

- For minimally invasive excision
  - Large endoscopically irretrievable rectal polyps and T1 rectal cancers; some extended used for more advanced disease

- More precise than traditional transanal excision
  - More likely to get clean margins with less manipulation of the mass

- Avoids abdominal incision
INDICATIONS OF TEM

- **Benign**
  - Rectal polyps
  - Carcinoid tumors
  - Retrorectal masses
  - Anastomotic strictures
  - Extrasphincteric fistulae
  - Pelvic abscesses

- **Malignant**
  - Malignant rectal polyps
  - T\textsubscript{1}-T\textsubscript{2} rectal cancer
  - Palliative excision of T\textsubscript{3} cancer

PREOPERATIVE EVALUATION OF TEM

- Full colonoscopy
  - Rule out synchronous lesions

- Rigid proctoscopy
  - Determine level and position of lesion

- Endorectal ultrasound
  - Confirm stage of lesion/depth of penetration
  - Confirm uT₀ or uT₁ status
    - If uT₂ or uT₃ should do definitive surgery if patient a candidate
    - TEM is not generally used to treat N₁ disease
PATIENT POSITIONING IN TEM

- Position of lesion determines positioning of patient on the operating room table
- The lesion should be made to be in the 6 o’clock position for the operator
PATIENT POSITIONING IN

Lesion at right lateral position

World Laparoscopy Hospital
EQUIPMENTs USED IN TEM

- Rigid proctoscope
- Operating instruments
- Stereoscope
- Insufflator-suction device

- Setup available by Wolf Surgical Instruments Co. (Vernon Hills, IL, USA) or Karl Storz GmbH & Co. (Tuttlingen, Germany)
PROCTOSCOPE USED IN TEM

40 mm operating proctoscope

World Laparoscopy Hospital
OPERATING INSTRUMENTS IN TEM

- Angle of instruments key in manipulation of tissues with limited range of motion
- Graspers, suction, electrocautery, needle-holders, etc.

World Laparoscopy Hospital
STEREOSCOPE USED IN TEM

- Provides binocular vision
- Microscope – magnifies 6x
STEREOSCOPE
VISUALIZATION WITH TEM
INSUFFLATOR-SUCTION DEVICE USED IN TEM

- Maintains continuous pressure by constantly insufflating CO₂ into the rectum and suctioning CO₂ out – maximizes operating field
TEM: POSITIONING
TEM: MARKING
TEM: EXCISION
TEM: CLOSURE
TEM RESULTS

- Professor Buess published early results in 1987
  - 75 patients
  - 3 experienced complications in short-term follow-up
  - 1 with recurrence requiring salvage surgery

TEM RESULTS

- Later series by Buess in 1994
  - 265 patients; 1989-1993
  - 190 adenomas; 75 rectal cancers
  - 14 month follow-up in >90% patients

- Average OR time - 92 minutes
  - Mucosectomy - 62 minutes
  - Partial wall excision - 77 minutes
  - Full thickness excision - 96 minutes
  - Segment resection - 163 minutes
TEM: FOR RECTAL TUMORS

- Complications
  - Perforation of intraperitoneal rectal wall – unable to close using TEM in 3.9%
    - Required LAR (2 patients) or diversion (1 patient)
    - Early mild incontinence/soiling in 2.6%
      - Resolved by 10 weeks
  - No mortality

TEM: CONCLUSIONS

- Technically demanding procedure
- Utilizes highly specialized instrumentation
- Advanced endoscopic technique
- Can spare selected patients laparotomy and anterior resection
- Adequate training is imperative
- Patient selection is paramount
THANKS