Endoscopy in Reproductive Medicine

ESHRE Campus course
Leuven, Belgium

25-27 November, 2009.

L.I.F.E.
Leuven Institute for Fertility & Embryology

SIG Reproductive surgery

Coordinator:	**M. Gergolet**
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Young deputy:	***P. Gambadauro***
Past coordinator:	***S. Gordts***

Ambulatory based one stop exploration of the female reproductive tract

S.GORDTS

ESHRE workshop
Leuven, February 24-26, 2010

L.I.F.E.
Leuven Institute for Fertility & Embryology

LEARNING OBJECTIVES

At the end of this presentation, participants should be able to:

- Discuss the necessity for exploration.
- Estimate when and how to perform an exploration.
- Manage the possibilities of a minimally invasive endoscopic ambulatory exploration.

Investigation

WHEN ?

WHY ?

HOW ?

NICE Fertility Guidelines 2004

- People who are concerned about their fertility are informed that 84% will conceive within 1 year if they do not use contraception and have regular intercourse.
- In those who do not conceive in the first year, about half will do so in the second year (CPR: 92%)

- Grading of evidence: D

NICE Fertility Guidelines 2004

- People who are concerned about their fertility should be told that sexual intercourse every 2 to 3 days optimizes the chances of pregnancy.
- Timing intercourse to coincide with ovulation causes stress and is not recommended.

- Grading of evidence: C

Investigation of Infertility

Time to Pregnancy?

- Prospective Studies
  - Grading of evidence : A

Time to Clinical Pregnancy

Wang et al. 2003

- **Prospective, population-based**
- **518 newly married Chinese textile workers who intended to conceive**
- **Daily records of vaginal bleeding and first morning urine specimen for 1 year or till pregnant**

Time to Clinical Pregnancy

Wang et al. 2003

- **Clinical pregnancy:**
  - **within first 2 cycles 50%**
  - **within 6 cycles 85%**
- **Rate per cycle over 12 months:**
  - **conception 40%**
  - **clinical pregnancy 30%**

Time to Clinical Pregnancy

Gnoth et al. 2003

- **Prospective**
- **Users of vulvar mucus changes (NFP)**
- **346 German women**

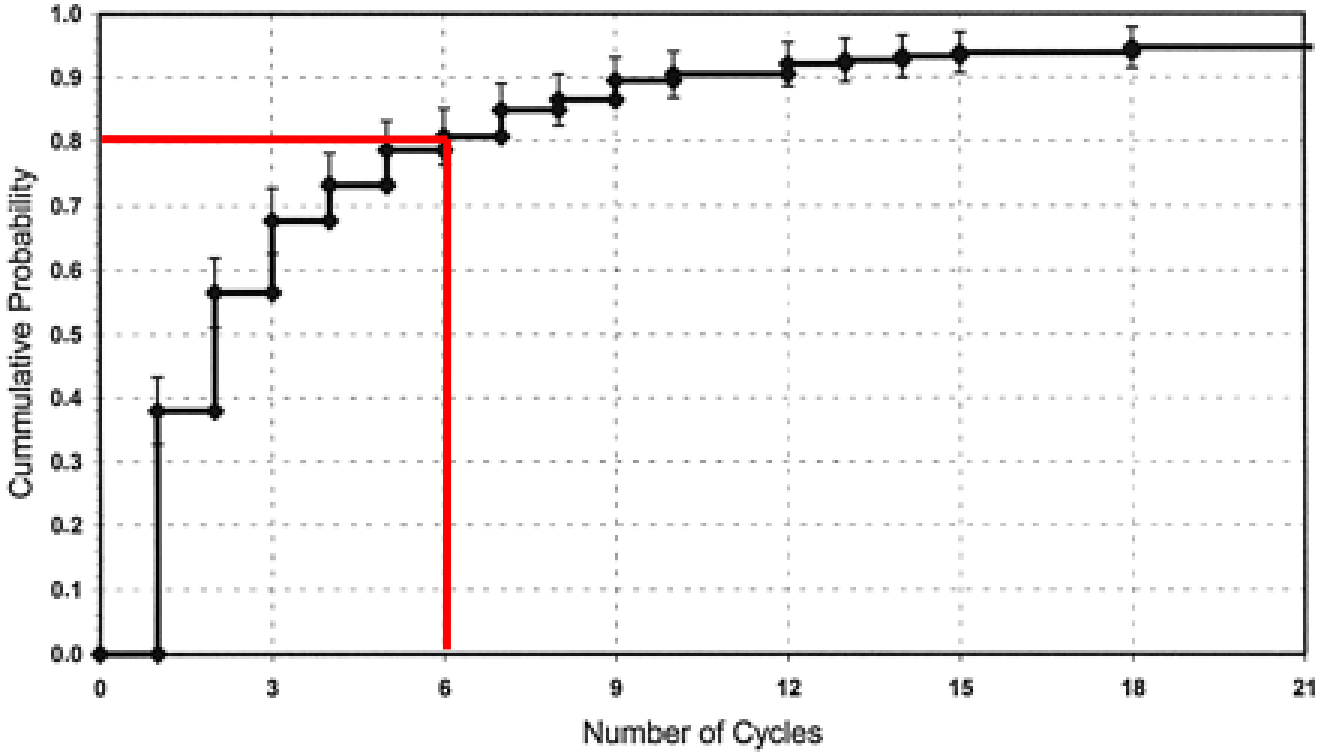
Time to Clinical Pregnancy

Gnoth et al. 2003

- **Pregnancy rate at:**
  - **3 months 68%**
  - **6 months 81%**
  - **12 months 92%**

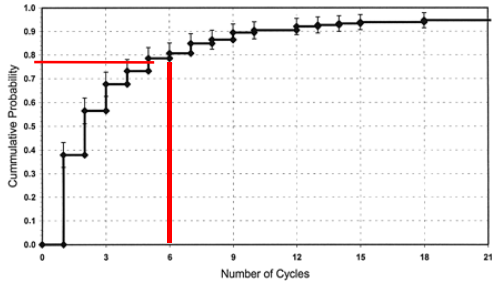
- **It is assumed that 50% of the remaining couples after 6 cycles are subfertile**

Pregnancy Probability



Gnoth Hum Reprod. 2003

Investigation of Female Fertility
When?



Conclusion:

Normal fecundity is higher than previously estimated.

If no conception after 6 months

- 50 % of the remaining patients will have fertility problems.

If no conception, start exploration

Current challenges in infertility work-up

- Modern exploration:
  - Starts after 6 months of subfertility
  - Minimal invasive with high accuracy
  - Short duration
  - Minimal interference with professional activities
  - Provides useful information regarding the reproductive future of the patient

Current challenges in infertility work-up

- The requirements of patients with fertility problems and the possibilities of professional care have significantly changed over the last years.
- Couples want a baby rather than an exhaustive and prolonged investigation.

Investigation

WHEN ?

WHY ?

HOW ?

Infertility surgery is dead: only the obituary remains?

Despite the multiple advantages of assisted reproductive technology compared with surgery, there remain several diagnoses for which surgery is still widely performed: distal tubal occlusion, regret of permanent sterilization, and endometriosis. Assisted reproductive technology is superior to surgery and should be offered as first-line treatment. (Fertil Steril® 2008;89:232–6. ©2008 by American Society for Reproductive Medicine.)

TABLE 1

Oocyte to baby rate in patients without frozen embryos.

Age group	Number of Patients	Cycles	Oocytes	ET	FHB	LBB	FHB per Oocyte (%)	FHB per ET (%)	LBB per Oocyte (%)[a]	LBB per ET (%)
Donors	32	32	473 (14.8 ± 7.6)	78 (2.5 ± 0.7)	24	22	5.1	30.8	4.7[b]	28.2
<35	123	154	1948 (12.6 ± 7.3)	441 (3.0 ± 0.9)	81	71	4.2	18.4	3.6[b]	16.1
35–37	85	98	943 (9.6 ± 6.0)	257 (2.8 ± 0.8)	46	37	4.9	17.9	3.9[b]	14.4
38–40	70	92	777 (8.4 ± 6.5)	249 (3.0 ± 1.2)	21	20	2.7	8.4	2.6[b]	8.0
41–42	34	43	349 (8.1 ± 4.6)	129 (3.2 ± 1.3)	5	3	1.4	3.9	0.9[c]	2.3
>42	16	21	130 (6.2 ± 3.9)	49 (2.7 ± 1.1)	0	0	0.0	0.0	0.0[c]	0.0

Note: Numbers in parentheses are the mean + SD for the number of oocytes and embryos transferred. ET, total number of embryos transferred; FHB, total number of fetal heartbeats; LBB, total number of live babies born.

[a] Final expected LBB per oocyte in relation to age is significantly different: chi-square = 16.8, d.f.= 5, $P<.01$.

[b,c] Final expected LBB per oocyte in relation to age is not statistically significantly different for groups with the same letters.

Patrizio. Oocyte to baby rate and inefficiency of IVF. Fertil Steril 2008.

Pasquale & Sakkas, Fertil Steril 2008

Investigation Why?

- Accurate diagnosis accurate treatment
  not to liberal referral to ART
  ⟶
  offering couples possibility for spontaneous conception whenever possible

- In case of referral guarantee of highest success rate

Investigation

WHEN ?

WHY ?

HOW ?

HSG versus LAP

- **TUBAL PATENCY**

Sensitivity: 65% (95% CI: 50 - 78)

Specificity: 83% (95% CI: 77 - 88)

- **PERITUBAL ADHESIONS**

Sensitivity: 62% (range: 0 - 83)

Specificity: 67% (range: 50 - 99)

Swart, et al. Fertil Steril 1995;64:486

a meta-analysis of 20 studies

Tubal patency and pregnancy rate

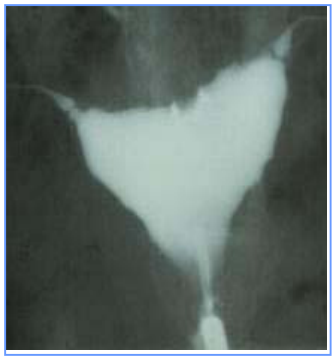
HSG two-sided abnormality:

Laparoscopy normal in 42% of the patients

Gun to shoot a mosquito

Mol B, 2002 Hum reprod

Diagnosis



Bilateral obstruction and hydrosalpinges at HSG

only 41% confirmed at laparoscopy

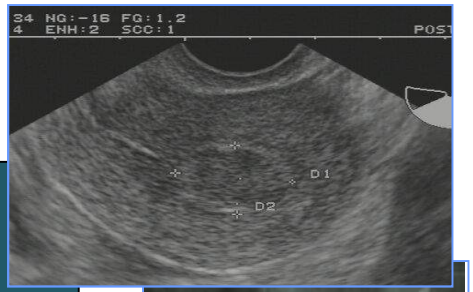
Omitting laparoscopy → 60 % incorrect treatment

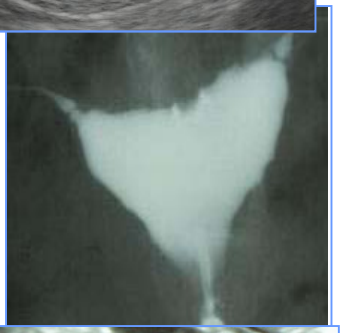
Omitting laparoscopy → Costs/pregnancy was higher

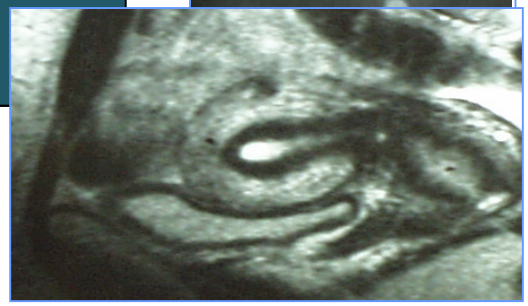
Tanahatoe S. RBMonline 2008; 16: 410-15

Indirect visualisation techniques

- Are the indirect visualization techniques sufficient?
  - Uterine factor?
  - Tubal factor?
  - Peritoneal factor?
  - Endometriosis???







Laparoscopic findings in 92 oligo-ovulatory infertile patients after 4 failed ovulation induction cycles

	No	%
Normal	33	35.9
Severe	32	34.8%
Minimal	27	29.3%

CAPELLO ET AL. FERTIL STERIL, 80, 2004

Diagnostic Laparoscopy

direct visualisation of the peritoneal cavity

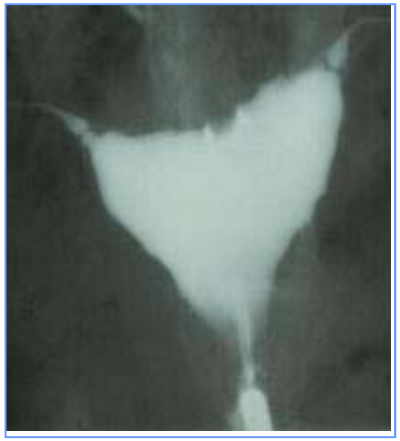
- Tubal patency
- Detect and assess severity of

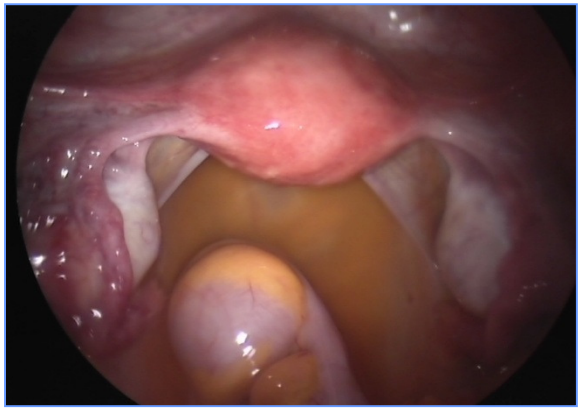
  sequelae of PID

  endometriosis
- Diagnose unexplained infertility

Investigation of Infertility

- Limitations:
  - US and HSG: Not sufficient
  - Laparoscopy: Too invasive





Investigation of Infertility

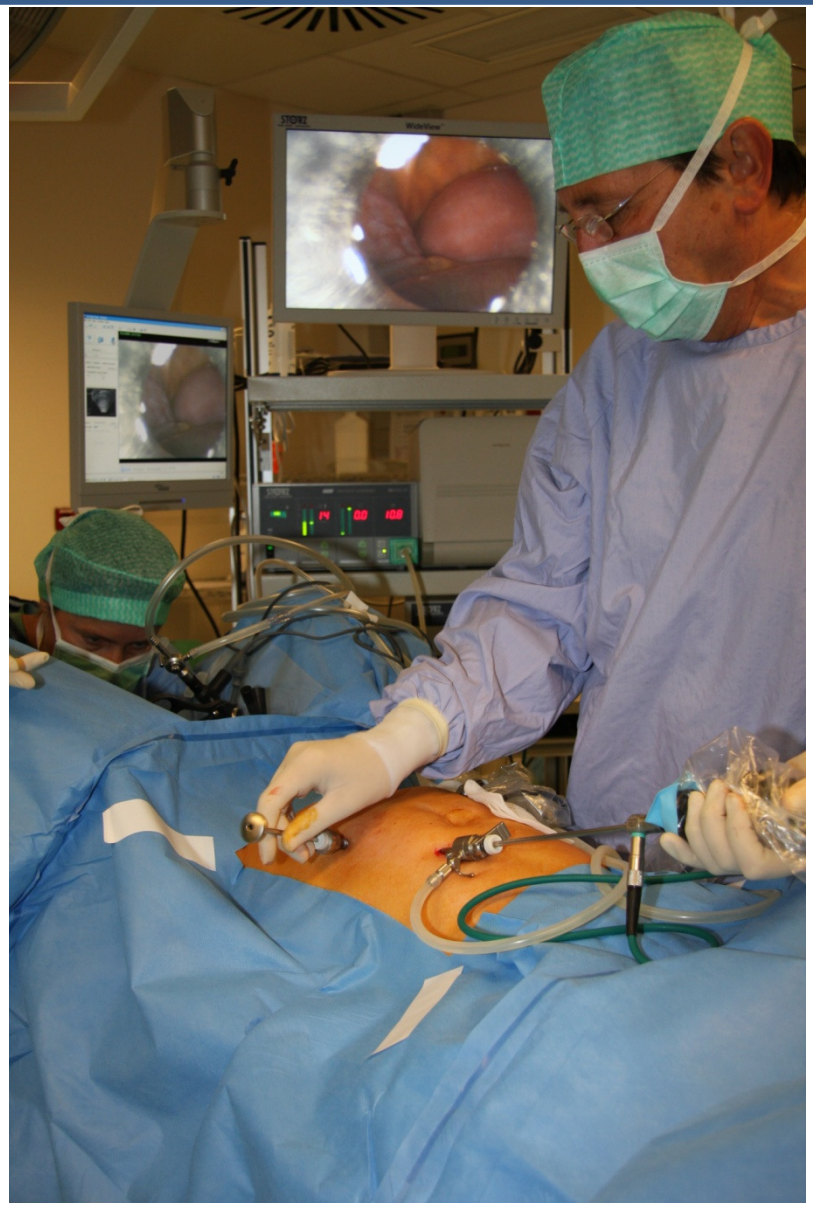
- **Laparoscopy is too invasive as a diagnostic tool in patients without obvious pelvic pathology and is therefore frequently omitted.**
- **Accurate diagnosis of disorders for which effective treatment exists is therefore delayed.**

Fertility Investigation

- Challenge:
  - Combine the advantages avoiding the limitations.
  - In a “one-stop” fertility clinic setting
- Importance of proper diagnosis:
  - Evaluation of possibilities of spontaneous conception.
  - Exclusion of factors with negative impact on IVF outcomes

Laparoscopy as “diagnostic tool” is postponed in the exploration of the female pelvis

to invasive
not innocious
expertise
results ART



As a pure diagnostic tool

"Multiple access laparoscopy"

should be banned from the exploration of the female pelvis

However direct endoscopic visualization

of the female pelvis remains important and

is superior to indirect methods of exploration

TRANSVAGINAL ENDOSCOPIC

EXPLORATION

Minimal invasive

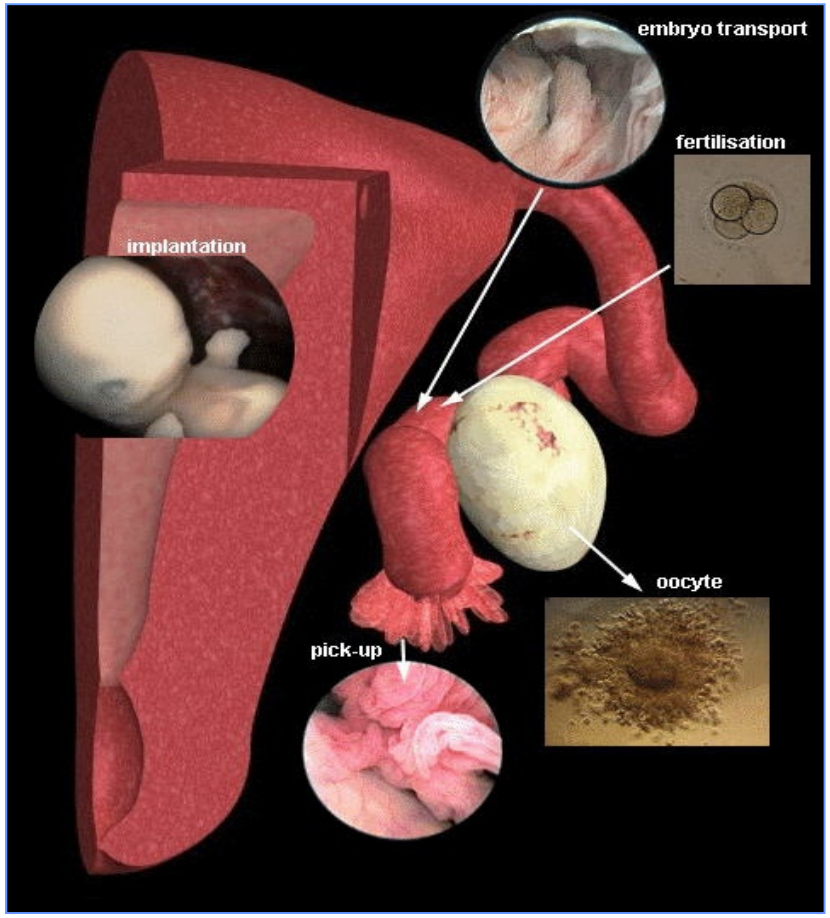
Accuracy

Ambulatory setting

Implantation function

Pick-up and transport

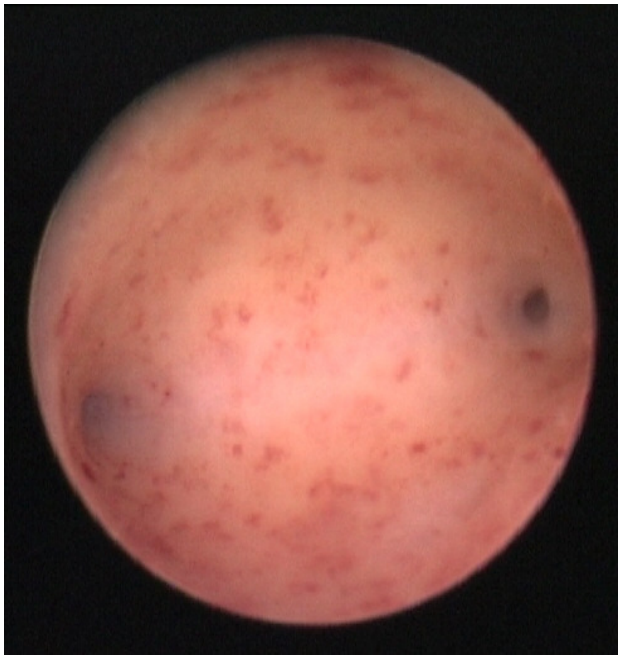
Transvaginal Endoscopy

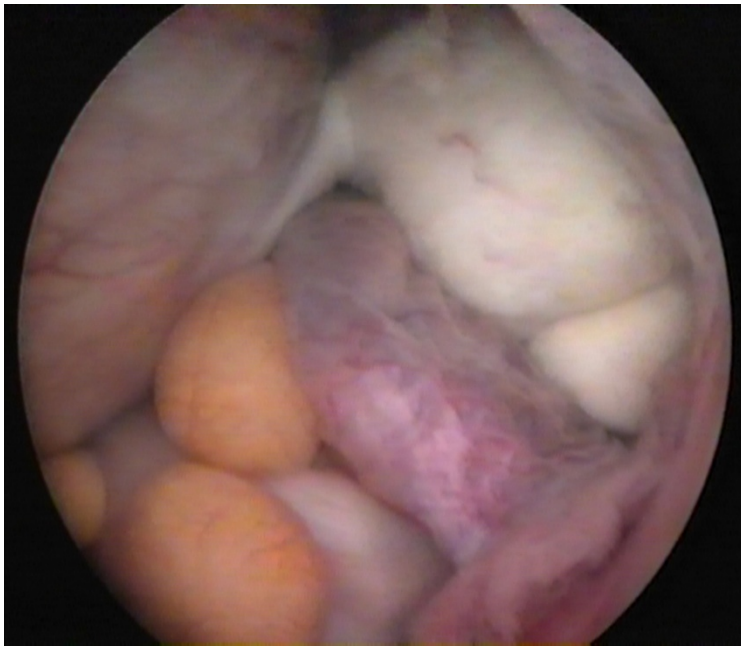


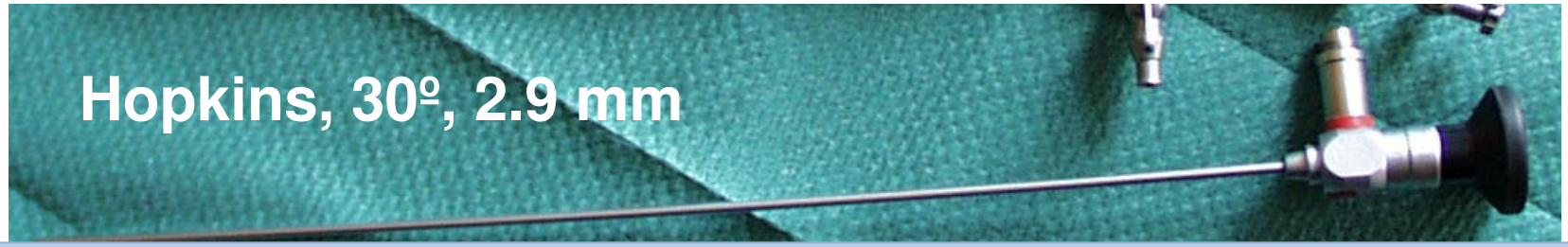
Complete endoscopic investigation of the female reproductive tract.

- Hysteroscopy
- Transvaginal Laparoscopy (TvL)
- Salpingoscopy
- Patency test

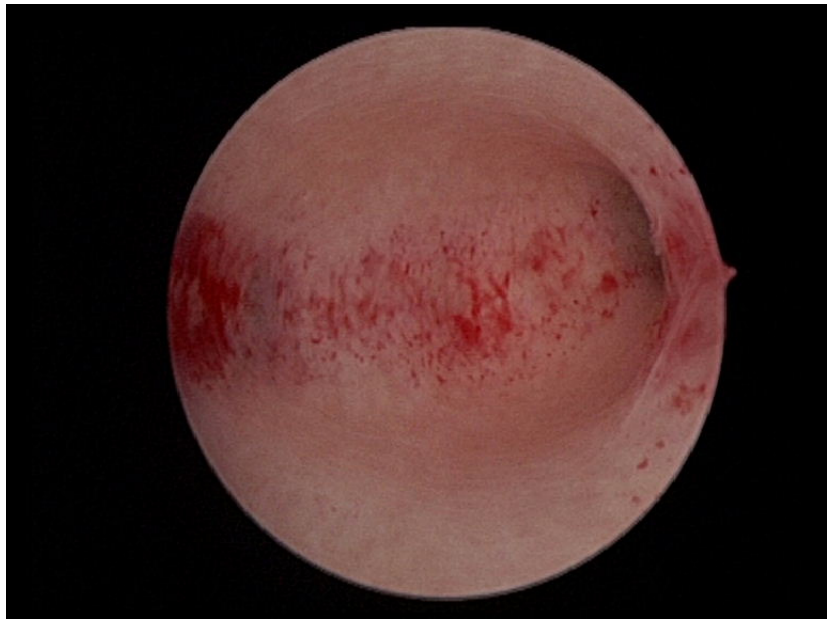
Mini endoscopes
for minimal invasive approach





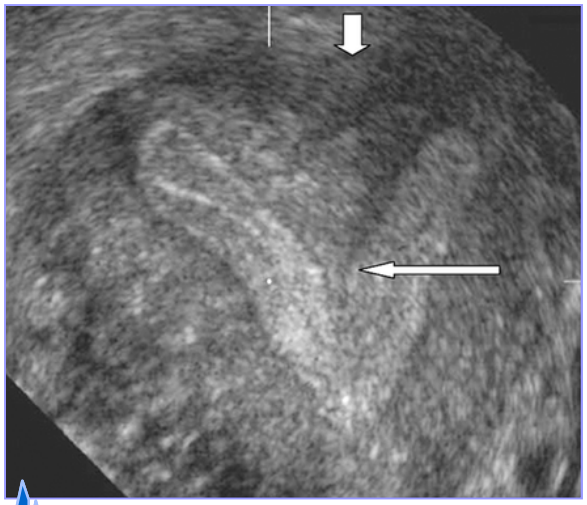


Diagnostic hysteroscopy

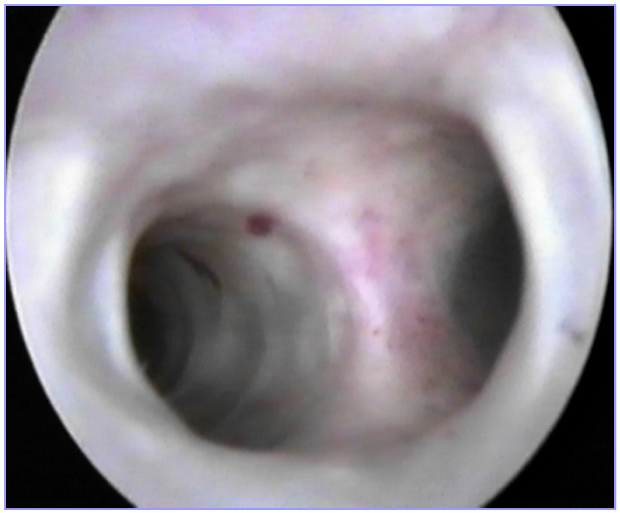


First line diagnostic procedures

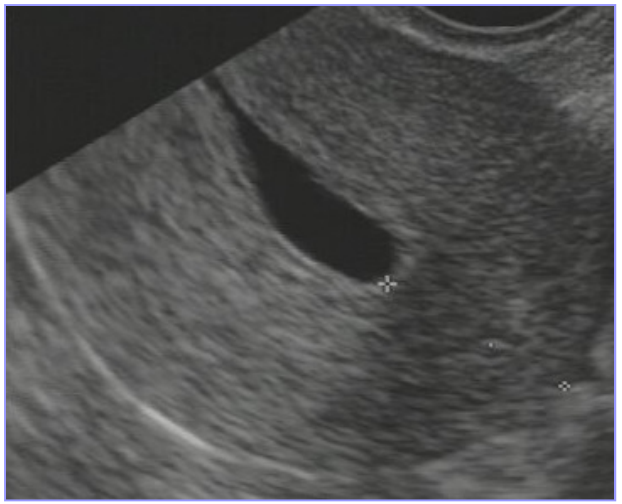
Trans vaginal Ultrasound

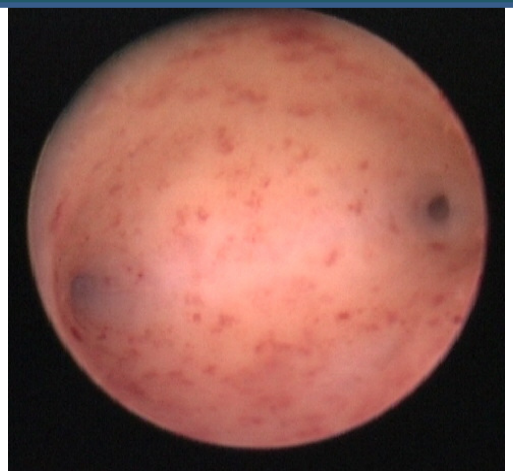


Fluid Mini Hysteroscopy

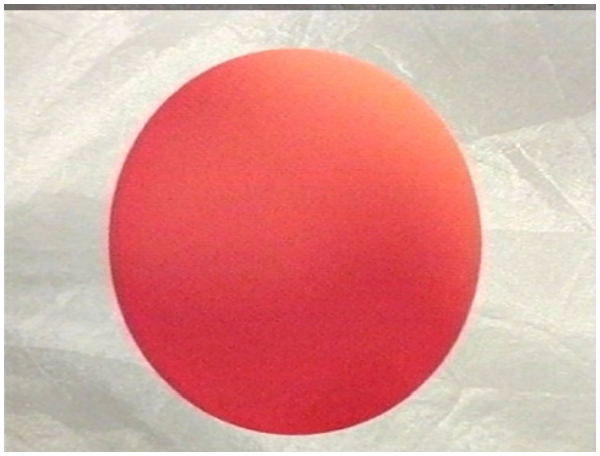


Kontrast Sonography





HYSTEROSCOPY
SPECIFIC PROBLEMS



Virtual uterine cavity

Endometrium is very fragile

Distension medium resorting - loss

Instrument diameter and optical quality

Documentation

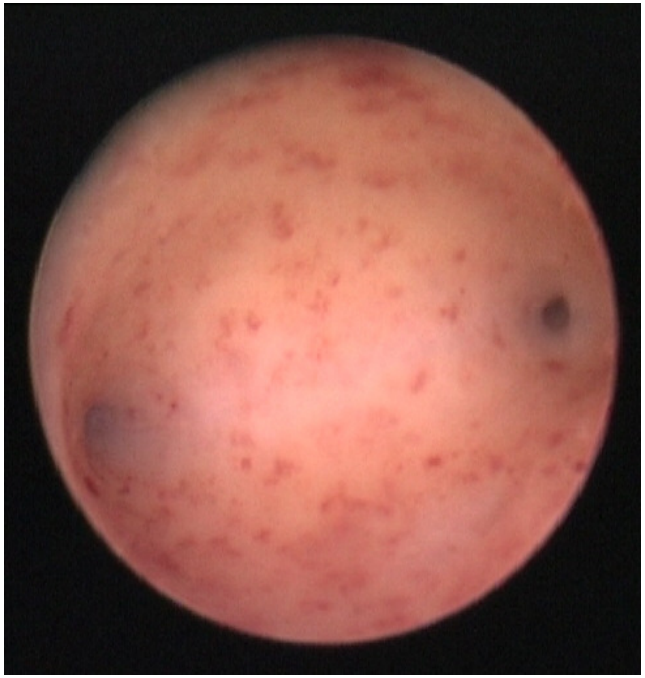
Slow learning curve

Cost benefit for the surgeon is generally poor

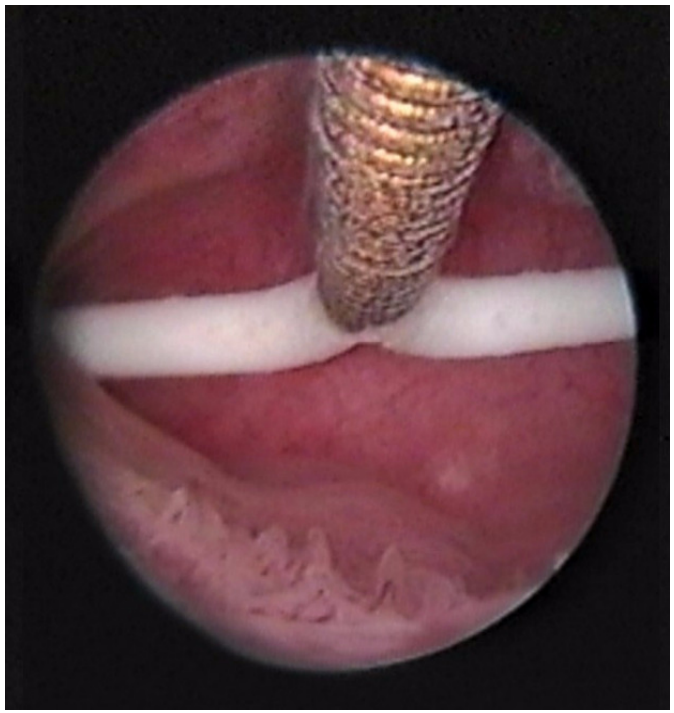
Minihysteroscopy: Findings

- Congenital pathologies
- Acquired pathologies:
  - Large lesions:
    - Myoma, polyp, adhesions
  - Subtle lesions:
    - Mucosal elevation, hypervascularisation, strawberry pattern, diffuse polyposis, exofitic or necrotic lesions

Minihysteroscopy in the infertile patient
Subtle changes can impair fertility?

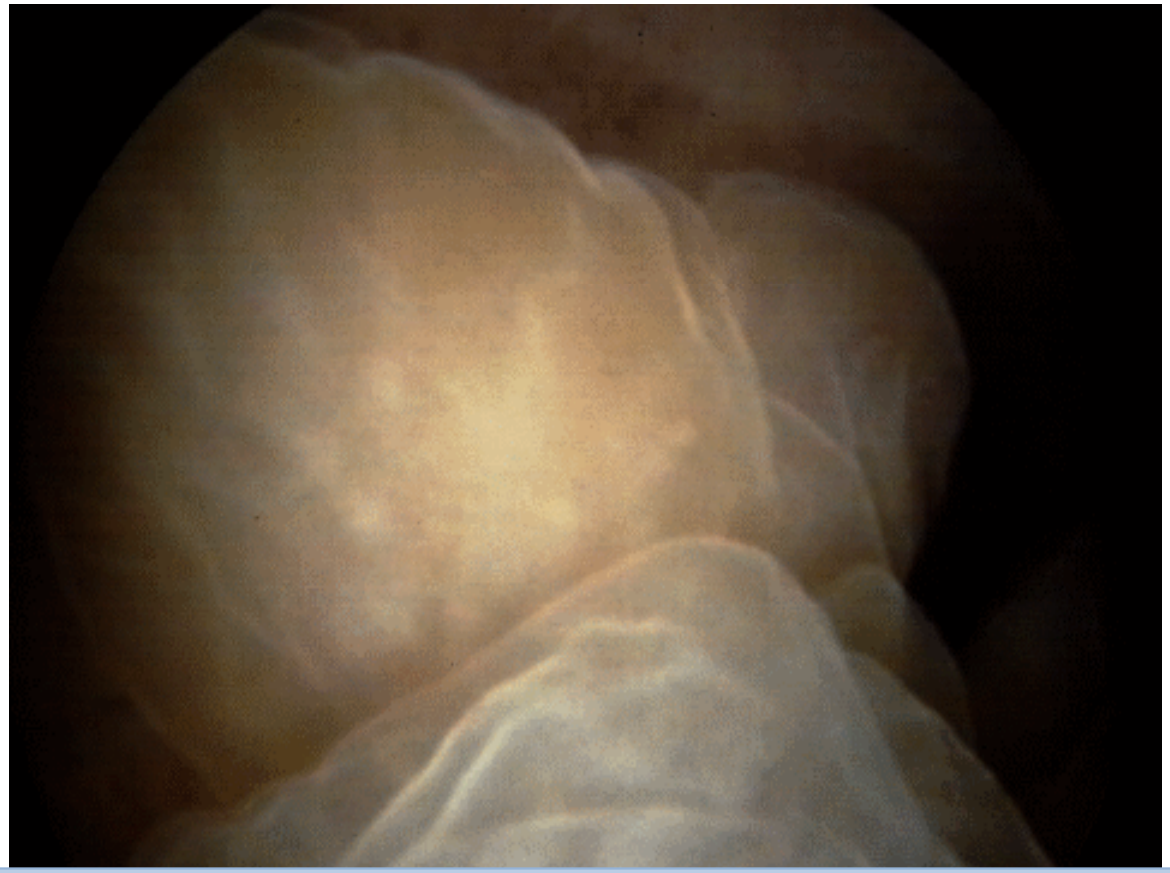


Fertile environment ?

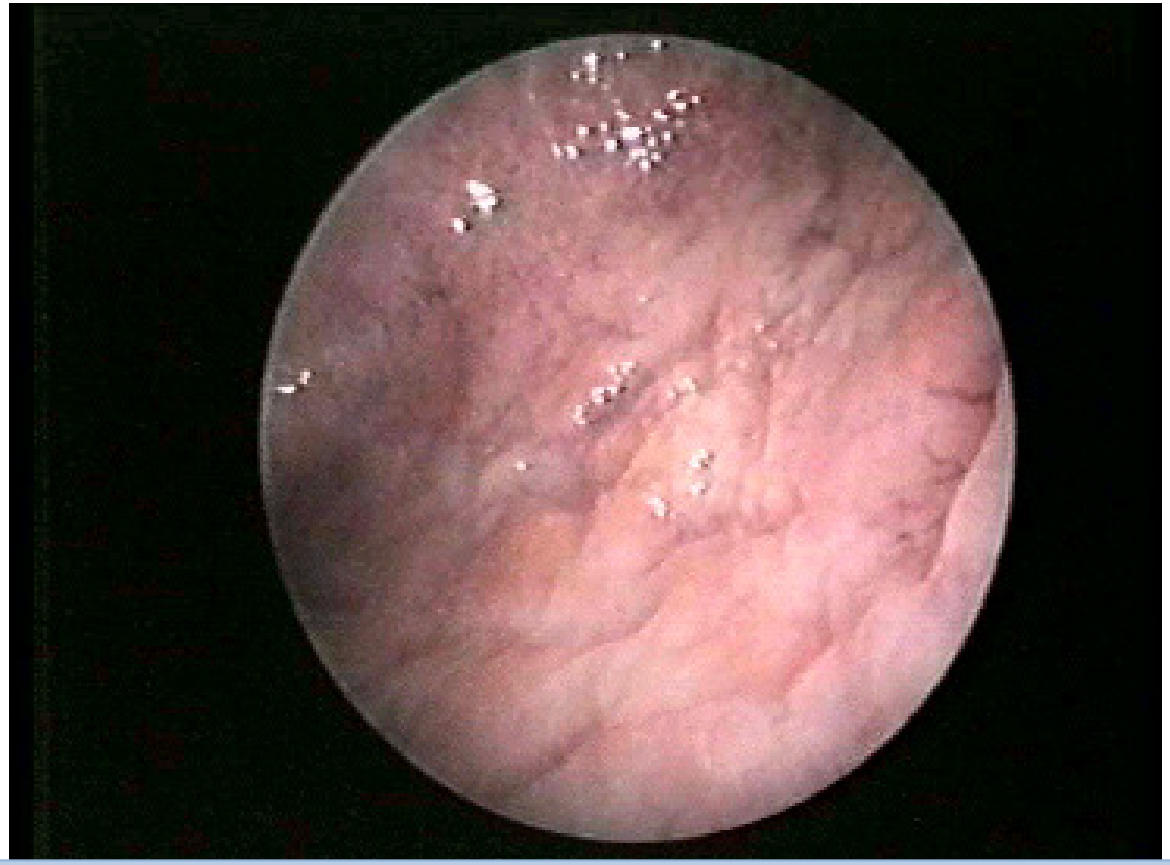


Infertile environment ?

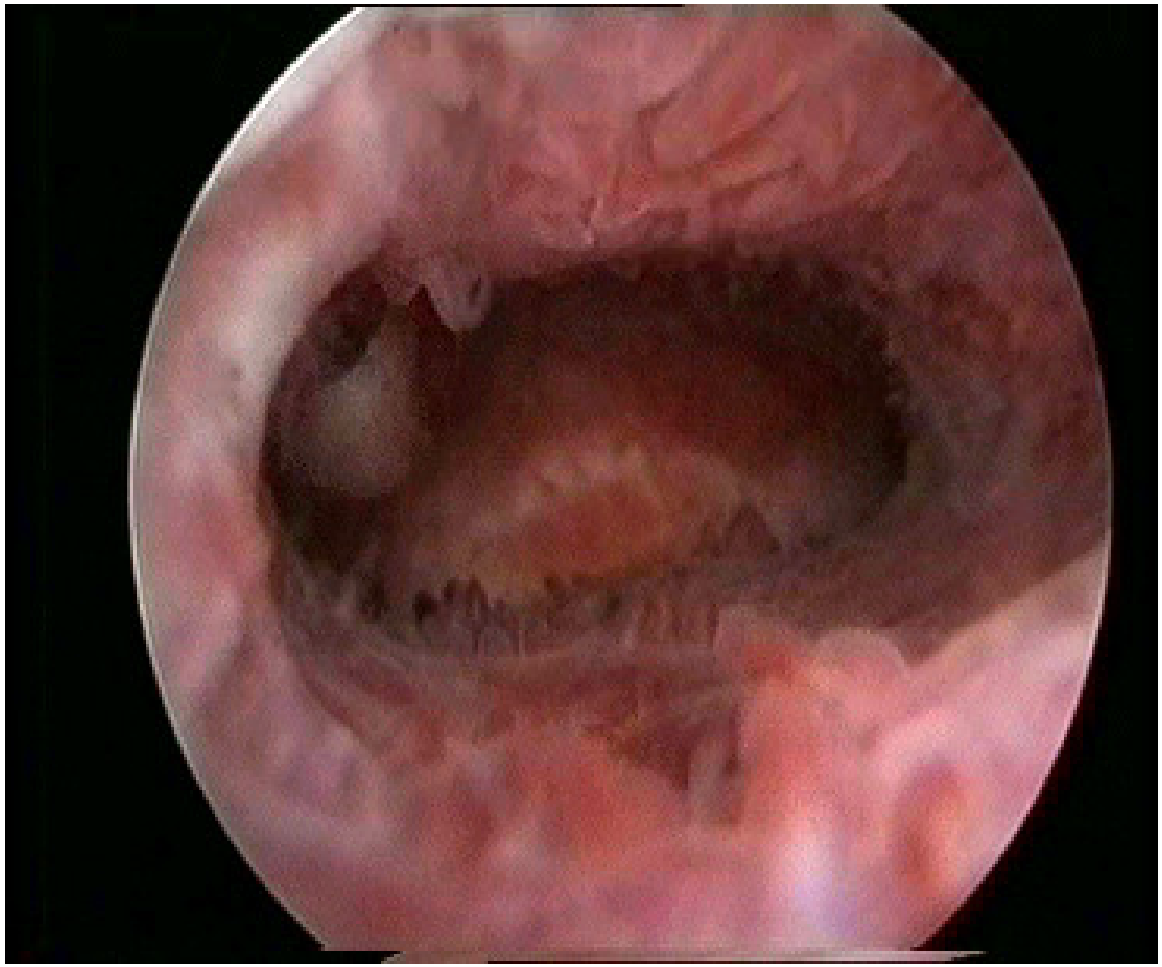
Localised mucosal elevation



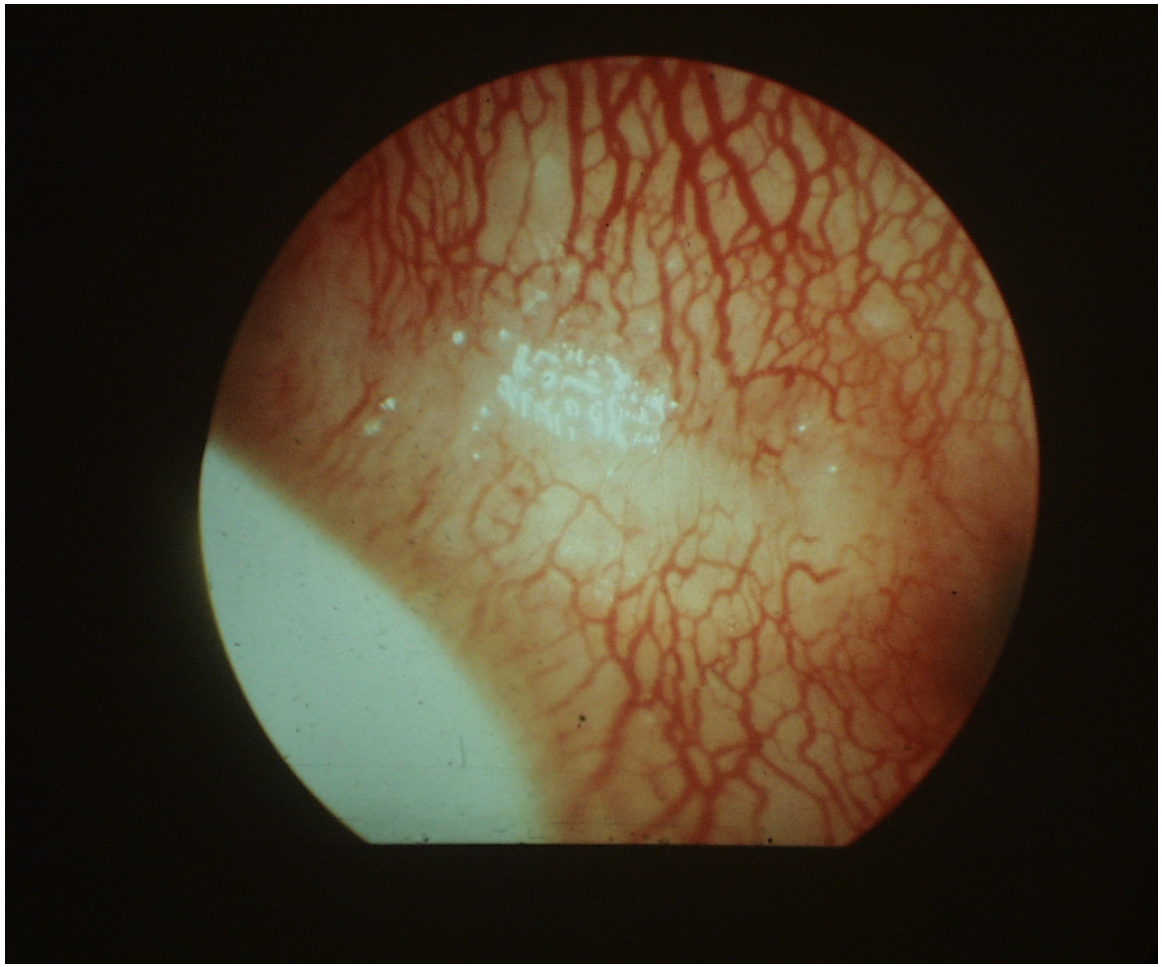
Diffuse mucosal elevation



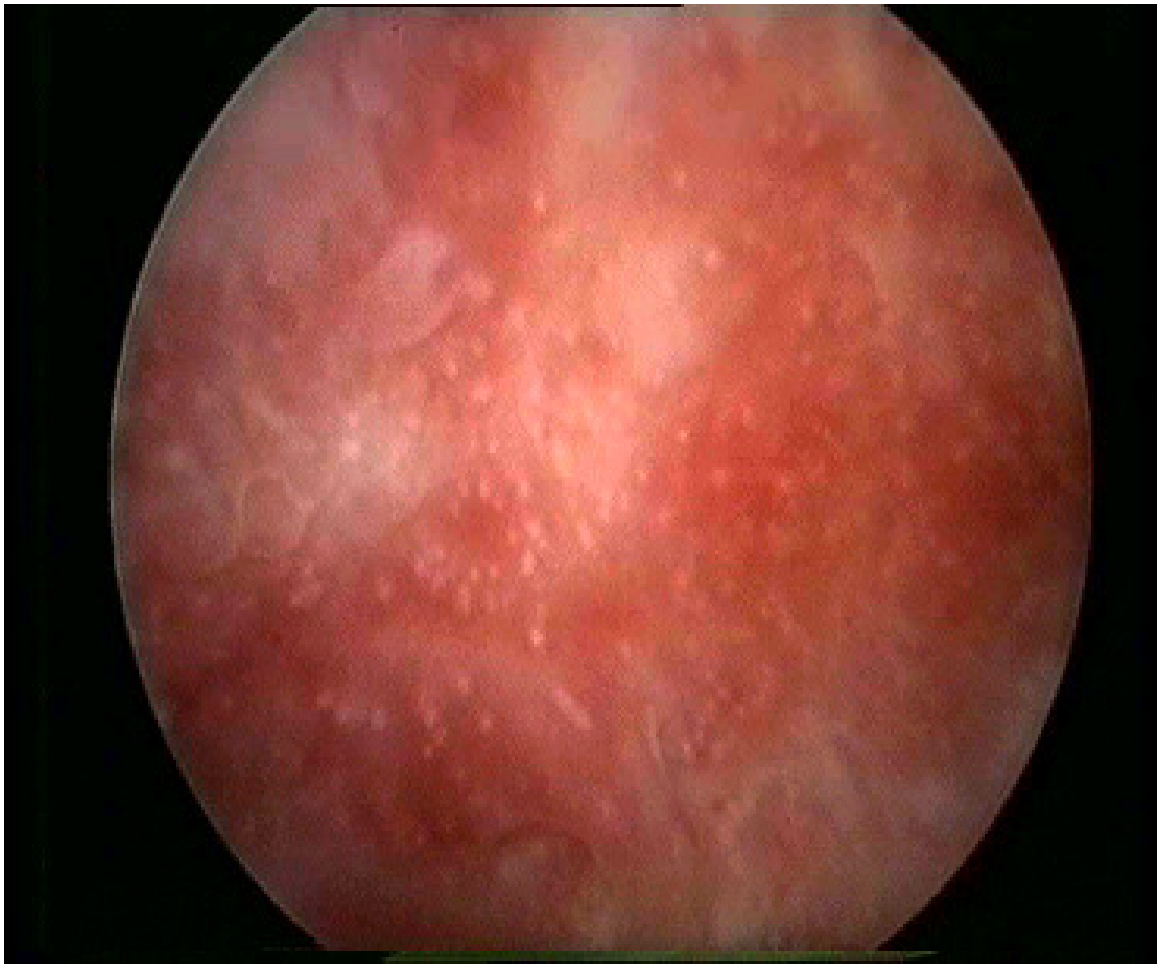
Diffuse polyposis

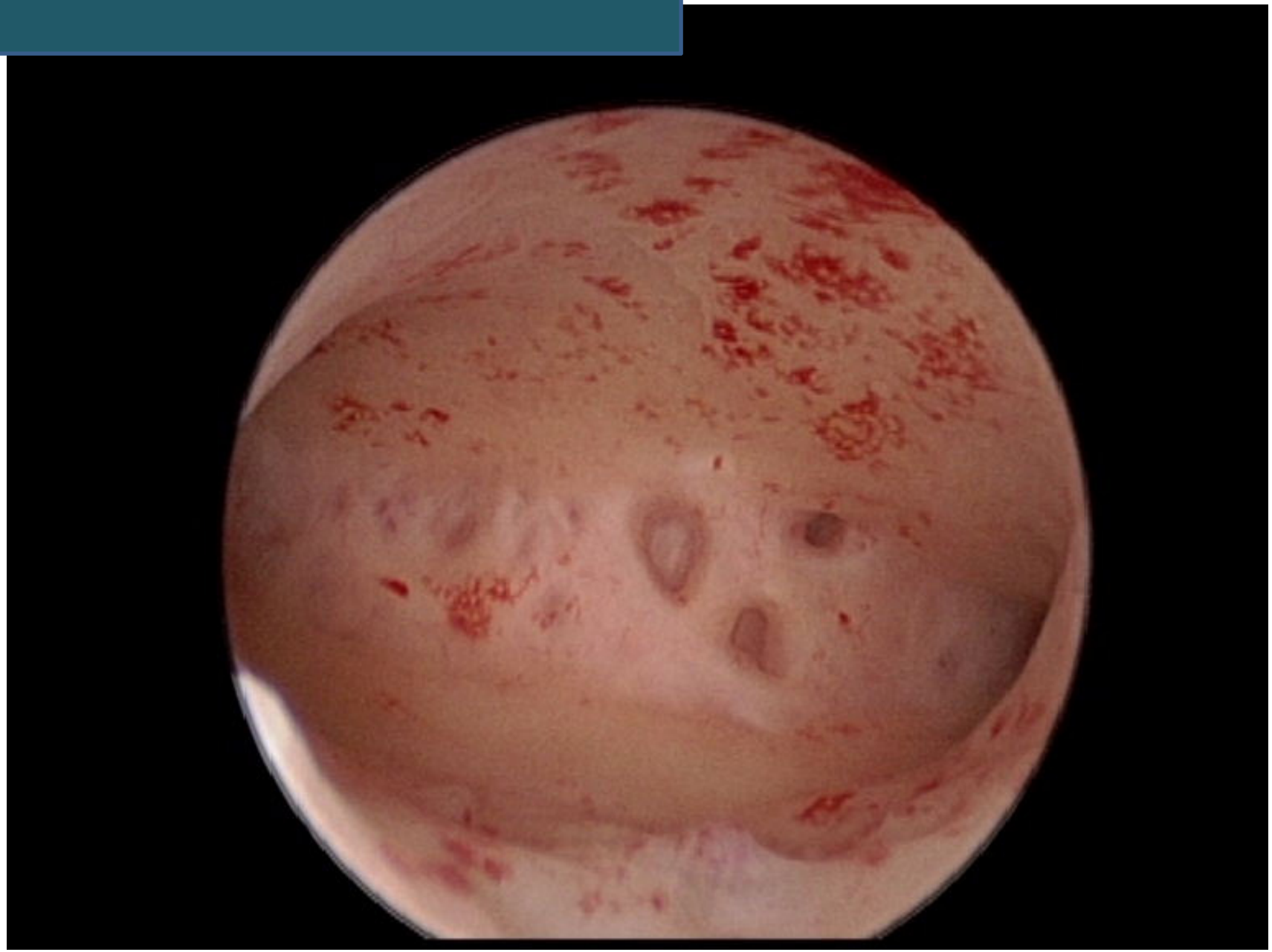


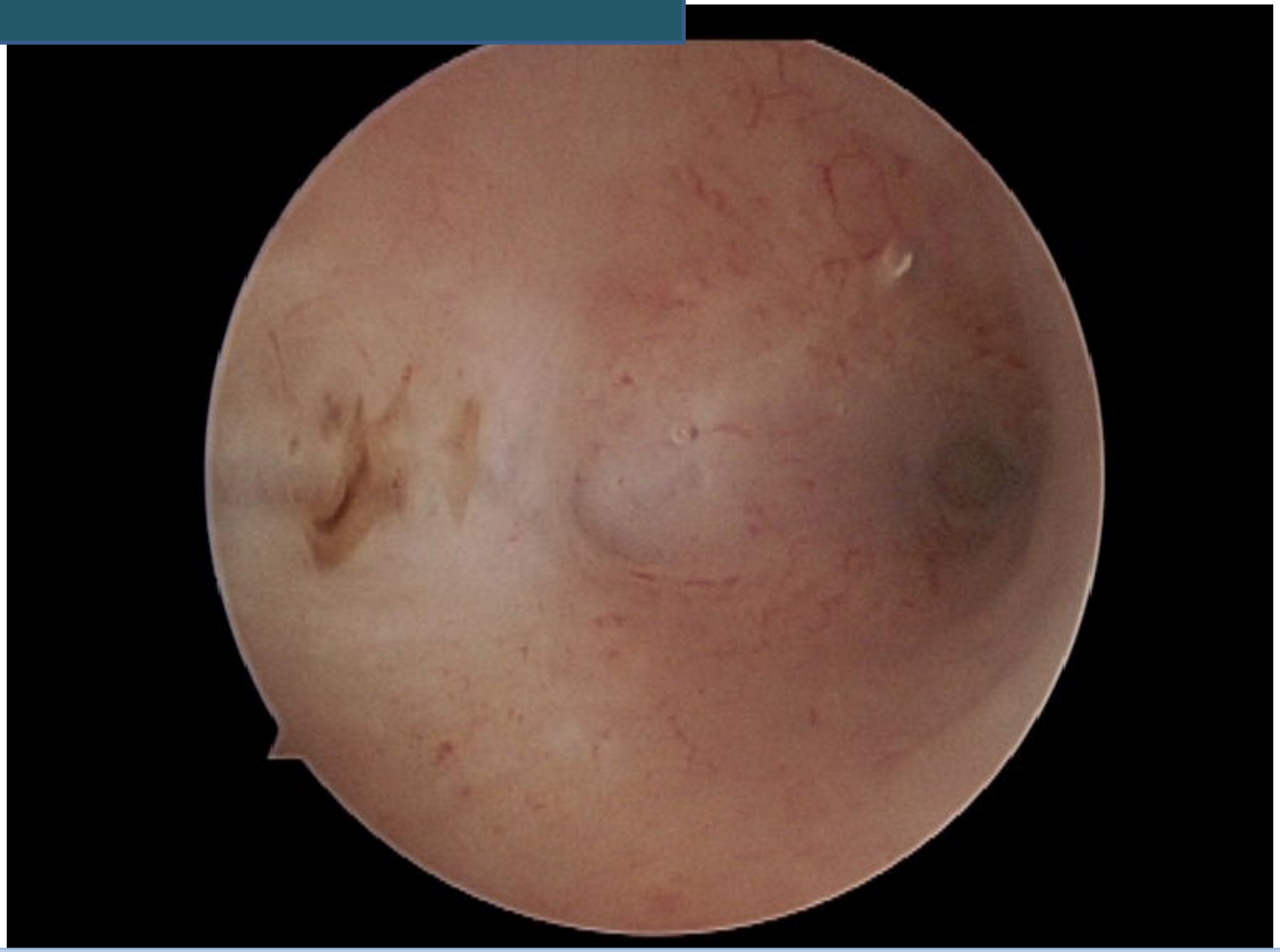
Hypervascularisation



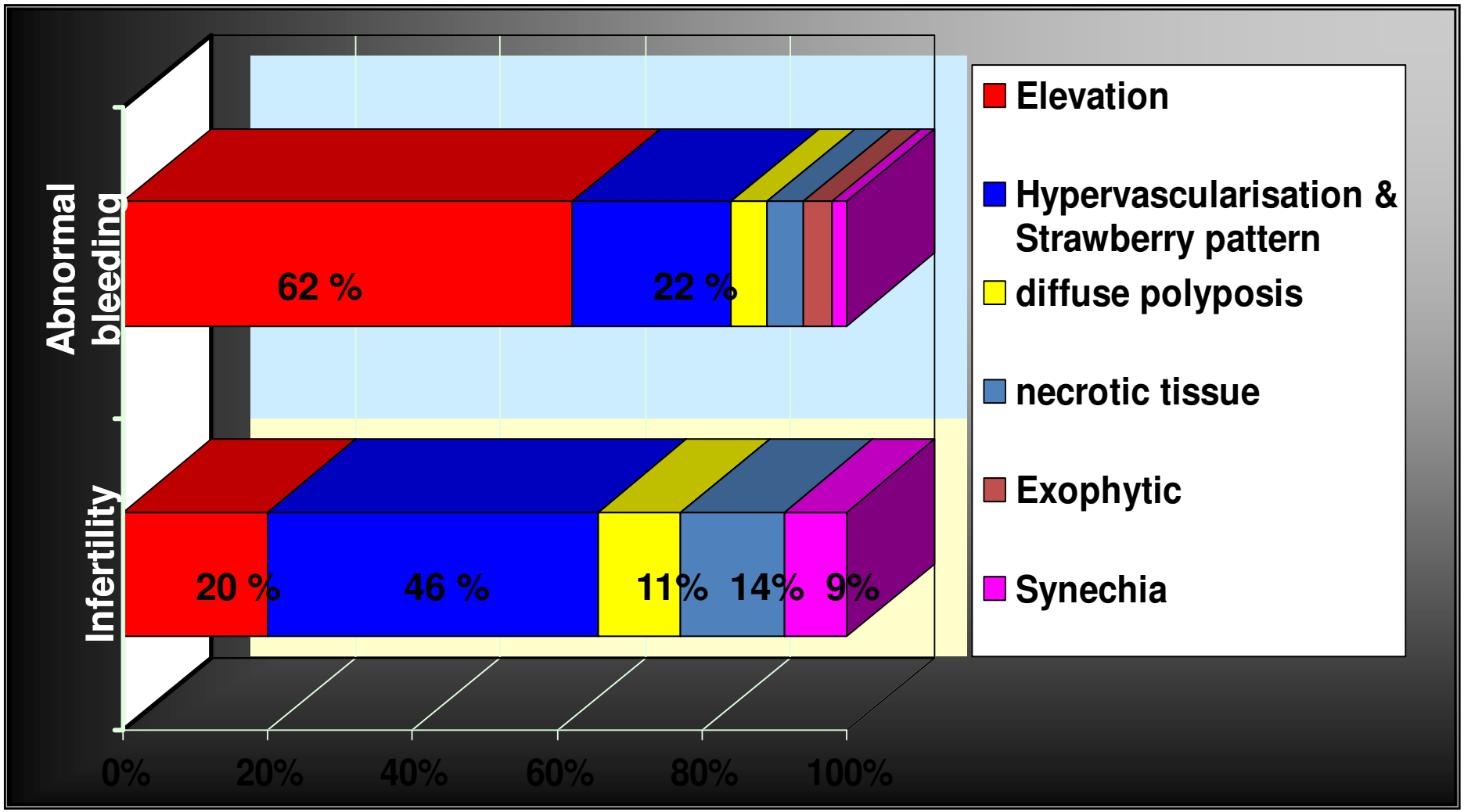
Strawberry pattern







Subtle lesions



Hysteroscopic findings in patients with repeated IVF failure

Nb patients with 2 IVF failures and nl. HSG n=55

SUBMUCOUS LEYOMYOMA	2
POLYPS	10
ADHESIONS	6
ENDOMETRITIS	7

Oliveira et al. Fertil Steril, 80, 2004

Hysteroscopic findings in subfertile patients

	No	%
Total	530	100
Normal	370	69.8
No diagnosis	9	1.7
Abnormal	151	28,5

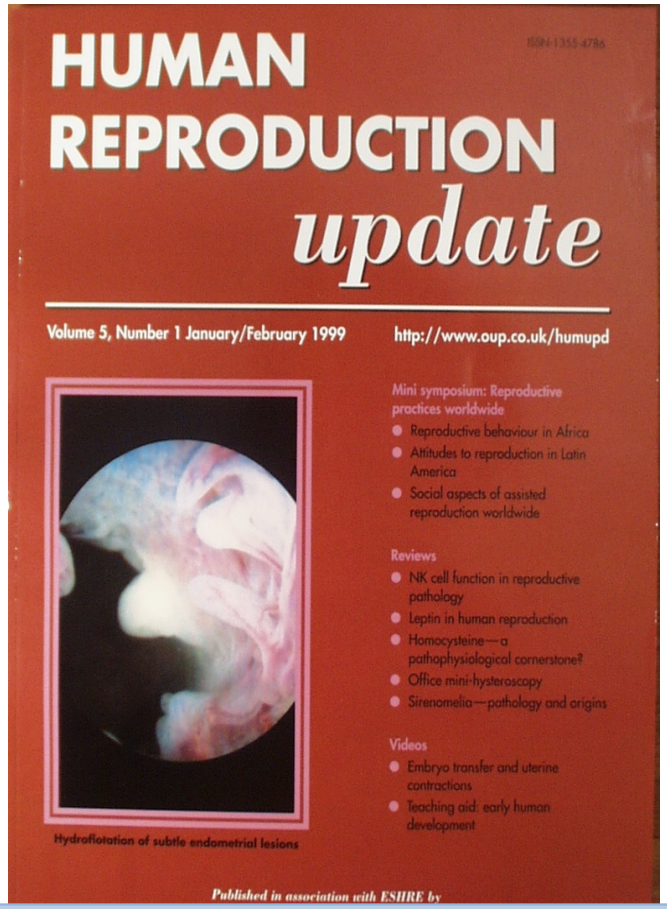
Specific characteristics for minimal invasive approach

- Ambulatory endoscopic unit
- Watery distension medium
- Small diameter instrumentation with high optical quality
- Atraumatic technique

Ambulatory Endoscopic Unit
For minimal invasive approach

- No conventional OR
- No general anaesthesia

Watery distension medium
For minimal invasive approach



Hydro floatation shows subtle lesions,

Rinsing effect in case of bleeding

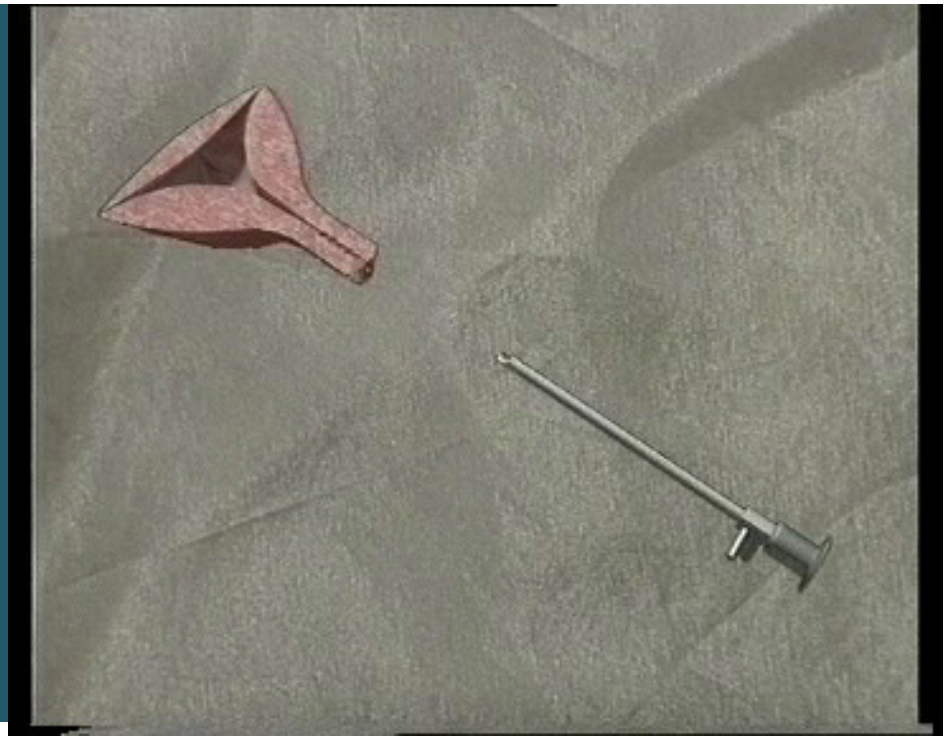
Less discomfort than CO2 gas.

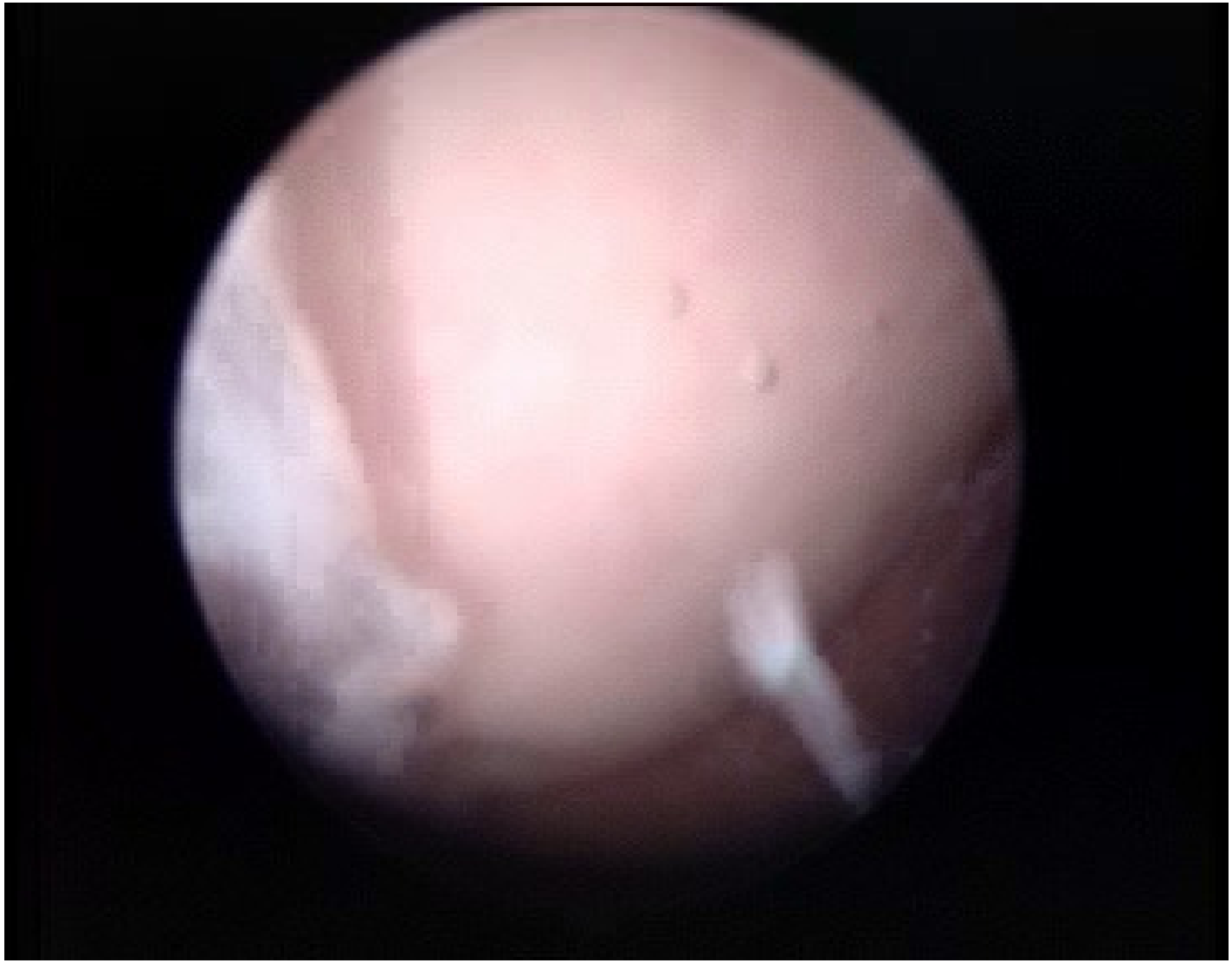
Scientific evidence that ringer lactate Is to be preferred

Only for unipolar surgery Purisol° is indicated

Minihysteroscopy
Atraumatic technique

- No speculum
- No tenaculum
- No cervical dilatation
- No anaesthesia,
  no analgesia
- Atraumatic and sight controlled insertion of the hysteroscope.





VAGINO-CERVICO-HYSTEROSCOPY

Office hysteroscopy

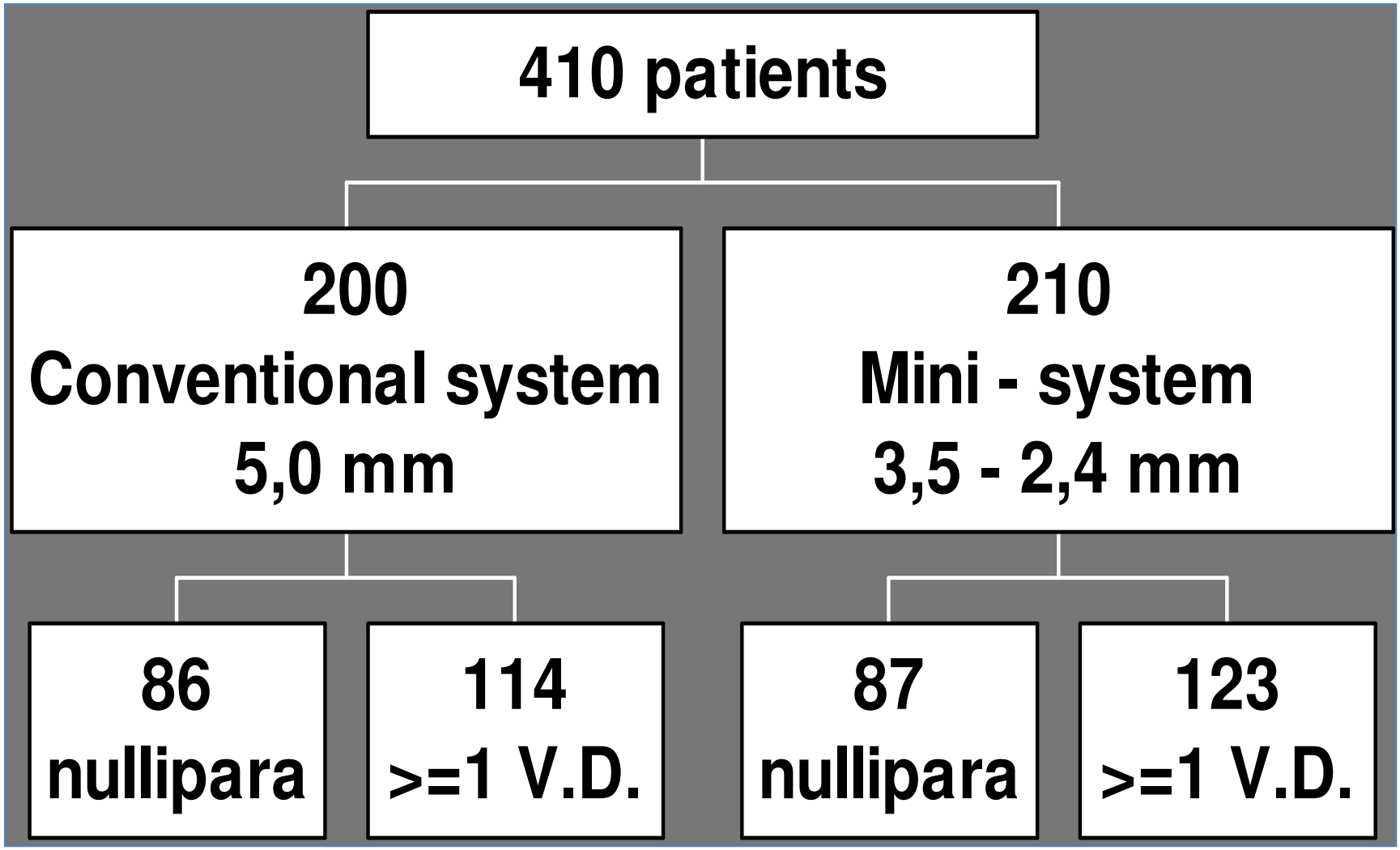
prospective, multicentre,
randomised controlled trial

To score objectively

Pain score
Visualisation quality

Stratified for Total instrument diameter
Vaginal delivery (0 versus >=1)

Office hysteroscopy

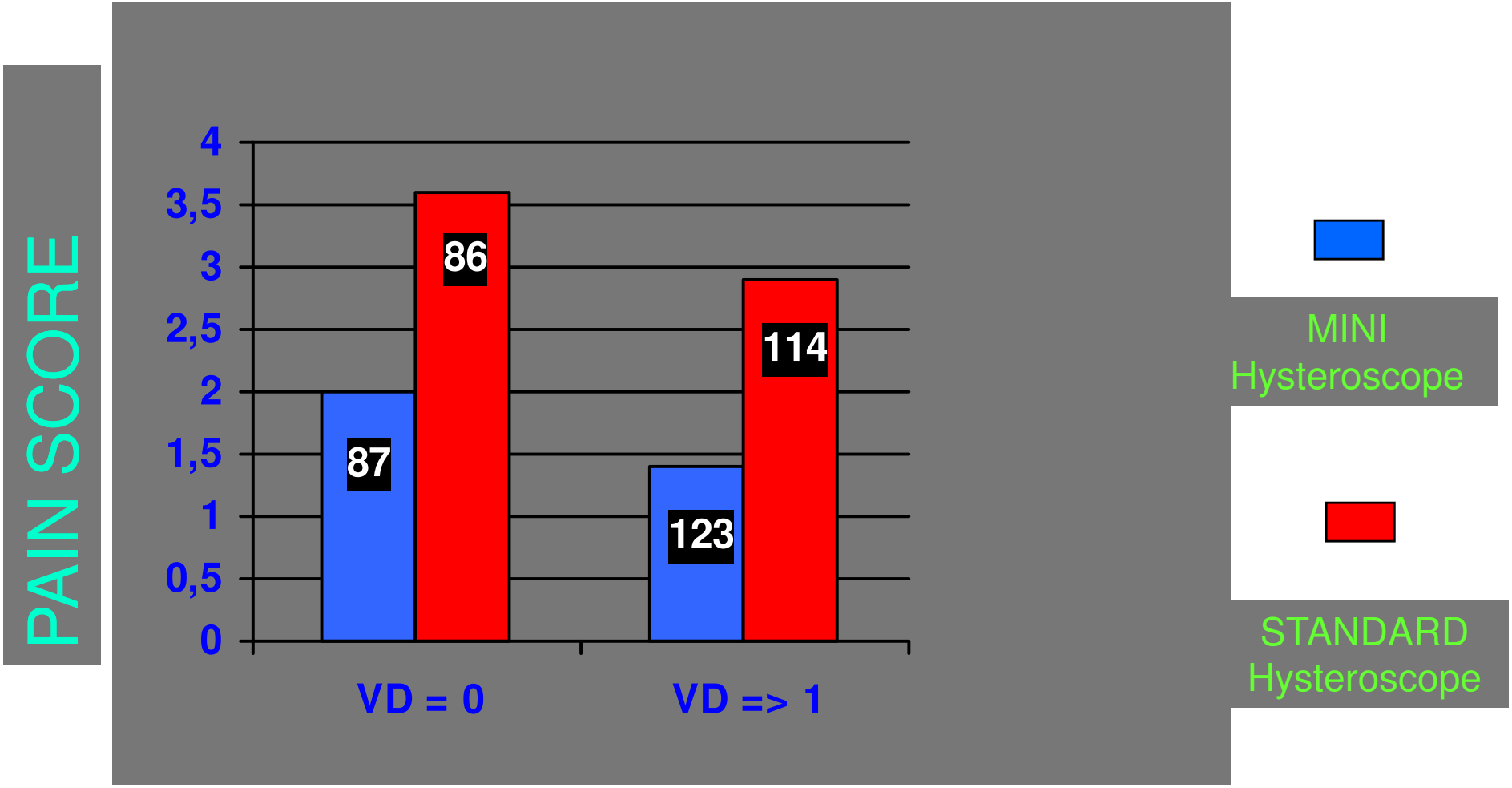


PAIN SCORE

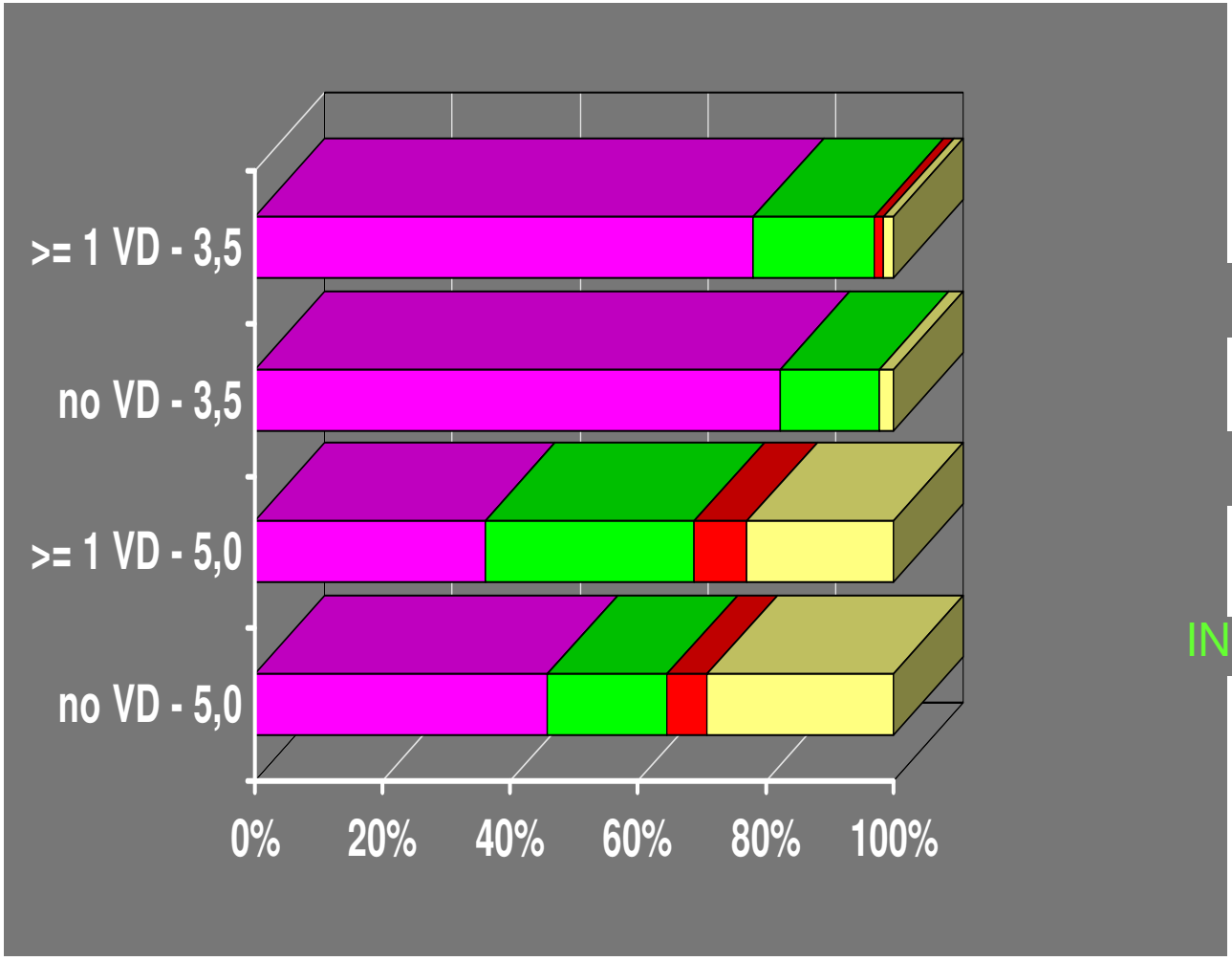
QUALITY OF VISUALISATION

Excellent
Sufficient
Insufficient
No visualization

PAIN SCORING



VISUALIZATION INDEX



CONCLUSIONS

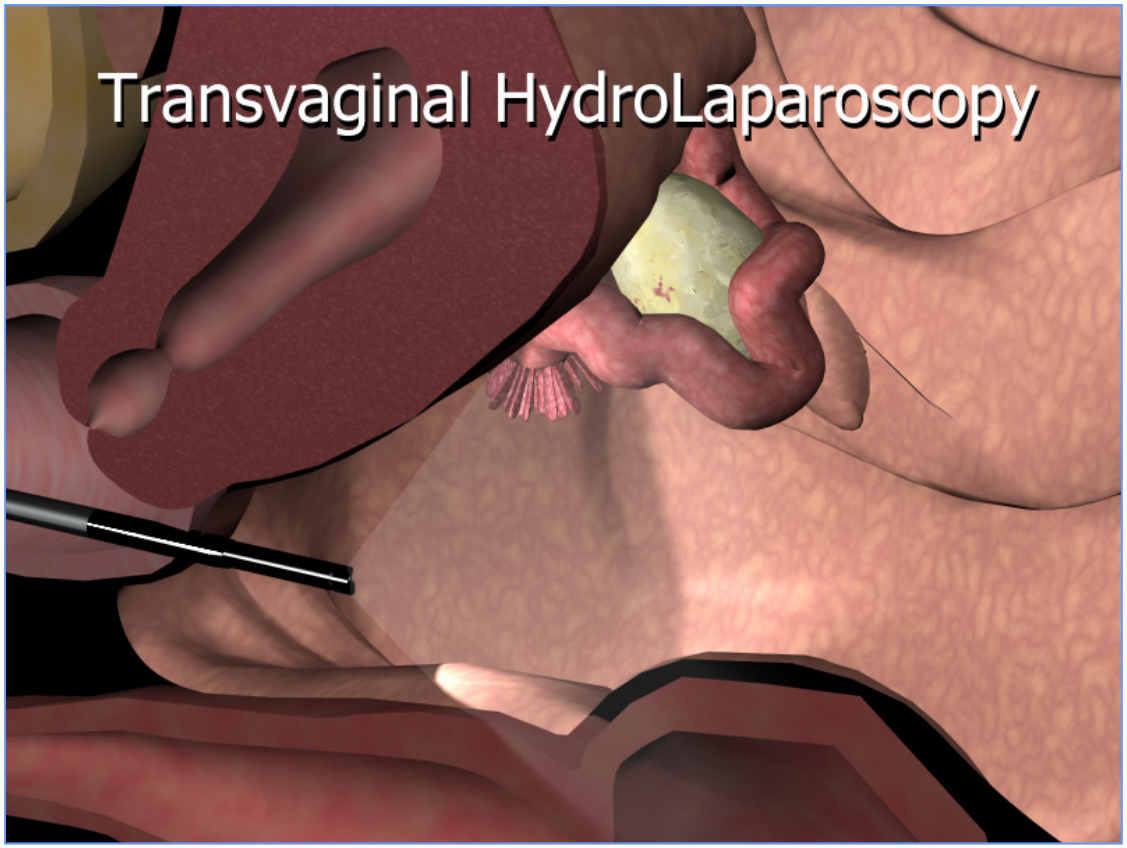
Diagnostic hysteroscopy is a first line ambulatory office procedure.

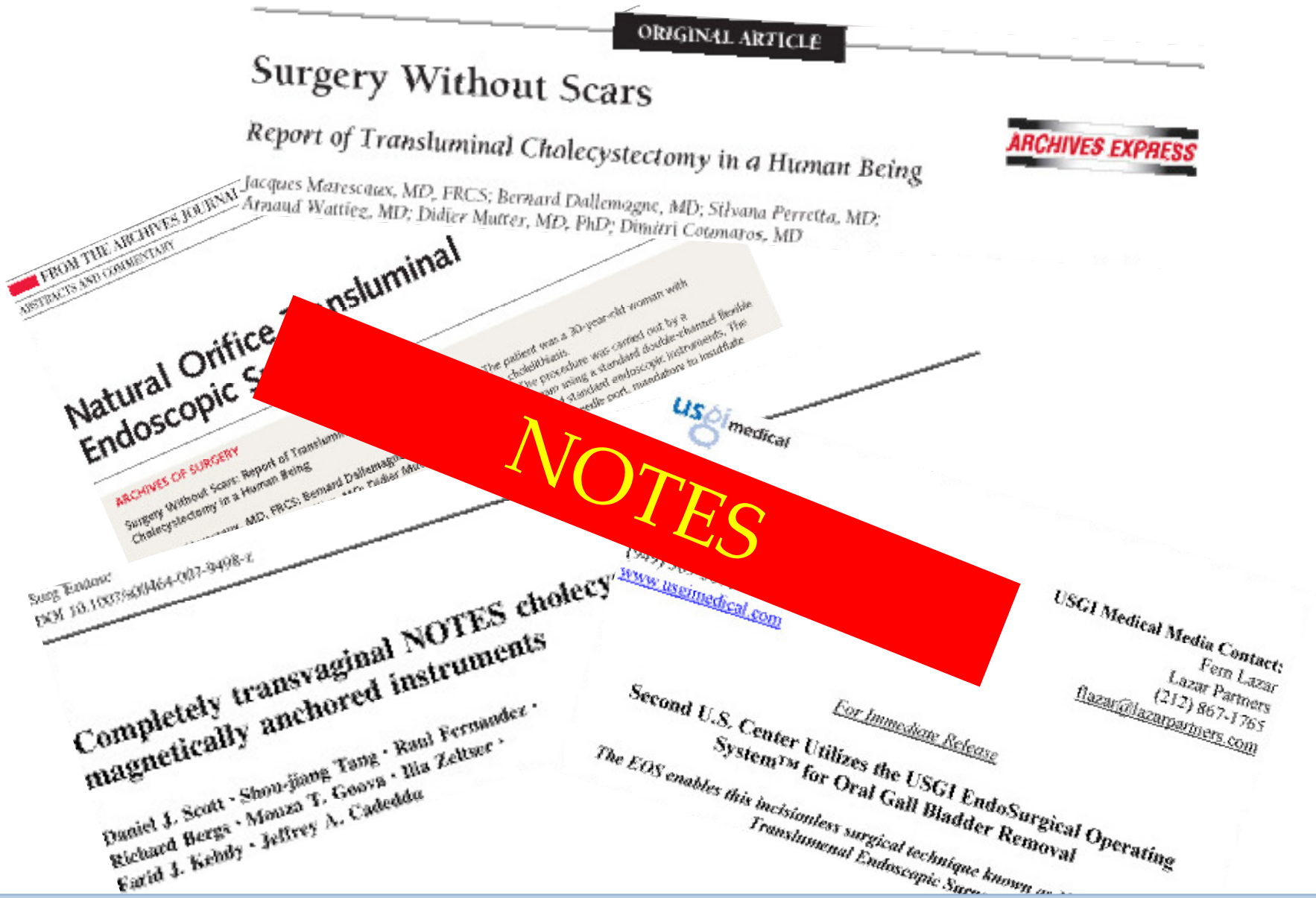
Our data shows that the best results are obtained with the mini-hysteroscopes of 3.4 mm

Classification of myoma: based upon their relation to the junctional zone ??

Transvaginal Endoscopy

A valid alternative ?




ORIGINAL ARTICLE
Surgery Without Scars
Report of Transluminal Cholecystectomy in a Human Being
ARCHIVES EXPRESS
Jacques Marescaux, MD, FRCS; Bernard Dallemagne, MD; Silvana Perretta, MD; Arnaud Wattiez, MD; Didier Mutter, MD, PhD; Dimitri Coumaros, MD
FROM THE ARCHIVES JOURNALS
ABSTRACTS AND COMMENTARY
Natural Orifice
Endoscopic S
nsluminal
usgi medical
NOTES
Completely transvaginal NOTES cholecy
magnetically anchored instruments
Daniel J. Scott · Shou-jiang Tang · Raul Fernandez · Richard Bergs · Mouza T. Goova · Ilia Zeltser · Farid J. Kehdy · Jeffrey A. Cadeddu
www.usgimedical.com
For Immediate Release
Second U.S. Center Utilizes the USGI EndoSurgical Operating System™ for Oral Gall Bladder Removal
The EOS enables this incisionless surgical technique known
Transluminal Endoscopic
USGI Medical Media Contact:
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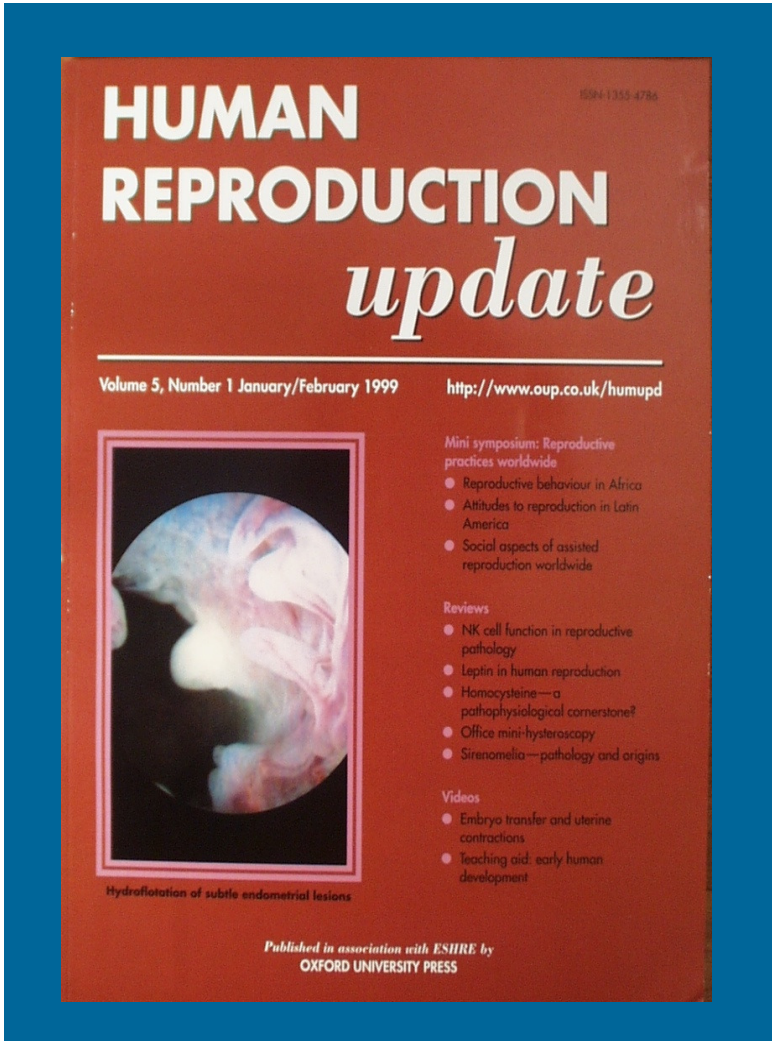
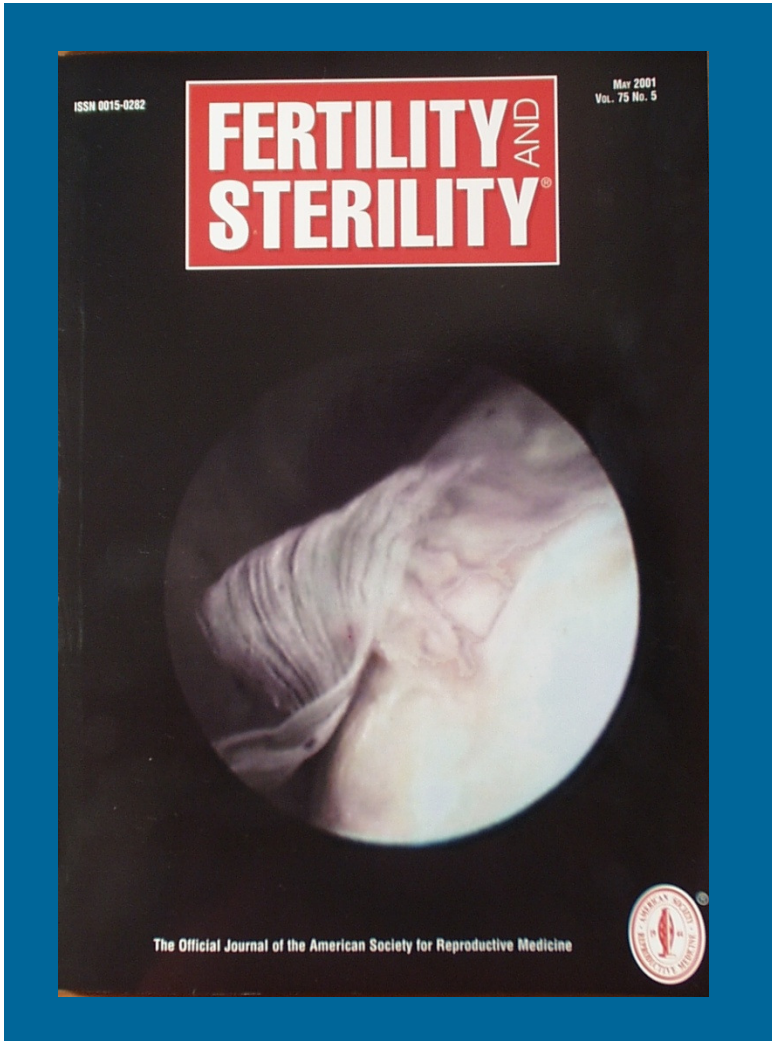
TVE

Watery distension medium





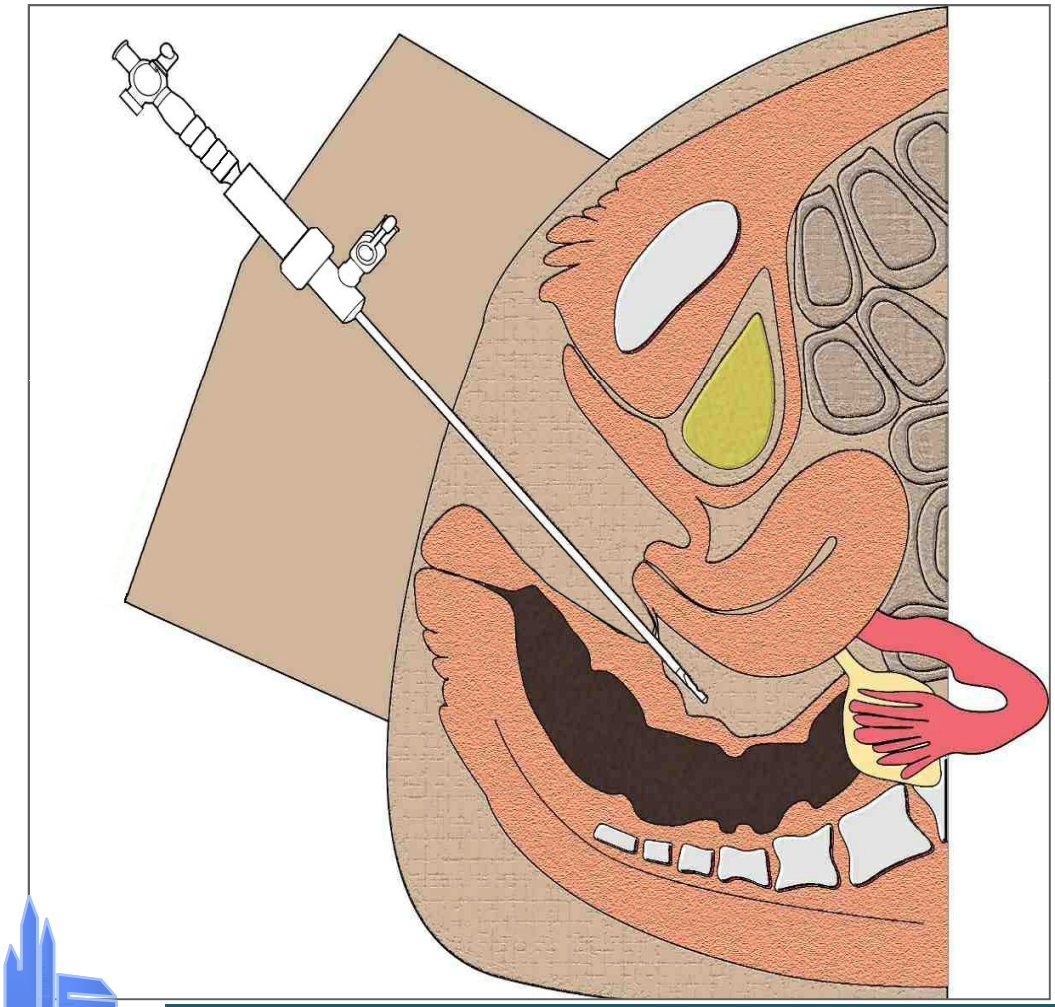
TRANSVAGINAL LAPAROSCOPY

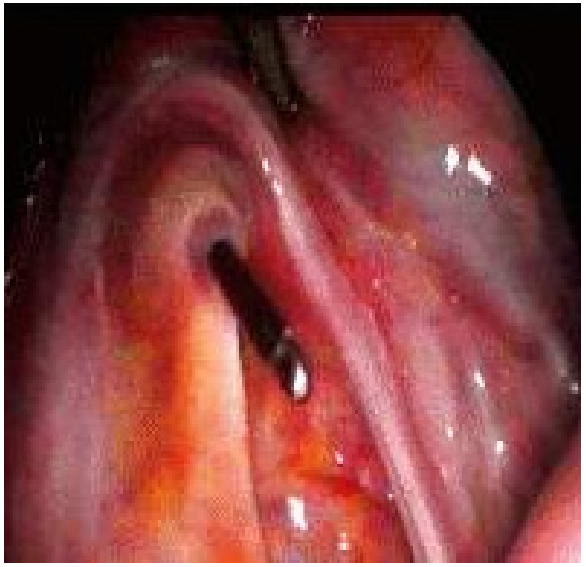
Selection of patients:

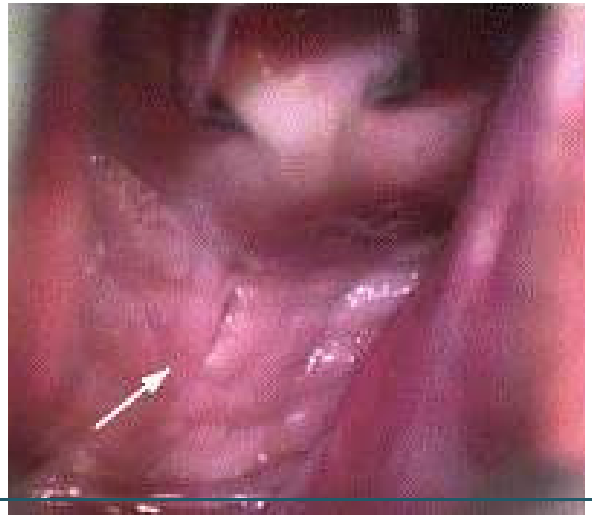
normal vaginal examination
normal vaginal ultrasound

Patients without obvious pelvic pathology

TECHNIQUE



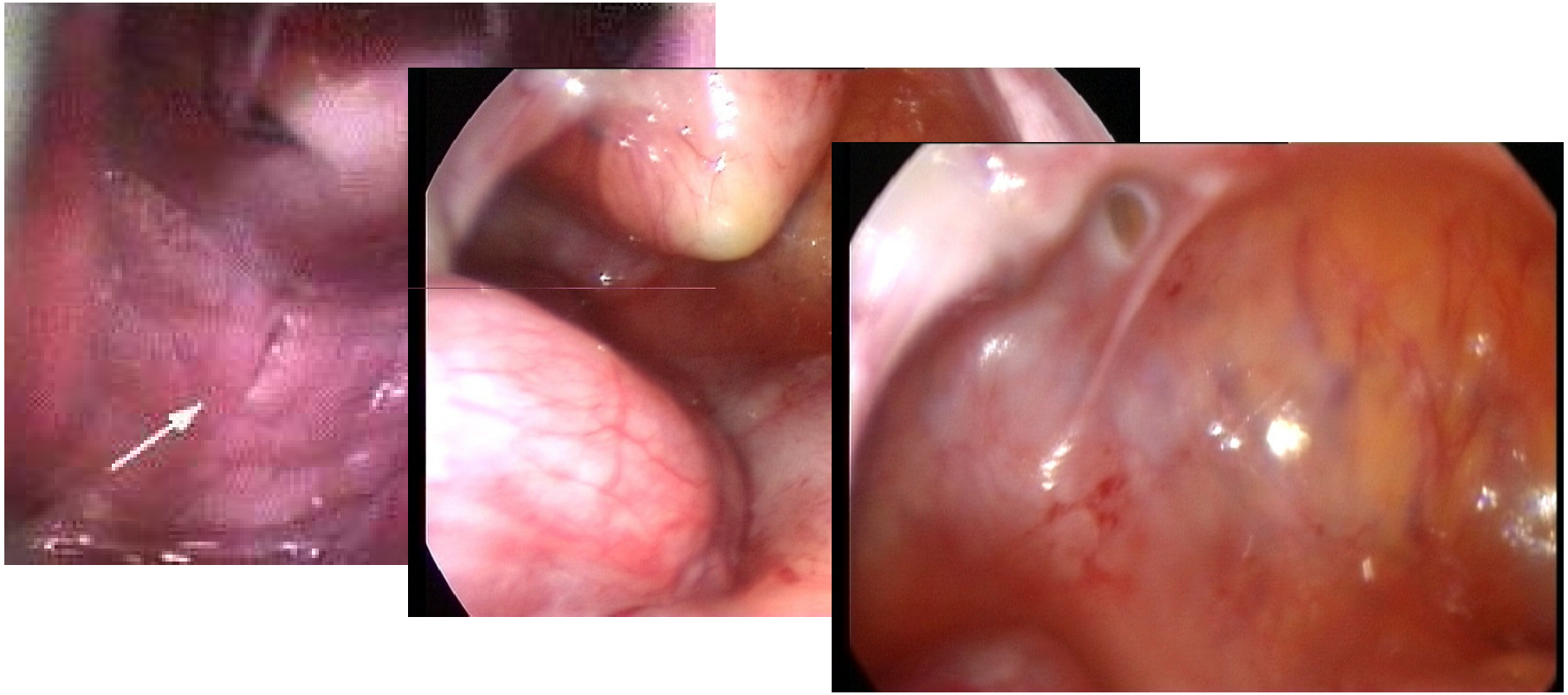




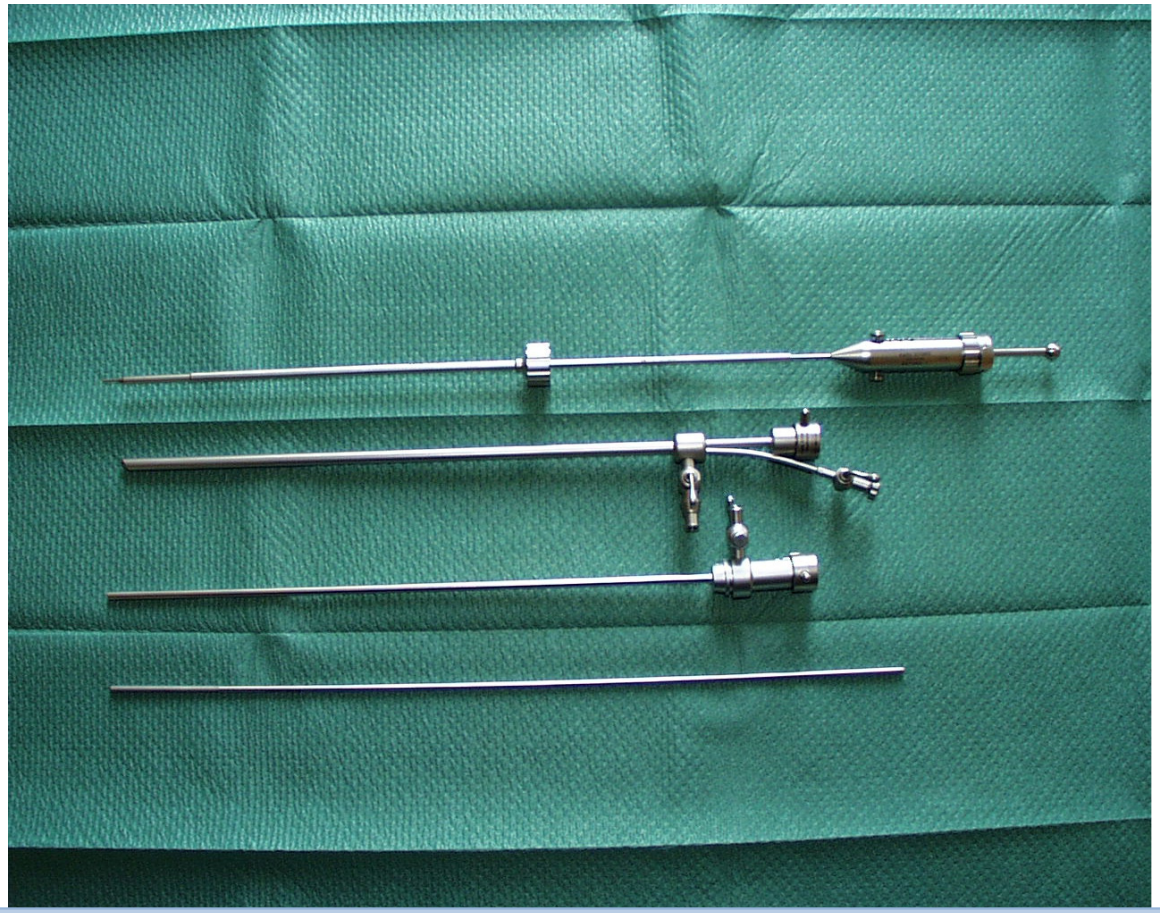
Instrumentation

Needle - dilator - trocar system

TECHNIQUE



INSTRUMENTS TRANSVAGINAL LAPAROSCOPY



TvL: Instrumentation

Needle - dilator - trocar system

TvL: Instrumentation

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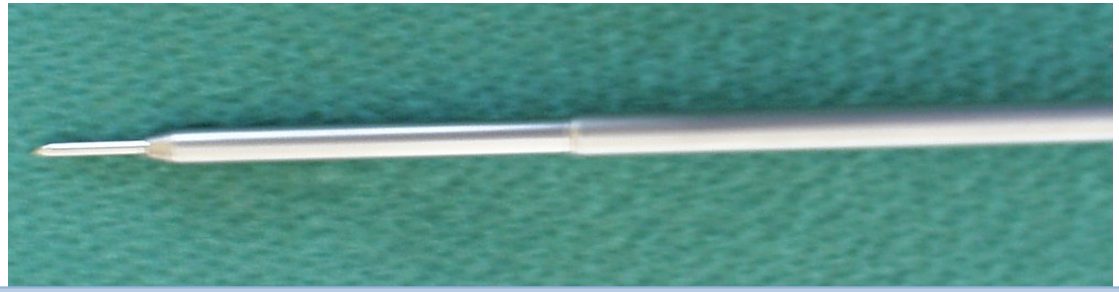
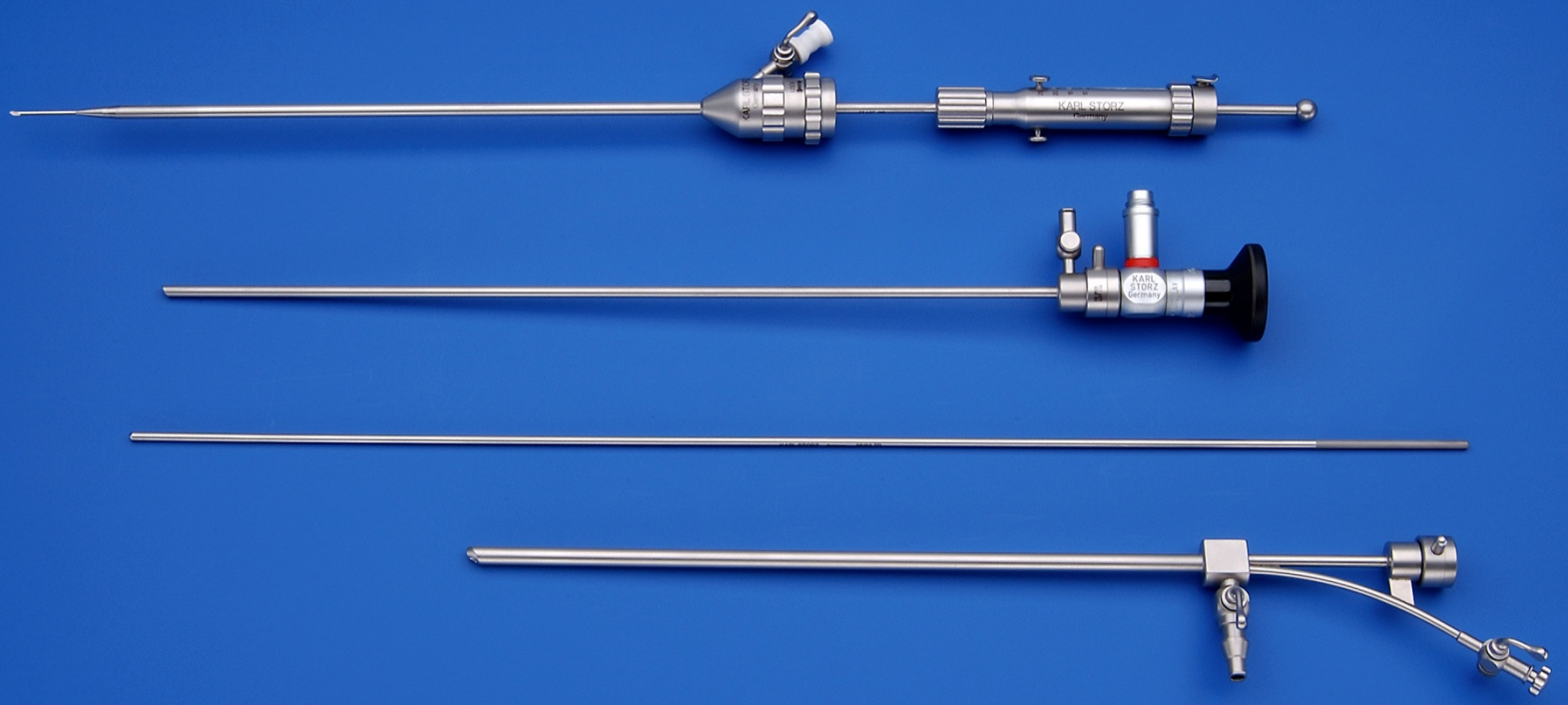
TvL: Instrumentation

Needle - dilator - trocar system

STORZ
KARL STORZ — ENDOSKOPE



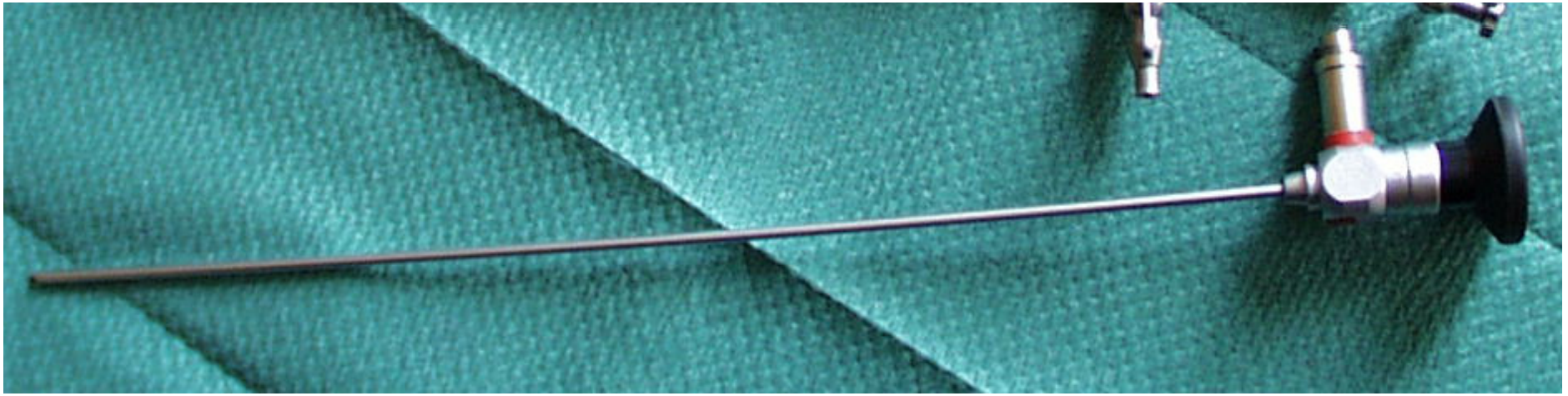
Instrumentation



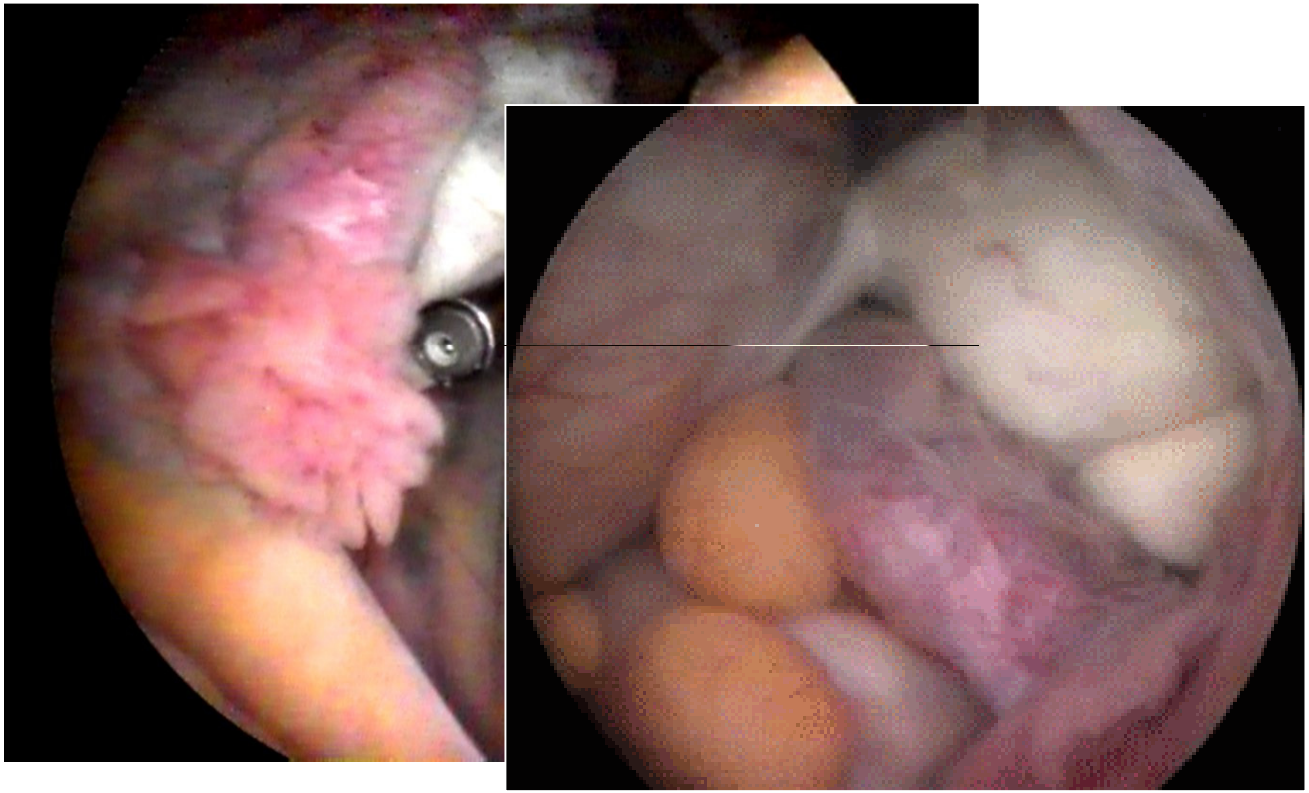
STORZ
KARL STORZ — ENDOSKOPE

TvL: Instrumentation

Endoscope (Hopkins, 30º, 2.9 mm)



TRANSVAGINAL LAPAROSCOPY



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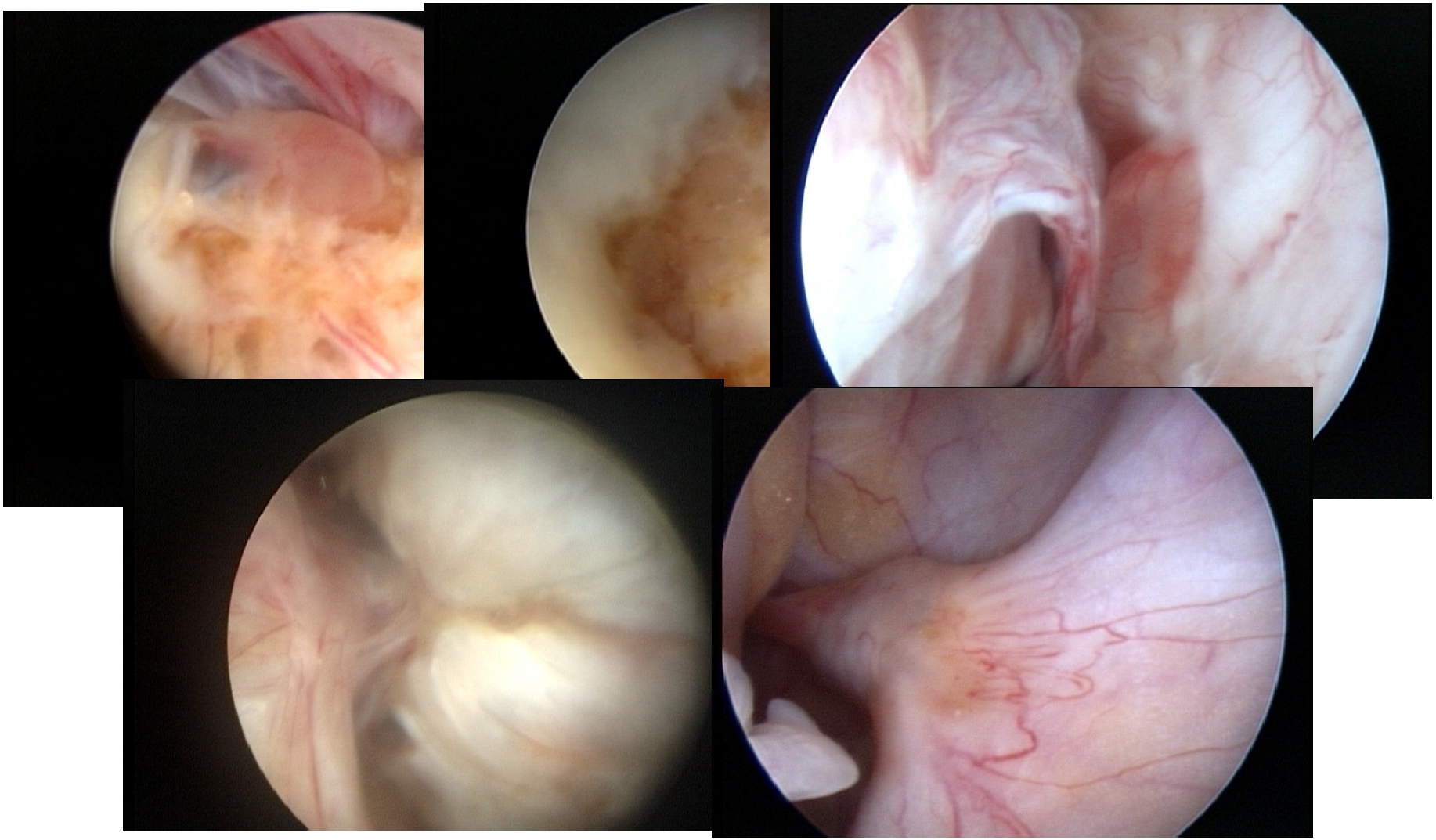
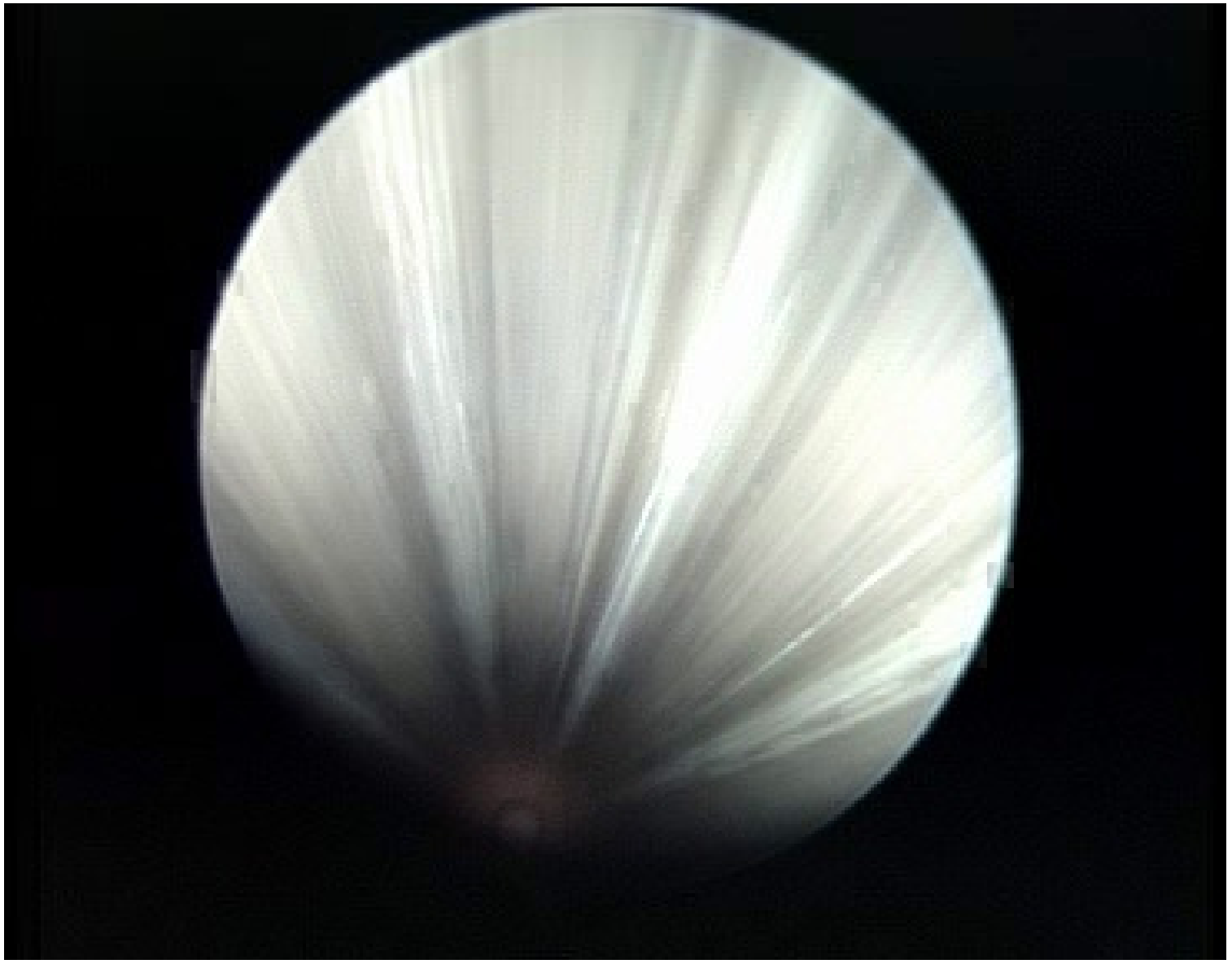




Transvaginal salpingoscopy

Advantages

- ampullary segment in axis of endoscope
- no extra manipulation
- hydroflotation allows easy detection of adhesions
- ambulatory procedure
- avoids delay in diagnosis & treatment
- accurate therapeutic management

Transvaginal salpingoscopy

Disdvantages

Immobilisation of tubes

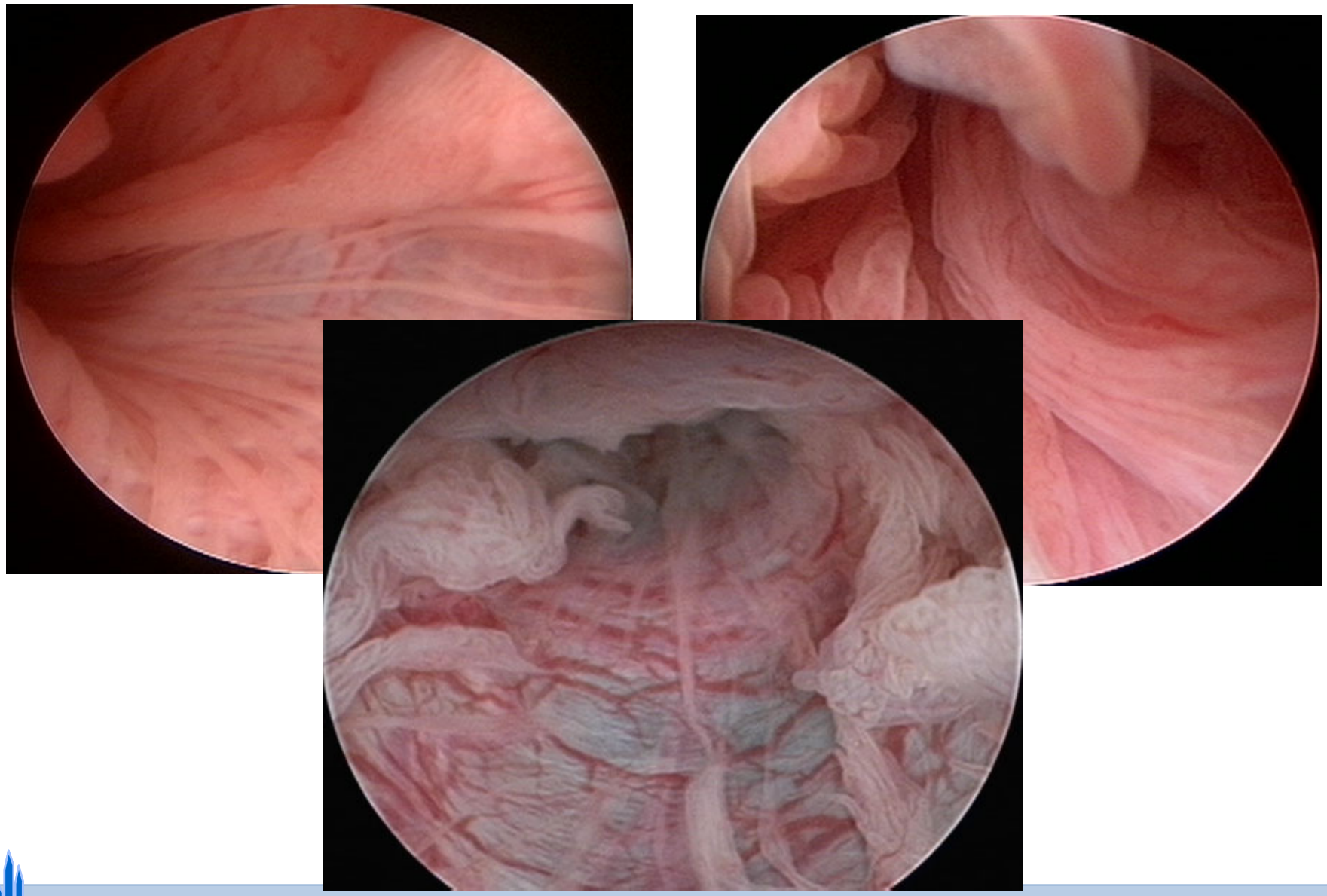
Abnormally positioned

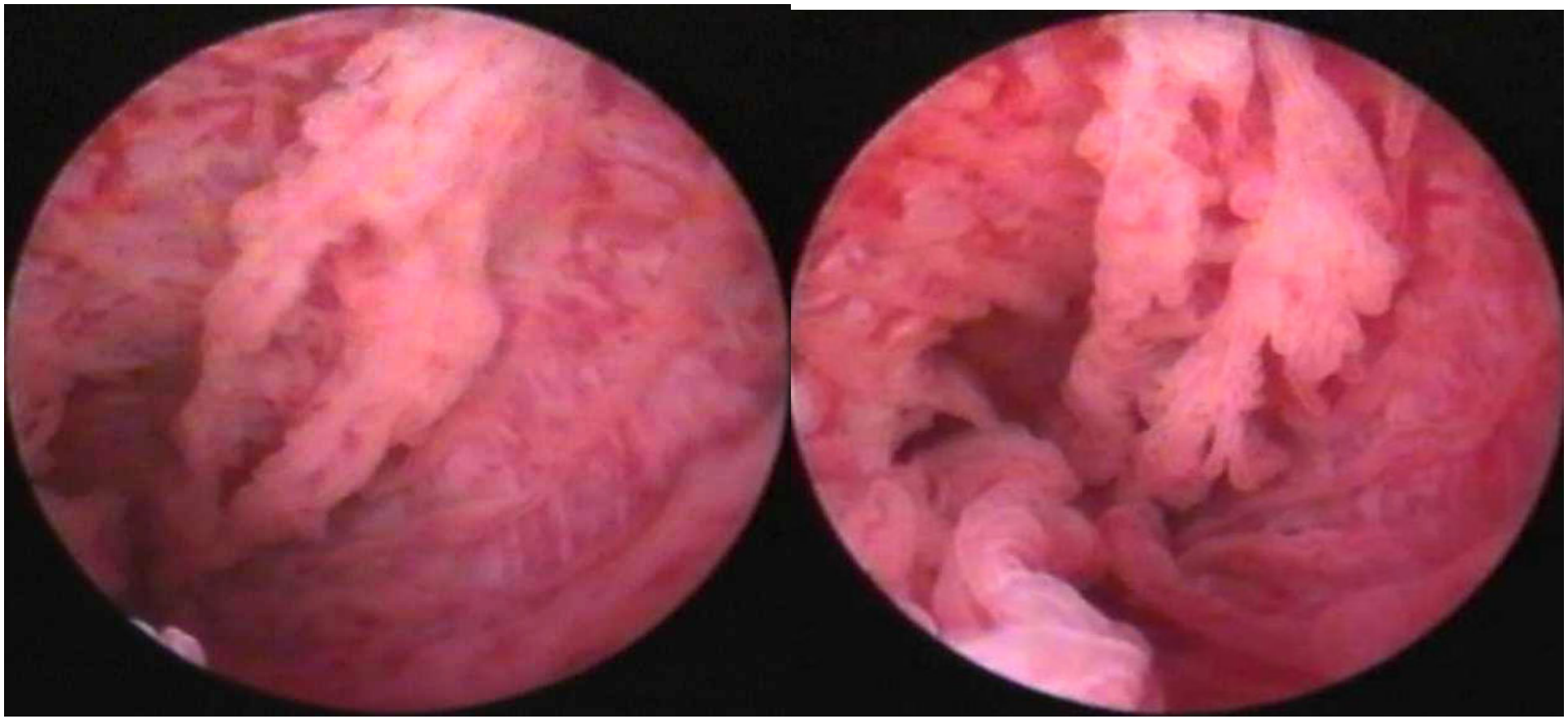
Transvaginal salpingoscopy

Feasibility

Access: 61% patients

	% attempted tubes
Peri-ovulatory phase	56 %
Early follicular Late luteal	36%






[EDIT] P01 L02 C01
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TRANSVAGINAL LAPAROSCOPY

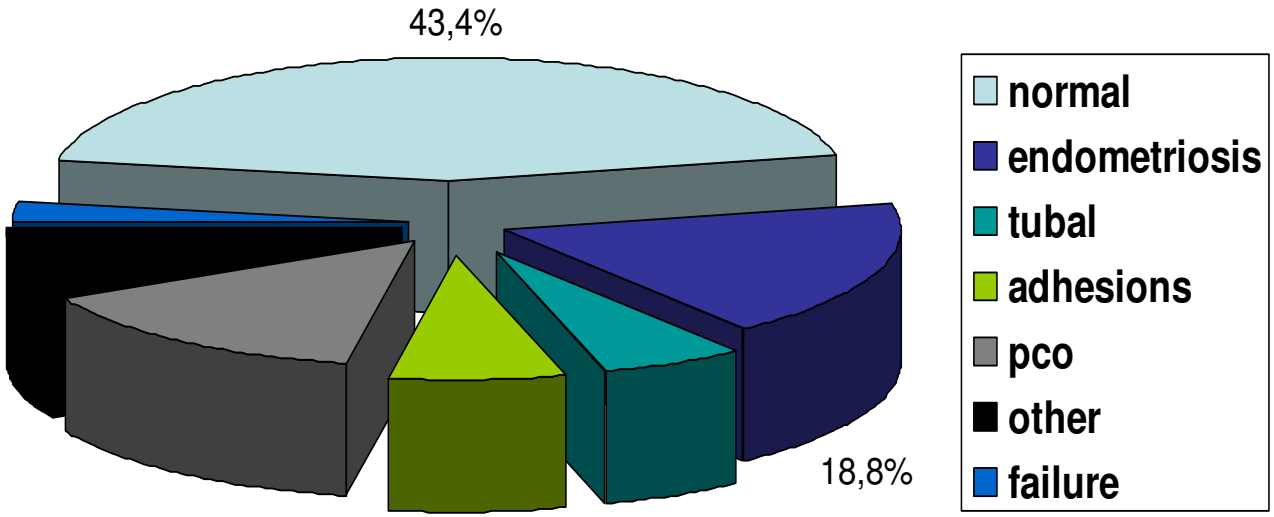
FEASIBILITY

ACCURACY

COMPLIANCE

SAFETY

FINDINGS OF 880 TVL PROCEDURES



TRANSVAGINAL LAPAROSCOPY

RESULTS

FAILURE RATE :	**3.4%**	**(23/663)**
COMPLICATION RATE :	**0.9%**	**(6/663)**
hematoma broad ligament:		**1**
bowel perforation:		**5**

TRANSVAGINAL LAPAROSCOPY

RESULTS

Minor problems (n=663)

inadvertent puncture uterus:	5
vagal reaction:	7
bleeding vagina:	1

TRANSVAGINAL ENDOSCOPY FEASIBILITY

		N	Failure	Compl
Moore M	*JAAGL 2001*	40	0%	0%
Moore M	*JAAGL 2003*	109	0.9%	0.9%
Watrelot	*Hum. Reprod,1999*	160	3.8%	0.6%
Dechaud	*E JObst.Gyn,2001*	23	4.3%	0%
Darai	*Hum Reprod 2000*	60	10%	1.9%
Shibahara	*Hum Reprod 2001*	41	7.3%	0%

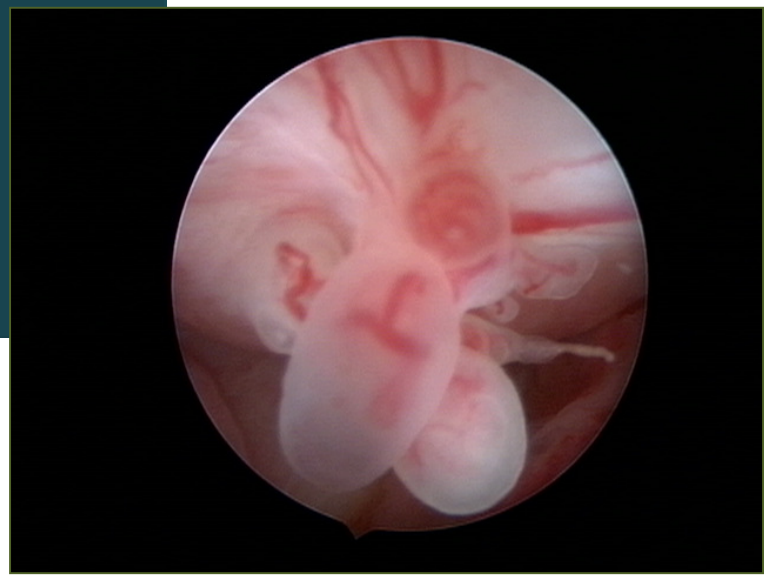
TRANSVAGINAL LAPAROSCOPY

FEASIBILITY

ACCURACY

COMPLIANCE

SAFETY



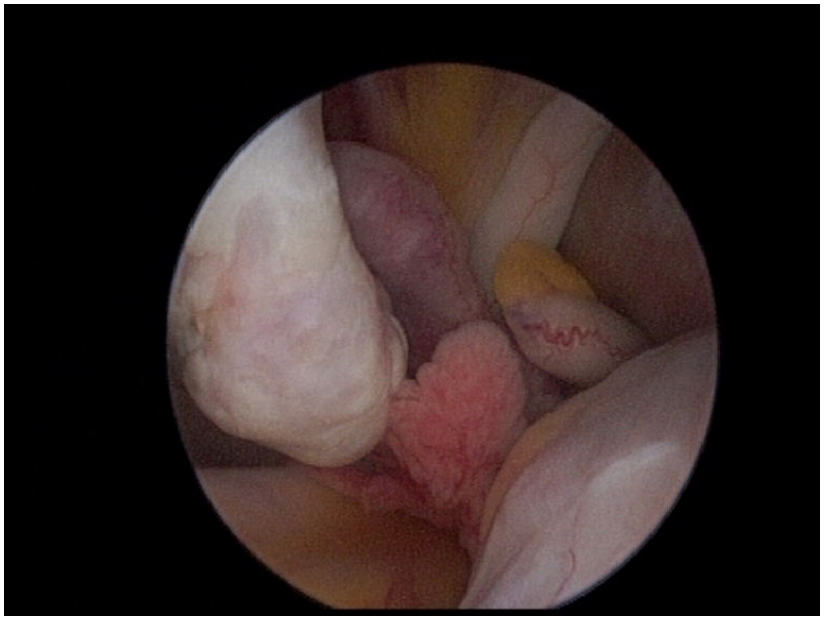
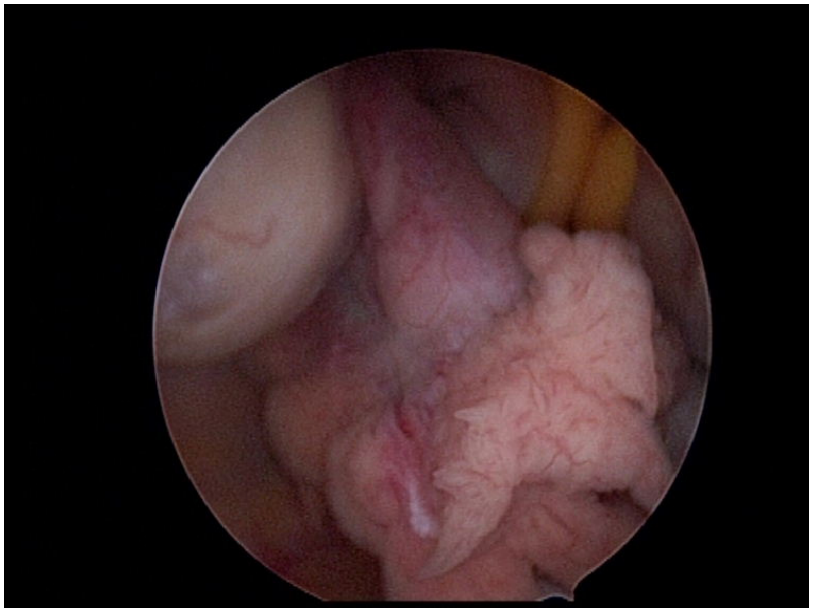
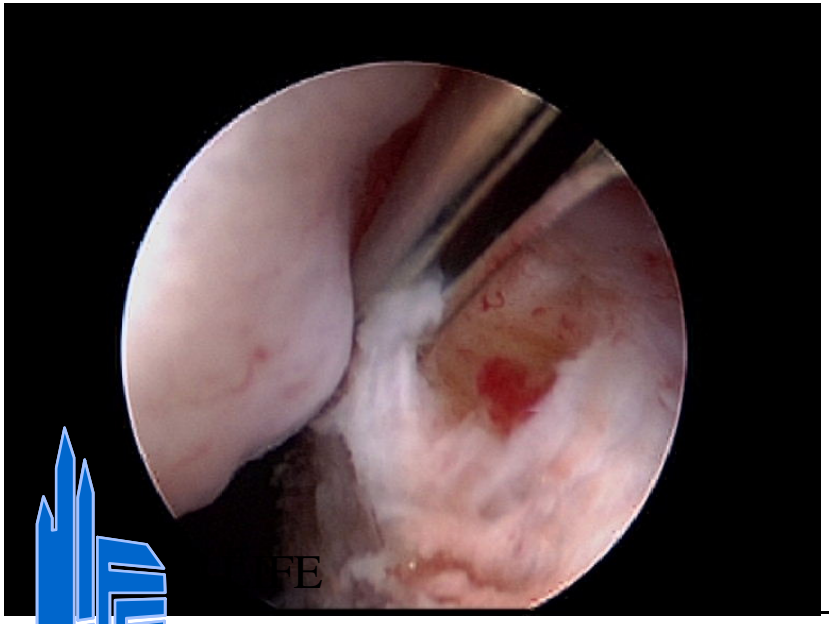
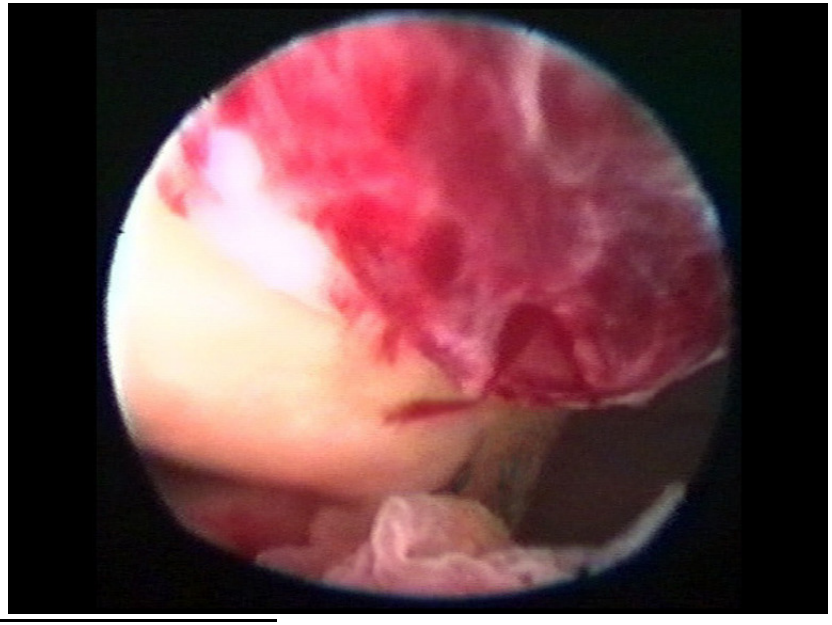
Transvaginal Laparoscopy versus Hysterosalpingogram

	nl HSG	abnl THL
Moore (2001)	9	5 (56%)
Dechaud (2001)	23	9 (39%)
Durai (2000)	54	14 (26%)
Watrelot (1999)	155	79 (51%)
Total	241	106 (44%)

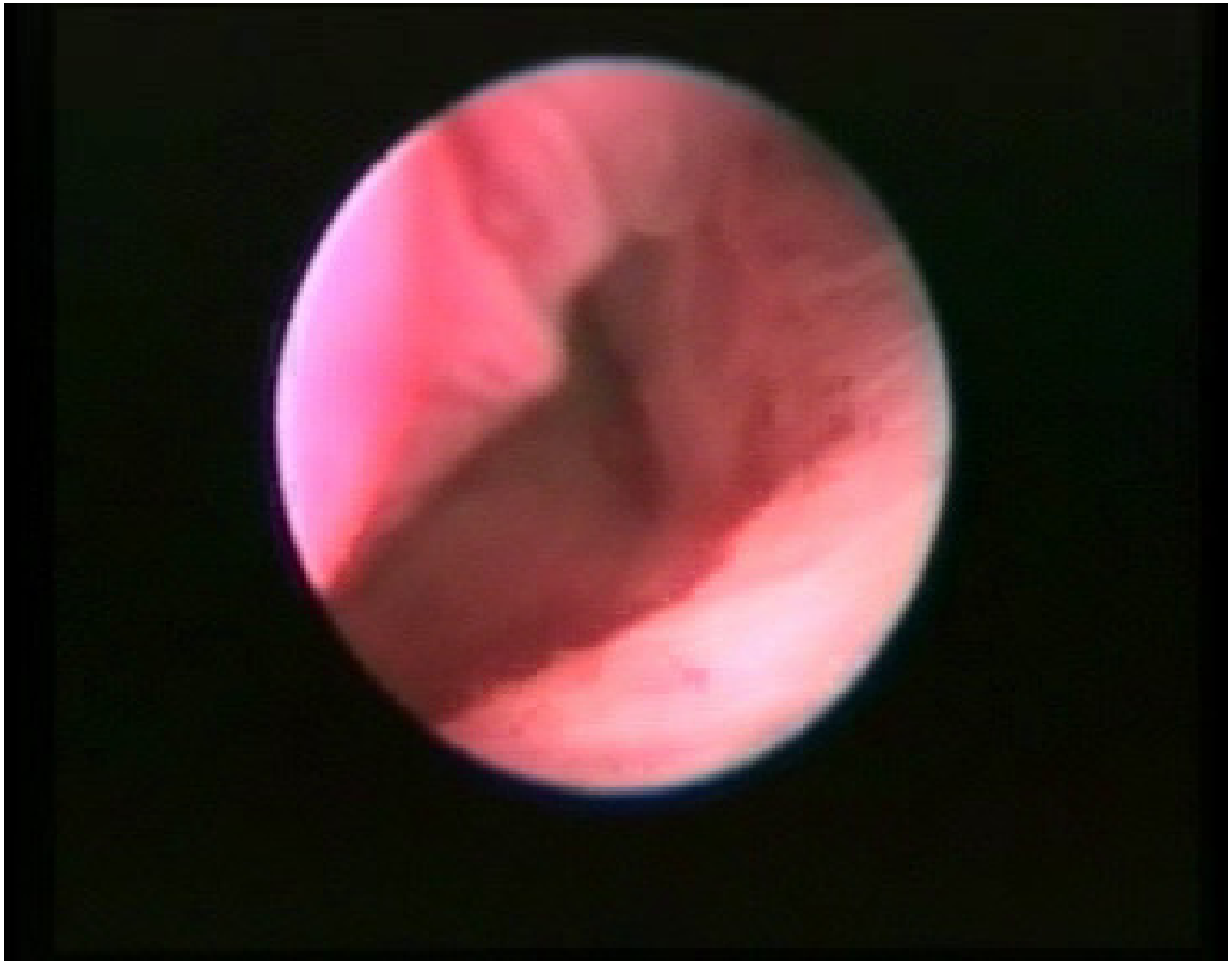
TRANSVAGINAL LAPAROSCOPY DIAGNOSTIC ACCURACY

Subtle (endometriotic) ovarian adhesions

	mild endometriosis	unexplained infertility
S. laparoscopy	40%	0%
Transv.laparoscopy	70%	45%

Video Clip Showing the Event of Ovulation



TRANSVAGINAL LAPAROSCOPY

FEASIBILITY

ACCURACY

COMPLIANCE

SAFETY

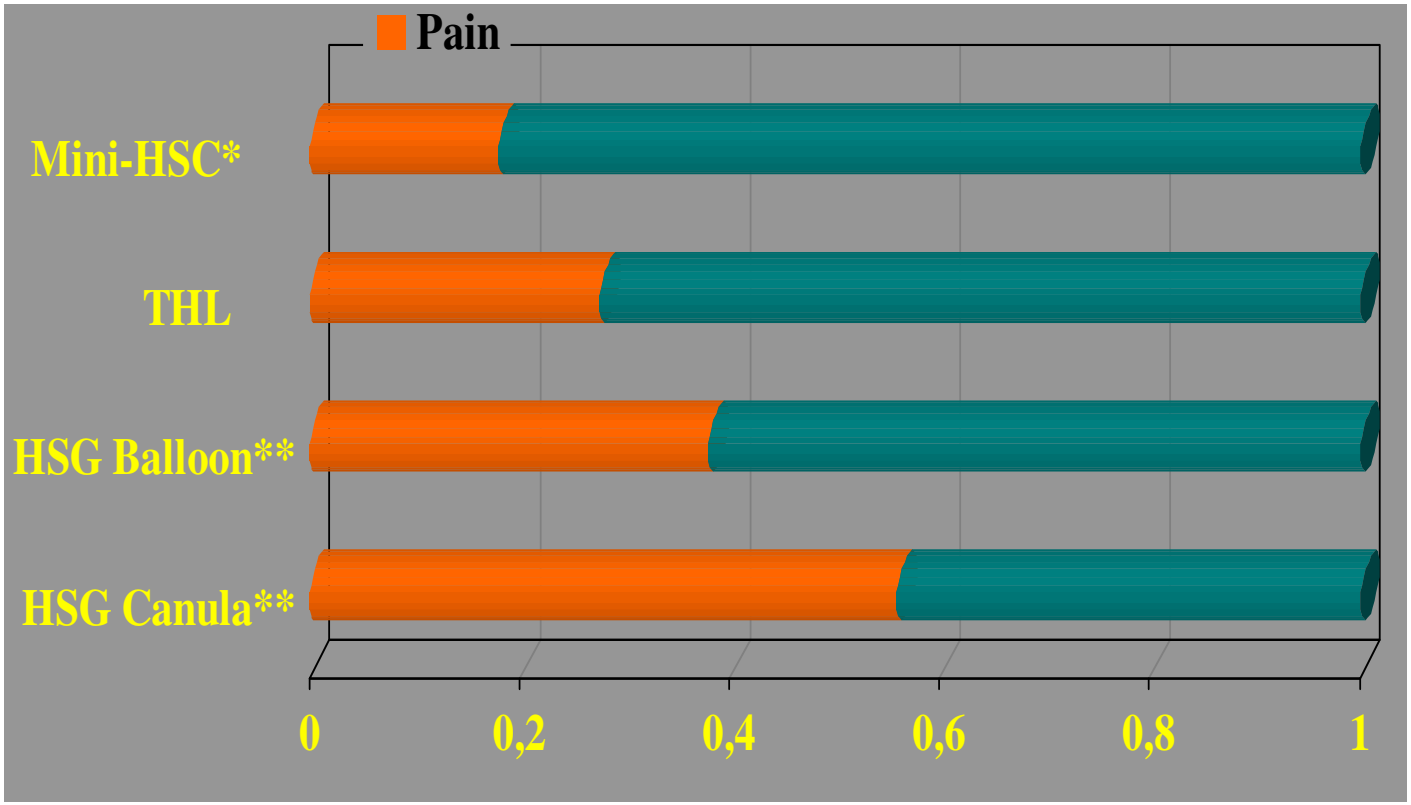
TRANSVAGINAL LAPAROSCOPY PATIENT'S TOLERANCE

Pain score

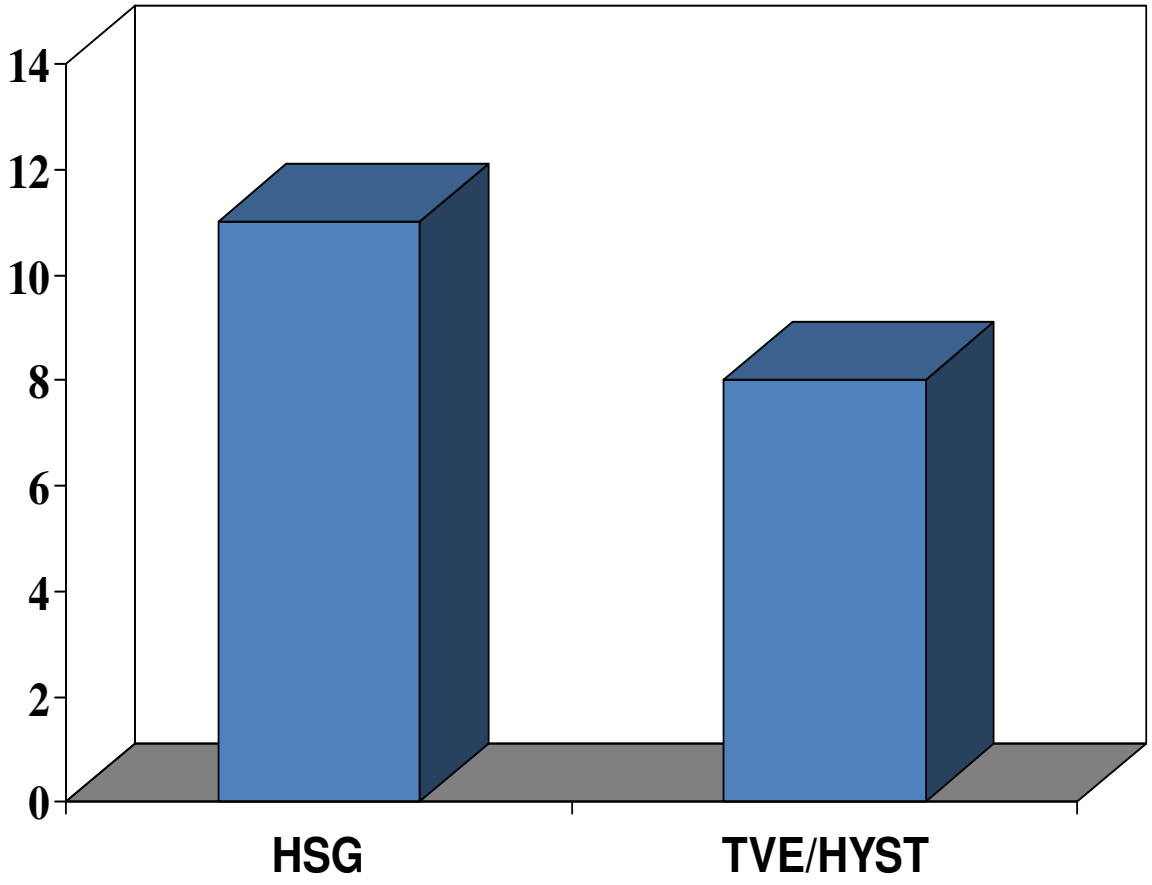
Repeat procedure

96% 4%

Transv.endoscopy : Compliance



TRANSVAGINAL ENDOSCOPY
PATIENT'S TOLERANCE



Cicinelli, 2001

TRANSVAGINAL LAPAROSCOPY

FEASIBILITY

ACCURACY

COMPLIANCE

SAFETY

Transvaginal Laparoscopy

Complications

(Verhoeven et al. Gyneco Surg 2004)

Personal series of 1,000 cases :

- Access failure 3.2%
- Intraperitoneal bleeding 1.9%
- Bowel injury (nb>50) 0.1%
- Infection 0.2%

No life-threatening complication

TRANSVAGINAL LAPAROSCOPY

TVL BOWEL INJURY SURVEY

Retrospective, including initial experience

By questionnaire

Multi-national: 32 participants, 16 countries

Criterium: full thickness lesion

TVL BOWEL INJURY SURVEY

# procedures	# bowel injuries
1 - 50	11/860 (1.3%)
> 50	4 /1266 (0.3%)*
All	15/2126 (0.7%)

* p = 0.02

TVL BOWEL INJURY SURVEY

Prevalence:	**0.7%**
Retroperitoneal:	**84%**
Size:	**2-5mm**

No leakage

Expectant management (14/15)

No delayed diagnosis

Survey Transvaginal Laparoscopy (Sept 07)

Pubmed & Scopus: 27 original papers
excluded papers from pioneering centres and already included in first survey

Procedures	2843
Major complications(sepsis,abcess)	0
Minor complications	
Bowel (antibiotics, no consequence)	10 (0.35%)
vaginal hemorrhage	6
puncture post uterine wall	3
suspected PID	2
Total	21 (0.74%)

TRANSVAGINAL LAPAROSCOPY

Bowel injuries and infections using a transvaginal access for pelviscopy

	Nb	Perf	Inf
Riva (1960)	2850	11	0
Diamond (1978)	4000	5	1
Gordts (2001)	3667	24	0
Current review	2843	10	0
Total	13360	50	1
		0.37%	0.007%

TRANSVAGINAL LAPAROSCOPY

CONTRAINDICATIONS

Acute pathology infection
bleeding

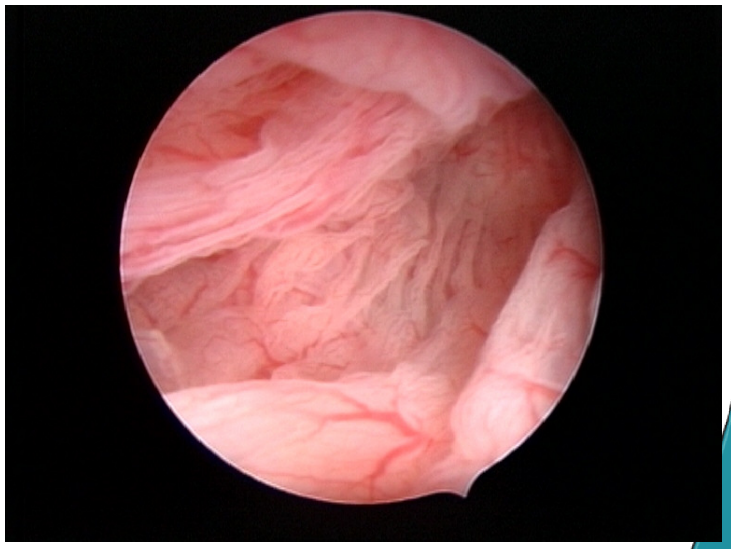
Obliterated pouch of Douglas
retroversion
recto vag. endom.

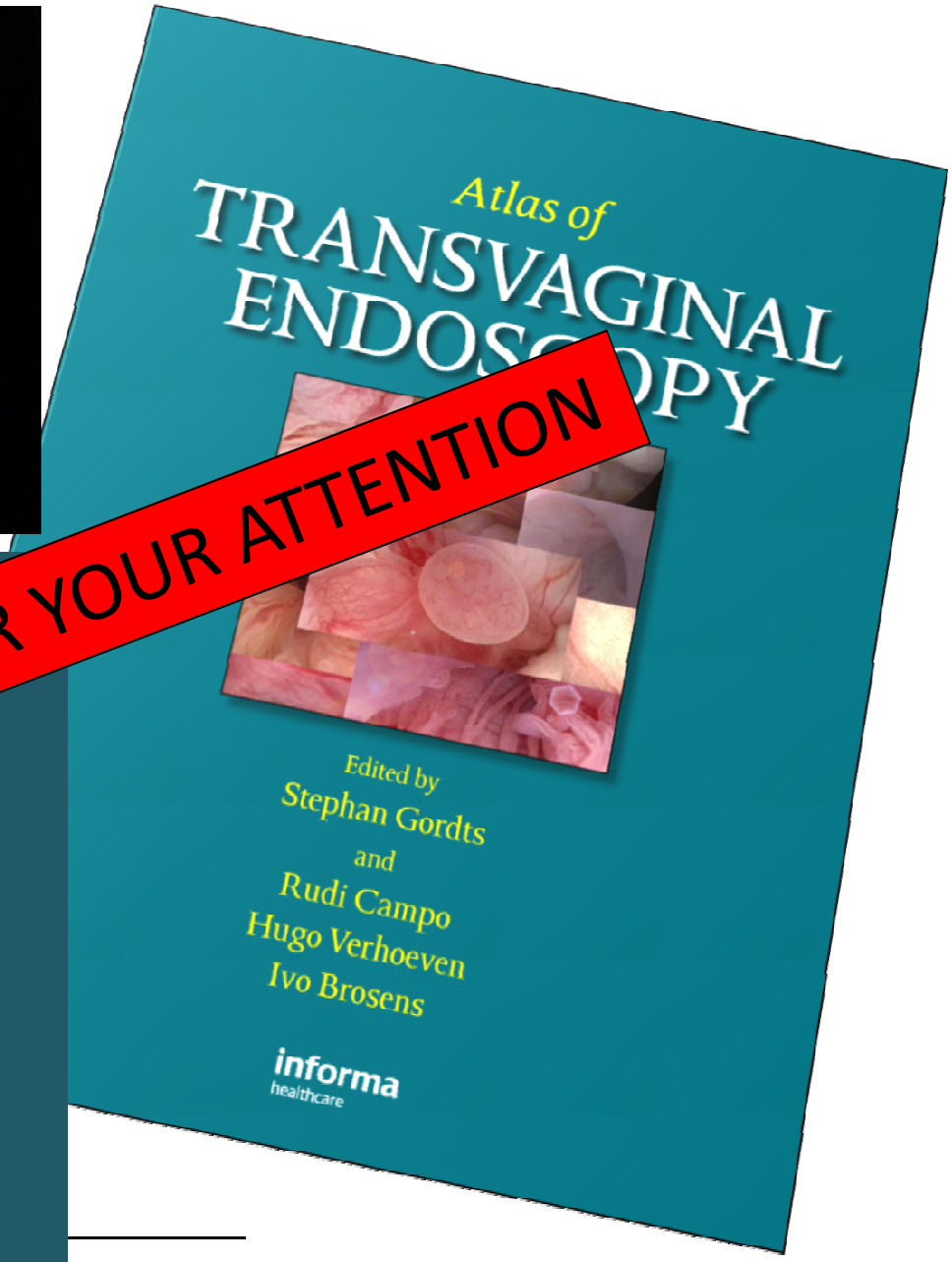
Conclusions (1)

- Transvaginal endoscopy (TVE) overcomes many limitations and combines many advantages of the traditional diagnostic methods for infertility investigation.
- TVE is a feasible, accurate and well tolerated procedure with low complication rates.
- TVE can offered as a *first-line diagnostic* office procedure for the investigation of infertility.

Conclusions (2)

- Because of *hydro-flotation* TVE can detect very incipient lesions that might be the cause of the so-called unexplained infertility.
- TVE is the ideal strategy for a "one-stop" fertility clinic.(hysteroscopy, laparoscopy, patency test, salpingoscopy)
- First application of NOTES





THANK YOU FOR YOUR ATTENTION

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