

Sonographer led HyCoSy service

Angela Clough

Advanced Practice Sonographer

Derriford Hospital, Plymouth

BMUS Gynae Study Day, Sheffield

26/4/24

Overview

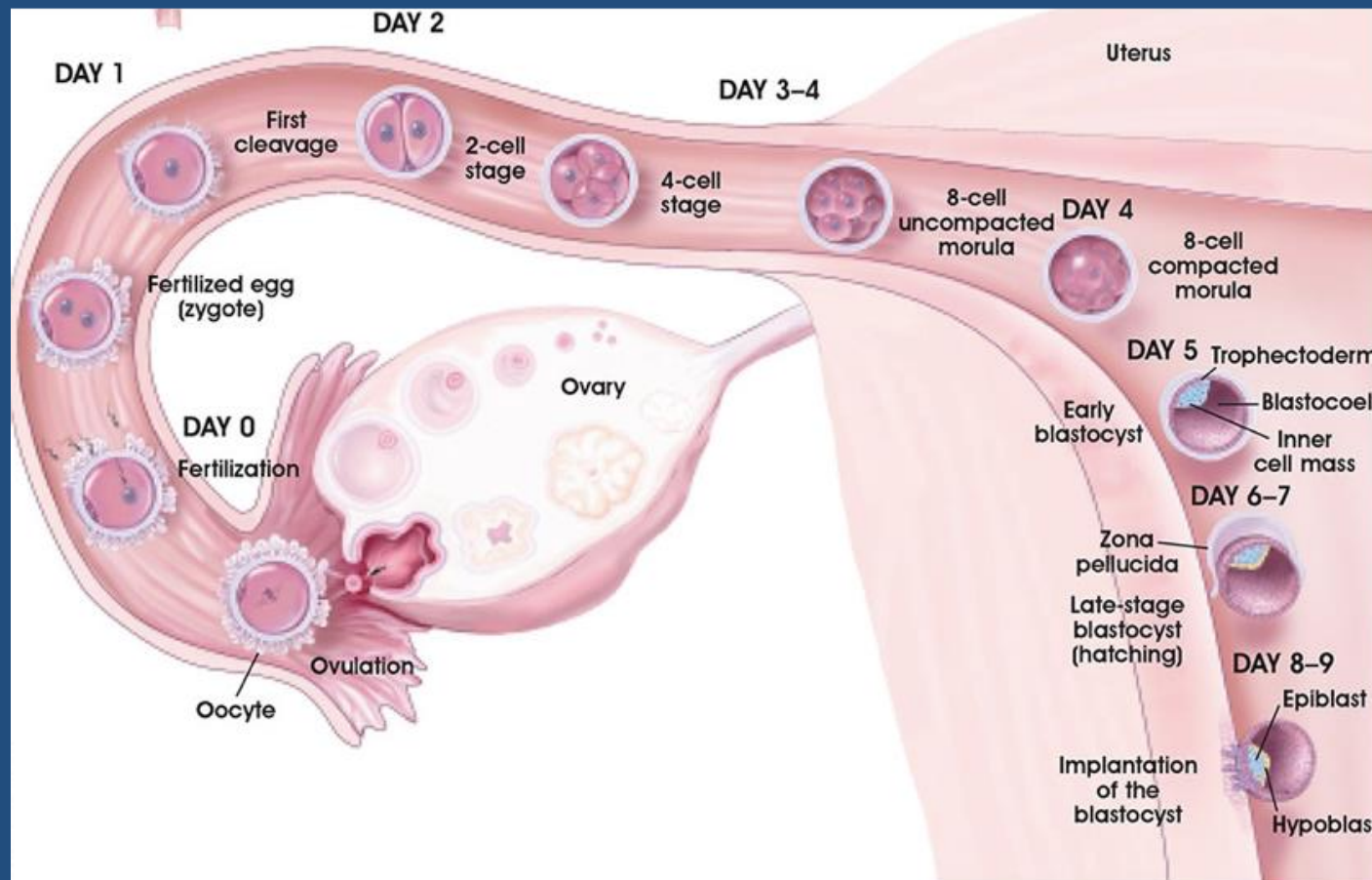
- Role of tubal assessment in Infertility
- HyCoSy compared with established techniques
- HyCoSy technique + reporting

Tubal factors in infertility



- Occlusion of tubes is the most common cause of infertility in women and
- Accounts for 12% -33% of infertility overall
- 186 million people affected worldwide

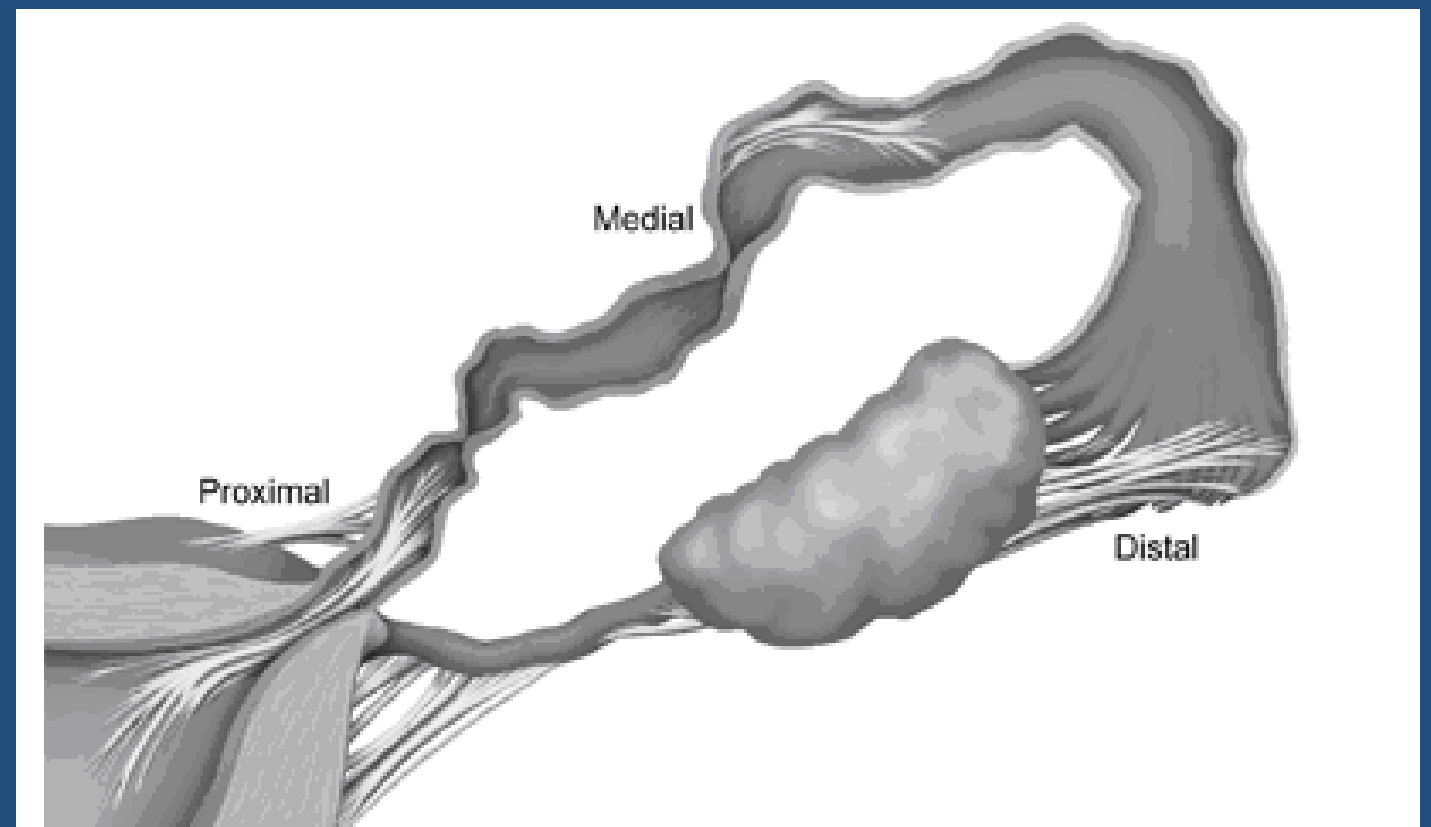
Tubal anatomy+pathology



Normal fallopian tube

- Highly specialized organ
- Endosalpinx has ciliated epithelial cells - important for movement, nutrition and development of embryo
- Muscle layer assists with movement

Abnormal fallopian tube -
Adhesions affecting isthmus,
endosalpinx, fimbrae, adjoining
peritoneum



Causes for tubal pathology

Infective tubal damage - STD - Chlamydia - Gonorrhoea - Mycoplasma genitalium

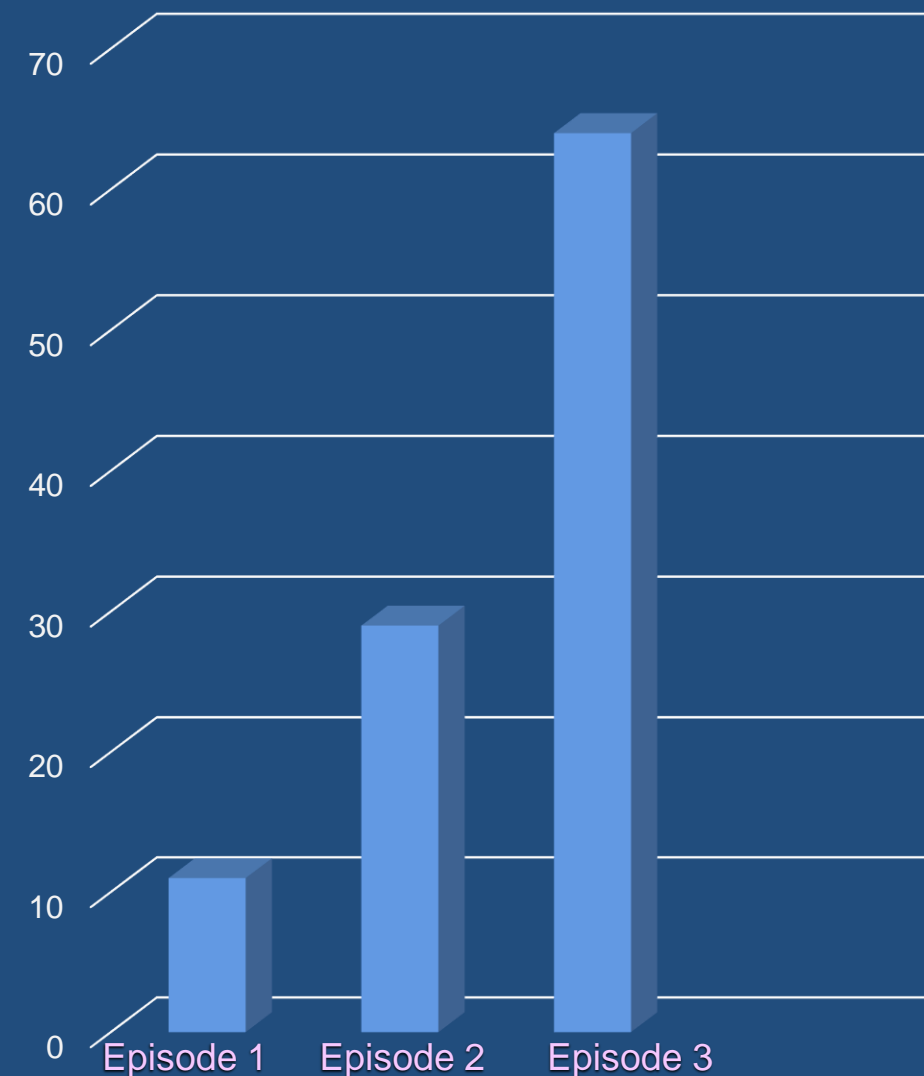
- Post pregnancy sepsis
- Insertion of IUD/IUS
- Genital tuberculosis

Structural damage

- Surgery
- Ectopic pregnancy

Other pathologies

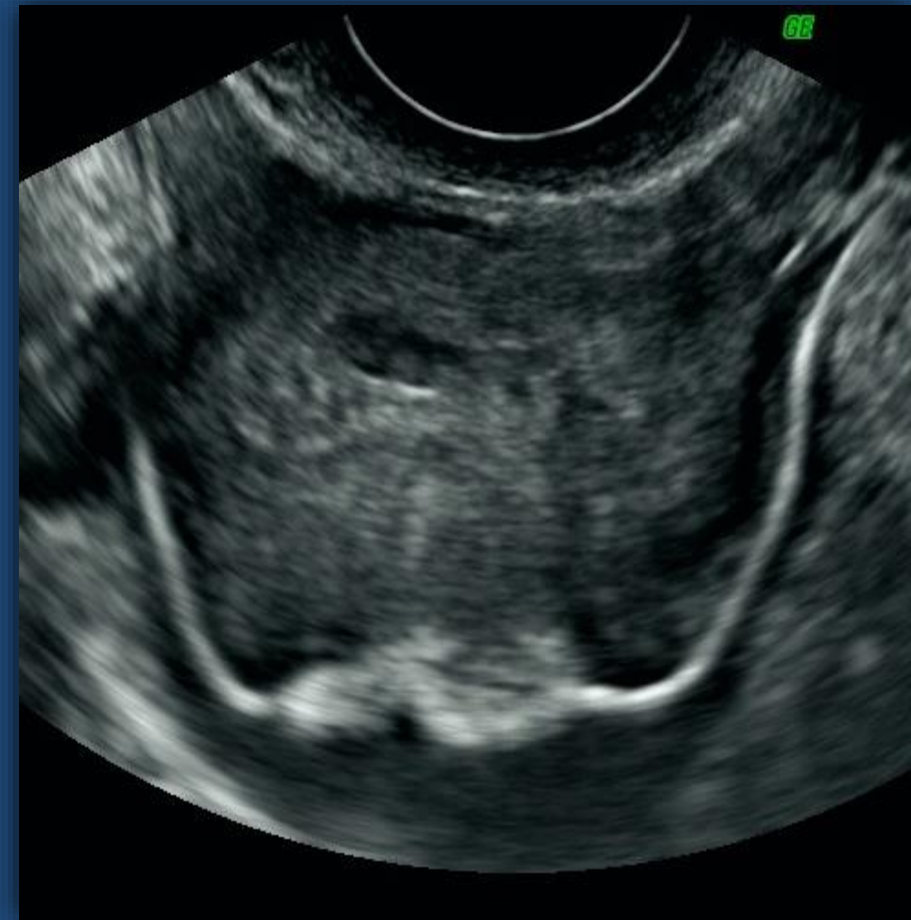
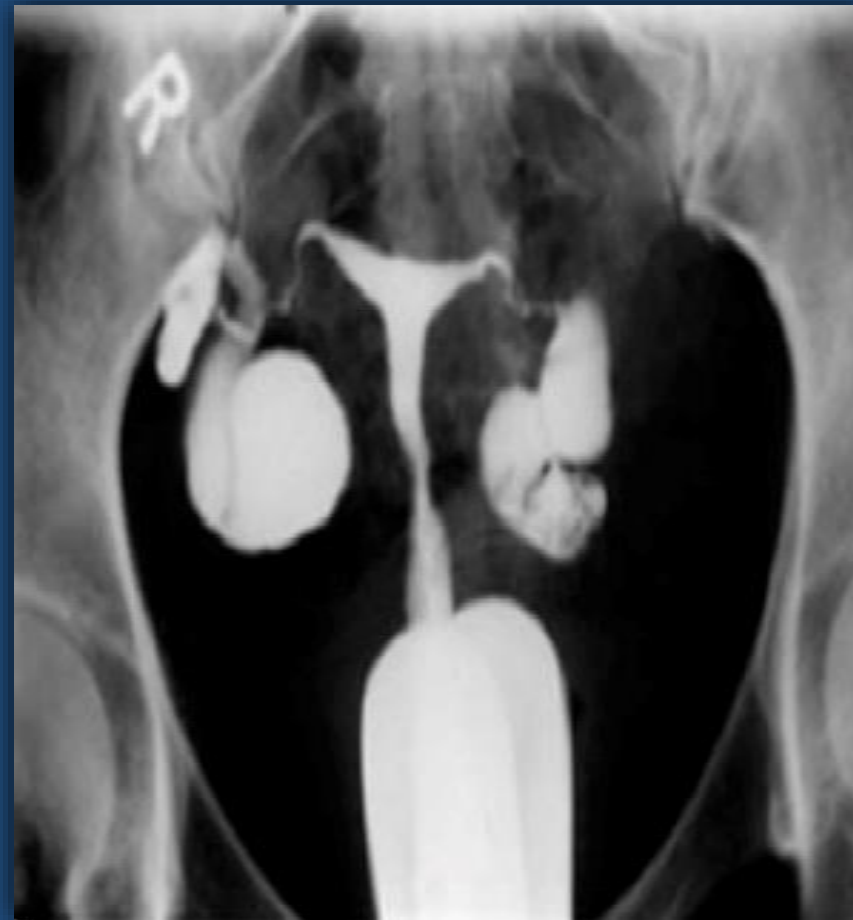
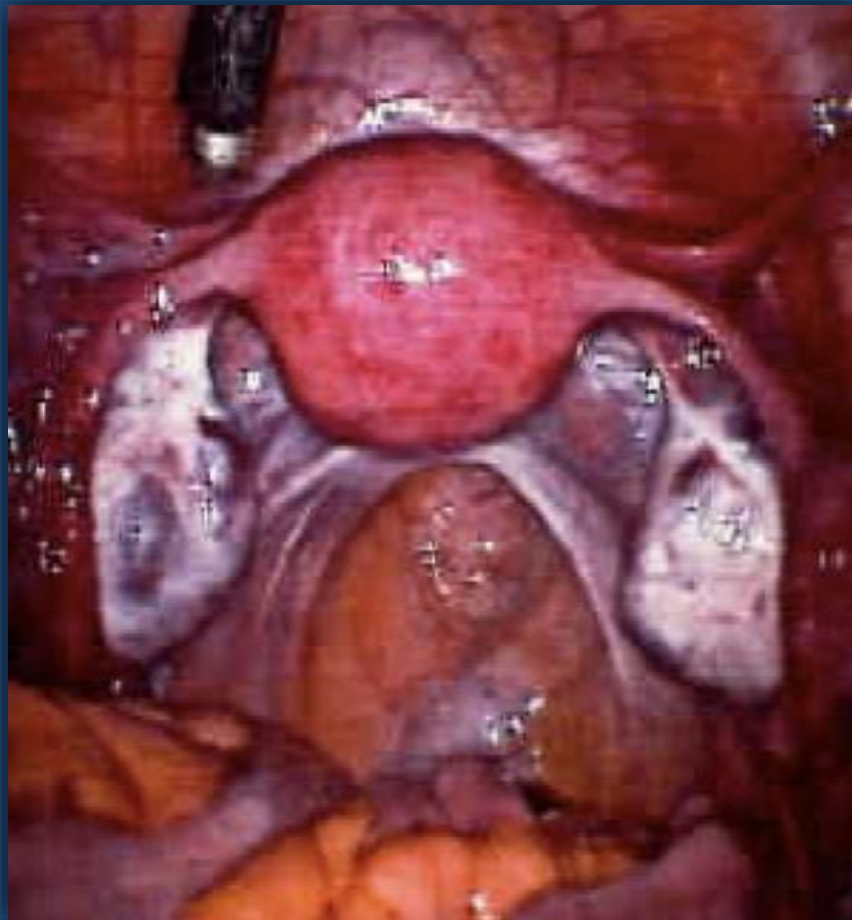
- Fibroids
- Endometriosis
- Appendicitis/diverticulitis



% Incidence of tubal occlusion after pelvic infection

Dun, 2012

Methods of tubal assessment

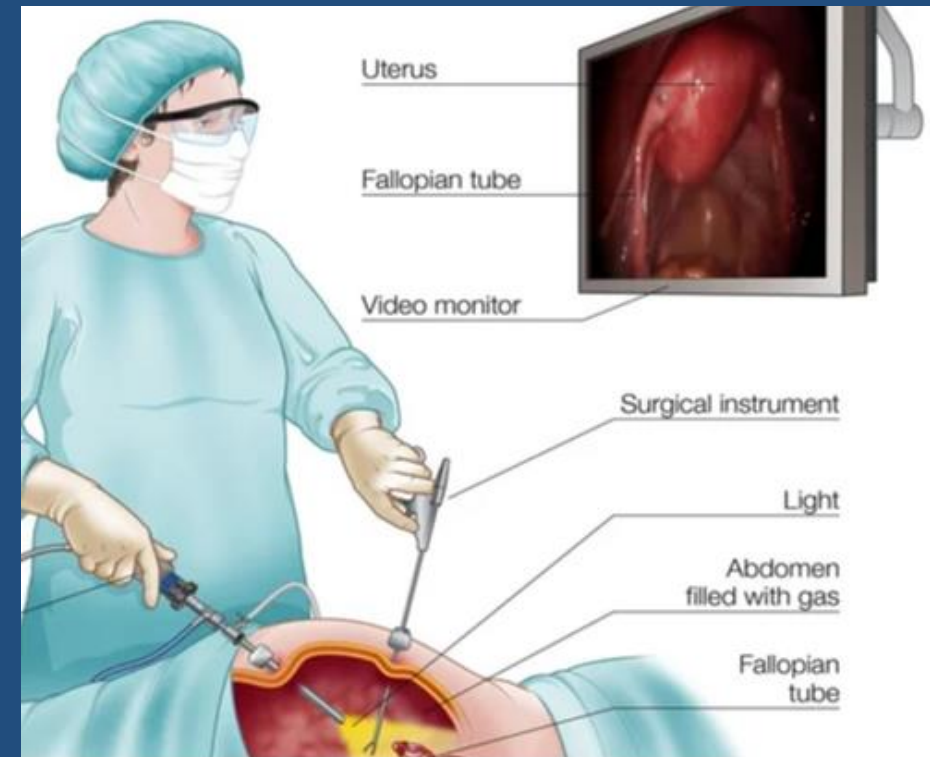


Laparoscopy and dye hydrotubation

- Diagnostic 'Gold Standard'
- Effective therapeutic options-
 - Adhesions
 - Fibroid resection
 - Endometriosis *

*(fertility improves by 13% over 9 months with Tx for endometriosis)

- Requires GA + recovery
- Risk of damage to uterus/bowel/blood vessels (0.13%)



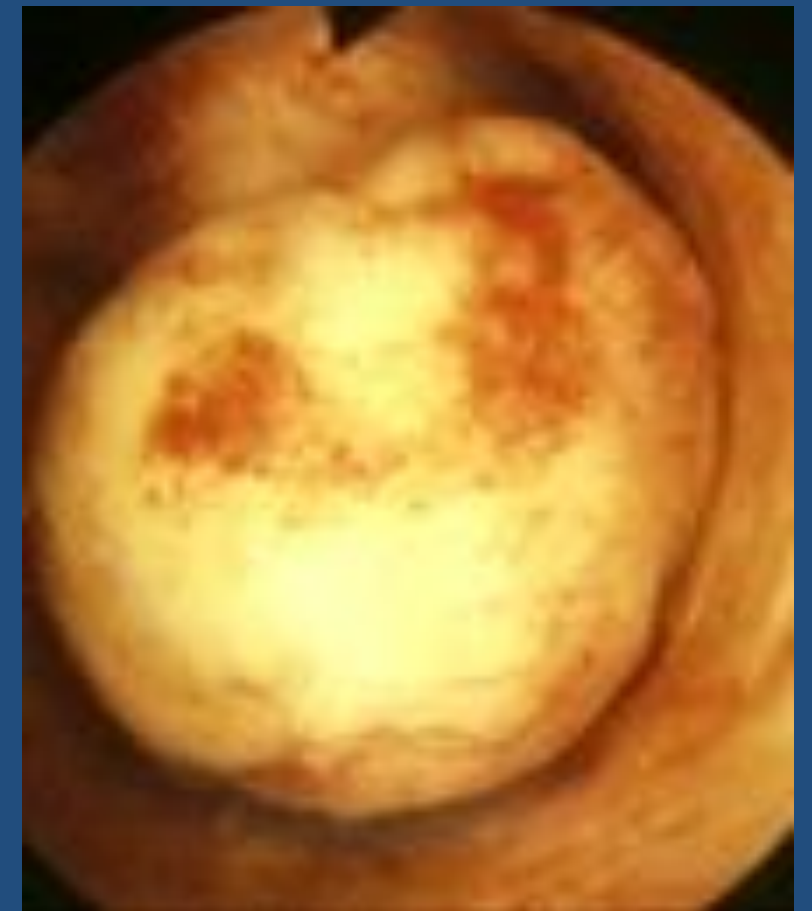
Hysteroscopy

Can diagnose and treat -

- Polyps/Fibroids/Adhesions/septum
- GA not always required

Risk of damage

- perforation,
- Ashermans syndrome,
- haemorrhage



Hysterosalpingogram

- Outpatient procedure
- Good detail of endosalpinx
- Locate site of blockage
- May be therapeutic/corrective
Selective transcervical recanalization
- Limited information on
cavity lesions/abnormality
- Ionizing radiation



HyCoSy

- Simple, convenient
- Well tolerated
- Good uterine and adnexal assessment
- May be therapeutic (flushing and/or immune response?)
- Limited detail of endosalpinx
- No current corrective treatment



CAT – Chlamydia antibody test

High sensitivity

Low specificity

Positive predictive value = 58%

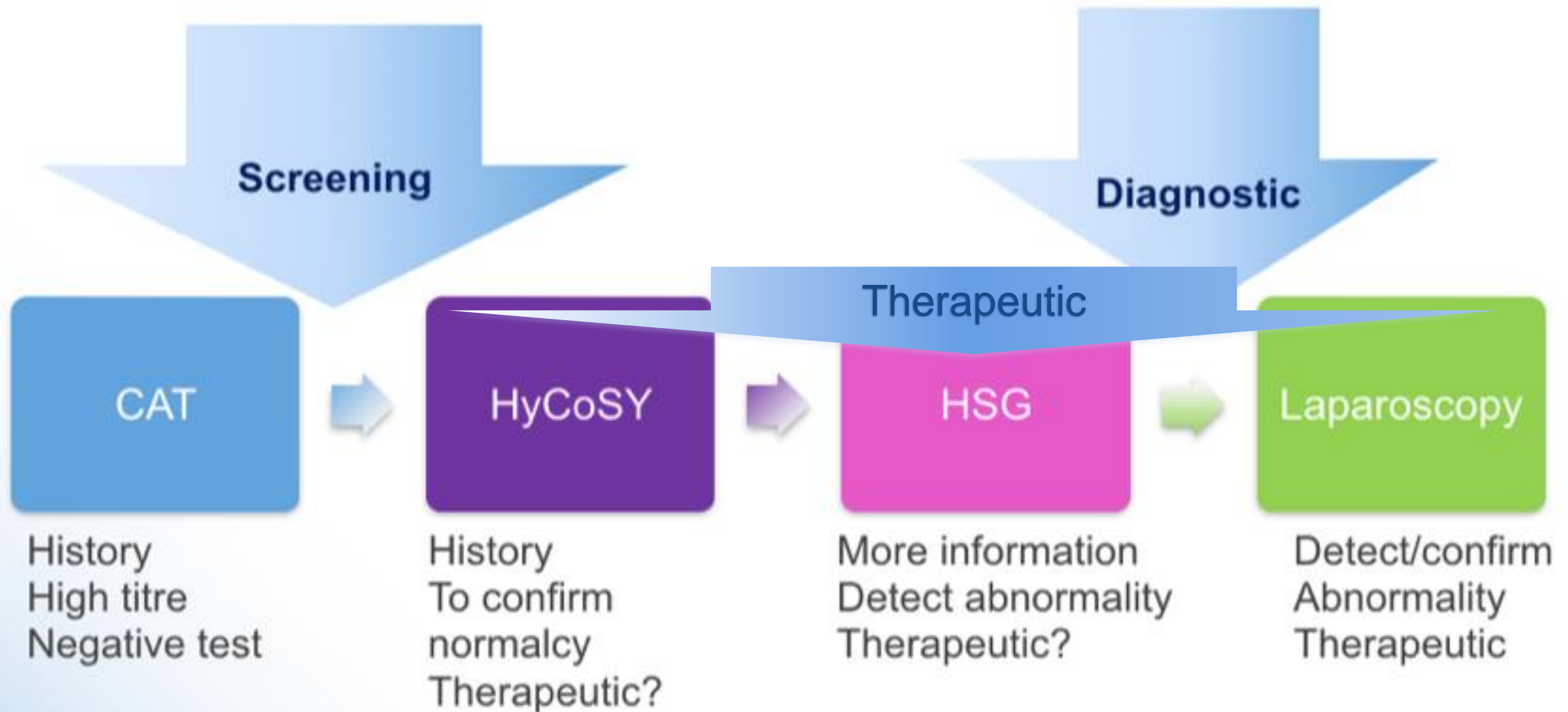
Negative predictive value = 92%

Helpful when combined with
medical history



Screening v diagnostic

Assessment of tubal patency



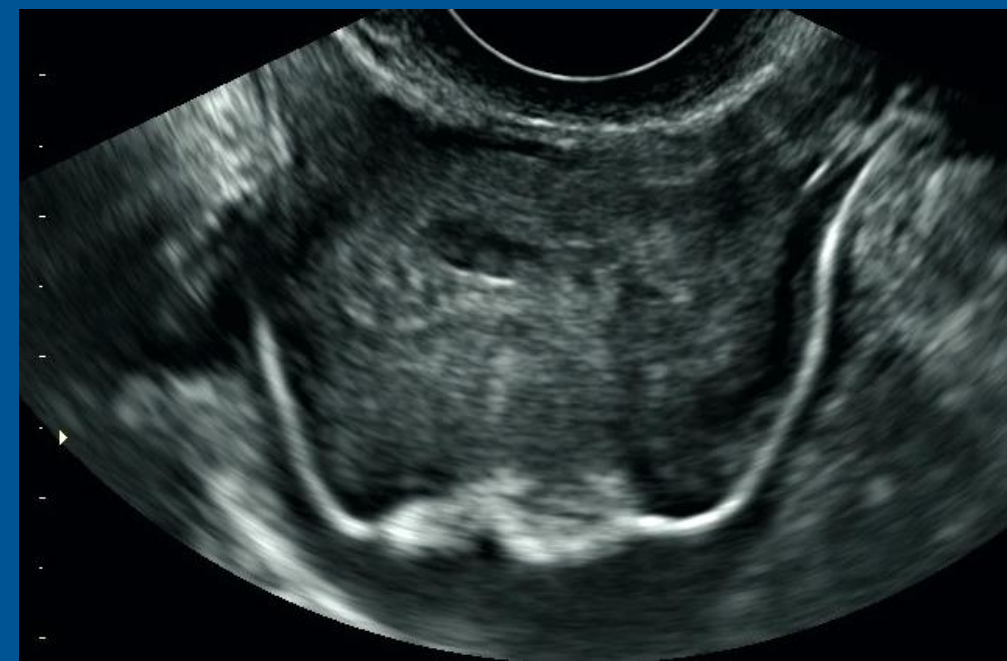
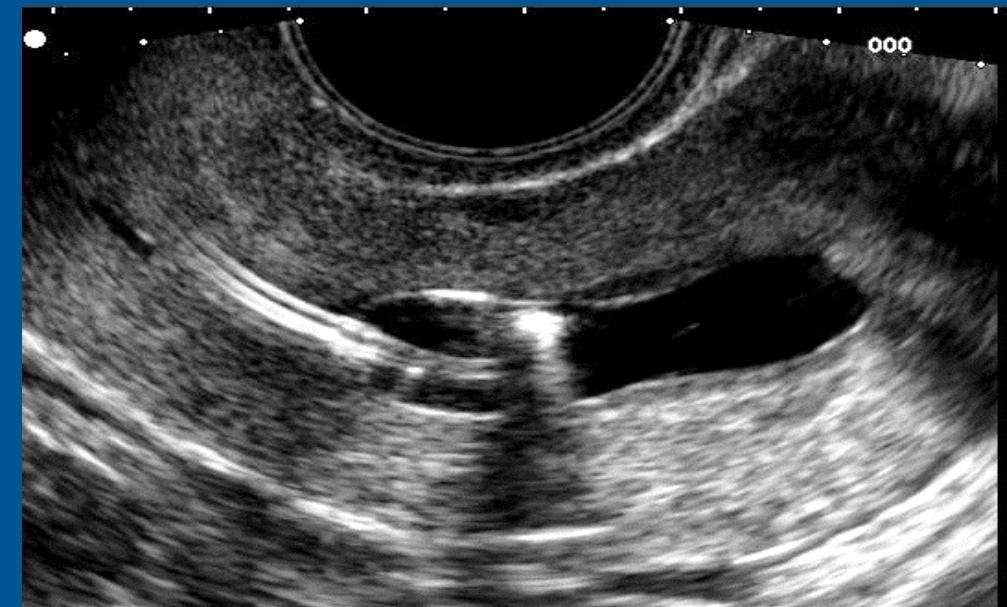
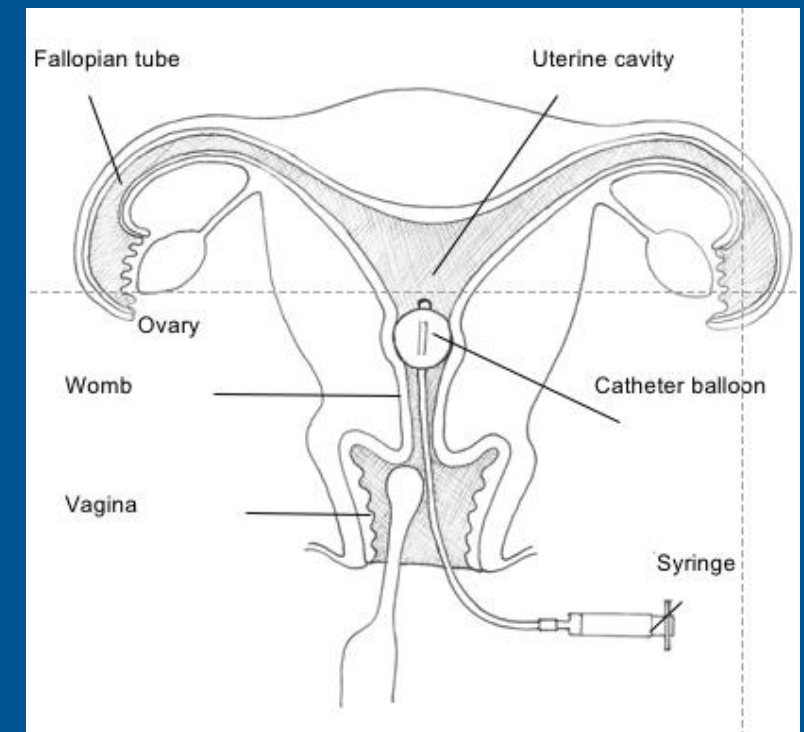
No single test is suitable for all patients

HyCoSy procedure

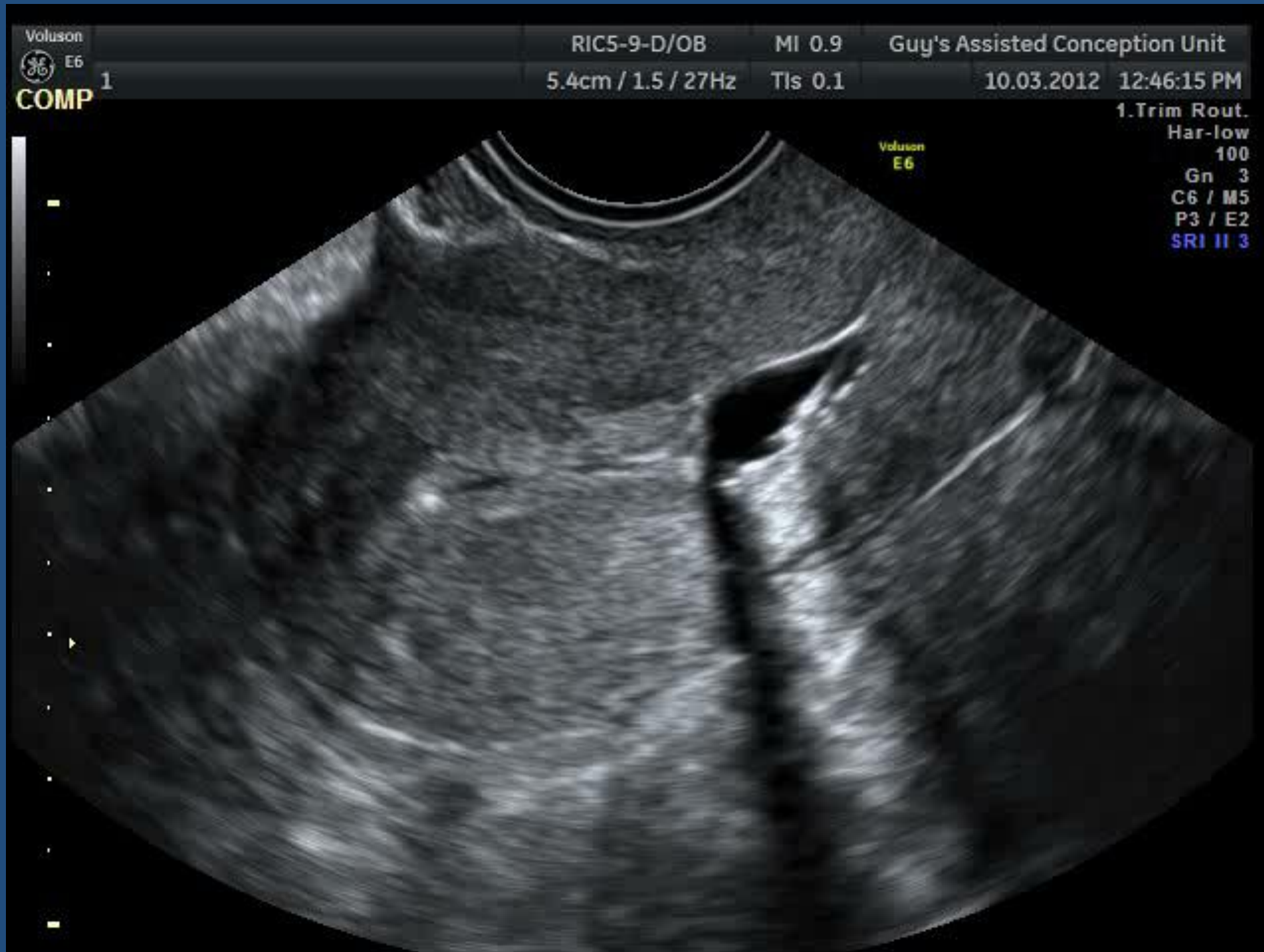
Two part diagnostic test –
Saline infusion sonography
(also known as cavity check,
'aqua' scan or hysterosonography)

Tubal patency assessment using
ultrasound contrast agent

(Also known as HyFoSy when the
contrast agent used is foam)



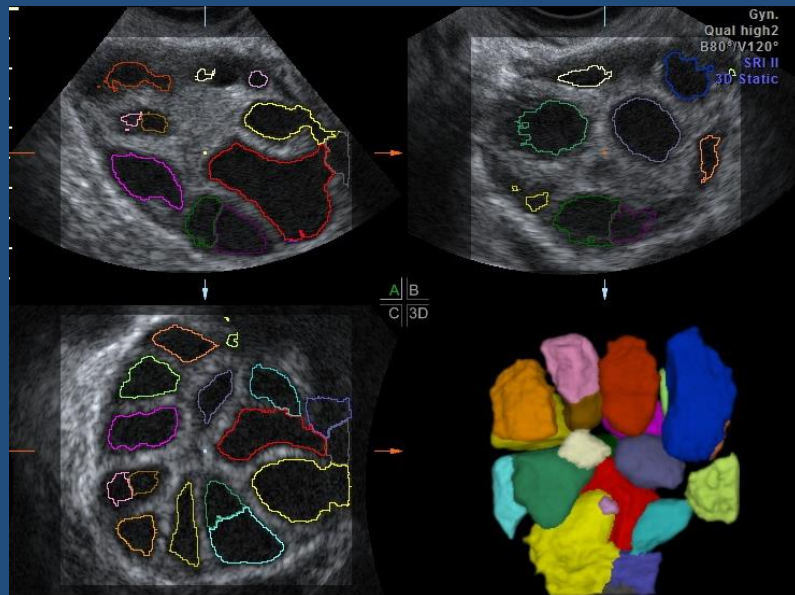
Endometrial polyp video



HyCoSy video



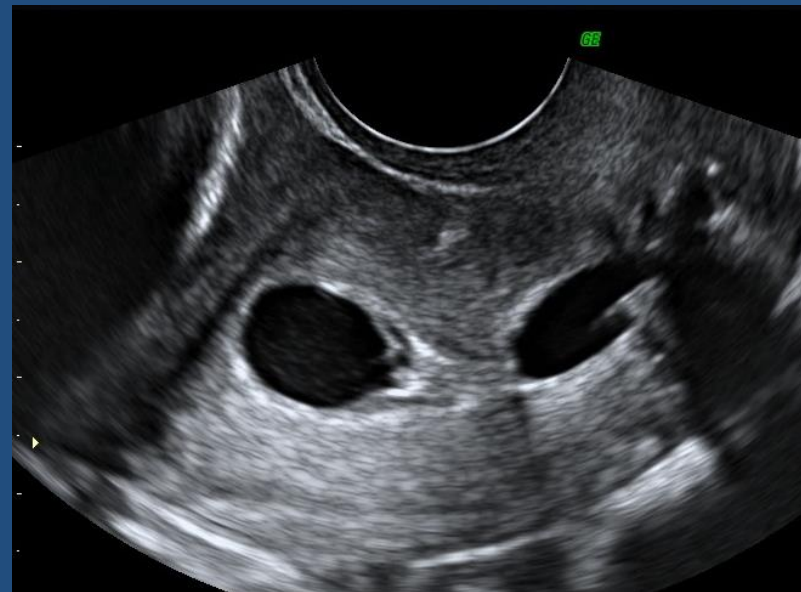
Additional benefits of HyCoSy



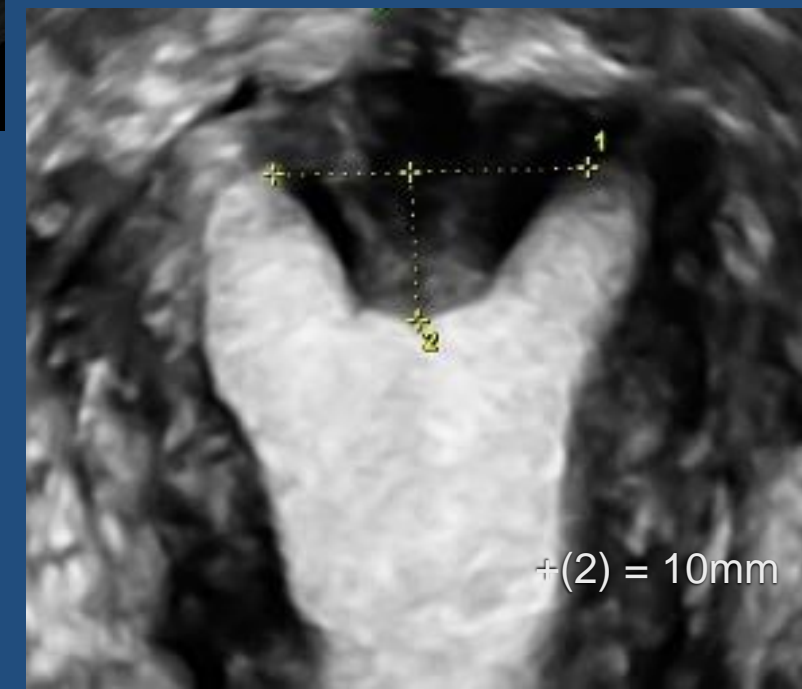
AFC

Ovarian mobility/accessibility

Cavity assessment



3D assessment of uterine malformation



What are the current
recommendations/literature about
HyCoSy's?

NICE recommendations

1.3.8 Investigation of suspected tubal and uterine abnormalities

1.3.8.3 Women who are thought to have comorbidities should be offered laparoscopy and dye so that tubal and other pelvic pathology can be assessed at the same time. [2004]

1.3.8.1 Women who are not known to have comorbidities (such as pelvic inflammatory disease, previous ectopic pregnancy or endometriosis) should be offered hysterosalpingography (HSG) to screen for tubal occlusion because this is a reliable test for ruling out tubal occlusion, and it is less invasive and makes more efficient use of resources than laparoscopy. [2004]

1.3.8.2 Where appropriate expertise is available, screening for tubal occlusion using hysterosalpingo-contrast-ultrasonography should be considered because it is an effective alternative to hysterosalpingography for women who are not known to have comorbidities. [2004]

Advantages and disadvantages

TABLE 4

Advantages and disadvantages of hysterosalpingogram (HSG), hysterosalpingo-contrast sonography (HyCoSy), and laparoscopy with chromopertubation (LSC).

Study	Advantages	Disadvantages
HSG	<p>Potential visualization of entire length of fallopian tube</p> <p>Ability to diagnose various tubal pathologies (i.e., SIN, hydrosalpinx)</p> <p>Therapeutic lavage with documented improvement in pregnancy rates (10)</p>	<p>Exposure to radiation</p> <p>Potential severe adverse contrast reaction (1, 2, 8, 9)</p> <p>Requires trained staff with appropriate equipment & facilities</p> <p>Visualization of pelvic adhesions and ovaries not possible</p>
HyCoSy	<p>Visualization of ovaries, uterus, and fallopian tubes in a single study</p>	<p>Requires trained staff with appropriate equipment & facilities</p> <p>Therapeutic lavage or improved pregnancy rates not proven (60)</p>
LSC	<p>Visualization of pelvic pathology (i.e., adhesions, endometriosis)</p> <p>Possible concomitant therapeutic surgical correction or removal of pelvic pathology</p>	<p>Invasive procedure with increased morbidity and mortality (62, 63)</p> <p>Requires general anesthesia</p> <p>Longer post-procedure pain and recovery</p> <p>Higher medical costs</p>

Note: SIN = salpingitis isthmical nodosa.

Saunders. Tubal patency assessment. Fertil Steril 2011.

Considerations for performing HyCoSy + SIS

- Sensitivity + Specificity
- Safety and side effects
- Pain

HyCoSy compared with HSG or LSC

HyCoSy studies compared with reference study for the detection of tubal occlusion by study design.

Study	Study design	Sample size	Study type	Reference standard	Sensitivity	Specificity	PPN	NPV	C
					(%)	(%)	(%)	(%)	(%)
1	Holz et al. (1997)	1,007	HyCoSy	HSG	—	—	87.2	96.1	83.1
			HyCoSy	LSC	—	—	89.7	92.3	83.3
2	Campbell et al. (1994)	600	HyCoSy	HSG	—	—	—	—	84–91
			HyCoSy	LSC	—	—	—	—	80–93
3	Hamilton et al. (1998)	185	HyCoSy	LSC	90.4	70.3	91.2	68.2	85.8
4	Strandell et al. (1999)	103	HyCoSy	HSG	—	—	—	—	72.0
			HyCoSy	LSC	27.0	90.0	75.0	88.0	80.0
			HSG	LSC	73.0	87.0	47.0	94.0	83.0
5	Chenia et al. (1997)	50	HyCoSy	HSG	—	—	—	—	85.0
6	Radic et al. (2005)	68	HyCoSy	LSC	100.0	77.0	70.0	100.0	—
7	Mitri et al. (1991)	80	HyCoSy	HSG	—	—	—	—	72.0
8	Hamed et al. (2009)	57	HyCoSy	LSC	76.1	79.4	71.4	83.1	78.1
			HSG	LSC	81.8	77.1	69.2	87.1	79.9
9	Kiyokawa et al. (2000) ^b	25	HyCoSy	HSG	84.4 ^a	100.0 ^a	100.0 ^a	33.0 ^a	84.0
10	Deichert et al. (1989)	219	HyCoSy	LSC	83.7	87	63.2	87.0	86.3
			HyCoSy	HSG	80.6	85	65.9	92.4	83.8
			HSG	LSC	71.4	84.4	—	—	80.4
11	Deichert et al. (1987)	76	HyCoSy	HSG or LSC	100.0	90	—	—	87.5
12	Degenhardt et al. (1996)	57	HyCoSy	LSC	—	—	—	—	90.9
			HyCoSy	HSG	—	—	—	—	89.2
13	Tanawattanacharoen et al. (2000)	60	HyCoSy	LSC	—	—	—	—	80.0
14	Reis et al. (1988)	44	HyCoSy	LSC	85.2	85.2	71.9	92.9	85.2
			HSG	LSC	85.2	83.6	69.7	92.7	84.1
15	Inki et al. (1998)	32	HyCoSy	LSC	90.2 ^a	83.3 ^a	94.9 ^a	71.4 ^a	88.7
16	Exacoustos et al. (1996)	38	HyCoSy	HSG	80.0	94.0	84.0	92.0	89.6
			HyCoSy	HSG	—	—	—	—	—
17	Volpi et al. (2003)	29	HyCoSy	HSG	—	—	—	—	—
			HyCoSy	HSG	—	—	—	—	—
18	Dietrich et al. (1996)	20	HyCoSy	HSG	—	—	—	—	—

Conclusion(s)

Increasing evidence supports the more recently described hysterosalpingo-contrast sonography procedure as an acceptable screening study for the subfertile patient with the potential advantage that it is a comprehensive evaluation, methodologically simple, cost effective, and time efficient.

Safety and side effects

1. Safety aspects and side effects of ExEm gel and foam for uterine cavity distension and tubal patency testing

Niek Exalto⁽¹⁾, Mario Stassen⁽²⁾, Mark Hans Emanuel⁽³⁾.

1) Department of Obstetrics and Gynaecology, Division of Obstetrics and Perinatal Medicine, Erasmus MC, University Medical Centre, Rotterdam, the Netherlands; 2) Department of Pharmaceutical Sciences, Faculty of Science, Utrecht University, Utrecht, the Netherlands; 3) Department of Obstetrics and Gynaecology, Spaarne Ziekenhuis, Hoofddorp, the Netherlands

- Lit search of use in animals + humans
- Tested toxicity, influence on sperm, blastocysts, eggs, uterus and tubes
- No known side effects - optimum risk-benefit ratio
- Probably best to restrict to ovulatory phase

Pain

2. Hysterosalpingo-foam sonography, a less painful procedure for tubal patency testing during fertility workup compared with (serial) hysterosalpingography: a randomized controlled trial.

Kim Dreyer, M.D.,^a Ren_ee Out, M.D.,^b Peter G. A. Hompes, M.D., Ph.D.,^a and Velja Mijatovic, M.D., Ph.D.^a

^a Department of Reproductive Medicine, VU University Medical Center, Amsterdam; and ^b Department of Obstetrics and Gynecology, Spaarne Hospital, Hoofddorp, the Netherlands

- 2 centre randomised control trial
- 40 subfertile women
- Vas scores: HyCoSy -1.7 HSG - 3.7

Pregnancy outcome following HyCoSy/HyFoSy

Can Tubal Flushing with Hysterosalpingo-foam Sonography (HyFoSy) Media Increase Women's Chances of Pregnancy? 2015 Exacoustos C, Tiberio F, Szabolcs B, Romeo V, Romanini E, Zupi E

294 in study - 157 pts responded – Pregnancy rate

- Infertile patient pregnancy rate is 30% within 6 months and
- In secondary infertility pregnancy rate is 38% within 6 months

Hysterosalpingo-foam sonography (HyFoSy): Tolerability, safety and the occurrence of pregnancy post-procedure 2018 Tanak K, Chua J, Cincotta R, Ballard E, Duncombe G


200 in study - 111 followed up for 6 months

- 50% of women spontaneously conceived within 6 months of procedure
- 46.1% of these women did so in the first 30 days

Departmental preparation

- Patient information sheet + HyCoSy specific consent form
- SOP/protocol
- Decide on contrast (+ obtain off-label drug permission where necessary)
- Competency training, assessment and on-going audit

Preparation – Booking patient

- Follow exclusion criteria 
- Information sheet to patient
- Patient consent completed
- Advice on analgesia
- Instructions for booking HyCoSy

- History of PID, endometriosis or previous surgery
- Risk of undetected pregnancy
- Intolerance of uterine catheterization

- Chlamydia screen

NICE guidelines

1.3.13 Screening for *Chlamydia trachomatis*

1.3.13.1 Before undergoing uterine instrumentation women should be offered screening for *Chlamydia trachomatis* using an appropriately sensitive technique. [2004]

1.3.13.2 If the result of a test for *Chlamydia trachomatis* is positive, women and their sexual partners should be referred for appropriate management with treatment and contact tracing. [2004]

1.3.13.3 Prophylactic antibiotics should be considered before uterine instrumentation if screening has not been carried out. [2004]

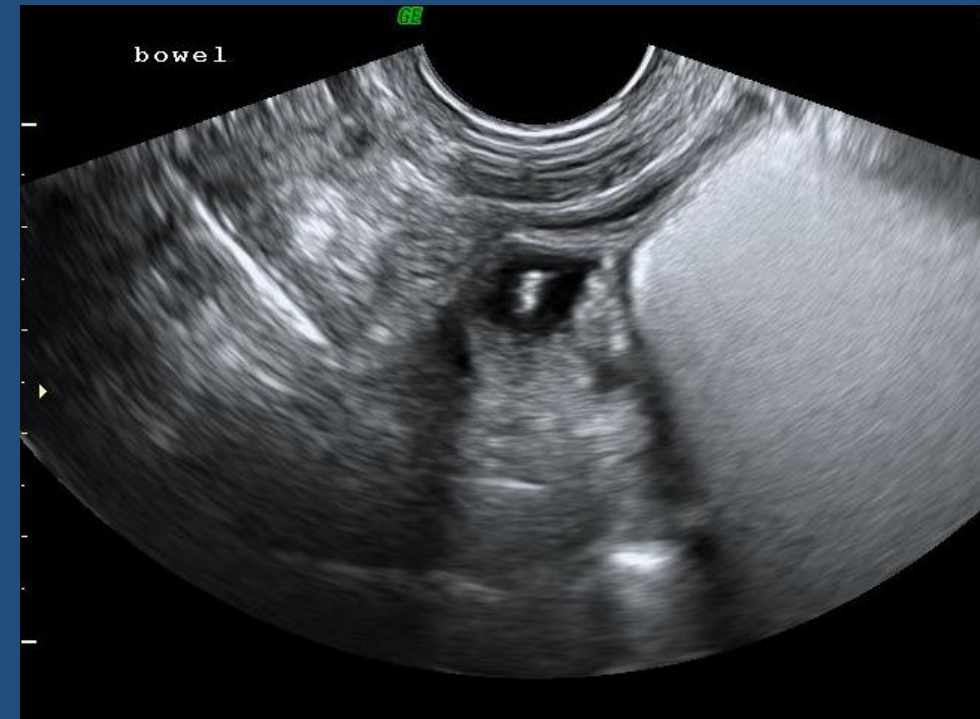
The procedure

- Simple sterile pack (speculum, sponge holders, saline, 10 or 20ml syringe)
- Contrast agent
- Scan room with motorised couch (up/down/tilt)
- Spot light
- Balloon catheter



Pitfalls

- Suboptimal catheter placement
- Tubal spasm
- Position of the ovaries/uterus
- Pelvic pathology
- Gassy bowel (CD useful)
- Rapid migration of contrast from one side of the pelvis to the other
- Slicing of endometrium causing 'pseudo polyp'
- Pain/vasovagal reaction



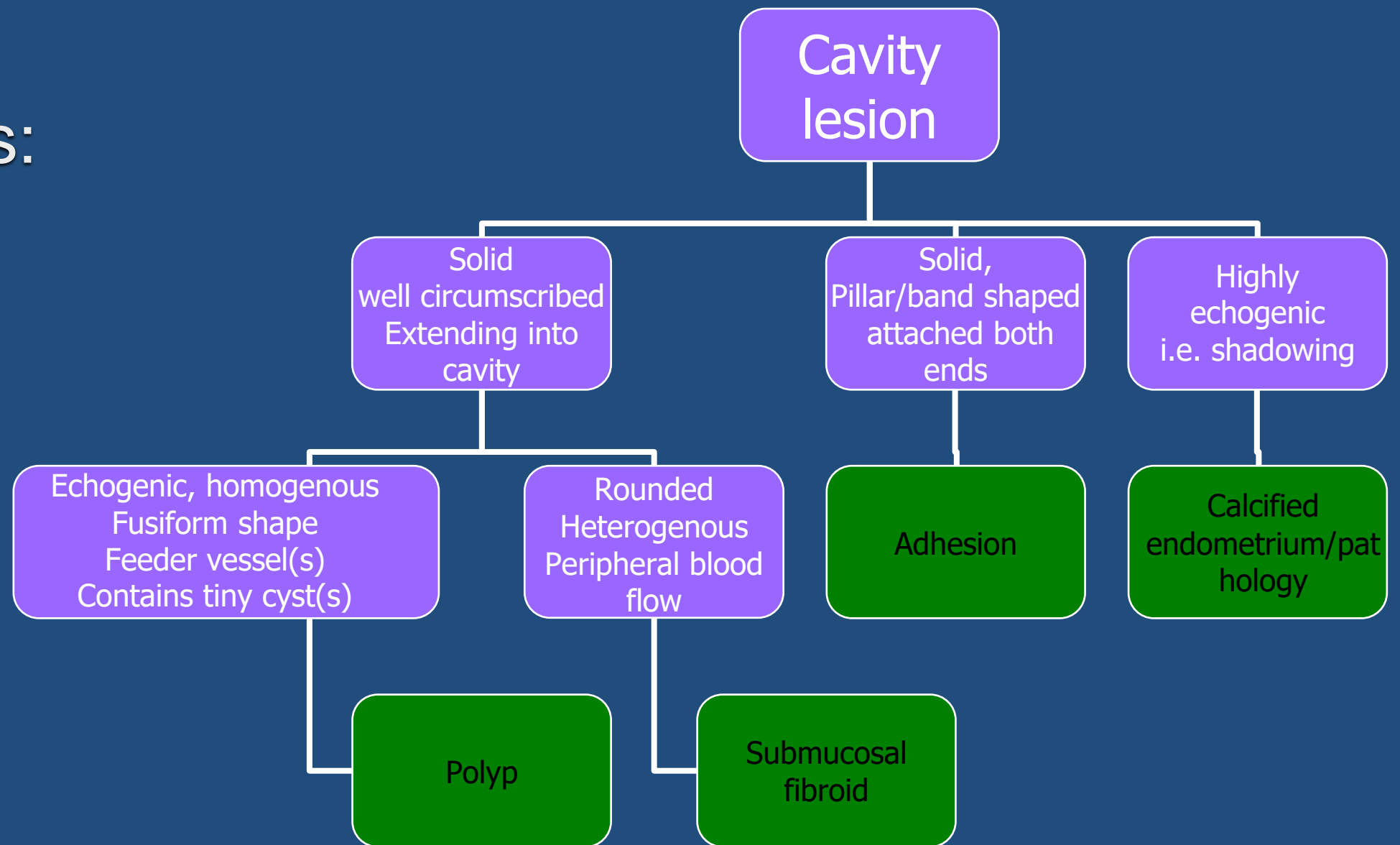
Reporting abnormal cavity findings

Cavity lesions:

➤ size

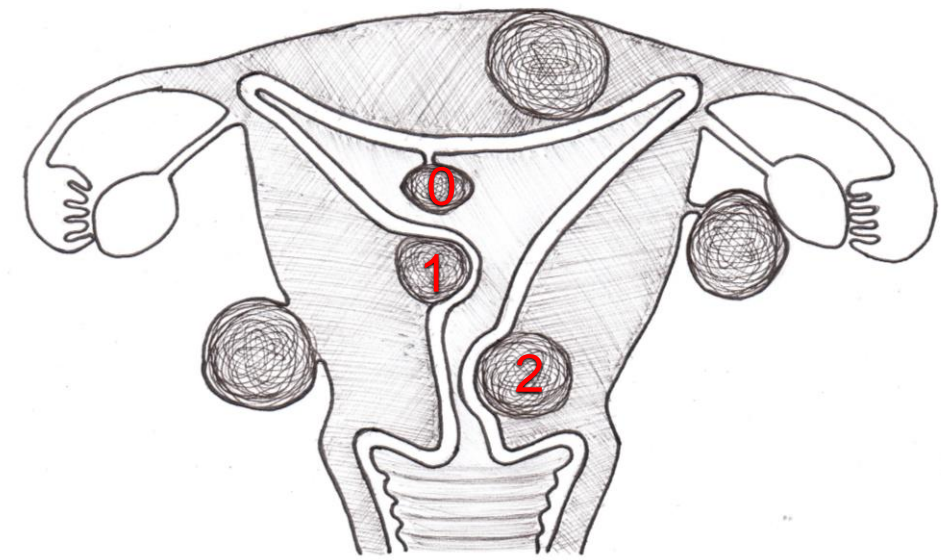
➤ location

➤ number



- When diagnosing a submucosal fibroid indicate its type using FIGO type 0, 1 or 2

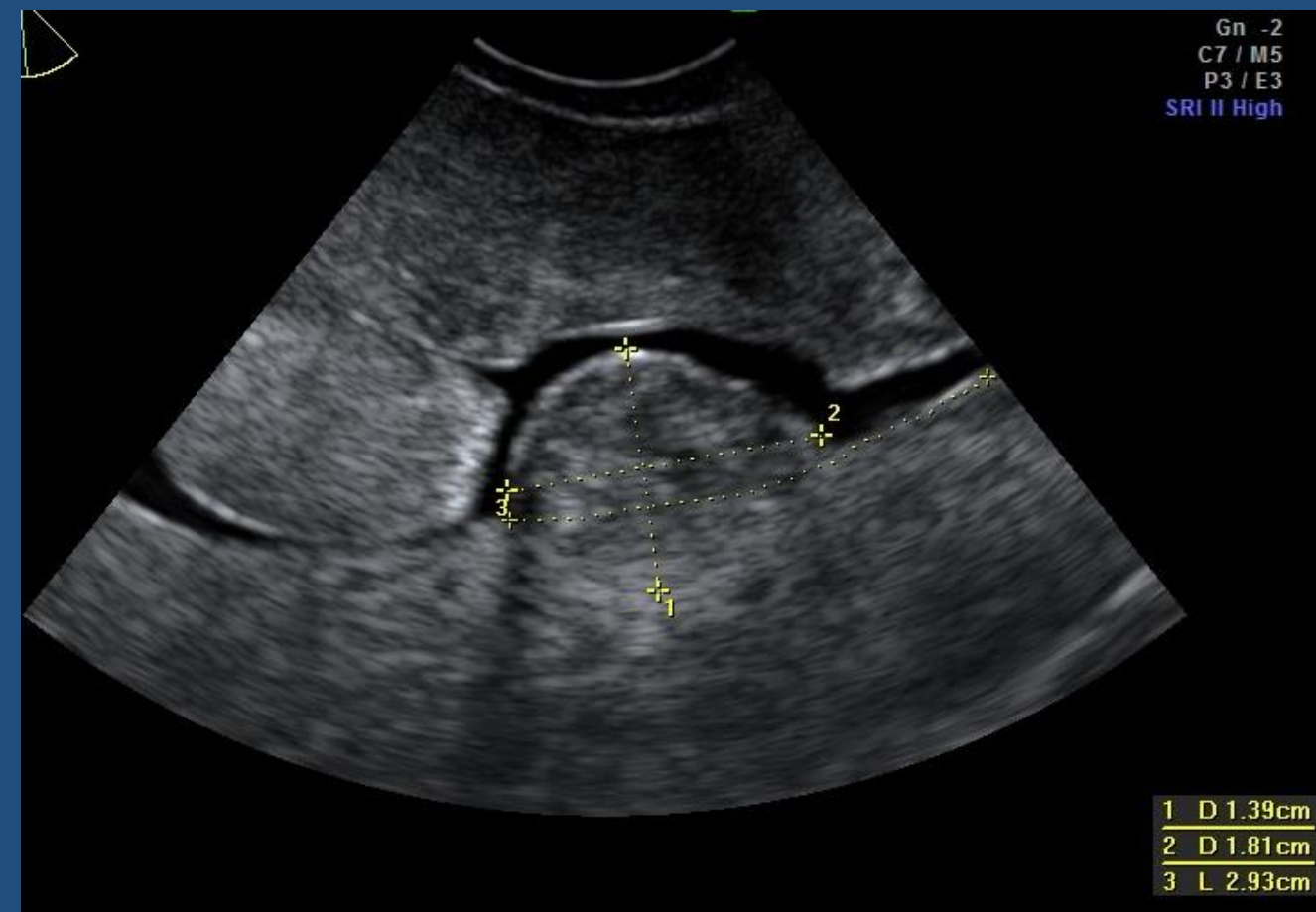
Quantifying submucosal fibroids



FIGO Type 0,1 and 2 submucosal fibroids

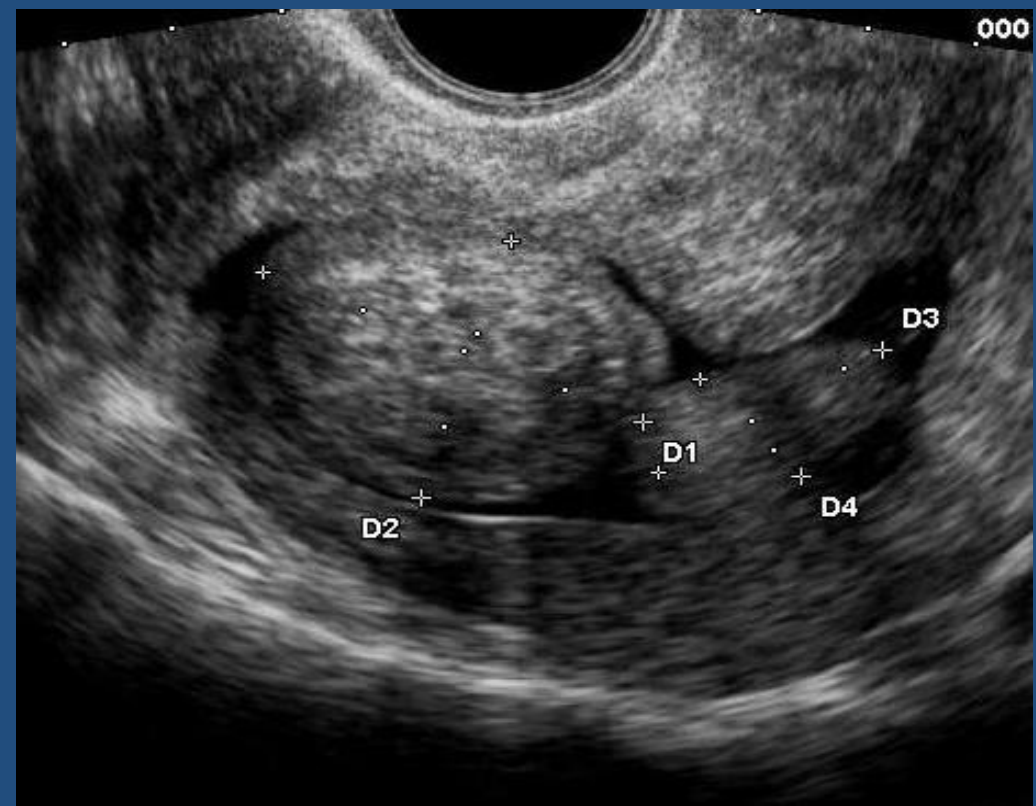
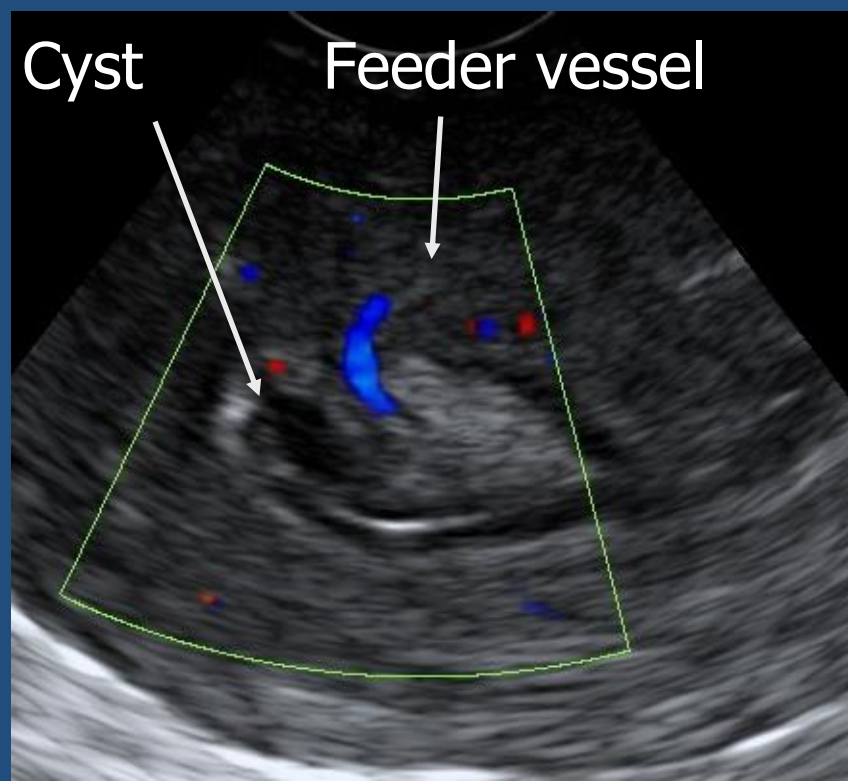
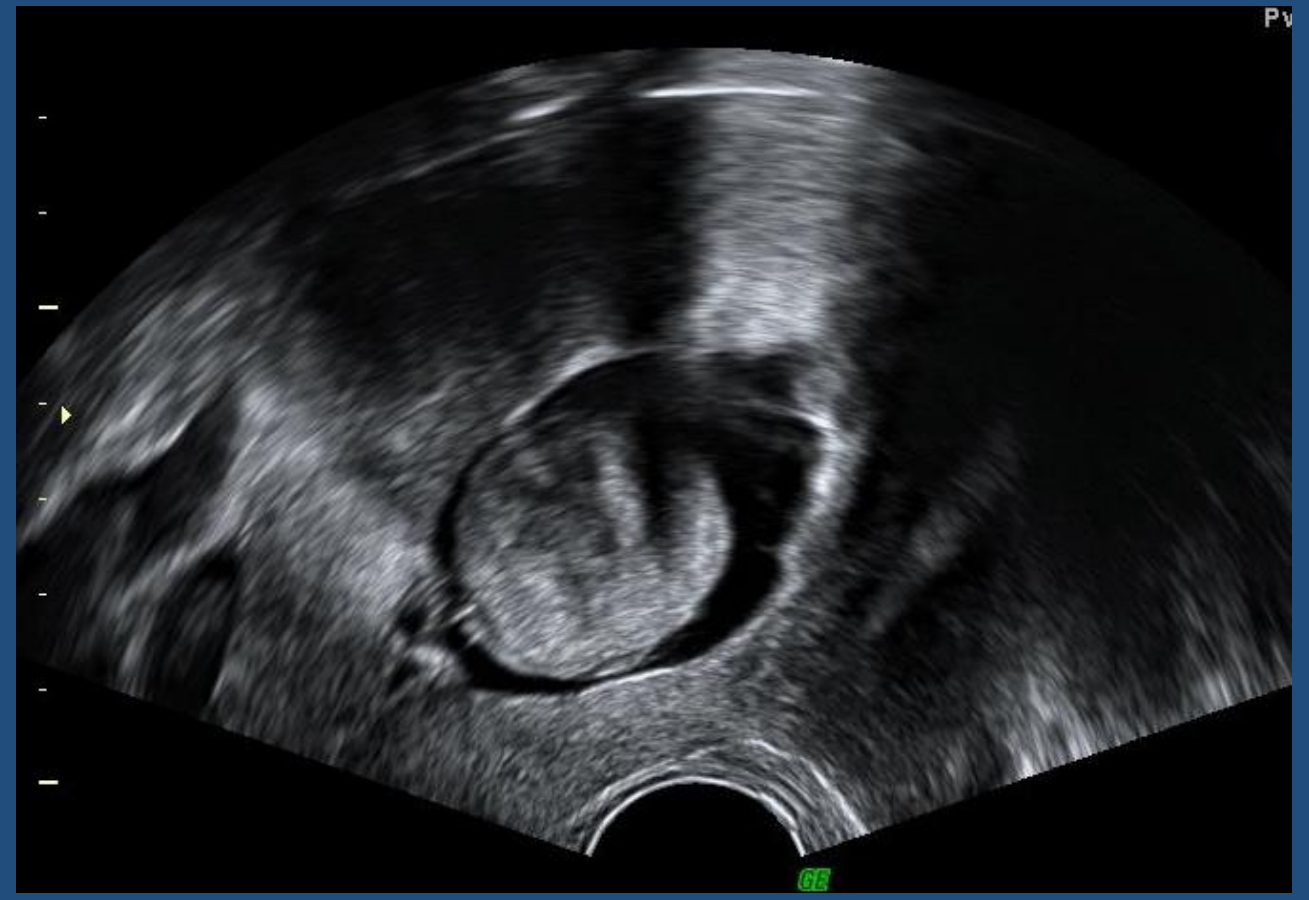
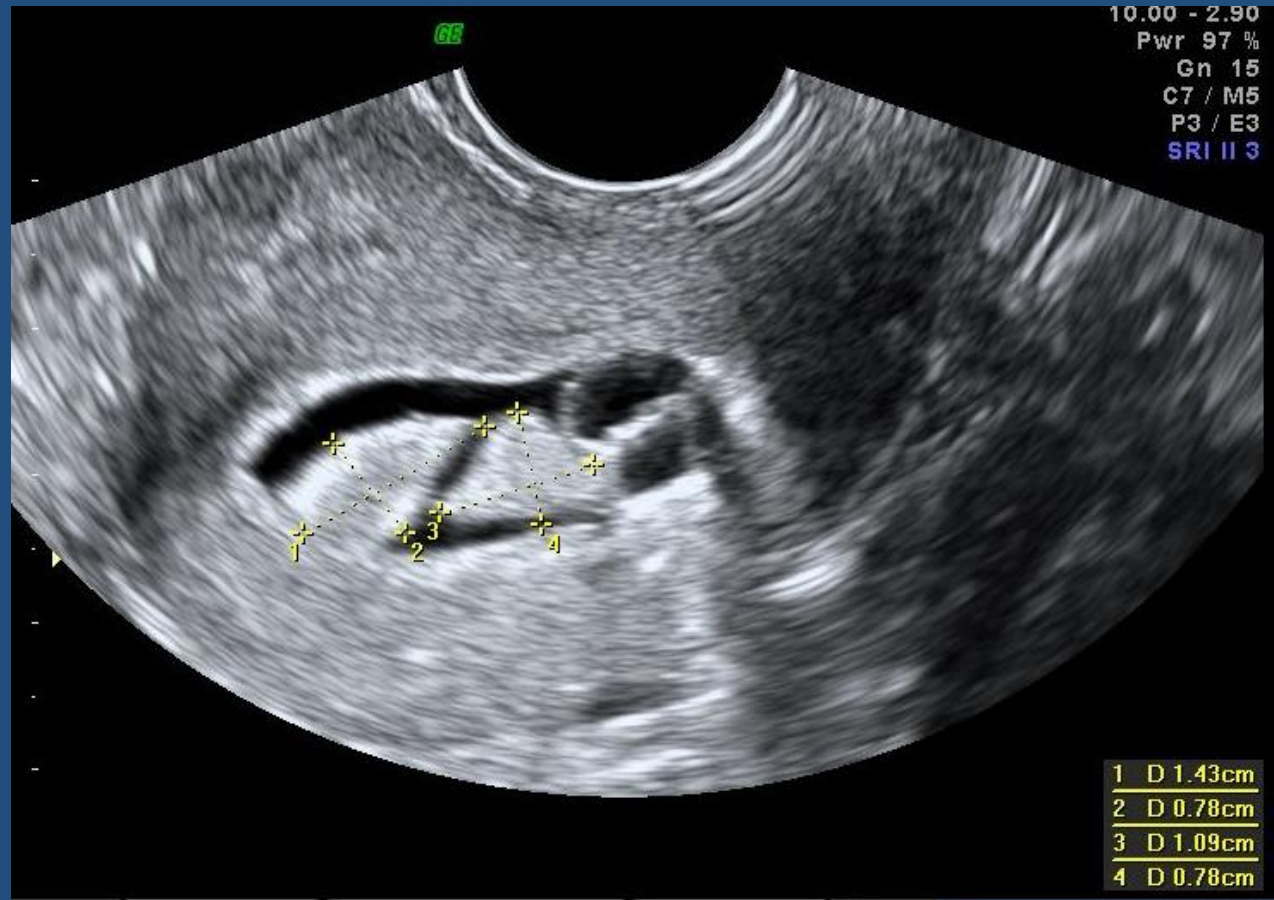


Type 0 submucosal fibroid – pedunculated into the cavity



Type I submucosal fibroid - with 70% extension into the cavity

Polyp or fibroid?



Other endometrial anomalies

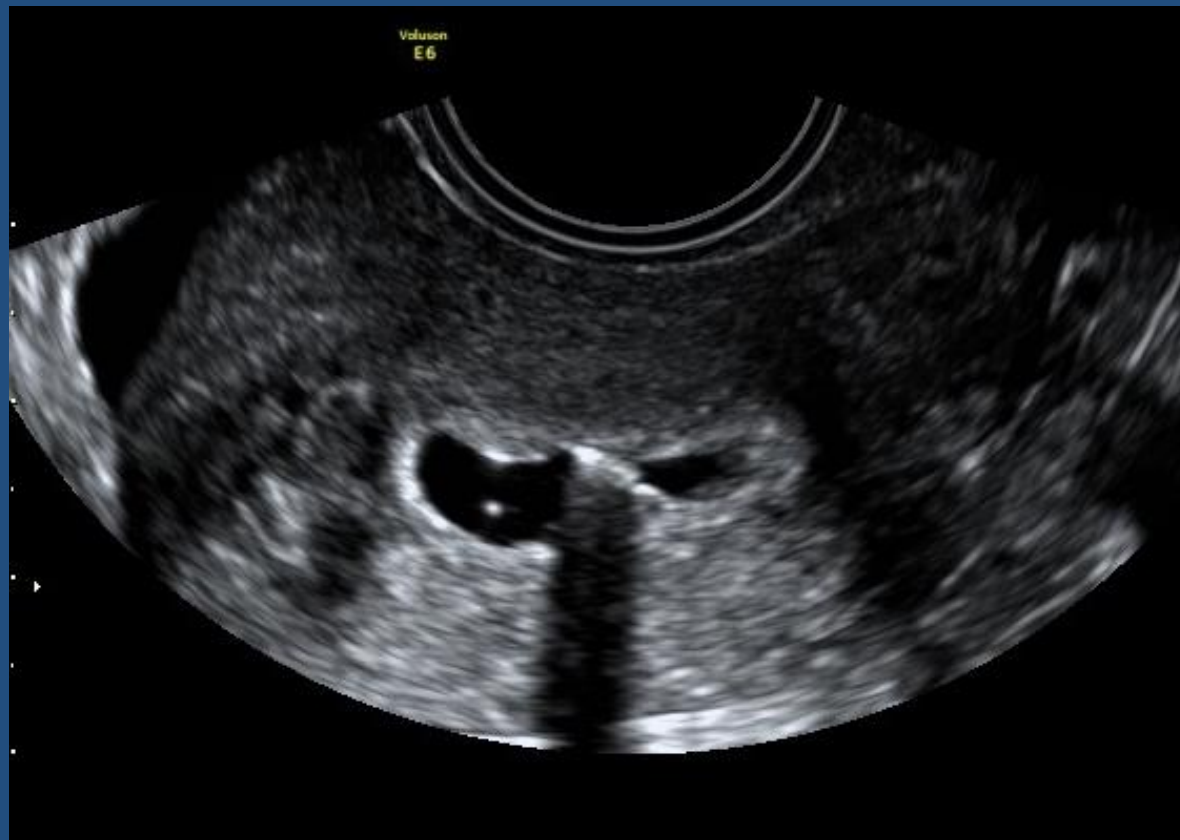
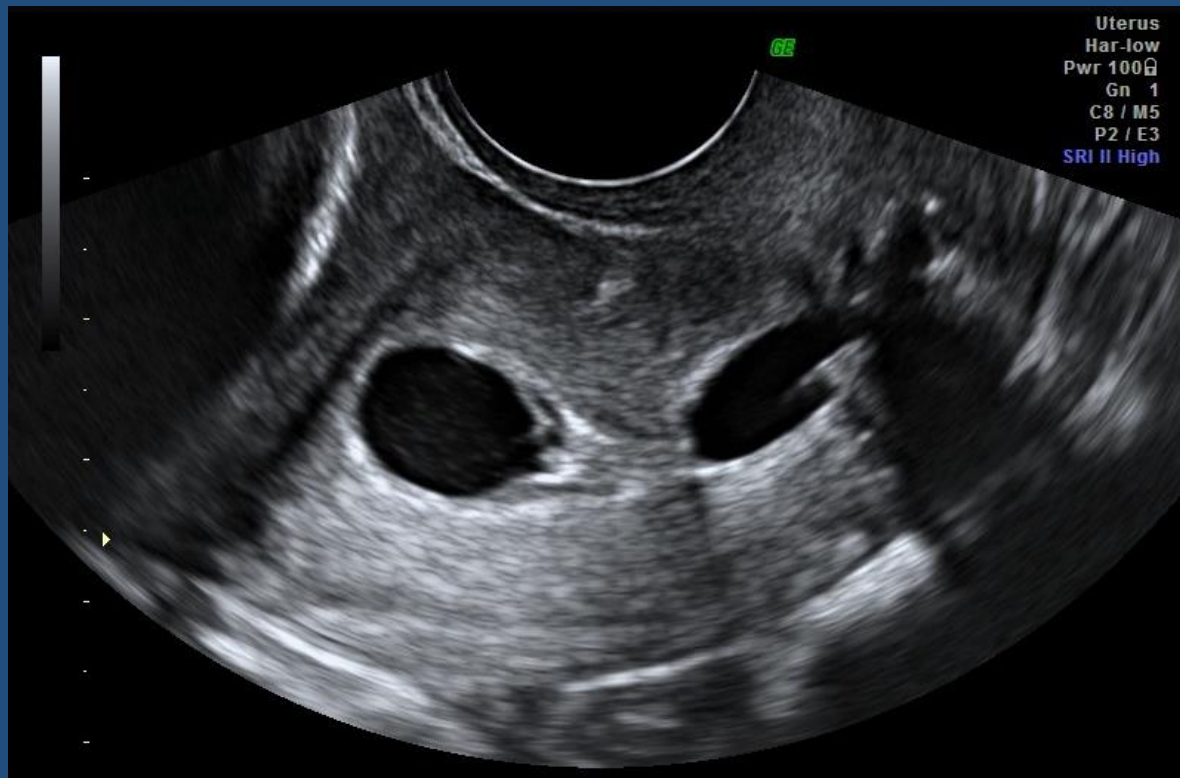
Polypoid endometrium



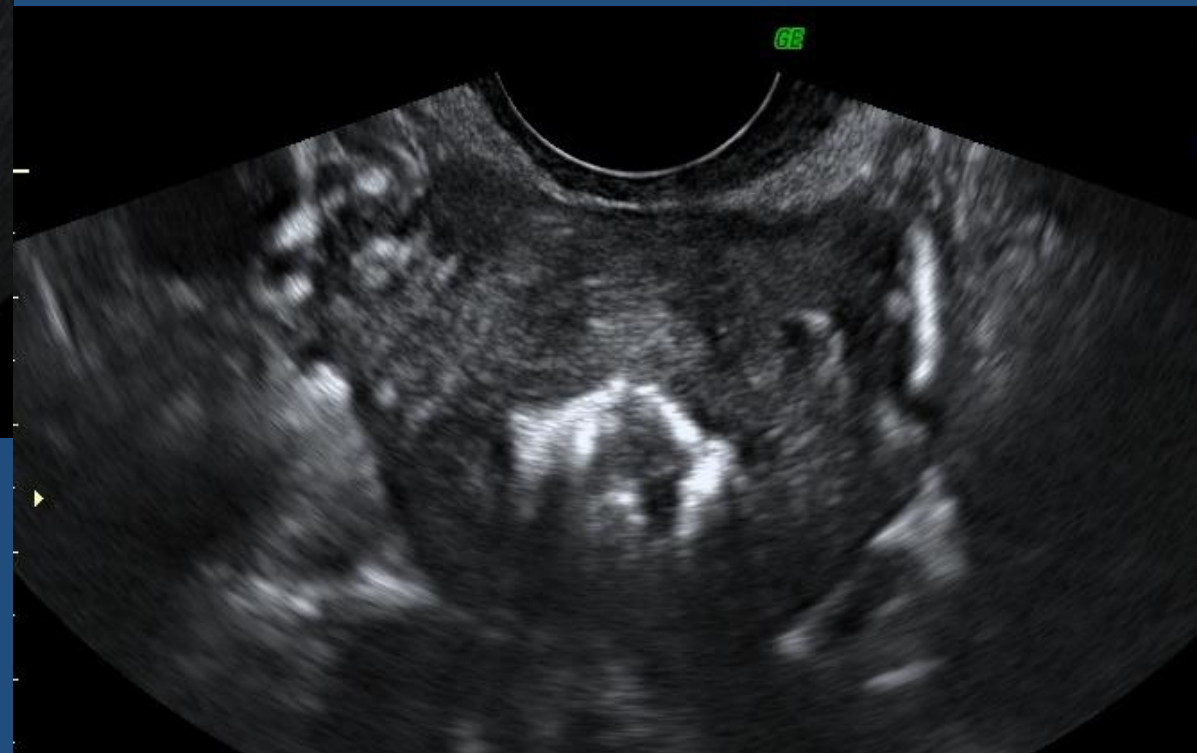
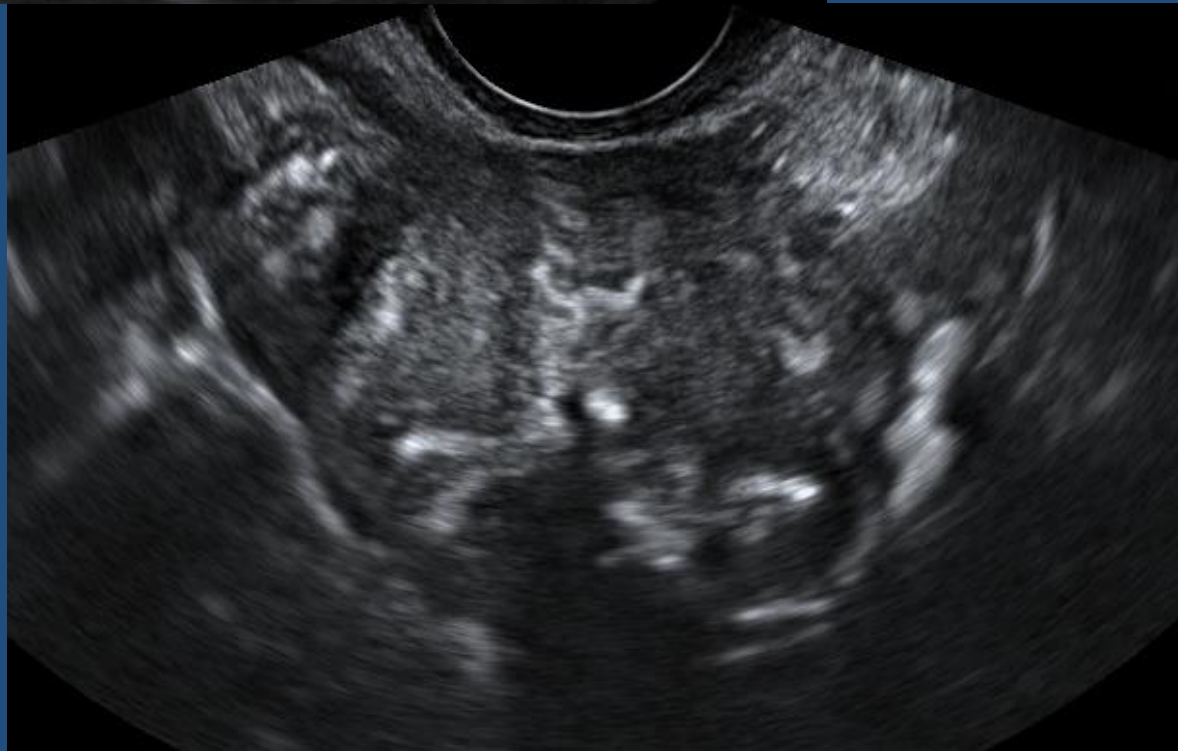
Scarring post-myomectomy



Uterine adhesions



Extravasation



Abnormal tubal findings

Comment on :

- Absent, unilateral or bilateral spill
- Significantly delayed spill (particularly if painful)
- Abnormal appearances such as extravasation, 'pearling' (salpingitis), hydrosalpinx etc

Normal report

'I performed a HyCoSy procedure after having confirmed that there was protected intercourse since the last period, that an STD test was negative and that analgesia had been taken prior to the procedure. Cannulation of the cervix was straightforward and on instillation of saline into the cavity a normal cavity appearance was demonstrated. Ultrasound contrast was then instilled, and this showed normal fill and spill from both fallopian tubes.

Conclusion: A normal cavity and bilateral tubal patency was identified. AFC = N The results were discussed with the patient and the following management was decided.....'

Conclusion

Numerous advantages in setting up a HyCoSy service

- A well-tolerated procedure
- Can easily characterize uterine cavity, myometrial lesions, malformations
- Additional assessment of the adnexae and AFC
- No ionizing radiation
- Recent studies show a therapeutic effect
- Extended role for the sonographer

- **Limitations of HyCoSy**
 - Still considered to be not as accurate as HSG or lap and dye,
particularly when risk of tubal pathology

- Requires a degree of technical competence



angelaclough@nhs.net