

GYNECOLOGIC DIAGNOSTICS and TREATMENT PROCEDURES

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PAPANICOLAOU - "PAP Screening"

- Screening test for cervical cancer - detects cervical CA in pre-invasive stage
- Ideal screening test
 - Inexpensive and non-invasive; reasonably good rate of detection
 - Cervical CA is common and highly curable when detected early (95%)
- Pap screening discovered in 1943 by Dr. George Papanicolaou
 - Steady decline (70%) since 1950s when test discovered by Dr. George
 - 32 cases [er 100,000 women in 1940s
 - 8.3 cases [er 100,000 in 1980s
 - **Pap can detect CA in pre-invasive stage**
 - Progression from early dysplasia to squamous cell carcinoma (SCC) can take up to 10 yrs
 - Even localized invasive malignancy has relative 5 yr survival rate of 91%
 - Worse 5 year survival rate for regional spread (48%) or distant metastases (11%)

PAP SMEAR CLASSIFICATION

- 1988 National Cancer Institute: Workshop in Bethesda MD
- Developed **The Bethesda System** (TBS) for reporting cervical/vaginal cyto disease
 - Standardize terminology
 - Provide description based on latest info cervical dis
 - Descriptive category developed
 - Benign cellular changes
 - Reactive changes
 - Epithelial and glandular abnormalities
- 1991 Bethesda updated and simplified
 - Criteria for adequacy of specimen included
 - Two categories for **squamous intraepithelial lesions (SIL)**
 - Previous system referred to PAP class or degrees CIN
 - Dysplasia and CIN replaced with SIL
 - Terminology of atypia deleted
 - **ASCUS**: Atypical squamous cell of undetermined significance (term introduced)
 - More marked change than just reparative (inflammation)
 - No evidence of SIL (squamous intraepithelial lesion)
 - **LSIL**: Low-grade squamous intraepithelial lesions
 - Include old categories of CIN I
 - Mild dysplasia, koilocytosis (HPV effect) and atypia
 - **HSIL**: High grade squamous intraepithelial lesion
 - old CIN II (moderate dysplasia) and CIN III (severe dysplasia)
 - old CIS (carcinoma in situ)
 - **AGUS**: atypical glandular cells of undetermined significance

Includes lesions from benign reactive to **adenocarcinoma in situ (AIS)** of endocervix

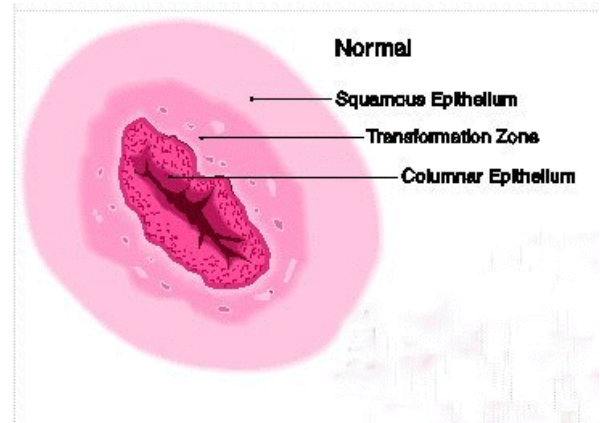
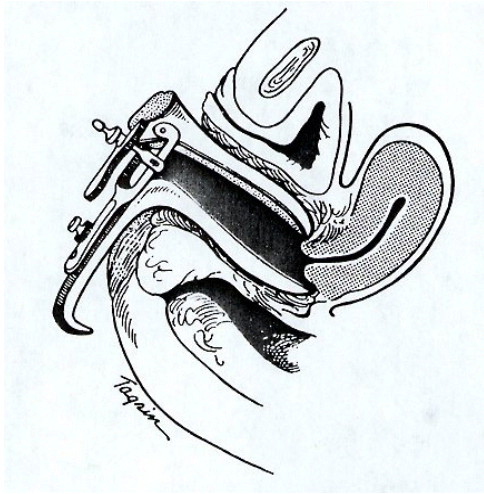
- HSIL always requires colposcopy and directed biopsy - simple repetition of pap smear is not appropriate
10% of women older than 40 with HSIL have normal appearing cervix to gross exam despite invasive tumor
 - Glandular cell lesions: occurrence rare vs cervical squamous cell lesions but incidence is rising
 - Requires aggressive investigation
 - More difficult to find because located inside endocervical canal
 - Can become quite large - growing into uterus - before presence is known
 - AGUS warrant concern -> require colposcopy, endocervical curettage and endometrial biopsy
 - Can mean anything from atypical cells from reactive process to adenocarcinoma in situ
 - Cone bx of cervix if cell source undetermined on colposcopy
 - Rarely can signify malignancy of breasts, fallopian tubes, ovaries or colon
- LSIL and ASCUS: greatest source of frustration - research ongoing to resolve this issue
- Require follow-up but experts unsure of best approach
 - Weigh need to detect more serious lesions versus avoid unnecessary invasive procedures

MANAGEMENT OF MINIMALLY ABNORMAL RESULTS

See "Pap Screening Handout"

- **Hyperkeratosis - parakeratosis**
- **Inflammation**
- **STD, HPV and BV** when seen on Pap
- **No endocervical cells**
- **ASCUS**
- **AGUS**
- **Endometrial Cells on Pap Smears**
- **LSIL**
- **HSIL**

Low Risk	6, 11, 42, 43, 44
Intermediate Risk	32,33,35,39,51,52
High Risk	16,18,45,56



GUIDELINES FOR SPECIMEN COLLECTION

- Use largest speculum which allows good visualization and is comfortable
- Inspect cervix for abnormalities
- Gently remove any excess vaginal discharge
- Take samples from transformation zone and SCJ *
- Rotate contoured end of spatula 360 degrees maintaining, firm contact with cervix
- Spread material on spatula thinly on slide
- Roll brush across slide
- Fix immediately (within 3-5 seconds)
- Avoid
 - Dying artifact
 - Crushed cells forceful application of specimen on slide
 - Too thick preparation
 - Insufficient clinical history
- Hold spatula while collecting cytobrush specimen then place and fix both on slide where no assistance is available
- Do NOT collect during menses or infection (treat infection)

* reduces false negatives to < 5%

PATIENT INSTRUCTIONS

- No douching 48 h prior to Pap
- No intercourse 48 h prior to Pap
- Nothing in vagina 48 h prior to Pap
 - NO tampons
 - NO contraceptives
 - NO medications
- No current infection or active bleeding at time of Pap
- Optimal time 1-2 weeks after menses

THIN-PREP PAP TECHNOLOGY

Collected with spatula and cytobrush

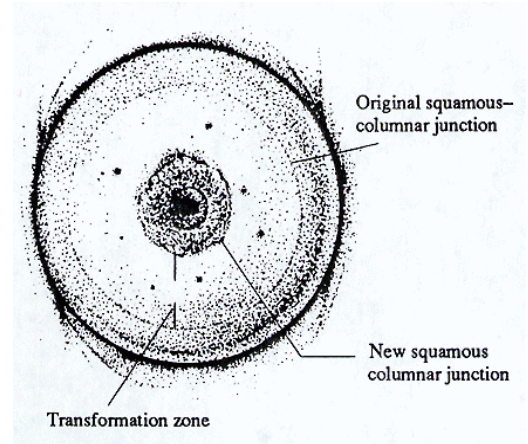
Cervical cells suspended in preservative; filtered to eliminate impurities

Plated on slide prepared from liquid - superfluous material excluded (WBC, mucus)

Specimens can be subsequently used for **Hybrid Capture HPV DNA Assay**

THE TRANSFORMATION ZONE

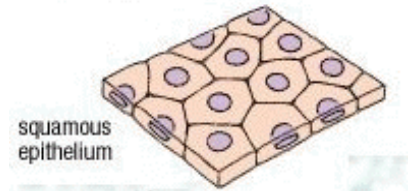
- 2 types of cervical cells present at birth
 - squamous
 - columnar
- Squamous cells
 - Much thicker and tougher than columnar
 - Line the distal ectocervix and vagina
- Columnar cells
 - One layer thick
 - Line proximal and mid-endocervical canal
- Junction of two types cells: **squamocolumnar junction (SCJ)**
- Location of SC junction is variable and changes w aging
 - Some women SCJ close to anatomical os
 - Others: more externalized on cervix



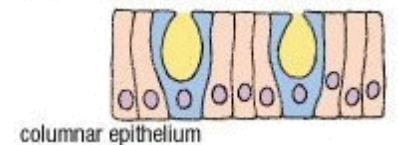
SQUAMOUS METAPLASIA AND THE TRANSFORMATION ZONE

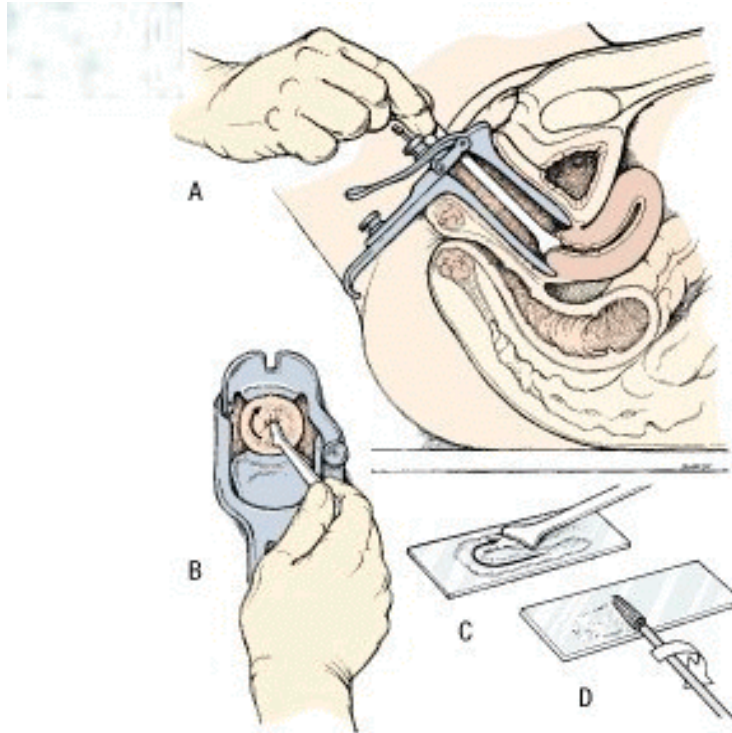
- Puberty: vaginal pH lowered from increased estrogen
 - Also lowered during pregnancy and postpartum
- When native (from birth) columnar epithelial cells exposed to this hostile acid environment it "transform" into squamous - a.k.a. squamous metaplasia (normal)

- Transformation zone: area wherein changes occur
- Squamocolumnar junction (SCJ): junction between S and C epithelial cells
 - Changes its location on ectocervix to point closer to external cervical os
 - Areas previously columnar epithelium are now squamous epithelium
 - This transformation zone is the new zone of metaplastic squamous epithelium



- Majority of cervical abnormalities occur in this transformation zone
 - Accordingly, must sample carefully during routine pap screening
 - No analogous transformation zone occurs in vagina or vulva
 - These areas accordingly more resistant to CA
- Hypothesis:
 - During "susceptible" times in natural history of cervical squamous, carcinogen may attack these immature cells -> incorporate into genome -> malignant transformation

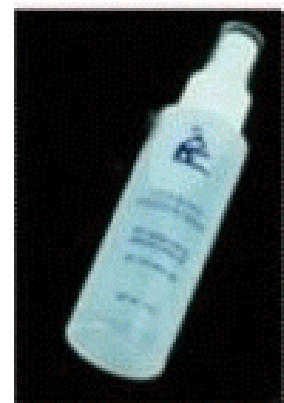




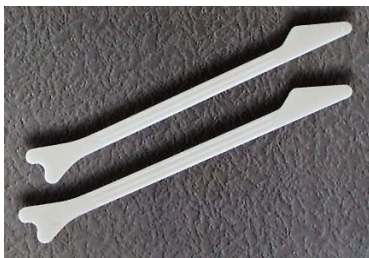
Pap smear: (A) speculum in place and Ayre spatula in position at cervical os, (B) tip of spatula placed in the cervical os and rotated 360°, (C) cellular material clinging to spatula is then smeared smoothly on glass slide, which is promptly placed in fixative solution, (D) Cyto-brush is rotated in cervical os and rolled onto glass slide



Thin-Prep



Fixative



Cyto-broom
Ayer Spathula (plastic)
Cytobrush



Pederson
speculum

COLPOSCOPY

OVERVIEW

Diagnostic test to evaluate patients with abnormal presentation

- Abnormal cervical cytology (Papanicolaou [Pap] smear)
- Abnormal- appearing cervix

Contrasted from Papanicolaou which is a screening test only

KEY COMPONENTS OF PROCEDURE

- Use of field **microscope** for magnified examination of cervix and vagina
- **Lougal's iodine** and **acetic acid** applied to temporarily stain cervix
 - Aceto-whitening**: whitened appearance as a result of acetic acid application
- All abnormal areas identified
 - Entire transformation zone is examined
 - Extent of all lesions is seen
- Directed **biopsies** of suspicious areas; tissues sent for **histological** examination
- **Endocervical curettage**: scrapings sent for histology

Lesions which are most likely to be missed or under-read

- Endocervical lesions
- Extensive lesions which are difficult to sample
- Necrotic lesions

INDICATIONS

- Pap smear consistent with dysplasia or cancer
- Pap smear with evidence of HPV infection
- Pap smear with ASCUS or repeated ASCUS
- Pap smear with repeated inflammation
- Abnormal-appearing cervix
- History of intrauterine diethylstilbestrol (DES) exposure



NORMAL COLPOSCOPIC FINDINGS

Original squamous epithelium

- Featureless, smooth, pink
- No suggestion of columnar epithelium - gland openings or **Nabothian cysts**
- Considered “always” squamous; not transformed from columnar to squamous

Columnar epithelium

- Single-cell layer, mucus producing, tall epithelium
- Extends between endometrium and squamous epithelium
- Red and irregular with stromal papillae and clefts
- Appear grape-like (resembles sea-anemone) under aceto-whitening and magnification
- Location: endocervix, surrounding cervical os or (rarely) extending into vagina

Squamocolumnar Junction (SCJ)

- Clinically-visible line on ectocervix or within distal canal
- Anatomic feature which demarcates endocervical tissue from squamous *

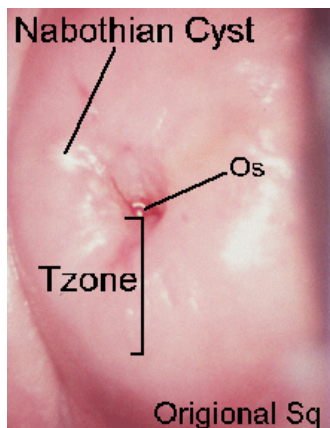
* Can be original squamous or squamous metaplastic tissue

Squamous Metaplasia

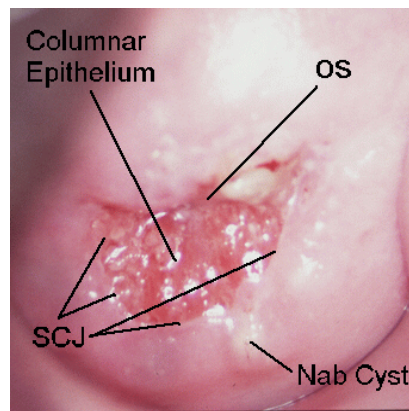
- Physiologic, normal process: columnar epithelium matures into squamous epithelium
- Typically occupies part of the transformation zone
- Acetic acid application results in a "ghost-white" or while-blue film appearance
- Sharply demarcated toward cervical os - very diffuse borders peripherally

Transformation Zone

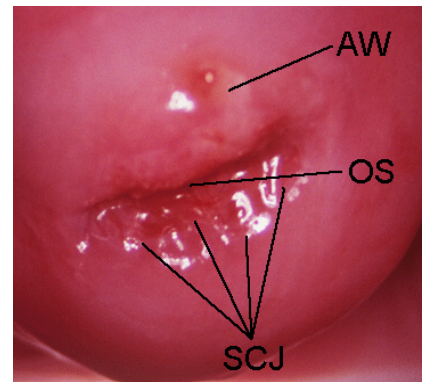
- Region between the original squamous epithelium (pre-puberty) and current SCJ
- May contain gland openings, Nabothian cysts
- Sometimes islands of columnar epithelium surrounded by squamous epithelium



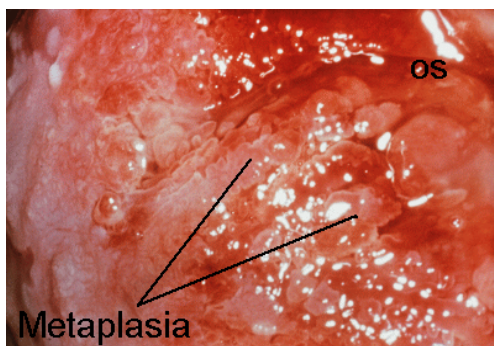
Transformation Zone



Columnar Epithelium



Squamocolumnar Junction



Metaplasia

ABNORMAL COLPOSCOPIC FINDINGS

ATYPICAL TRANSFORMATION ZONE

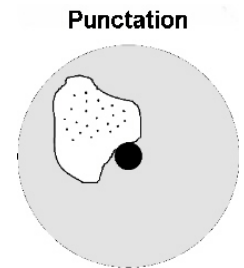
- Findings suggestive of **cervical dysplasia** or **neoplasia**
- Dysplasia and neoplasia can occur outside transformation zone (vagina, etc.)

Acetowhite (AW) - Transient, white-appearing epithelium following acetic acid application

- Suggest areas of higher nuclear density - suggest HPV infection
- These areas are typically biopsied during procedure

Punctuation:

- Stippled appearance to capillaries seen end-on
- Often found within acetowhite area - appear as fine to coarse red dots

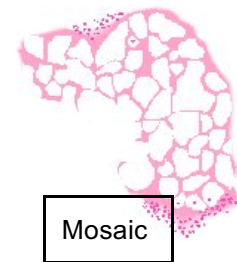
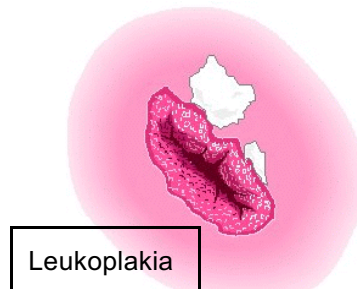
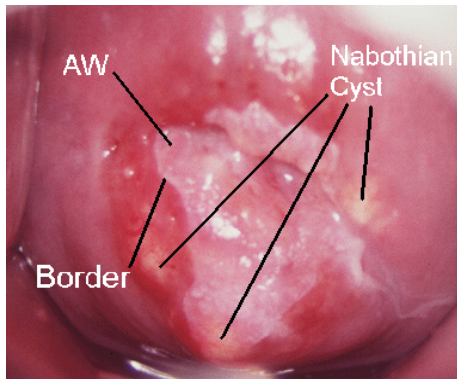


Mosaicism:

- Abnormal pattern of small blood vessels
- Suggest a confluence of "tile" or "chicken wire" reddish borders

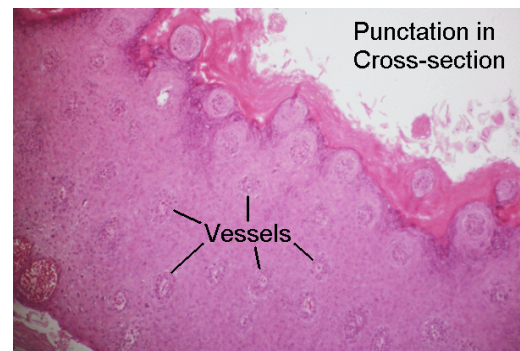
Leukoplakia (hyperkeratosis)

- Typically an elevated, white plaque seen prior to acetic acid application



Abnormal Blood Vessels

- Atypical irregular vessels
- Abrupt courses and patterns
- Comma, corkscrews, spaghetti patterns
- No definite pattern, irregular diameters
- Suspect **invasive cancer**



Complex irregular cervical epithelium

- No definite pattern: punctuation, mosaicism
- Typically with irregular vessel patterns
- Bizarre blood vessel forms: commas, hair pins, spaghetti, long, dilated, unbranching
- Suspect **invasive cancer**

OTHER COLPOSCOPIC FINDINGS

Vaginitis

- Cervicitis causing abnormal pap smears
- Interferes with accuracy of colposcopy
- Treat before biopsy where STDs is suspected

Traumatic erosion

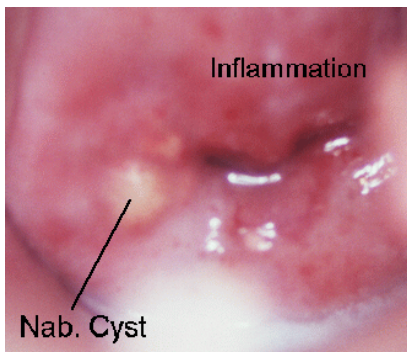
- Speculum insertion or over vigorous Pap smear collection
- Tampons, diaphragm, intercourse

Atrophic epithelium (vaginal or cervical)

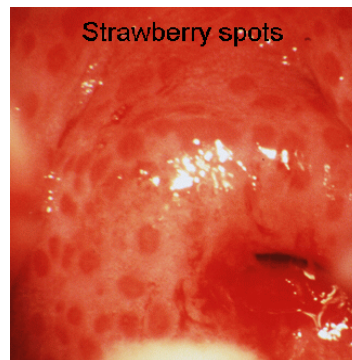
- May result in abnormal Pap smears
- Topical estrogen for 2-4 weeks will restore epithelium to more normal status
- Indicated even if dysplasia or cancer suspected
 - Short duration of therapy
 - Estrogen receptors in neoplastic cells not increased versus normal cells

Nabothian Cysts

- Normal finding
- Mucus producing epithelium sealed over with squamous epithelium layer(s)
- No treatment indicated
- Marker for transformation zone (columnar remnants occurring in squamous area)



Cervicitis with discharge



Trichomonas cervicitis (STD)

ADEQUACY OF COLPOSCOPY

Worst part of all lesions must be visualized and biopsied

Borders of all lesions must be seen in entirety

Entire transformation zone including all SCJ must be visualized to be adequate

Inadequate colposcopy with dysplasia or canal disease requires cone biopsy

Other procedures required when entire SCJ or limits of all lesions cannot be visualized

- **Cold knife cone, laser cone**
- **LEEP conization**

GRADING LESIONS

From increasing severity

1. Mild acetowhite epithelium > Intensely acetowhite
2. No blood vessel pattern > Punctation > Mosaic
3. Diffuse vague borders > Sharp demarcated borders
4. Follows normal iodine (dark) > Iodine-negative epithelium (yellow)
5. Normal iodine reaction (dark) > Iodine-negative epithelium (yellow)
6. Leukoplakia - usually a very good (condylomata) or very bad sign (SCC)

- Atypical vessels usually indicate severe dysplasia or cancer
- Acetowhite areas have sharp geographic borders
- Dimensions of thickness or roughness are likely to be histologically more severe
- Vessel atypia in any lesion implies more severe dysplasia

Reid Colposcopic Index - uses a point system to grade the lesions

- Lesion margins
- Color, blood vessel pattern, strong iodine staining characteristics

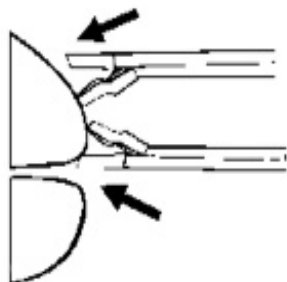


Endocervical
Curette

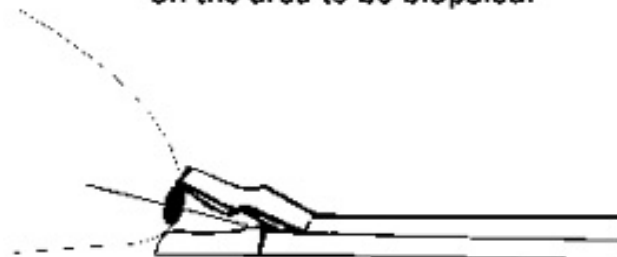
BIOPSY OF LESIONS

- Application of 20% benzocaine (Hurracaine Solution) decreases pain (onset 30-40 sec)
- Endocervical curettage (ECC) done before biopsy (unless blood would obscure biopsy sites)
 - Kevourkian curette (without basket) - scrape canal 360 degrees twice
 - Sample appears as coagulum of mucus, blood and tissue fragments
 - Use ring forceps or cytobrush to retrieve sample
 - Do not do ECC on pregnant patients
- Cervical biopsy
 - Posterior areas biopsied first to avoid bleeding over future biopsy sites
 - Manipulate cervix with Q-tip or hook to provide angle for biopsy
 - Forceps aligned radially from os so that fixed jaw is placed on posterior part of site
 - Jaw centered over biopsy area
 - Biopsy should be 3 mm deep and include all areas with vessel atypia
 - Normal margins need not be included with biopsy samples
- Controlling bleeding
 - Apply compression with Q-tip to biopsy area if more biopsies are needed
 - Monsel's solution applied when biopsies are completed
 - Monsel's should be consistency of toothpaste
 - Swab out excess Monsel and debris to minimize subsequent passing of same

The fixed jaw of the forcep is placed on the most distal part of the site.



Biopsy forceps should be centered on the area to be biopsied.



INTERPRETATION AND FOLLOW-UP

- CIN I has high rate of regression - followed with serial colposcopy
- CIN 2 and 3 normally treated
- Difference of one grade between Pap and biopsy is common
 - Example: Pap CIN 2; biopsy CIN 3
 - Where Pap is worse than biopsy suspect that worse areas of lesion were not sampled
- Avoid cryotherapy until discrepancy between Pap and colposcopy is explained
 - Repeat colposcopy may be indicated
 - Freezing invasive cancer is inappropriate - CA will spread untreated
- Cone biopsy (cold, laser or LEEP) is indicated if ECC reveals dysplasia
 - Cannot freeze cervix if disease is inside canal
 - Occasionally canal sample is contaminated with dysplastic cells on verge of os

TREATMENT

- Cryotherapy for patients with small lesions which do not enter os
- Small focal lesions even with severe dysplasia may respond well to ambulatory cryotherapy
- Loop or laser therapy for larger lesions even if only mild dysplasia
 - Over 1 inch in diameter
 - More than ½ inch from os
 - Involving more than 2 cervical quadrants
- LEEP or laser is standard of care for more significant lesions
 - Large lesions which enter cervical os
 - CIN 3 or CIS lesions
- Follow-up after treatment
 - Every 4-6 months x 2 years with colposcopy
 - Sometimes colposcopy interspersed with Pap
- Recurrence
 - Most common in first two years s/p therapy
 - Most common in os and on outside margins
 - Positive margin on LEEP requires colposcopic follow-up
 - Recurrences most common in first 2 years after therapy

LEEP - ELECTROSURGICAL EXCISIONAL PROCEDURE

OVERVIEW

- Thin wire loop electrodes used to remove dysplastic cervical lesions
- Low voltage, high frequency
- Allows for outpatient treatment, good pathology specimens
- Low risk of affecting future childbearing
- Increasing frequency of use - replaces older technologies
 - **Cryosurgery** - no tissue specimens obtained
 - **Electrocoagulation** - no tissue specimens obtained
 - **Laser vaporization** - no tissue specimens obtained
 - **Laser or knife conization** - requires surgery with general anesthesia
 - **Hysterectomy** - precludes future pregnancies
- **LEEP** most common term; also called Loop Electrosurgery
- Older terminology:
 - Diathermy Loop Treatment,
 - Loop excision of the transformation zone (LETZ)
 - Large loop excision of transformation zone (LLETZ)
- Physics: low voltage high frequency electric current;
 - Current dispersed to grounding electrode
 - Large surface area of return electrode prevents high charge density and burns
 - Return electrodes (patient) - adhesive gel pads or solid antennae
 - Placed on buttocks or thigh
 - Function as dispersive pad to avoid burns
 - Cutting mode: high frequency current produces clean cut with little coagulation artifact
 - Coagulation mode: fulguration (destruction via high frequency current) of tissues
 - Blend mode: combination
- Efficacy: 91-98% effective in treating SILs
 - Cryosurgery: 81-95% success rate
 - Laser: 83-94%
- Patient acceptance is favorable: 85% report no pain; pain is mild when reported
- Pregnancy: rates comparable to laser; better than conization; no difference in complications
- HPV viral particles isolated from laser plumes (smoke) thus clinician usually wears mask



PATIENT PREPARATION ISSUES

- Premedicate with NSAIDs previous evening and morning of the procedure
- Optimal timing: within 7 days of completion of menses or 4 days before next cycle
 - Swelling s/p procedure may occlude canal and prevent menstrual drainage
 - Less potential confusion re the origin of the post-procedural blood
 - Minimize chance of causing an arc along a blood path
 - Minimizes likelihood of pregnancy

Informed consent is mandatory; informed consent of a minor varies with state

INDICATIONS

- Treatment of ectocervical lesions - indications similar to those for cryotherapy and laser
- Any biopsy proven CIN lesion with an adequate colposcopy
- HPV infection without evidence of dysplasia is not an indication for LEEP
- Comparison to other modalities
 - Laser: LEEP is easier and less expensive vs laser
 - Cryotherapy
 - Cryo is easier and less expensive but does not provide tissue sample
 - LEEP preserves SCJ better than cryo
 - Similar cure rates and stenosis rates
 - LEEP preferred for high-grade lesions and dysplasia in appropriate for cryo
 - Modalities used is often a matter of personal preference
- LEEP conization ("cowboy hat" procedure) preferred therapy for certain conditions
 - Diagnosis and treatment of lesions extending > 5 mm into canal
 - When colposcopy is inadequate
 - When ECC is positive
 - Commonly used after cryotherapy failures esp with unsatisfactory subsequent colpo
 - Pap biopsy mismatch (must rule out vulvar or vaginal sources)

AFTERCARE

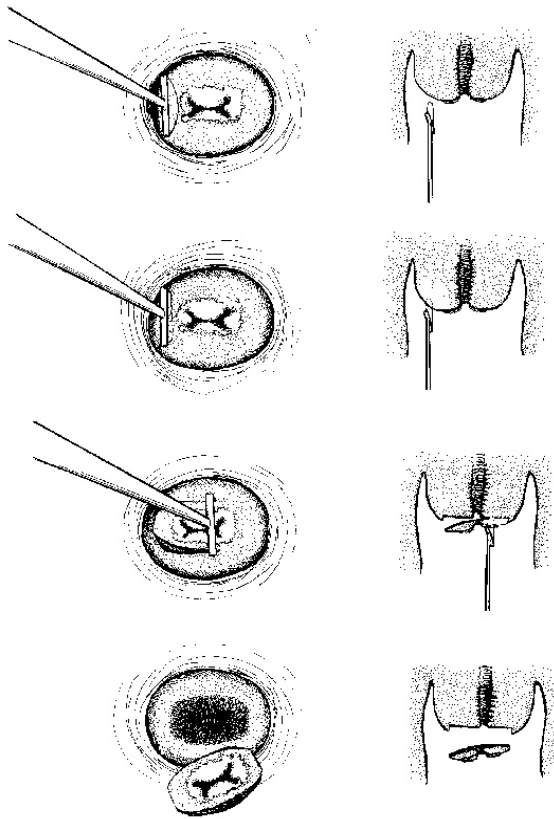
- No douching, sexual intercourse or tampons for 2-4 weeks
- Expect discharge for 2-3 weeks; up to 6 weeks
- Patient to report significant bleeding or malodorous vaginal discharge
- Follow-up Pap with or without colposcopy in 4-6 months

FOLLOW-UP

- Pap and/or colposcopy q 6 months x 2 yrs
- If all normal may resume yearly screening - patient considered high-risk
- Any sign of recurrence requires repeat colposcopy
- Positive margins on LEEP do not require immediate retreatment but require close follow-up
 - Colposcopy with directed biopsy and ECC
 - Must check for recurrences deep in os ("skip lesions") and along edge of LEEP
- Biopsy-proven recurrent lesions should be offered retreatment or hysterectomy

PROCEDURE

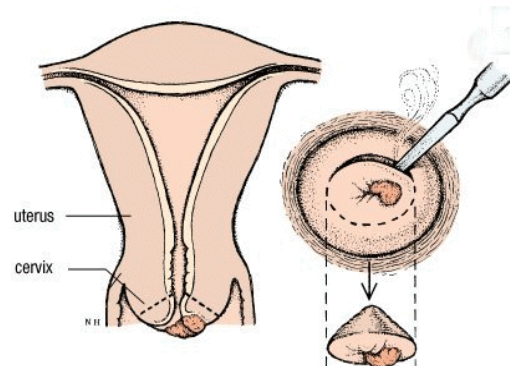
- Local anesthesia
- SIL lesions: loop excision of entire transformation zone in one or two passes
- Improper settings or technique will result in thermal burns
- Loop cuts through tissue at depth of 5-8 mm (max crypt involvement for CIN is 5 mm)
- Loop drawn through tissue until it is approximately 5 mm past edge of transformation zone
- Removed perpendicularly
- Cutting time is approximately 5-10 seconds - excision done in single smooth motion
- Endocervical curettage done after excision followed by superficial fulguration to entire crater
- Monsel's solution is applied to bed to reduce late bleeding
- **LEEP conization** used where lesion extends into endocervical canal
 - External os and distal endocervical canal is excised to 9-10 mm
 - Rest of transformation zone excised in usual manner
 - End result is similar to cold knife conization done in operating room.



Cold Knife Conization: malignancy shown in red - dashed lines show resection

LEEP Complications

- **Burns** esp with operator inexperience
- Learning curve is involved
- Perioperative bleed rare with excision of TZ
 - Less than laser
 - Most do not require hospitalization
- Infection: 0-8% of patients
- **Incomplete removal of lesion** when excising TZ
 - Positive margins in 15%
 - Recurrence low due to fulguration
- Cervical **stenosis** - less common
 - Occurs in patients with deep removal of extensive lesions
 - 15-19% for in LEEP conizations
- No data suggests incompetent cervix or sterility
- Contraindicated for invasive disease (vs cold knife)
- Safety in pregnancy not established
- Conization higher complication rate vs TZ excision



CRYOTHERAPY

OVERVIEW

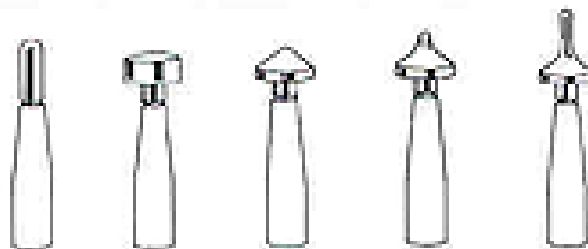
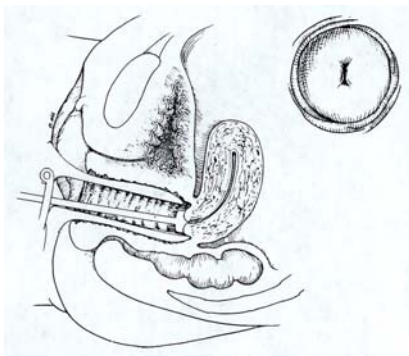
- Time-proven ablative method for treating lower grades of cervical dysplasia
- Typical candidate: abnormal Pap with subsequent colposcopy, biopsy
- Procedure is easy and suited to outpatient therapy
- Equipment: gas tank with non-explosive, non-toxic gas - usually **nitrous oxide**
 - 20 lb gas tank is preferable to 6 lb "E" type tank (more efficient pressure release curve)
 - Liquid nitrogen is not recommended - difficult to control
 - Regulator contains gas cut-off and pressure gage
- Gun-type unit connected to **cryoprobe** delivers refrigerant via flexible tubing
- Disinfect between uses usually via chemical methods

PHYSICS OF COOLING

- Cryoprobe cooled by Joule-Thompson effect
- Refrigerant fed into hollow cryoprobe under pressure
- Gas expands and absorbs heat in process which reduces temperature of probe
- Nitrous oxide probe is reduced to -65 to -85 degrees centigrade
- Cryoprobe acts as heat-sink and removes heat from cervical tissue.

FREEZING MECHANICS AND PHYSIOLOGY

- When probe contacts cervix a ring of frozen tissue or "ice ball" moves outward
- Depth of freeze approximates lateral spread of freeze - most tissue will necrose
- Ring of tissue (thermal injury or recovery zone) freezes but does not reach -20 degrees
 - Cell death occurs at -20 degrees hence thermal injury (not death) will recover
 - **Must freeze well beyond margins of any lesion**
- Endocervical crypt (gland) of intraepithelial neoplasia (CIN) may penetrate 3.8 mm into cervix
- Freeze to 4 mm will eradicate 99.7% of lesions with gland involvement
- Current recommendations are to produce an ice ball with 5 mm lateral spread
- Water soluble lubricant is applied to probe to act as thermocouple for irregular cervical surface
- Lubricant produces more uniform freeze
- Rapid freeze followed by slow thaw maximizes cryo-necrosis
- Freeze-thaw-freeze more effective than single freeze



Cryoprobes: Nipple-tip probes are not recommended, flat probes are preferred

INDICATIONS

- Indicated only for treatment of biopsy-proven dysplasia after an **adequate** colposcopic exam
- Treat HPV on external genitalia
 - Different freezing protocols versus treating uterine cervix
 - Cosmetic purposes
- Reserved for CIN 1 and 2 level lesions
- Higher recurrence rates vs LEEP with CIN 3 (greater depth of glandular involvement)
- Small area of cervix which is easily in entirety
- Cryoprobe must cover entire transformation zone and entire lesion to be effective

CONTRAINDICATIONS

- Lesions extending into endocervical canal more than a few mm
 - Destruction may not reliably penetrate beyond this level
 - **Positive endocervical curettage considered contraindication**
 - Use different treatment modality for these cases
- Avoid in pregnancy although case reports do not report complications
- Large lesions that cannot be covered with cryoprobe
- Active cervicitis
- Recurrent dysplasia after ablative therapy (use LEEP or other excisional therapy)
- CIN 3, CIS or invasive lesions
- Adenocarcinoma-in-situ

ADVANTAGES

- Serious injuries or complications are rare
- Quick to perform, easy to learn
- Outpatient treatment with relatively inexpensive equipment
- No anesthesia required - procedure is relatively painless
 - Cramping may occur
 - NSAIDs may help to decrease cramping
 - Submucosal injection of 1% lidocaine with 1:100,000 epinephrine to decrease pain
- Performed quickly; does not interfere with other activities eg work, school, etc. in the same day
- Minimal chance of heavy bleeding during or after procedure
- Least expensive widely available form of treatment for CIN
- Little effect on fertility or labor

DISADVANTAGES

- Heavy discharge for several weeks after procedure
- Amino-Cerv cream (1 applicator HS x 10d) may help decrease discharge
- Uterine cramping during treatment is common; rapidly subsides
- Bleeding and infections are rare occurrences during reparative period
- Cervical stenosis may occur after therapy
- No histologic examination is possible
- Future pap and colposcopy may be more difficult as SCJ migrates further into canal
 - More difficult to sample endocervix
 - Especially true of older "nipple-tipped" probes - not currently recommended
 - Recommended only use of flat-ended probes without endocervical extensions

TECHNIQUE

- Do not schedule during heavy menstrual flow
- NSAIDs before therapy may decrease cramping
- Informed consent; pregnancy status
- Use largest speculum patient can comfortably tolerate; open front end wide
- Address collapsing vaginal side walls if problematic - apply over speculum
 - Condom with tip cut off, - Glove thumb with tip cut off
 - Half Penrose drain; tongue blades, side-wall retractor
- Select probe which adequately covers lesion and entire TZ - do not use nipple-tipped probe
- Apply lubricant to probe to act as thermocouple with irregular surface cervix
- Apply probe firmly to cervix, do not touch vagina - start freeze
- Within few seconds probe will be frozen to cervix
 - Cervix can then be gently drawn forward for few mm into vagina where contact with side walls less likely
- Rim of ice should form and grow to width of at least 5 mm in all quadrants
 - Older method uses a 3 minute freeze followed by 5 minute thaw then 3 minute freeze
- Discontinue freeze - wait till probe visibly defrosts to disengage it
- Cervix should be allowed to regain pink color - usually about 5 minutes
- Repeat freeze sequence as above - second time is usually faster
- After second freeze is complete, disengage probe and remove speculum
- Patient may dress and leave as soon as procedure is complete

PROBLEMS DURING PROCEDURE

- Most common complication is probe touching and adhering to vaginal side wall
 - Results in pain
 - Tongue blade can be used to push mucosa off probe
 - If not removed quickly, it becomes more difficult to remove as freeze deepens
 - Vaginal mucosa will be destroyed; slight bleeding may occur
 - Sometimes tongue blade against vaginal wall is only way to prevent contact
- Asymmetric freeze on cervical face - change probes or freeze in sections
- Undue amount of pain (occasional) and cramping
 - Anxiolytic may help if due to high level of anxiety
 - Paracervical block, IM sedation if anticipated but rarely required
- Rare vasovagal reaction - patient to rest and arise slowly

AFTERCARE AND FOLLOW-UP

- Heavy - sometimes malodorous - discharge follows procedure for first 4 weeks
 - Discharge from sloughing of dead tissue and exudate from treatment site
 - Some physicians debride eschar to decrease discharge - not proven effective
- Refrain from intercourse and tampon use for 3 weeks to allow reepithelialization
- Avoid heavy exercise to less change of post-procedural bleed
- Follow-up pap in 3-6 months; Pap is of no value during sloughing and regenerative process
- Repeat Pap q 6 months x 2 years then yearly; most recurrences occur within 2 years
- Alternative follow-up: replace initial and each yearly pap with colposcopic examination
- If any of the follow-up tests are positive, restart work-up as if it were a new dysplasia
- If followup Pap is abnormal, colposcopy with directed biopsy is indicated
- F/U colposcopy may be difficult due to migration of SCJ deeper into os; LEEP preferred

ENDOMETRIAL BIOPSY

- Endometrial sampling and aspiration
- Provide bacterial endocarditis prophylaxis if indicated

INDICATIONS

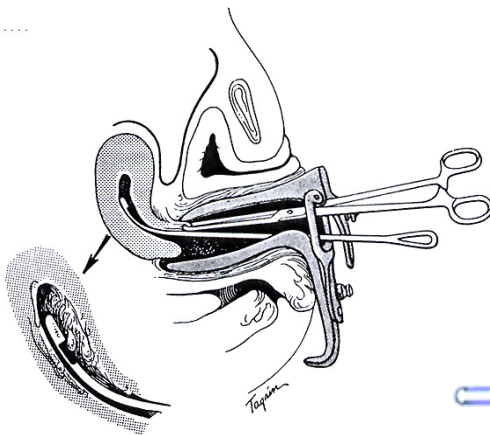
- Examination for DUB (rule-out endometrial hyperplasia or cancer)
- Work-up for glandular atypia or endometrial cells on Pap smear
- Monitor estrogen therapy
- Endometrial dating

CONTRAINDICATIONS

- Pregnancy
- PID
- Cervical infections
- Uncooperative patient

TECHNIQUE

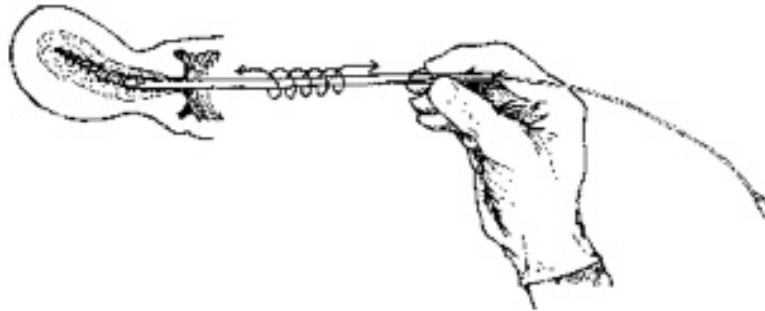
- Premedicate with ibuprofen 600-800 at least one hour before to decrease cramping
- Obtain informed consent: risks include pain, cramping, endometritis, failure of procedure
- Perform a pelvic exam
 - Determine size and position of uterus
 - Check for masses or structural abnormalities, cervical stenosis, signs of infection
- Apply povidone-iodine (Betadine) to the cervix with swab or cotton ball
- Measures to decrease pain of entry of curette into uterus
 - Topical benzocaine solution (Hurricane solution) may applied to cervix
 - Cervical or pericervical block may be used - may reapply anytime
 - Inject 2% lidocaine with epinephrine diluted 50% with 8.3% sodium bicarbonate solution in the center of each quadrant
- Optionally sound uterus or apply tenaculum
 - Sound uterus (normal depth is 6-7 cm)
 - Apply tenaculum and apply slight traction toward operator



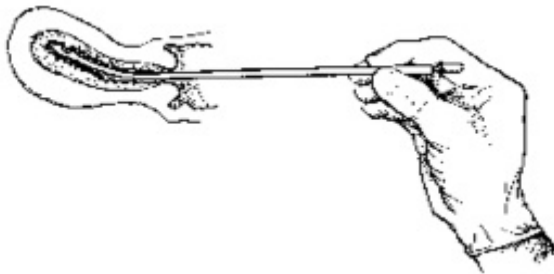
- Insert endometrial sampler into os with central piston fully inserted into sheath
- Do NOT pull central piston out during insertion
- Insert sampler into os until resistance is felt



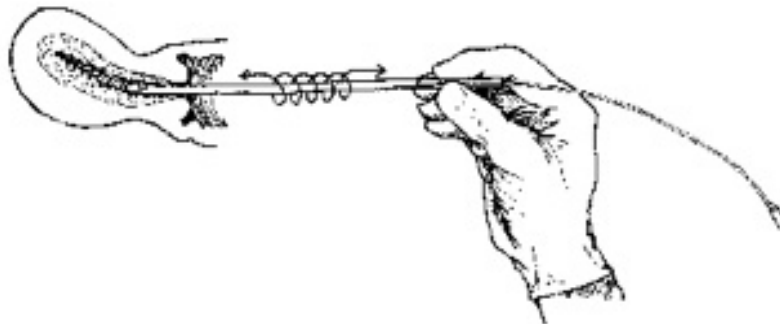
- If strong resistance is felt - abort procedure - forcing curette can cause uterine perforation
- Note depth of penetration



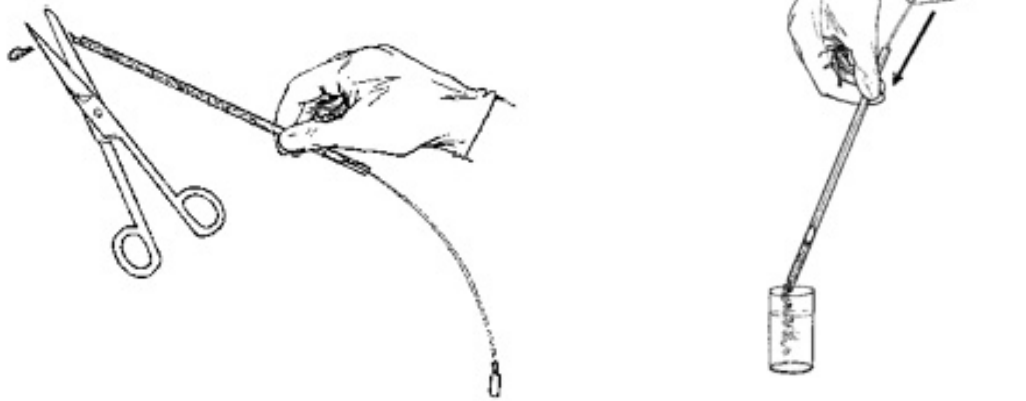
- Helpful to brace inserting hand on patients leg or perineum
- Hold sheath steady and pull back on piston until it stops creating negative pressure
 - Leave piston fully retracted



- Collect sample
 - **Roll or twirl laterally between thumb and forefingers**
 - **Simultaneously moving sheath tip back and forth between fundus and os**
- Do not allow hole in tip to emerge from os or suction will be lost
- Tissue should move into sheath as operation progresses
- Complete maneuver 3-4 times to obtain sample



- Remove sampling device and cut off distal tip
- Invert curette and allow contents to fall into container of fixative



- Remove speculum and allow patient to sit up and rest before dressing
- Advise re: possible cramping or spotting

FOLLOW-UP

- Normal endometrial tissue classification
 - Proliferative (estrogen effect or preovulatory) endometrium
 - Secretory (progesterone effect or postovulatory) endometrium
- HRT can be offered to patients with abnormal bleeding with normal endometrial biopsy
- Further work-up indicated if biopsy is normal but excessive vaginal bleed continues
- Atrophic endometrium yields scant or insufficient tissue for diagnosis
 - HRT may be considered for atrophic endometrium
 - Persistent bleed warrants further work-up
- Cystic or simple hyperplasia progresses to cancer in less than 5% of cases
 - Can manage with progestin therapy (MPA 10 mg qd 5d to 3 mo)
 - Follow-up biopsy in 3-12 months
- Atypical complex hyperplasia is a premalignant condition: progresses to cancer in 30-35%
 - Can treat with progestin therapy (MPA 10-20 mg qd for up to 3 months)
 - Most recommend D and C to preclude endometrial CA
 - Consider hysterectomy for high-grade or complex hyperplasia
- Biopsy which suggests endometrial CA (75% are adenocarcinoma) - definitive surgical therapy

OTHER DIAGNOSTIC PROCEDURES

Pelvic Ultrasound

- Ultrasonic evaluation of pelvic organs usually done transvaginally
Can also be done abdominally with a full bladder
- Outline shapes and density of various organs and structures
- Detect lesions, masses, etc.
- Estimates endometrial thickness

Hysterosalpingography

- Fluoroscopic radiographic examination of female genital tract with contrast dye
- Allows for evaluation of cervical canal, endometrial cavity, tubal lumen, peri-adnexal area
- Some feel it has been superseded by laparoscopy with hysteroscopy
- Minimal radiation exposure
- Contrast media infused into uterine cavity via cannulation device and balloon tip catheter
- Dye fills uterus and tubes - allowing for visualization under fluoroscopy
- Commonly used as part of infertility work-up
- Can sometimes have therapeutic effect for infertility due to blocked tubes
- Contraindicated with acute pelvic infection

Indications

- Uterine infertility
Endometrial adhesions (Asherman's syndrome), endometrial polyps, pedunculated leiomyomata, uterine abnormalities, DES, T-shaped uterus
- Tubal infertility
Assessment of tubal patency, salpingitis isthmica nodosa, peri-adnexal adhesive tissue
- Habitual abortion
Asherman's syndrome, uterine anomaly, DES, leiomyomata
- Pre and post operative evaluation
Tubal ligation reversal and tuboplasty, uterine septal resection, metroplasty, myomectomy, localization of lost of IUD, cervical incompetency

Contraindications

- Allergy to contrast dye
- Recent history of salpingitis
- Pregnancy
- Recent dilation and curettage
- Untreated STD

Hysteroscopy

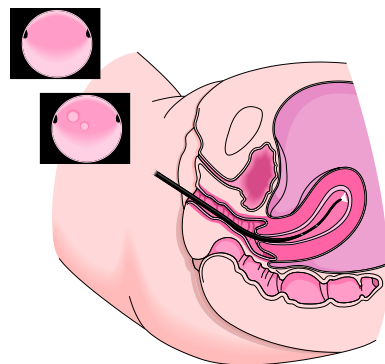
- Tool for viewing endocervical canal and uterine cavity
- Not intended to replace tissue diagnosis but to make sampling more precise
- Three goals of procedure
 - Transform uterine cleft into a cavity using distending agents
 - Controlled-rate carbon dioxide insufflator
 - Safe distention; minimal side effects
 - Illuminate uterine cavity with light source and transmission
 - Transmit image by an optical system
- Smaller scopes allow office procedure without need for cervical dilation or local anesthesia
- Best performed in early follicular phase when endometrium is the thinnest

Indications

- Suspicion of endometrial polyps or submucous myomas
- Evaluation of abnormal uterine bleeding in premenopausal patient
- Localization of lost IUD
- Diagnosis of uterine or cervical carcinomas
- Infertility evaluations
 - Including recurrent miscarriage with hysterosalpingography)
- Evaluation of post-partum bleeding

Contraindications

- Acute pelvic infections
- Acute uterine bleeding (if using CO2 insufflation)



Culdocentesis

- Procedure to detect and sample free intraperitoneal fluid
- Critical information via variety of gynecologic conditions: ectopic pregnancy, PID
- Results usually clear-cut

Indications: any suspicion of free fluid within peritoneal cavity

- Ectopic pregnancy: most widely applied indication is suspected leaking or rupture EP
 - Ruptured EP is life-threatening
 - Fastest diagnostic method in ER vs U/S, HCG or laparoscopy
- Acute salpingitis - pelvic inflammatory disease (PID)
- Ruptured cyst
- Ascitic fluid: to dx ovarian CA or relief of excessive ascites

Contraindications:

- Cul de sac mass
 - Could be benign or malignant neoplasm, endometrioma, abscess or unruptured ectopic pregnancy where rupture would be harmful
- Fixed and retroverted uterus: cul-de-sac would be obliterated; procedure impossible

Cervicography: combination of colposcopy with non-invasive photographic technique

- Permits quality-controlled expert evaluation of normal and abnormal findings
- Permanent and objective documentation of findings

Dilation and Curettage

- Somewhat less frequently performed due to role of endometrial biopsy
- Useful for determining cause of abnormal uterine bleeding
- Removal of retained products of conception

Indications

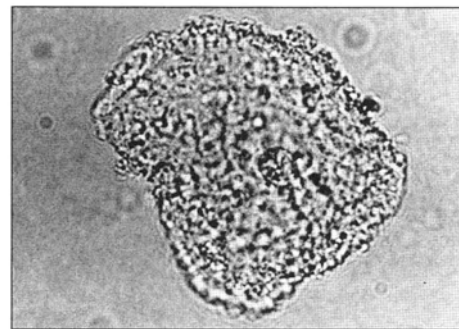
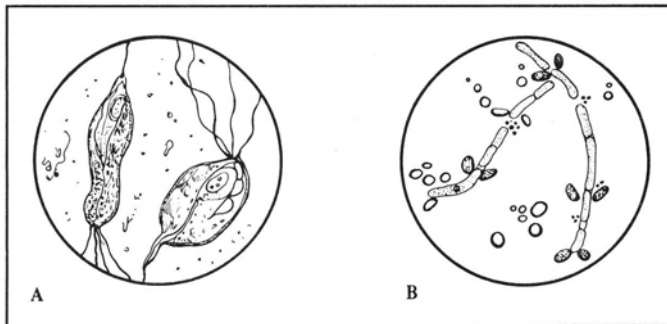
- Dx cause of premenopausal bleed not corrected by medical management
- Dx of premenstrual bleed in women over 40 yrs with inadequate endometrial biopsy
- Dx of premenopausal bleed with submucous myoma or endometrial polyp suspected
- Dx cause of premenopausal bleeding with adenomatous hyperplasia with atypia
- Dx of postmenopausal bleeding when endometrial aspiration is non-diagnostic
- Pre-hysterectomy measure to exclude possibility of endometrial or endocervical CA
- Postmenopausal vaginal surgery without hysterectomy
- Dx significant uterine bleeding where endometrial biopsy is contraindicated
- Removal of postpartum retained products of conception (hemorrhage or infection)
- Removal of retained products after incomplete abortion
- Therapy for excessive hemorrhage

Contraindications

- Infection unless cause is necrotic retained products of conception
- Pregnancy
- Lack of facilities to deal with uterine perforation or lack of resuscitation equipment

WET MOUNT

Vaginal smear preparations. A. Microscopic appearance of *Trichomonas vaginalis* organisms.
B. Microscopic appearance of candidal vaginitis.



Microscopic view of a clue cell, an epithelial cell coated with bacteria, indicates BV.