Colposcopy

Lianne Beck, MD
Assistant Professor
Emory Family & Preventive Medicine
INTRODUCTION

- The colposcopic exam serves to:

  1. Identify normal landmarks
  2. Identify abnormal areas in relation to these landmarks
  3. Facilitate directed biopsy of abnormal areas for histologic diagnosis
  4. Rule out invasive cancer
INTRODUCTION

- Pre-malignant and malignant cervical conditions produce colposcopically identifiable epithelial changes that generally occur within the transformation zone.
SQUAMOUS METAPLASIA

- Physiological replacement of the columnar epithelium with squamous epithelium

- The region where this occurs is known as the TRANSFORMATION ZONE

- IMPORTANT because almost ALL cervical cancer occur in this zone
Transformation Zone

**FIGURE 5.1:** A method of identifying outer and inner borders of the transformation zone

(SCJ: Squamocolumnar junction)
Normal Colposcopic Findings

**FIGURE 6.1:** The entire new squamocolumnar junction (SCJ) is visible, and hence the colposcopic examination is satisfactory; the transformation zone (TZ) is fully visualized. The metaplastic squamous epithelium is pinkish-white compared to the pink original squamous epithelium.
INTRODUCTION

The key ingredients of the exam are the observation of the cervical epithelium
- after application of normal saline
- 3-5% acetic acid
- Lugol’s iodine solution in successive steps
COLPOSCOPE

- Individually movable binocular eye pieces
- Green filter to view blood vessels in detail
- Objective lens
- Knob for tilt adjustment of optics carrier
- Height adjustment handle
- Handle for fine focus and tilting arrangement
- Colposcopic stand
- Fibre optic cable to deliver the light to the optics carrier
- Transformer
- Light source
- Light switch
- Dimmer for adjusting the brightness of the light
- 5-leg rolling pedestal
- Swivel casters

*for tilting the optics carrier

FIGURE 4.1: Colposcope
INDICATIONS

- Suspicious visible lesion or palpable lesion of the cervix, vagina, vulva, perineum or perianal area
- Pap smear consistent with dysplasia or cancer
- Pap smear with evidence of HPV infection (High Risk types)
- History of intrauterine DES exposure
- Follow-up of previously treated patients or high-risk patients
- Evaluation of child abuse or rape cases
RELATIVE CONTRAINDICATIONS

- Active, inflammatory cervicitis
- Non-cooperative patient
- Postmenopausal patient who is not estrogen-primed
- Heavy menses
Arranging Colposcopy

EMORY HEALTHCARE
THE EMORY CLINIC, INC.

EMORY FAMILY MEDICINE - Request to Schedule Precepted Procedures

 Midtown: 490 Peachtree St., NE, Suite 472-C, Atlanta, GA 30308
 South Dekalb: 2764 Candler Road, Decatur, GA 30034
 Student Health Service: 1711 Uppergate Drive, Atlanta, GA 30022

Tel: 404-686-5202 Fax: 404-686-4319
Tel: 404-778-8680 Fax: 404-778-8695
Tel: 404-727-3188

Patient: ____________________________
MR #: ____________________________
DOB: ____________________________
Phone (D): ____________________________
( W): ____________________________

Procedure to be Performed: ____________________________

Indication: ____________________________

 Patient has been given an explanation as to the reason for the procedure to be scheduled.

PCP: ____________________________

Time Frame Requested:
 ASAP (< 2 weeks)  < 1 month
 < 3 months  Other

Preceptor Requested:  any approved faculty
 Other: ____________________________

 Please schedule at first opportunity during my regular clinic time, when an appropriate preceptor is available (see preceptor list). If my first choice is not practical and/or will cause a significant delay in scheduling, please call me at PIC #: ____________________________

 Please schedule my patient during procedure’s clinic at:  MT  SD
(This means that another provider may do the procedure).

 Please schedule nurse visit _________ minutes before the procedure appointment, for: ____________________________

SPECIAL INSTRUCTIONS
 Nothing to eat or drink after midnight and take no medications the morning of procedure.
 Take nothing to eat or drink after midnight: (you may take all medications except diabetic medications with water the morning of procedure).
 Please bring an escort to drive you home.
 Come 30 minutes early as we plan to give you a prep or sedation prior to procedure (this usually means you will need an escort to drive you home).
 Take 3 Advil (Ibuprofen 200 mg) or 2 Aleve one hour before procedure.
 Take laxative of choice (e.g. MOM, Dulcolax, Correctol, etc.), at supper the evening before your procedure.
 Take 2 or 3 Fleet enemas 1 1/2 - 3 hours before your procedure.
 Wear comfortable clothing and walking shoes.
 Eat only light breakfast before procedure.
 Omit morning medications.

The necessity and instructions for the above procedure have been explained to me.

Patient Signature: ____________________________

70.0610.609
Steps in the colposcopic exam

- Explain the procedure and obtain informed consent
- Obtain a relevant medical history
- R/O pregnancy
- Perform bimanual exam if not already done
- Examine vulva
- Insert speculum
Steps in the colposcopic exam

- Examine cervix using low power (inflammation, infection, leukoplakia, punctation, mosaicism, abnormal vessels)
- Obtain KOH/WP, cultures and/or pap, if needed
- Use green filter and normal saline
Steps in the colposcopic exam

- Apply 5% acetic acid. Repeat Q 5 min.

- Scan entire cervix with white light. Start with low power and move to higher magnification to document abnormal vascular patterns.
5% Acetic Acid Application

FIGURE 6.11: The prominent white line corresponds to the new squamocolumnar junction and tongues of immature squamous metaplasia (a) with crypt opening at 4-8 o’clock positions (b) (after application of 5% acetic acid).
Steps in the colposcopic exam

- Use endocervical speculum if needed to view entire transformation zone

- The *entire TZ, including SCJ*, and borders of all lesions must be visualized in order for colposcopy to be satisfactory
Steps in the colposcopic exam

- Apply Lugol’s iodine solution to aid in delineating potential biopsy site
Steps in the colposcopic exam

- Perform endocervical curettage, if indicated
  - Glandular lesion
  - Unsatisfactory colposcopy
  - Normal colpoposcopy of ectocervix, yet abnormal cytology
  - CONTRAINDICATED in pregnancy or active cervicitis
Steps in the colposcopic exam

- Mentally map abnormal areas
  - Mild acetowhite < Intensely acetowhite
  - No blood vessel pattern < Punctuation < Mosaicism
  - Diffuse vague borders < Sharply demarcated borders
  - Follows normal contours of the cervix < “humped up”
  - Leukoplakia – usually a very good (condylomata) or very bad sign
  - Atypical vessels – usually cancer
  - Normal iodine reaction (dark) < Iodine-negative epithelium (yellow)
Steps in the colposcopic exam

- Perform cervical biopsies, if necessary
  - Biopsy posterior areas first
  - A depth of 3 mm is adequate
  - Biopsy area of the lesion with worst features and closest to SCJ, include the area with atypical vessels

*FIGURE 4.8: Cervical punch biopsy forceps with sharp, cutting edges*
Steps in the colposcopic exam

- Apply pressure and Monsel’s paste to bleeding sites after biopsy
- Remove speculum and inspect vaginal walls, vulva, perineum, and perianal areas
- Allow patient to recover
- Document findings
- Discuss findings with patient and give post-procedure instructions
Documentation
<table>
<thead>
<tr>
<th>Colposcopic Sign</th>
<th>Zero Points</th>
<th>One Point</th>
<th>Two Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margin</td>
<td>Condylomatosis or microcapillary contour. Indistinct borders.</td>
<td>Regular lesions with smooth, straight outlines.</td>
<td>Rolled, peeling edges. Internal borders between lesions of different severity.</td>
</tr>
<tr>
<td></td>
<td>Prominent or feathered margins. Jagged, angular lesions. Satellite lesions, acetowhite lesions outside the transformation zone.</td>
<td>Sharp peripheral margins.</td>
<td></td>
</tr>
<tr>
<td>Iodine</td>
<td>Positive iodine uptake, producing a mahogany brown color.</td>
<td>Partial iodine uptake. Verrucous, tumor-like appearance.</td>
<td>Negative iodine uptake (mustard yellow) of a lesion considered high grade by above criteria (3/4)</td>
</tr>
<tr>
<td>Staining</td>
<td>Negative iodine uptake (mustard yellow) of a lesion recognized as low grade by above criteria (2/4).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Read**

Colposcopic Index Score: 0-2 = HPV or CIN I 3-5 = CIN I or CIN II 6-8 = CIN II or CIN III

---

**Name:**

**Clinical Impressions:**

**Pathology report:** RX: ___________ ECC: ___________

**Repeat pap result:**

**Plan:**
- [ ] Discontinue smoking
- [ ] Quarterly pap
- [ ] Semiannual pap
- [ ] Annual pap

1. Lesion Limited to portio
2. Colposcopy indicates only CIN
3. ECC negative
4. Cytology indicates no invasion
5. Biopsy correlates with Pap

**Recommendations:**

**Medication:**

- [ ] Conization: [ ] Yes [ ] No [ ] Loop
- [ ] Cryocautery: [ ] Yes [ ] No
- [ ] Referral: [ ] Yes [ ] No

Follow-up: ___ weeks ___ month ___ yr ___ pm

---

**EXAMINER**

**ATTENDING**
Post-Procedure Instructions

- No douching, intercourse, or tampons until spotting subsides
- Return for foul odor or discharge, pelvic pain, profuse bleeding or fever
- Tylenol, ibuprofen, or Aleve may be used for cramping
- Otherwise, follow-up is usually 1-3 weeks to discuss histology results and definitive therapy
Post-Procedure Instructions

- Encourage contraception once definitive therapy completed

- Re-emphasize the relationship of cervical dysplasia with STDs, smoking, and non-monogamous sexual practices

- Stress patients life-long risks of HPV infection
Complications

- **Bleeding**
  - Reapply Monsel’s solution
  - Saturate the end of a tampon with Monsel’s and insert to provide pressure and astringent action for persistent oozing
  - Cauterize the biopsy site
  - Inject 1-2 cc of 2% lidocaine with epinephrine into the bleeding site
  - Rarely, a cervical stitch of 4-0 absorbable suture across a deep biopsy site
Complications

- Infection is rare but typically occurs on the 3rd or 4th day after biopsy.

- Avoid biopsy with active cervicitis.

- Pain can be minimized by caring and careful explanation of procedure, a warm room, NSAIDs given the night before and morning of procedure (Avoid Aspirin).

- Missing disease – lack of correlation between pap cytology and subsequent histology.
Colposcopic Findings
Normal Colposcopic Findings

- Original squamous epithelium
- Columnar epithelium
- Squamocolumnar junction
- Squamous metaplasia
- Transformation Zone
FIGURE 18: Location of squamocolumnar junction (SCJ)

(a) Original squamocolumnar junction (SCJ) in a young woman in the early reproductive age group. The SCJ is located far away from the external os. Note the presence of everted columnar epithelium occupying a large portion of the ectocervix producing ectropion.

(b) The new SCJ has moved much closer to the external os in a woman in her 30s. The SCJ is visible as a distinct white line after the application of 5% acetic acid, due to the presence of immature squamous metaplastic epithelium adjacent to the new SCJ.

(c) The new SCJ is at the external os in a perimenopausal woman.

(d) The new SCJ is not visible and has receded into the endocervix in a postmenopausal woman. Mature metaplastic squamous epithelium occupies most of the ectocervix.
Normal Findings w/ 5% Acetic Acid

**FIGURE 6.5:** Prominent new squamocolumnar junction after application of 5% acetic acid.

**FIGURE 6.7:** The colour changes in the columnar epithelium after the application of 5% acetic acid. The columnar villi turn white, obliterating the red colour of the columnar epithelium.

**FIGURE 6.9:** Immature squamous metaplasia: The columnar villi have fused together to form thin membrane (a). The adjacent villi are fusing together (b) (after 5% acetic acid application)

**FIGURE 6.11:** The prominent white line corresponds to the new squamocolumnar junction and tongues of immature squamous metaplasia (a) with crypt opening at 4-8 o’clock positions (b) (after application of 5% acetic acid).
Normal findings with Lugol’s solution

**FIGURE 6.16:** Colour changes after application of Lugol’s iodine

**FIGURE 6.13:** Pale, translucent acetowhiteness due to immature squamous metaplasia with several crypt openings after application of 5% acetic acid.

**FIGURE 6.17:** An area of no or partial iodine uptake in the immature squamous epithelium (a) (appearance after acetic acid application is shown in figure 6.13)
Ectropian
Polyps
Cervicitis

After application of Lugol’s iodine
Condylomata
Nabothian Cysts
Postmenopausal Cervix
Abnormal Colposcopic Findings

- Atypical transformation zone with the following features suggestive of dysplasia or neoplasia:
  1. Punctuation
  2. Mosaicism
  3. Leukoplakia
  4. Acetowhite
  5. Abnormal blood vessels
Punctation and Mosaicism

**FIGURE 7.1**: A schematic representation of punctation and mosaics.

**FIGURE 7.2a**: Fine punctation (a) and coarse mosaic (b) seen after application of normal saline.

**FIGURE 7.2b**: Schematic diagram to show the rete pegs and the stromal capillaries which on end-on view appear as punctations.

**FIGURE 7.3**: Coarse punctation before and after application of acetic acid.
Leukoplakia

FIGURE 7.4: Hyperkeratosis (leukoplakia) (a)
Acetowhite Changes CIN 1

**FIGURE 7.9:** Geographic satellite lesion after application of 5% acetic acid (a) far away from the squamocolumnar junction, suggestive of low-grade lesion.

**FIGURE 7.10:** Geographic satellite lesions after application of 5% acetic acid (a) far away from the squamocolumnar junction, suggestive of low-grade lesions.

**FIGURE 7.11:** Thin acetowhite lesion with geographic margins in the upper lip. Histology indicated CIN 1.

**FIGURE 7.12:** Mildly dense, thin, elongated acetowhite lesion with regular margins abutting the squamocolumnar junction. Note the fine mosaic at the distal end of the lesion. Histology indicated CIN 1.
Acetowhite Changes CIN 1

**FIGURE 7.13:** Mildly dense acetowhite lesions arising from the squamocolumnar junction in 12 and 6 o’clock position with irregular geographical margins, which on histology proved to be CIN 1 lesion.

**FIGURE 7.14:** Note the circumorificial acetowhite CIN 1 lesion with irregular margin and fine mosaics (a).

**FIGURE 7.15:** Moderately dense acetowhite lesions with irregular margins in the anterior and posterior lips (CIN 1).

**FIGURE 7.16:** Circumorificial, mild to dense acetowhite lesion with fine mosaic (arrow). Histology indicated CIN 1. Note the internal borders within the lesion (a).
Acetowhite Changes CIN 2

**FIGURE 7.17:** Moderately dense acetowhite lesions with well defined margins and coarse punctations in the anterior lip and in 3 o’clock position (CIN 2 lesion).

**FIGURE 7.19:** A dense acetowhite lesion with varying colour intensity and coarse mosaics (a) in a CIN 2 lesion.

**FIGURE 7.20:** Acetowhite lesions with coarse punctation (a) and mosaics (b) in a CIN 2 lesion.

**FIGURE 7.21:** An acetowhite lesion arising at 12 o’clock position, abutting the squamocolumnar junction. Note the two colour intensities in the same lesion (a and b) with an internal border within the same lesion (c). This is an example of a lesion within a lesion.
**Acetowhite Changes CIN 3**

**FIGURE 7.22:** A circumorificial dense opaque acetowhite area with coarse mosaics (CIN 3 lesion).

**FIGURE 7.23:** A dense acetowhite lesion with regular margin and coarse, irregular punctuation in a CIN 3 lesion.

**FIGURE 7.25:** Note the intensely dense, complex acetowhite lesion (CIN 3 lesion) with raised and rolled out margins, obliterating the external os.

**FIGURE 7.26:** A dense acetowhite lesion with raised and rolled out margins with a cuffed crypt opening (dense arrow) and coarse mosaics with umbillation, suggestive of a CIN 3 lesion.
Abnormal Lugol’s Iodine Uptake

**FIGURE 7.28:** Satellite lesions (a) do not stain with iodine after the application of Lugol’s iodine solution and remain as thin yellow areas (see the appearance after acetic acid application in Figure 7.10).

**FIGURE 7.29:** A CIN 1 lesion with a mustard yellow iodine-negative area with irregular margins (see the appearance after acetic acid application in Figure 7.15).

**FIGURE 7.30:** Mustard yellow iodine-negative area in the anterior lip (CIN 2 lesion) after the application of Lugol’s iodine solution.

**FIGURE 7.31:** Dense saffron yellow iodine-negative area of a CIN 3 lesion after the application of Lugol’s iodine solution. Note the surface irregularity.
Comparison CIN1 vs CIN3

**FIGURE 7.15:** Moderately dense acetowhite lesions with irregular margins in the anterior and posterior lips (CIN 1).

**FIGURE 7.26:** A dense acetowhite lesion with raised and rolled out margins with a cuffed crypt opening (dense arrow) and coarse mosaics with umbilation, suggestive of a CIN 3 lesion.

**FIGURE 7.29:** A CIN 1 lesion with a mustard yellow iodine-negative area with irregular margins (see the appearance after acetic acid application in Figure 7.15).

**FIGURE 7.32:** A dense mustard yellow iodine-negative area in the upper lip suggestive of CIN 3 lesion (see the appearance after acetic acid application in Figure 7.26).
Atypical Vessels

FIGURE 8.2: Early invasive cancer: Note the raised irregular mosaics with umbilication (a), breaking mosaics (b), surface irregularity and the atypical vessels (c) after the application of 5% acetic acid.

FIGURE 8.1:

(a) There is a dense, opaque, thick aceto-white area involving all four quadrants of the cervix and extending into the endocervix, with irregular surface contour and atypical vessels.

(b) The lesion is not taking up iodine and remains as a saffron yellow area after the application of Lugol’s iodine solution.
Invasive Carcinoma

FIGURE 8.3
Early invasive cancer

(a) There is a large, dense, opaque acetowhite area with an irregular surface contour, coarse punctations and atypical vessels, involving all four quadrants of the cervix. There are internal borders within the acetowhite areas (arrows). There are several cuffed crypt openings.

(b) The lesion does not take up iodine and remains as a mustard yellow area after the application of Lugol’s iodine.

FIGURE 8.4: Early invasive cancer: Note the thick, dense, opaque acetowhite lesions with raised and rolled out margins (a) and atypical vessels (b) which started to bleed after touch. Note the mustard-yellow iodine-negative area corresponding to the extent of the lesion. Irregular surface with “mountains-and-valleys” pattern is evident.
Invasive carcinoma

**FIGURE 8.7**: Invasive cervical cancer: (a) note the irregular surface contour with mountains-and-valleys appearance with atypical blood vessels in the dense acetowhite area; (b) appearance after the application of Lugol’s iodine.

**FIGURE 8.8**: Invasive cancer: There is a proliferative growth on the cervix which becomes dense, chalky white after the application of acetic acid. Bleeding partly obliterates the acetowhitening.
Glandular Lesions (AIS and Adenocarcinoma)

**FIGURE 8.9:** A dense acetowhite lesion in the endocervical canal visible after stretching the os with a long dissection forceps (adenocarcinoma \textit{in situ}).

**FIGURE 8.10:** Adenocarcinoma \textit{in situ}: The tips of some of the columnar villi turn densely white compared to the surrounding columnar villi after the application of acetic acid (arrow). The nabothian cysts turn white after the application of acetic acid.

**FIGURE 8.11:** Adenocarcinoma \textit{in situ}: Note the elevated lesions with an irregular acetowhite surface, enlarged and hypertrophied villi, papillary patterns (a), and atypical vessels (b), overlying the columnar epithelium.

**FIGURE 8.12:** Adenocarcinoma: Note the greyish-white dense acetowhite lesion with character writing-like atypical blood vessels (a).
Table 7.3: Grading abnormal colposcopic findings using two categories

<table>
<thead>
<tr>
<th>Grade</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insignificant</td>
<td>The acetowhite epithelium is usually shiny or semitransparent. The borders are not sharp, with or without fine-calibre vessels (fine punctuation and/or fine mosaic), which have ill-defined patterns and short intercapillary distances. There is an absence of atypical vessels.</td>
</tr>
<tr>
<td>2. Significant</td>
<td>Dense acetowhite or grey opaque epithelium is sharply bordered. There are dilated calibre, irregular shaped or coiled vessels (coarse punctuation and/or mosaic). Atypical vessels and sometimes irregular surface contour indicate either imminent or invasive cancer.</td>
</tr>
</tbody>
</table>

Adapted from Coppleson et al., 1993 b
<table>
<thead>
<tr>
<th>Feature</th>
<th>0 points</th>
<th>1 point</th>
<th>2 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour of acetowhite (AW) area</td>
<td>Low-intensity acetowhening; snow-white, shiny AW; indistinct AW; transparent AW; AW beyond the transformation zone</td>
<td>Grey-white AW with shiny surface</td>
<td>Dull, oyster-white; Grey</td>
</tr>
<tr>
<td>AW lesion margin and surface configuration</td>
<td>Feathered margins; angular, jagged lesions; flat lesions with indistinct margins; microcondylomatous or micropapillary surface</td>
<td>Regular lesions with smooth, straight outlines</td>
<td>Rolled, peeling edges; internal demarcations (a central area of high-grade change and peripheral area of low-grade change)</td>
</tr>
<tr>
<td>Vessels</td>
<td>Fine/uniform vessels; poorly formed patterns of fine punctuations and/or fine mosaic; vessels beyond the margin of transformation zone; fine vessels within microcondylomatous or micropapillary lesions</td>
<td>Absent vessels</td>
<td>Well defined coarse punctuation or coarse mosaic</td>
</tr>
<tr>
<td>Iodine staining</td>
<td>Positive iodine uptake giving mahogany brown colour; negative uptake of lesions scoring 3 points or less on above three categories</td>
<td>Partial iodine uptake by a lesion scoring 4 or more points on above three categories – variegated, speckled appearance</td>
<td>Negative iodine uptake by a lesion scoring 4 or more points on the above three criteria</td>
</tr>
</tbody>
</table>

**Scoring:**
A score of 0 to 2 points = Likely to be CIN 1; 3-4 points = Overlapping lesion: likely to be CIN 1 - 2; 5 to 8 points = Likely to be CIN 2 - 3 lesions.
References

- AAFP Colposcopy Position Paper