Cervical cancer screening - case study of colposcopy and clinical practice

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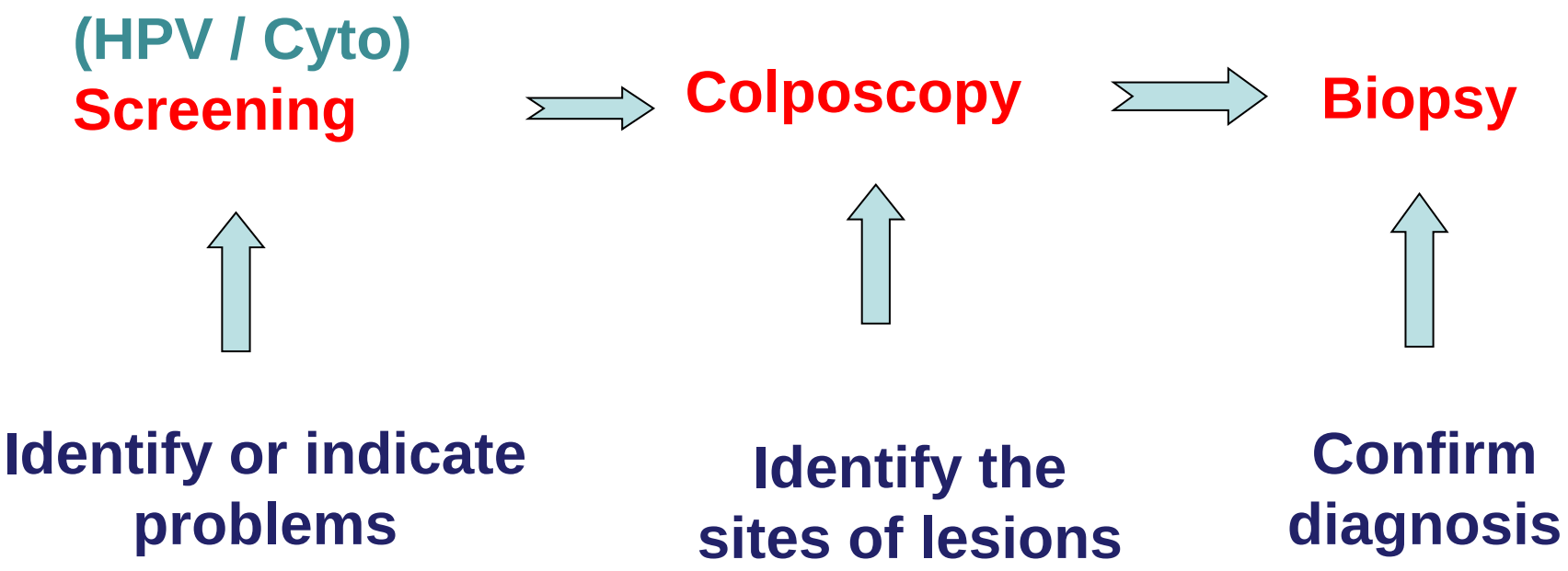
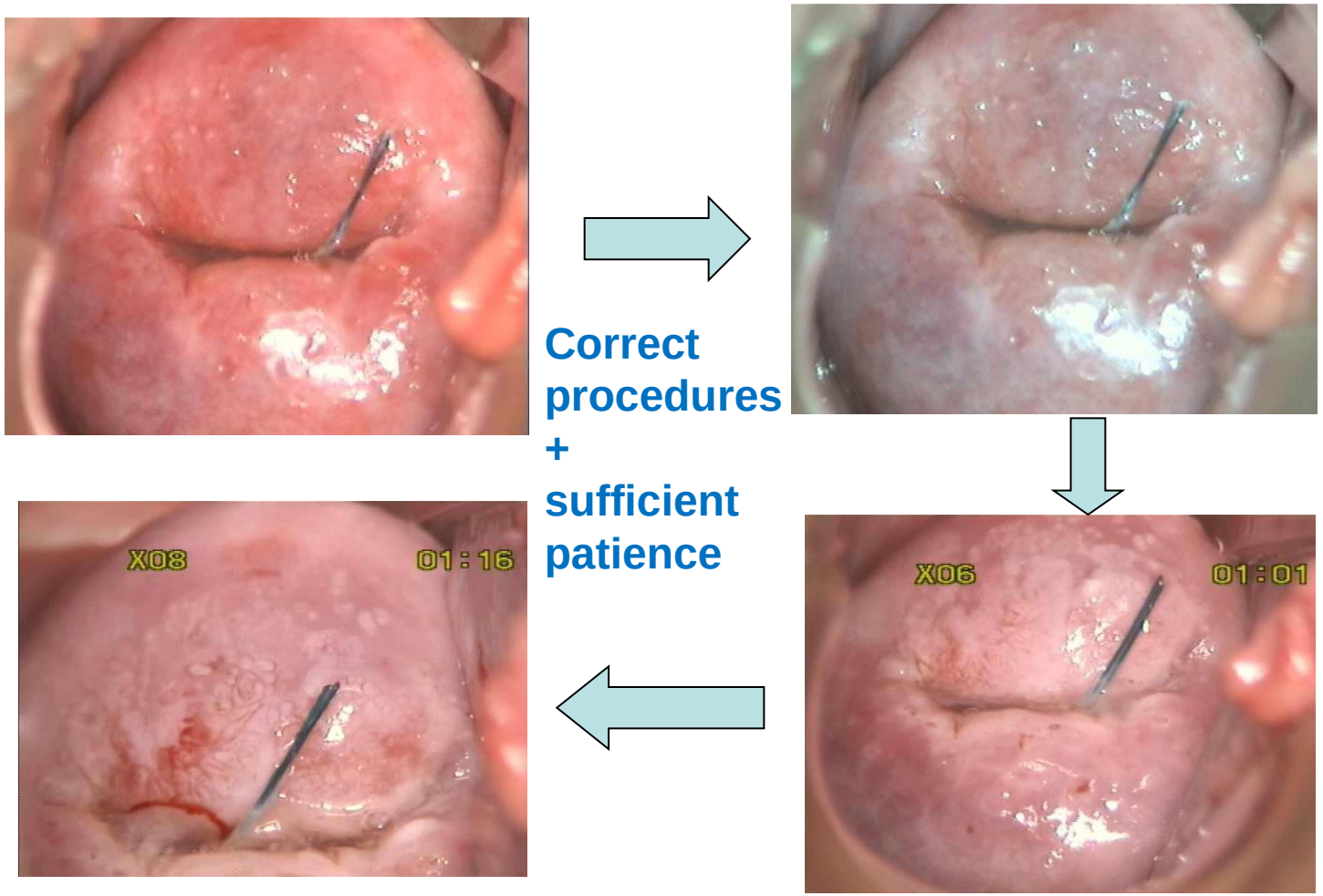
Preface

Three-step approach



Preface

- **Purpose of colposcopy: accurate detection of abnormal proliferative lesions**

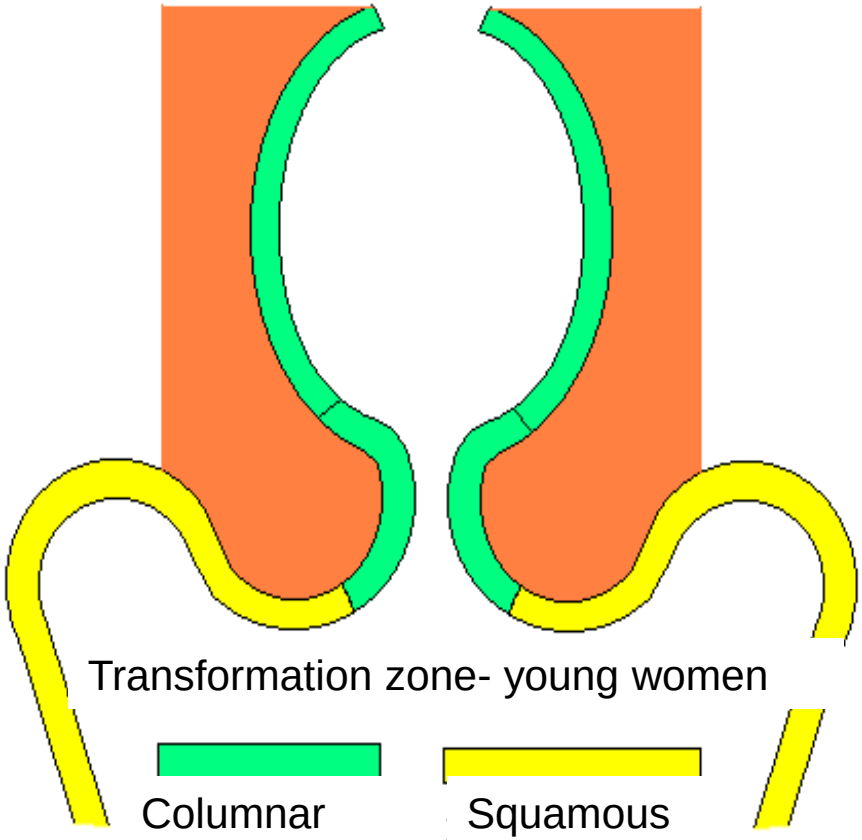


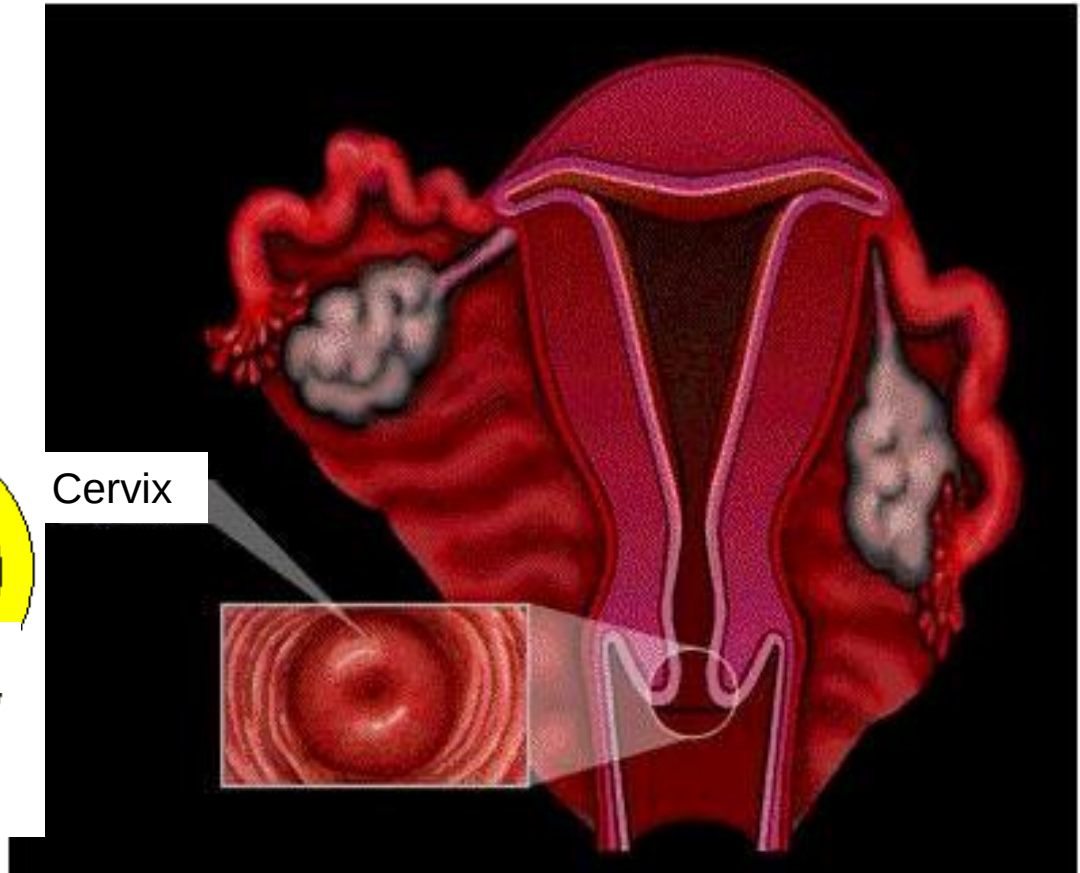
Factors affect colposcope

- **Concentration, duration, and distribution of acetic acid**
- **Quality of Iodine Test**

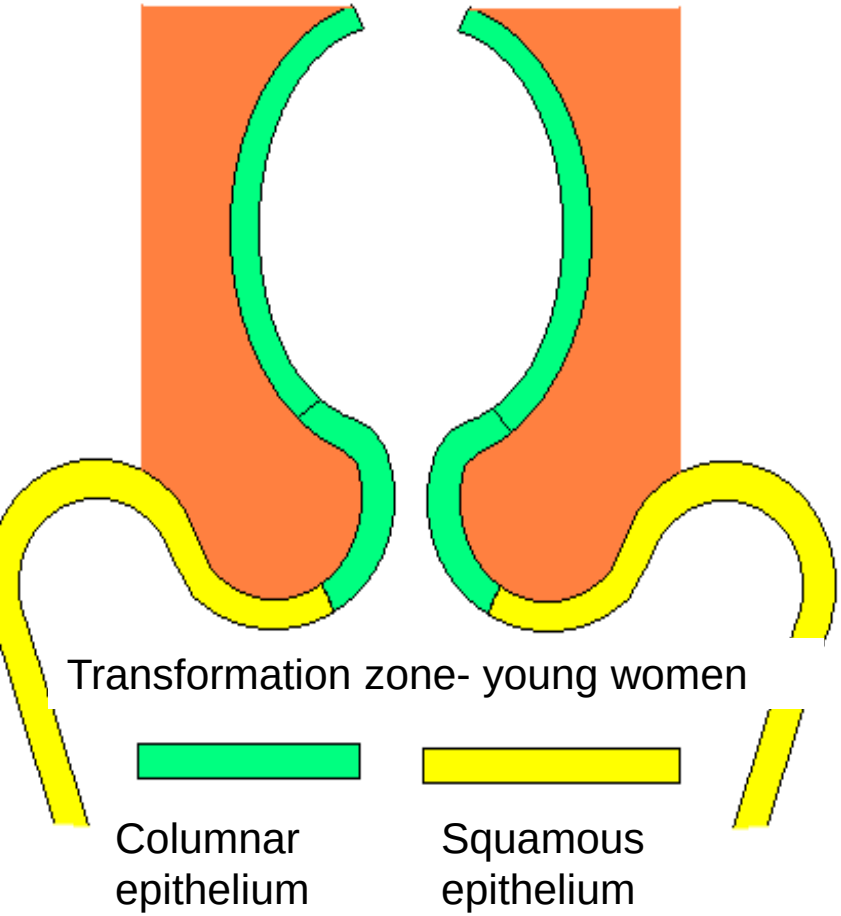
Cervical histology

- There are two types of epithelium in the cervix: stratified squamous epithelium in the vaginal part of cervix, and simple columnar epithelium in the cervical canal





Histological images of columnar epithelium



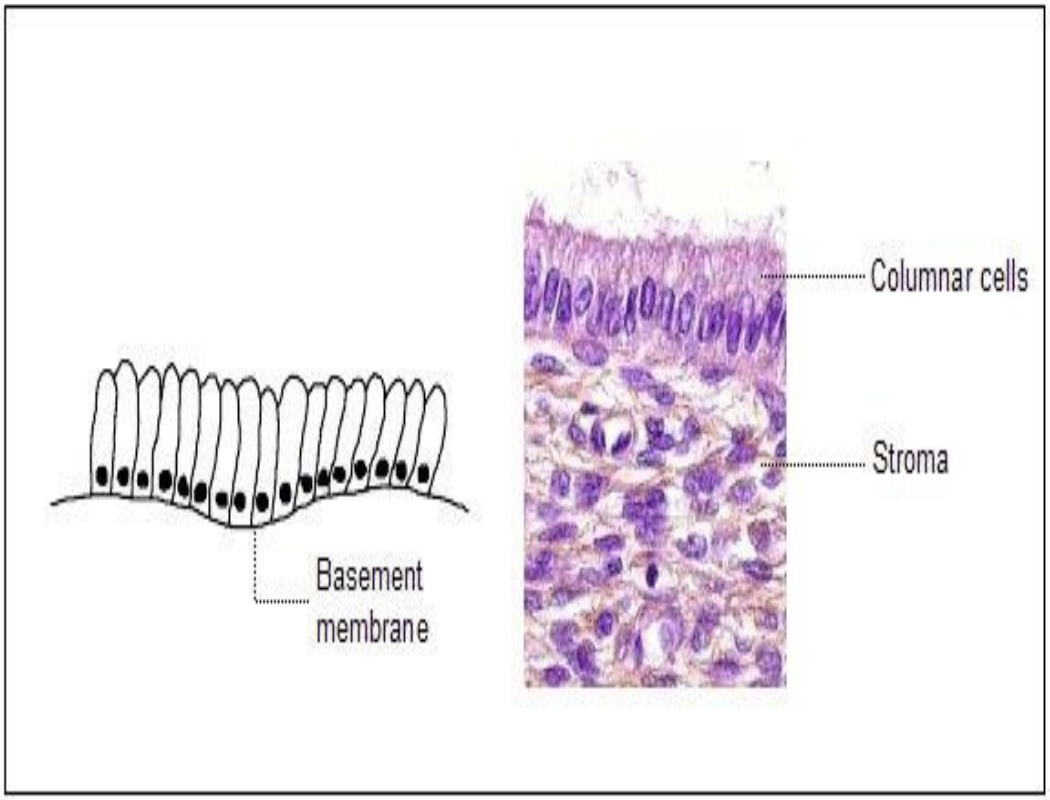
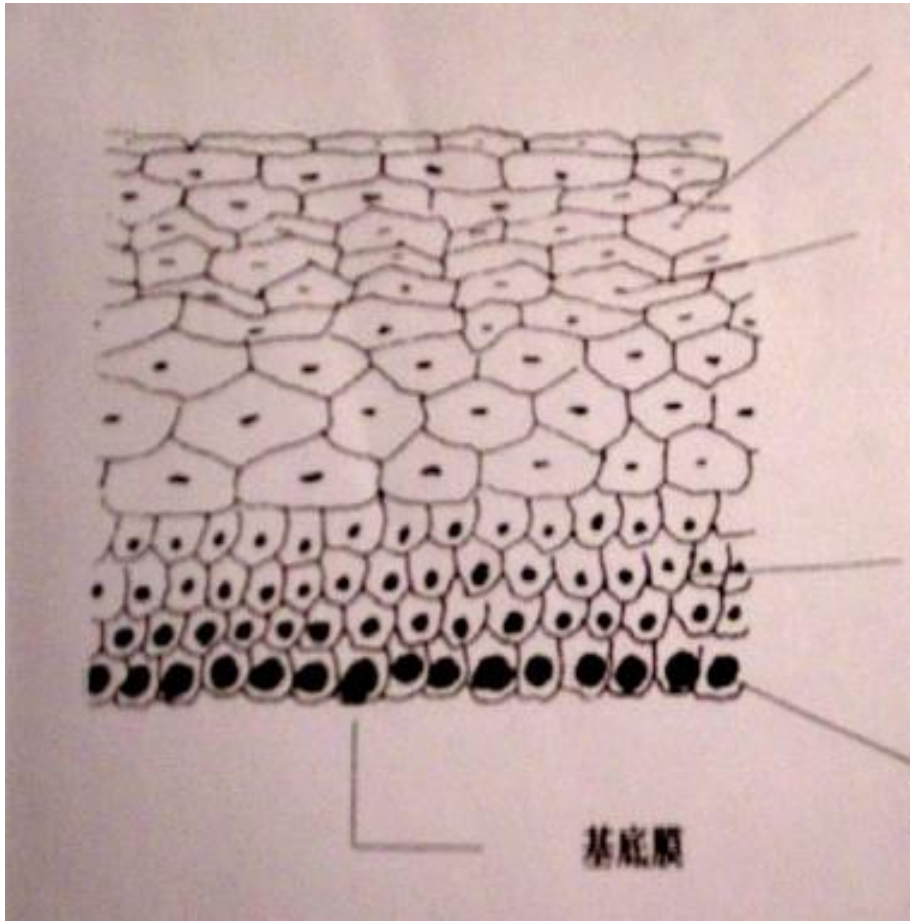


FIGURE 1.3: Columnar epithelium (×40)

Histological images of stratified squamous epithelium



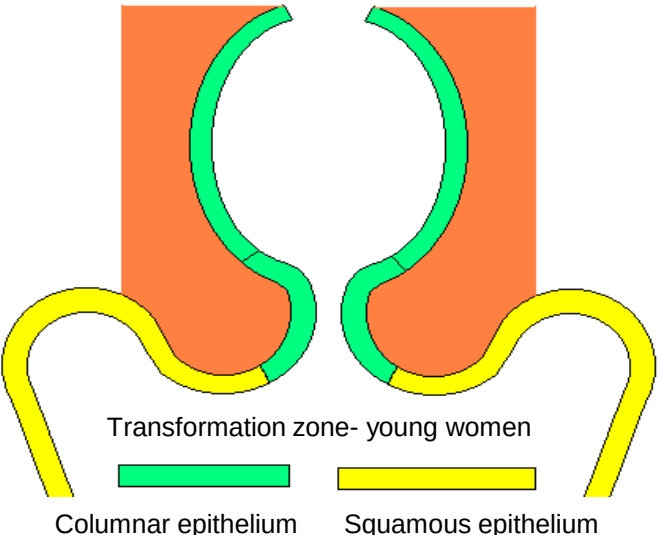
Epidermal cell layer

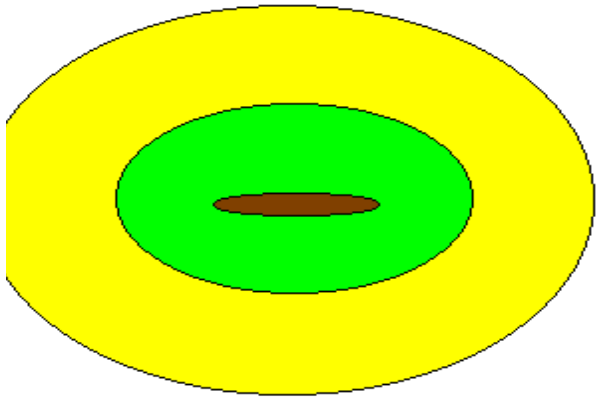
Stratum spinosum

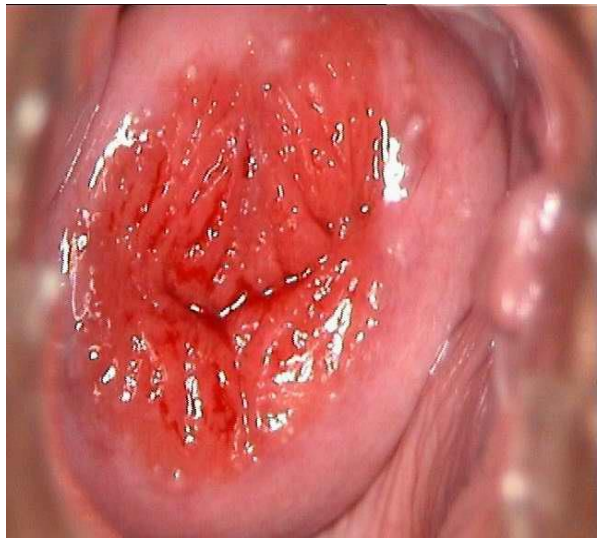
Para-stratum basele

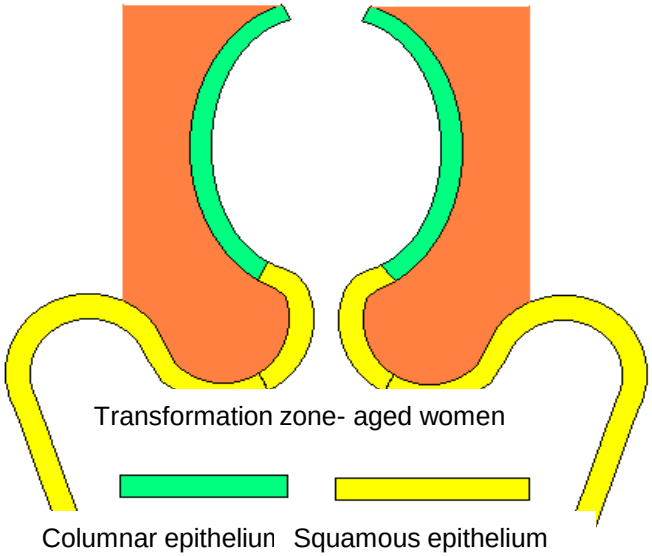
Stratum basele

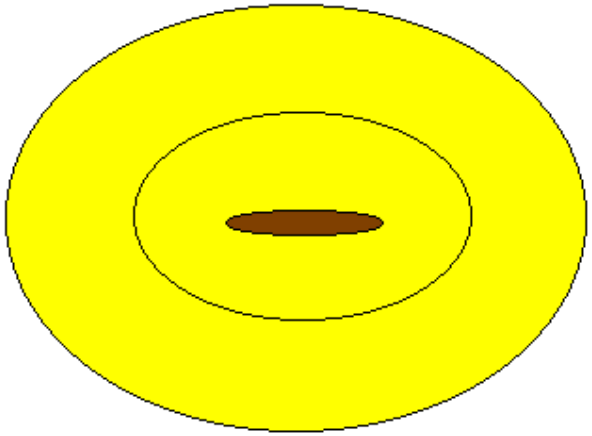
Changes in cervical squamocolumnar transition zone and cervical morphology in women of different ages











Transformmation zone

The area where the cervical columnar epithelium has been or is replaced by the newly transformed squamous epithelium is called transformmation zone.

Squamocolumnar junction SCJ

The junction between squamous epithelium and columnar epithelium of cervix

Original squamocolumnar junction

New squmaocolumnar junction (physiological squmaocolumnar junction）

Transformmation Zone

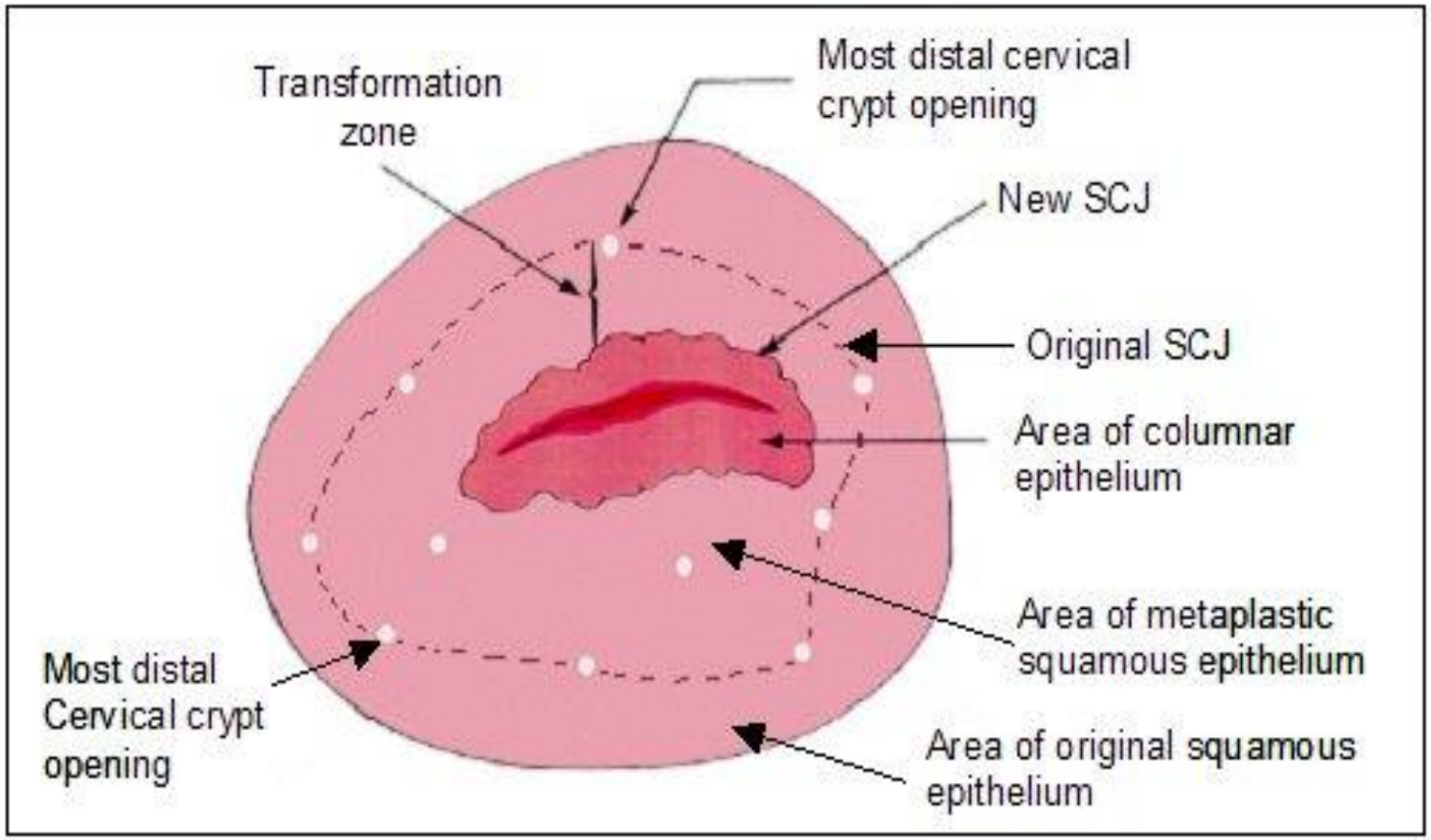


FIGURE 5.1: A method of identifying outer and inner borders of the transformation zone

(SCJ: Squamocolumnar junction)

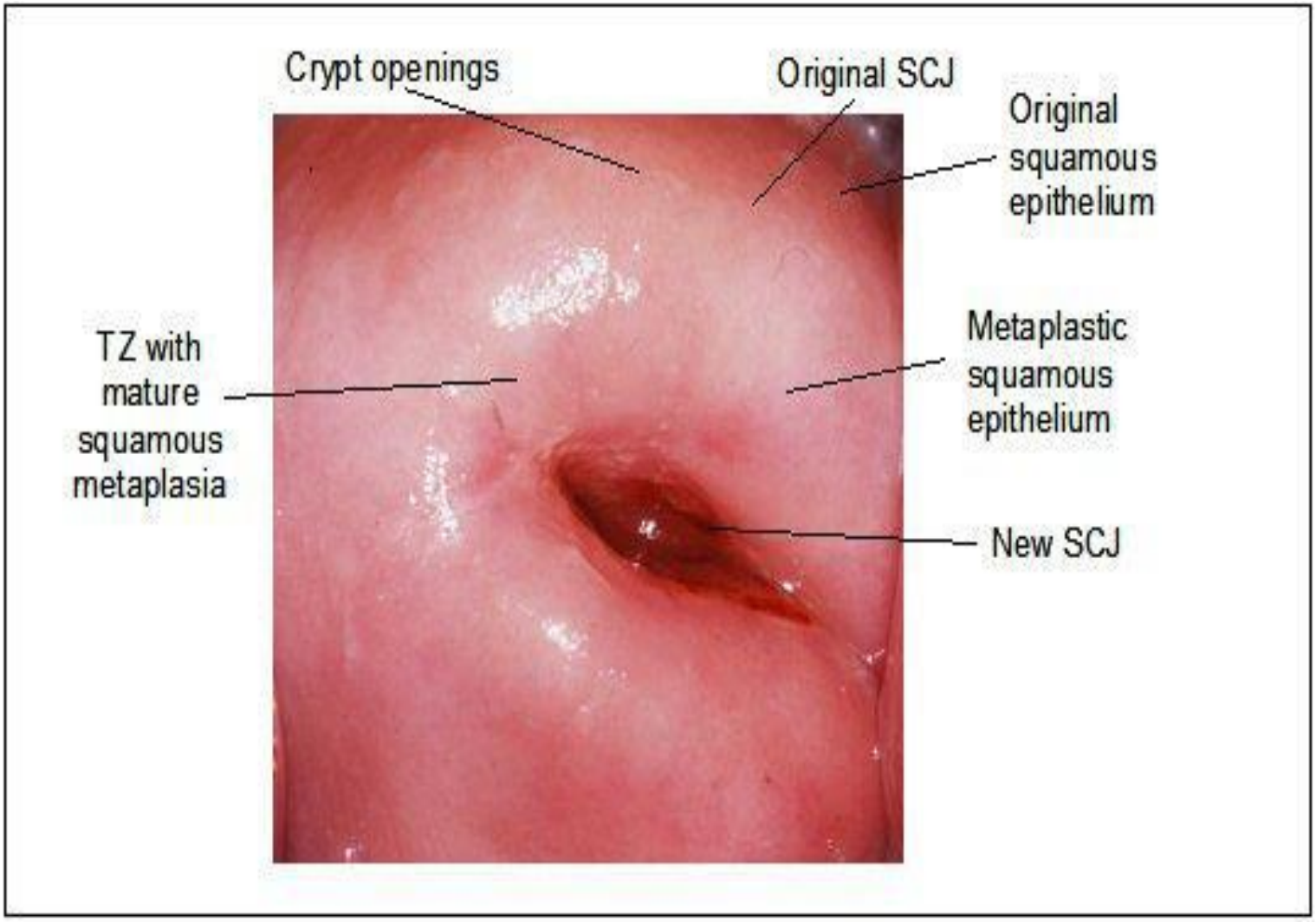
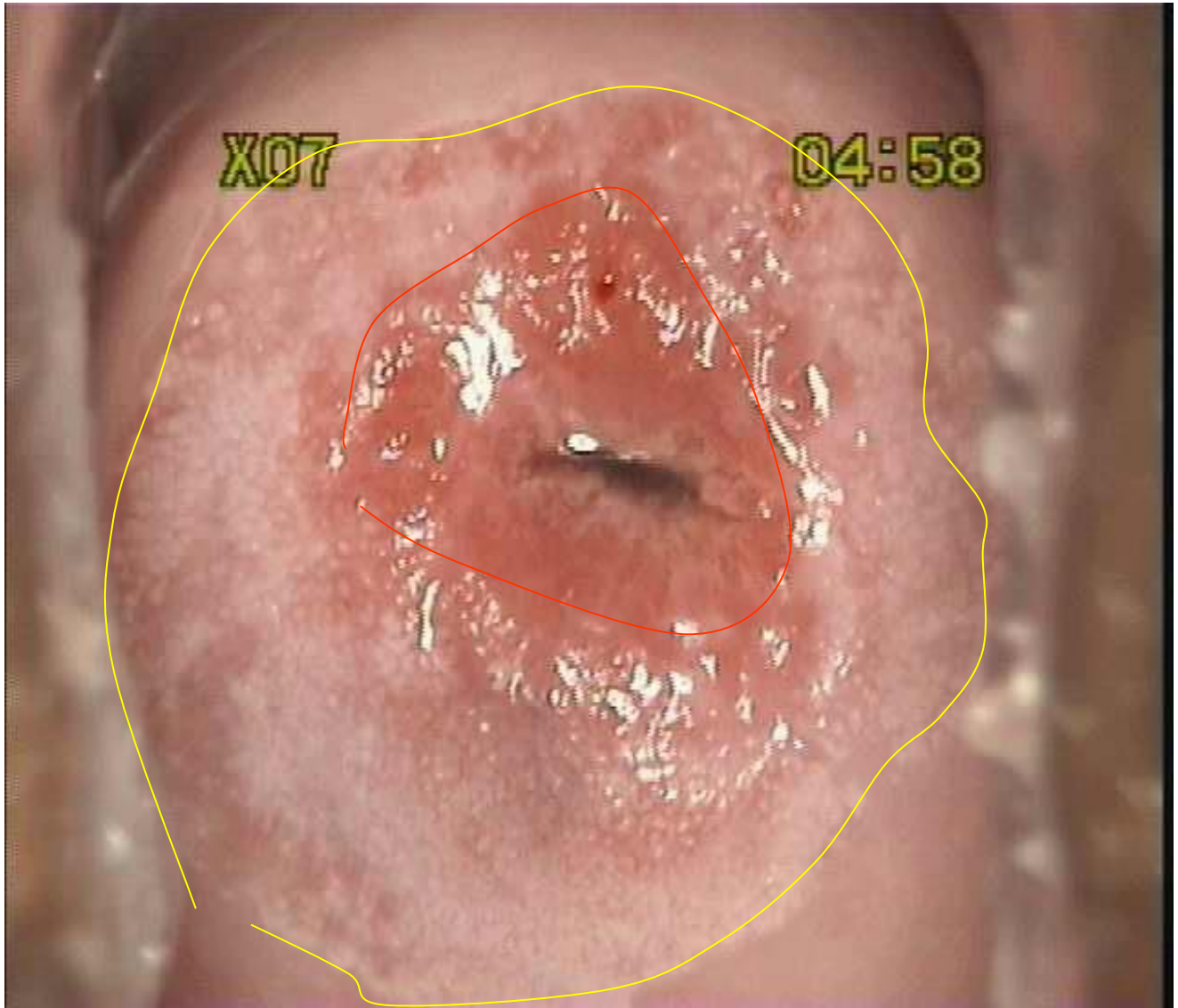


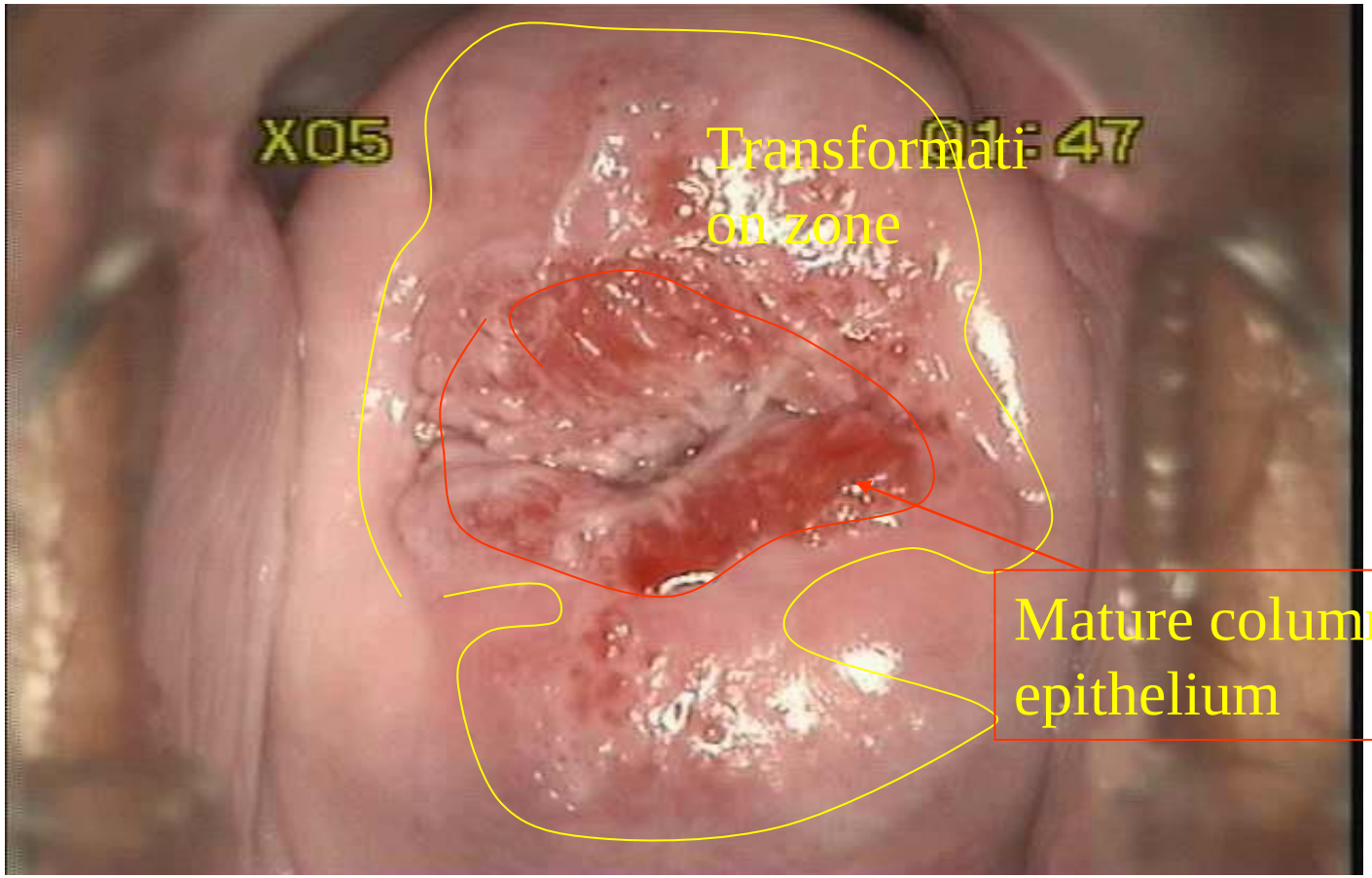
FIGURE 6.1: The entire new squamocolumnar junction (SCJ)is visible, and hence the colposcopic examination is satisfactory; the transformation zone (TZ) is fully visualized. The metaplastic squamous epithelium is pinkish-white compared to the pink original squamous epithelium

Colposcopy image of transformation zone



The part beween the yellow and red line is transformation zone

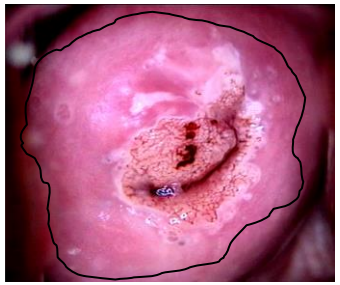
Colposcopy image of transformation zone



The key to colposcopy technique

◆The key technology - identifying the transformation zone（TZ）

- **Defintion of TZ - The area between the old and new squamocolumnar junction**
- **TZ - The primary zone for developing CIN and cervical cancer**
- **Key areas for colposcopy**



＊The essential technique for colposcopist

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.

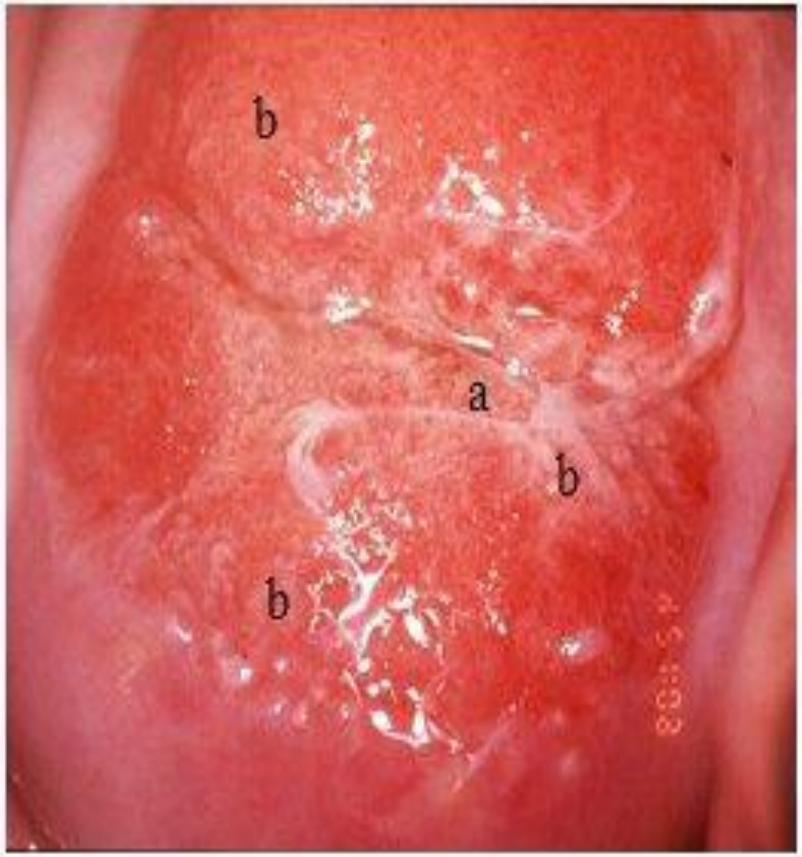


FIGURE 6.8: The earliest colposcopic changes in immature squamous metaplasia (after application of 5% acetic acid) in which the tips of the columnar villi stain white (a) and adjacent villi start fusing together (b).

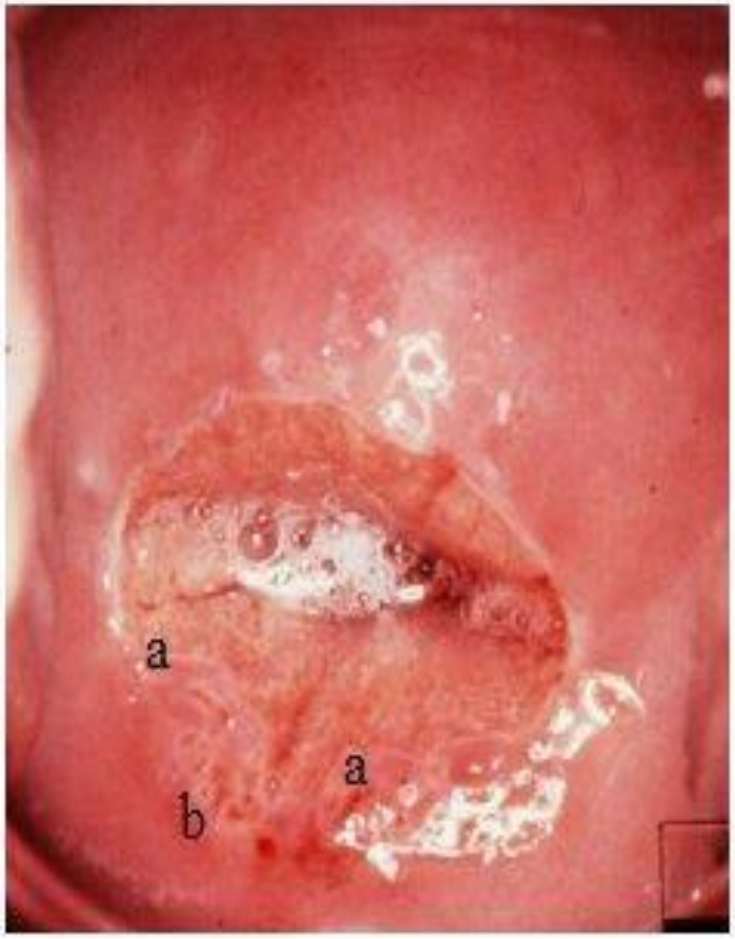


FIGURE 6.11: The prominent white line corresponds to the new squamocolumnar junction and tongues of immature squamous metaplasia (a) with crypt opening at 4-8 o'clock positions (b) (after application of 5% acetic acid).

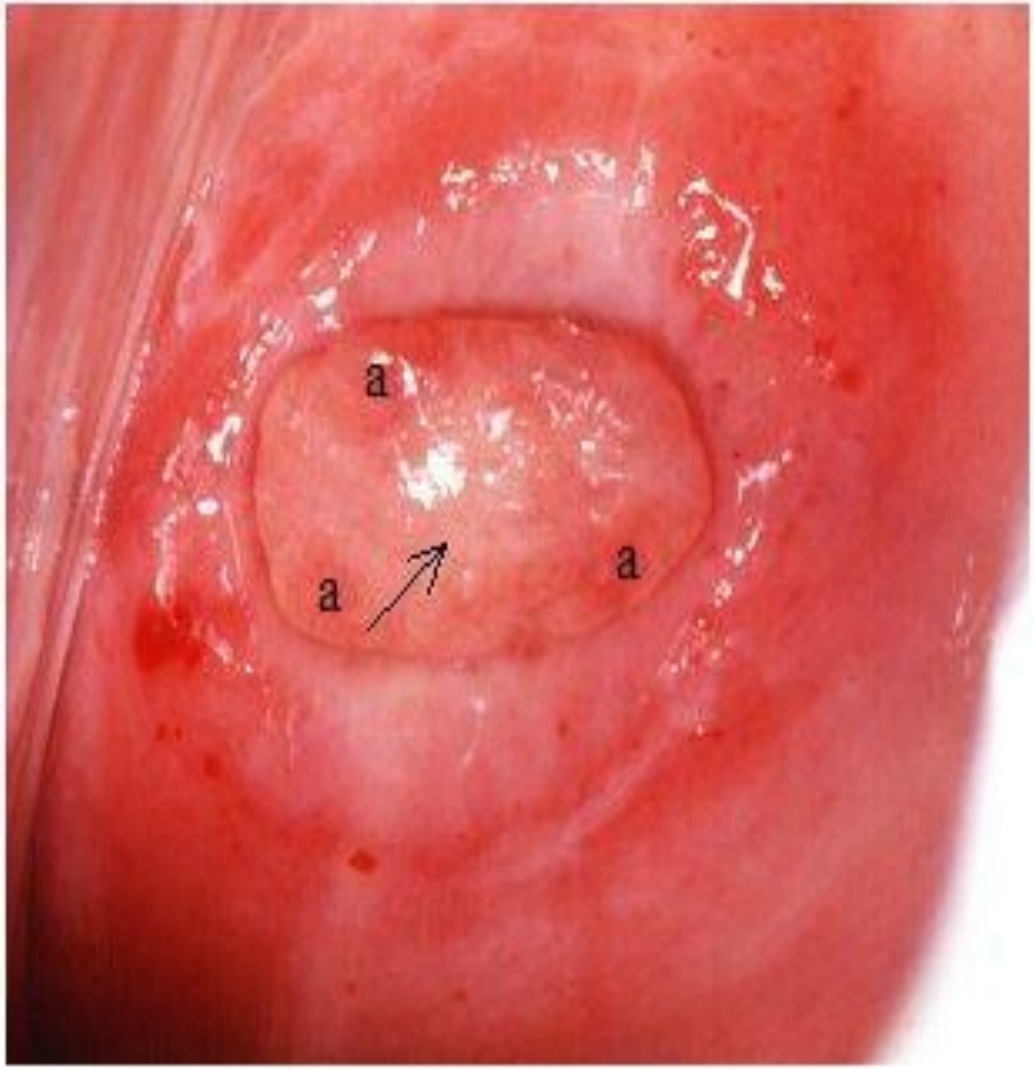


FIGURE 6.15: Immature squamous metaplastic epithelium (narrow arrow) on the polyp with intervening areas of columnar epithelium (a), after application of 5% acetic acid.

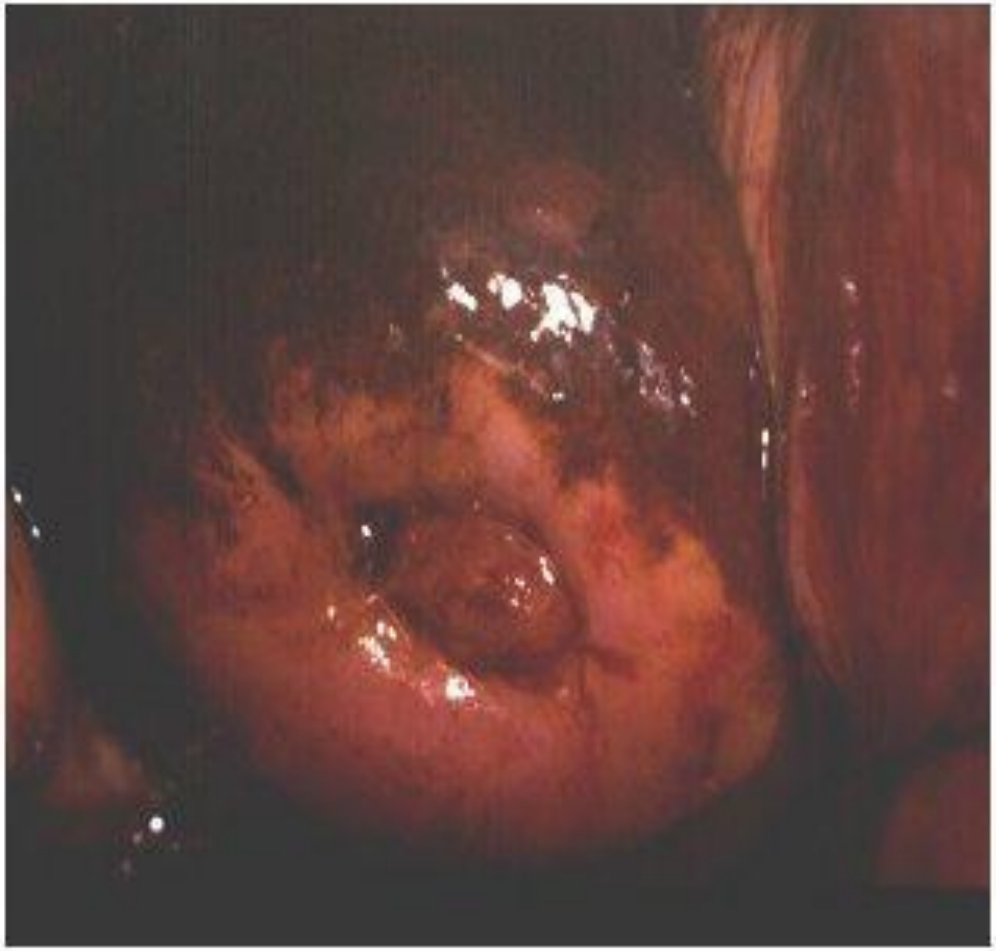


FIGURE 6.18: After application of Lugol's iodine solution, the endocervical polyp and the immature squamous metaplasia surrounding the os partially take up iodine.

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

Distribution of cervix squamocolumnar epithelium

- **Concept of cervix transformation zone**
- **Transformation zone means the zone where cervix columnar epithelium has been or is replaced by new squamous epithelium, located between the primitive squamocolumnar junction and physiological squamocolumnar junction**
- **Clinical meaning: >90% cervical cancer occurred at transformation zone; the primary zone for colposcopy examination**

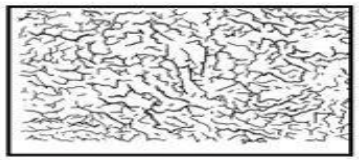
CIN lesions under colposcopy

- **CIN contains a large number of nuclei, and the nucleoprotein will undergo a reversible coagulation reaction under the action of acetic acid. As a result, it affects the light transmittance of the epithelium and prevents light from passing through the epithelial layer, making it difficult to see the subcutaneous blood vessels, thereby forming white epithelium.**
- **CIN lesions showed mustard yellow after iodine test due to lack of glycogen.**

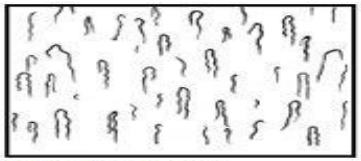
- **According to the degree of lesion, CIN is divided into three grades:**

- **CIN I grade: mild dysplasia, nucleo-cytoplasmic ratio is slightly larger, cell polarity is normal**
- **CIN II grade: moderate dysplasia**
- **CIN III grade: severe dysplasia + cancer in situ (CIS)**
- **All grades have the potential to develop into invasive cancer. Generally, the higher the grade, the easier to develop into invasive cancer. According to relative statistics, there are 10% ~15% in mild and moderate, 75% in severe cases to develop into cancer. (Not fixed, reversible)**

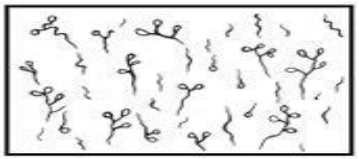
Normal vessels



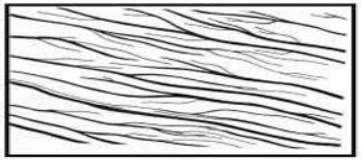
Network capillaries



'Hairpin' capillaries



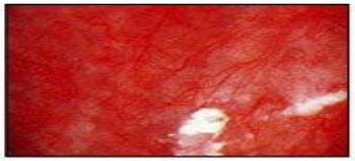
'Staghorn'- like vessels



Long, parallel blood vessels

Regular vascular network

Long, regular branching vascular tree with gradual decrease in calibre



Blood vessels showing regular branching

FIGURE 6.2: Normal vascular patterns.

Atypical vessels

(a): Wide hair pin–like vessels

(b): Waste thread vessels

(c): Tendril–like vessels

(d): Bizarre branching waste thread vessels

(e): Corkscrew vessels

(f): Irregular root–like vessels

(g): Tree–like vessels

(h): Comma–shaped or tadpole-like vessels

(i): Irregular branching vessels

FIGURE 8.5: Atypical vessel patterns

Normal vessels

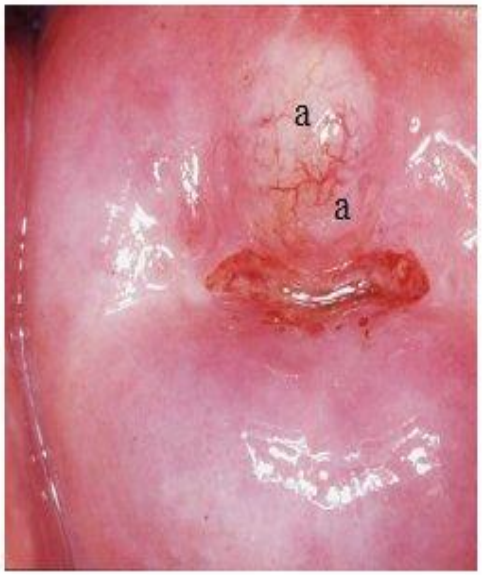


FIGURE 6.3: Nabothian cyst with regularly branching tree-like vessels (a).

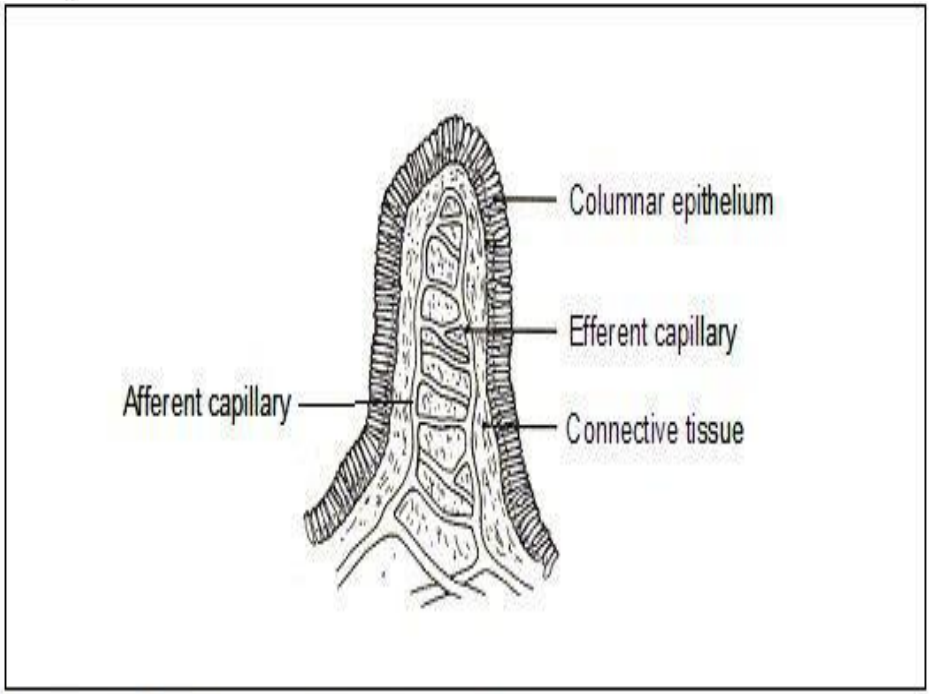


FIGURE 6.4: Capillary network in columnar villi

Puctuation

Punctuation & mosaic

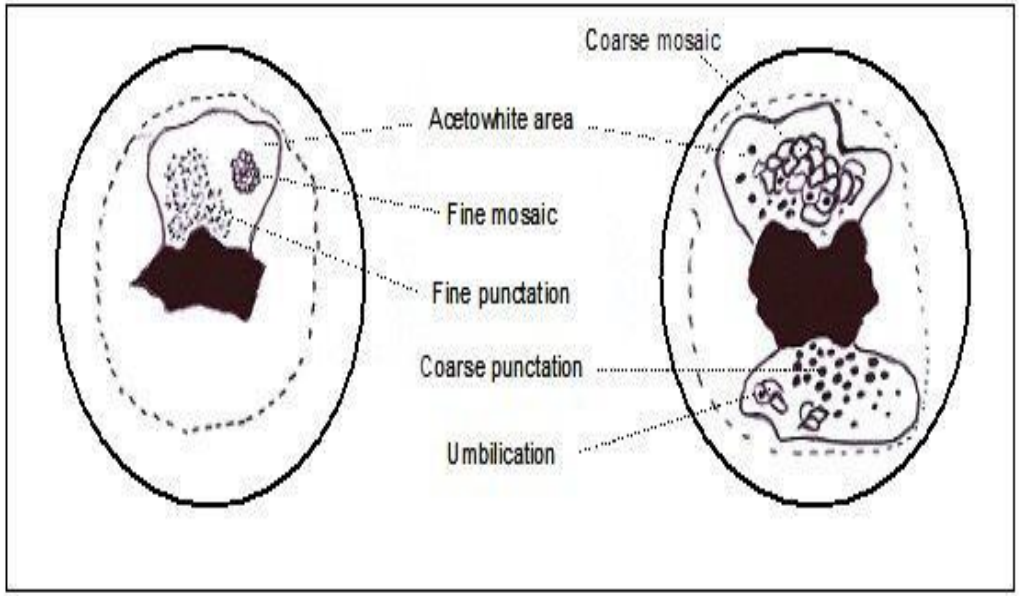


FIGURE 7.1: A schematic representation of punctation and mosaics.

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

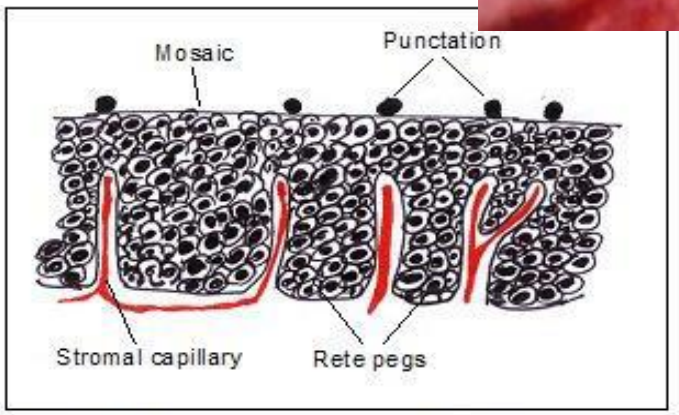


FIGURE 7.2b: Schematic diagram to show the rete pegs and the stromal capillaries which on end-on view appear as punctations.

Course punctuation

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

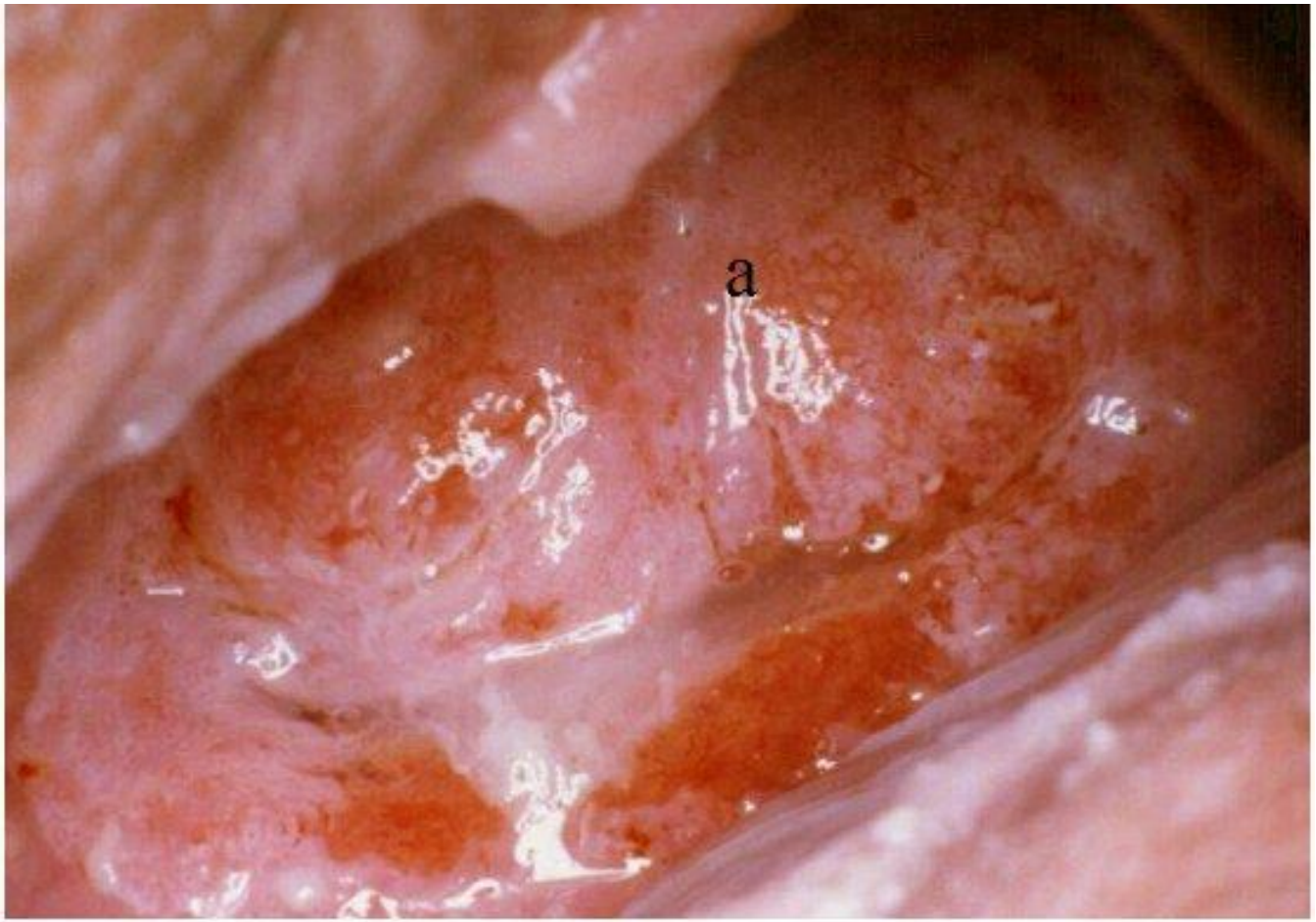


FIGURE 7.24: Coarse mosaics (a) in a CIN 3 lesion.

Colposcopy image of CIN changes

Distinguish the degree of lesions, by:

1. Acetate white epithelium, its color, transparency, boundary, and surface contour characteristics.
2. Relationship between vinegar white and shape, number, and distribution of blood vessels.
3. Overlap and boundary between the iodine-negative area and the acetic acid white.
4. Determine the relationship between tissue and CIN lesions according to the area where the characteristics appear.

Examples of colposcopy image

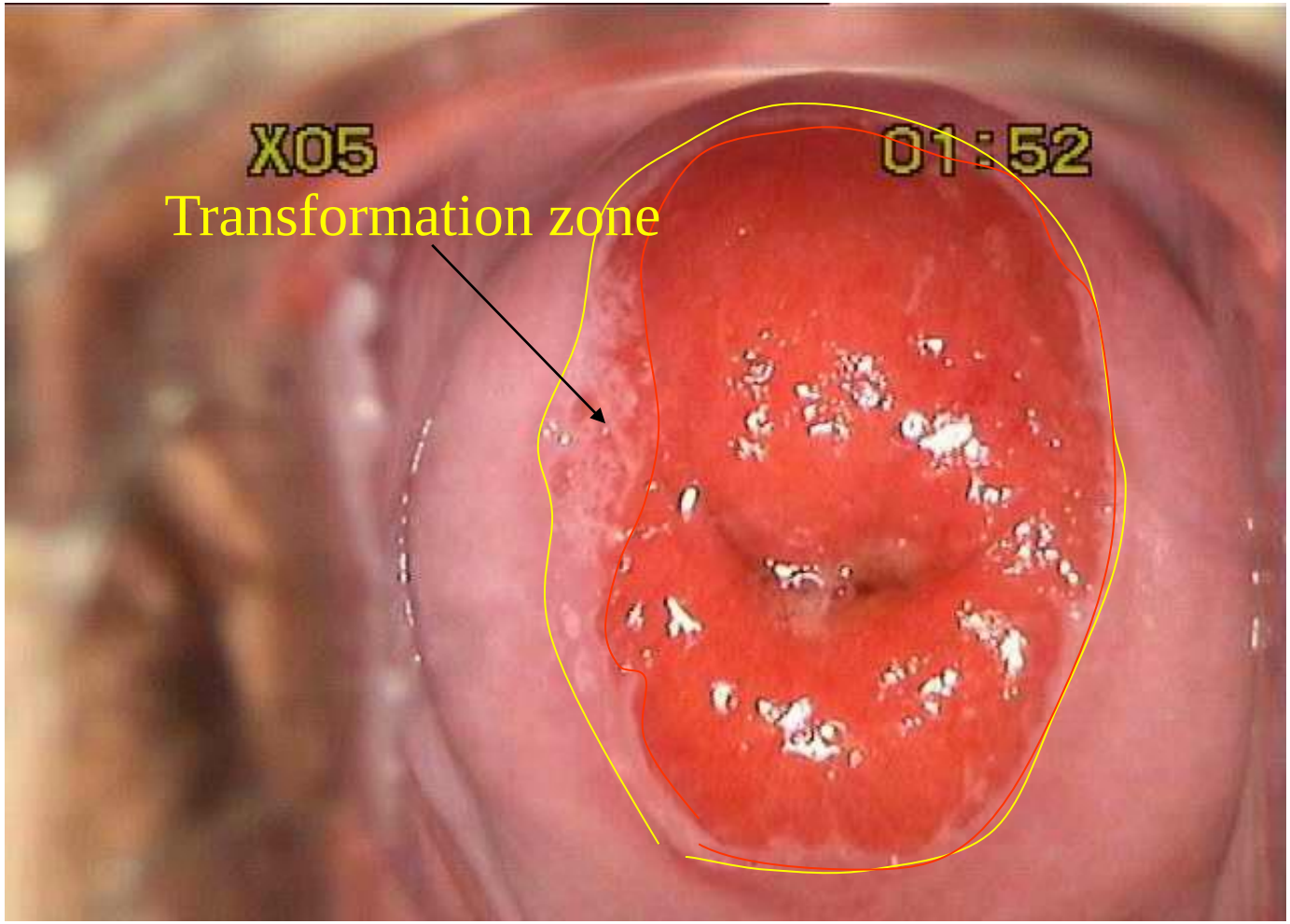
Where to exam for colposcopy?

First colposcopy diagnosis:

Satisfactory colposcopy

Unsatisfactory colposcopy

FIGURE 6.6: Postmenopausal cervix: The epithelium is pale, brittle and lacks lustre, showing sub-epithelial petechiae (a). Squamocolumnar junction is not visible.


X05
01:52
Transformation zone

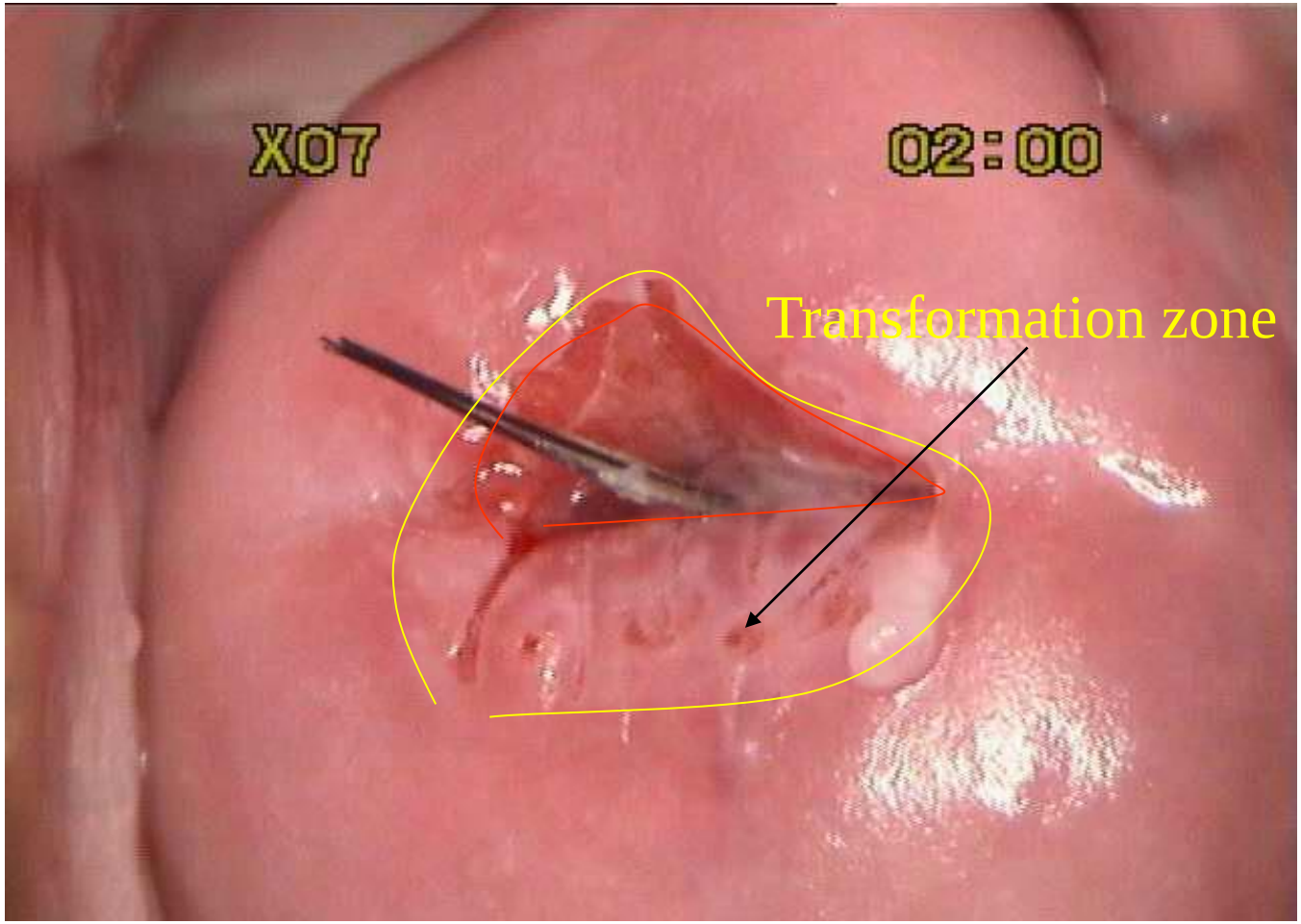
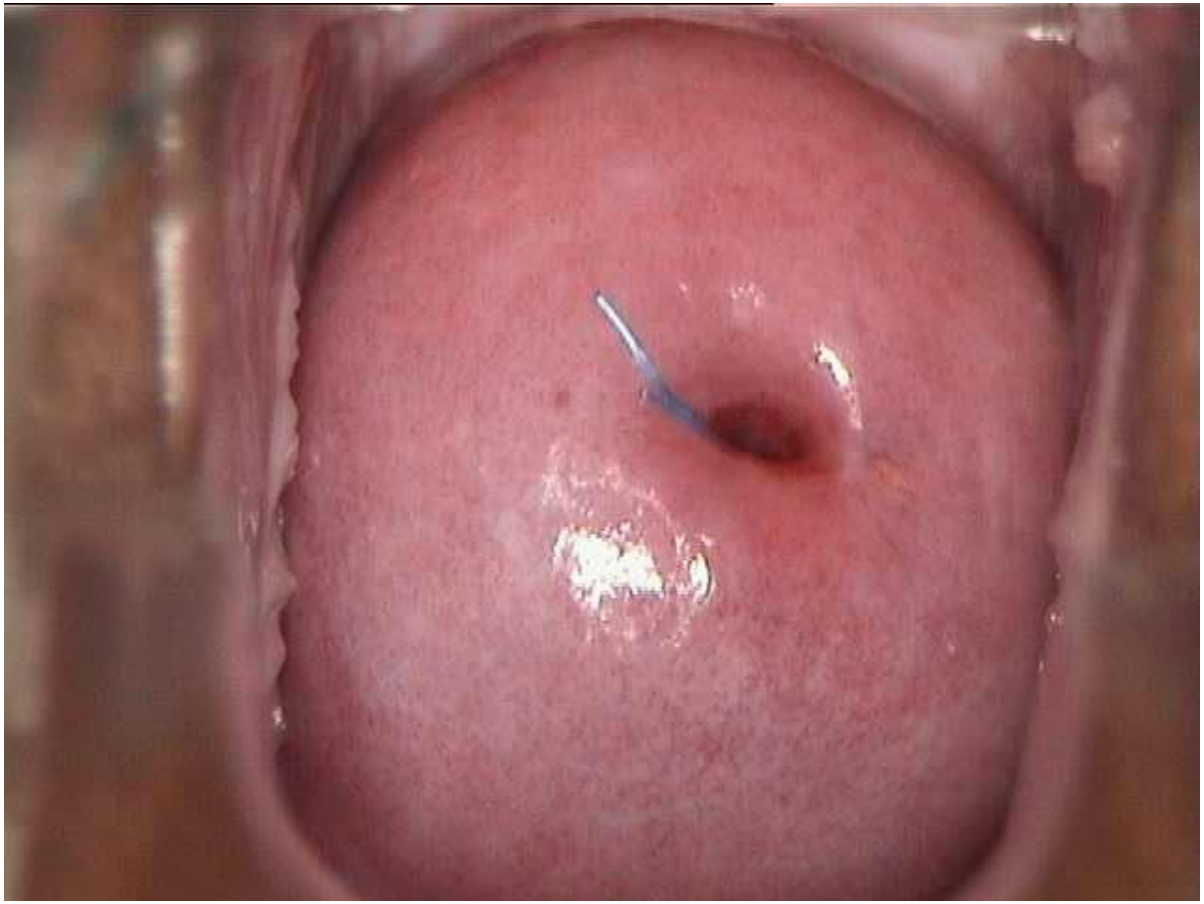
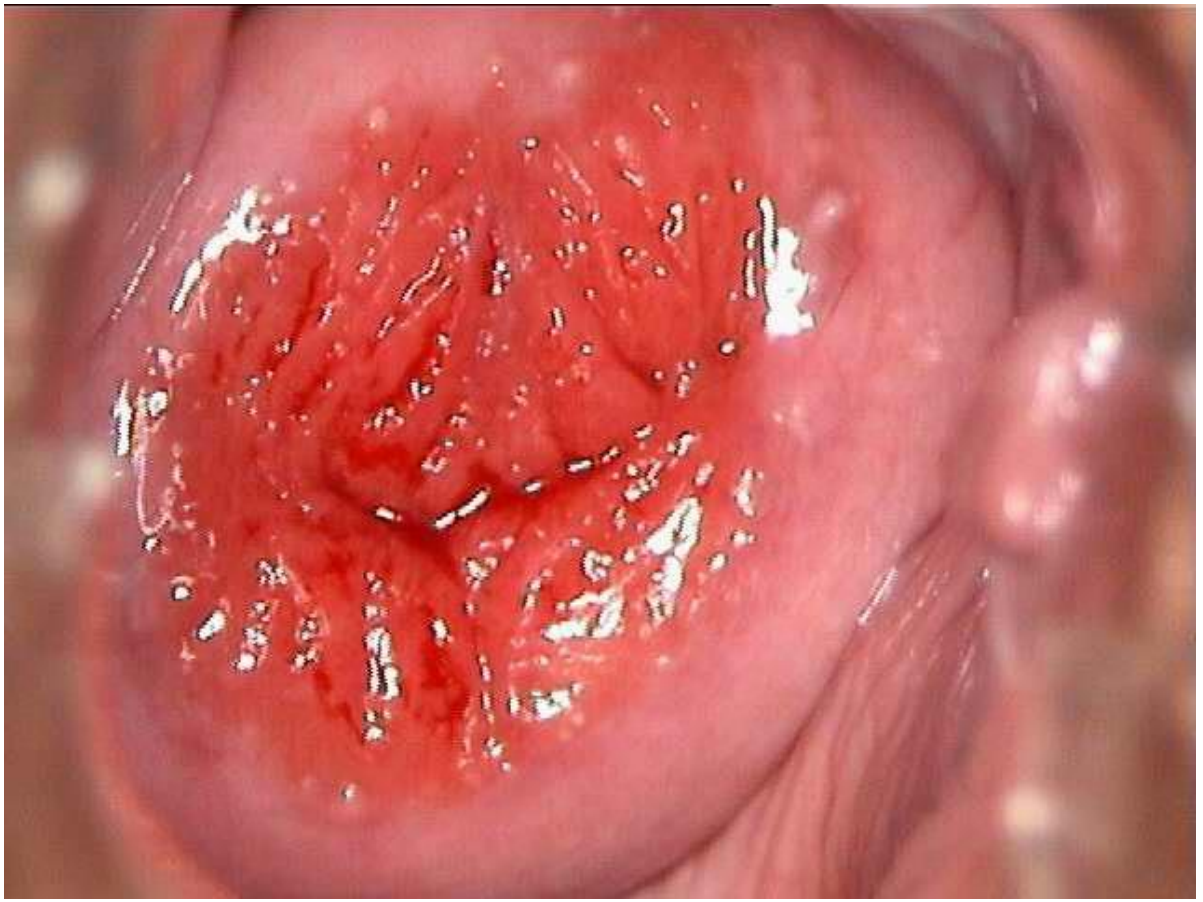

X07
02:00
Transformation zone

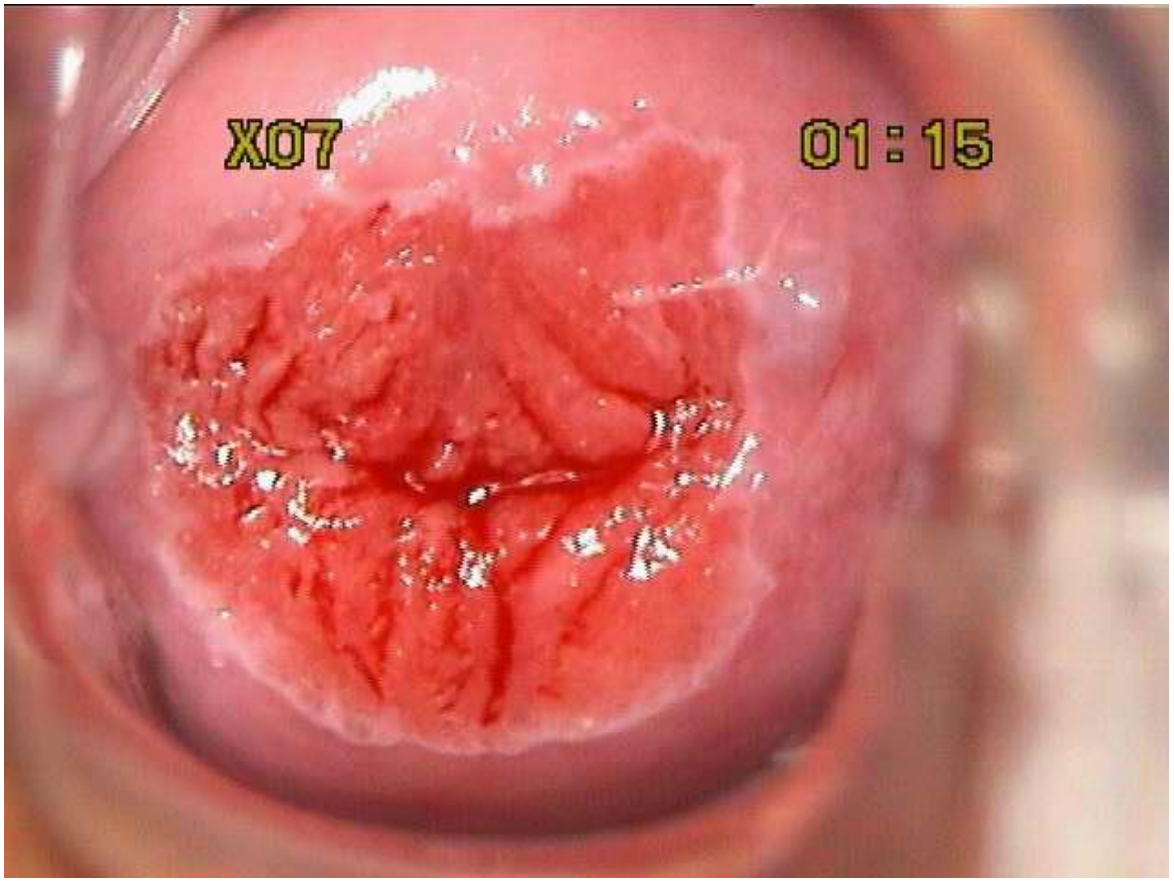
Image of normal cervix



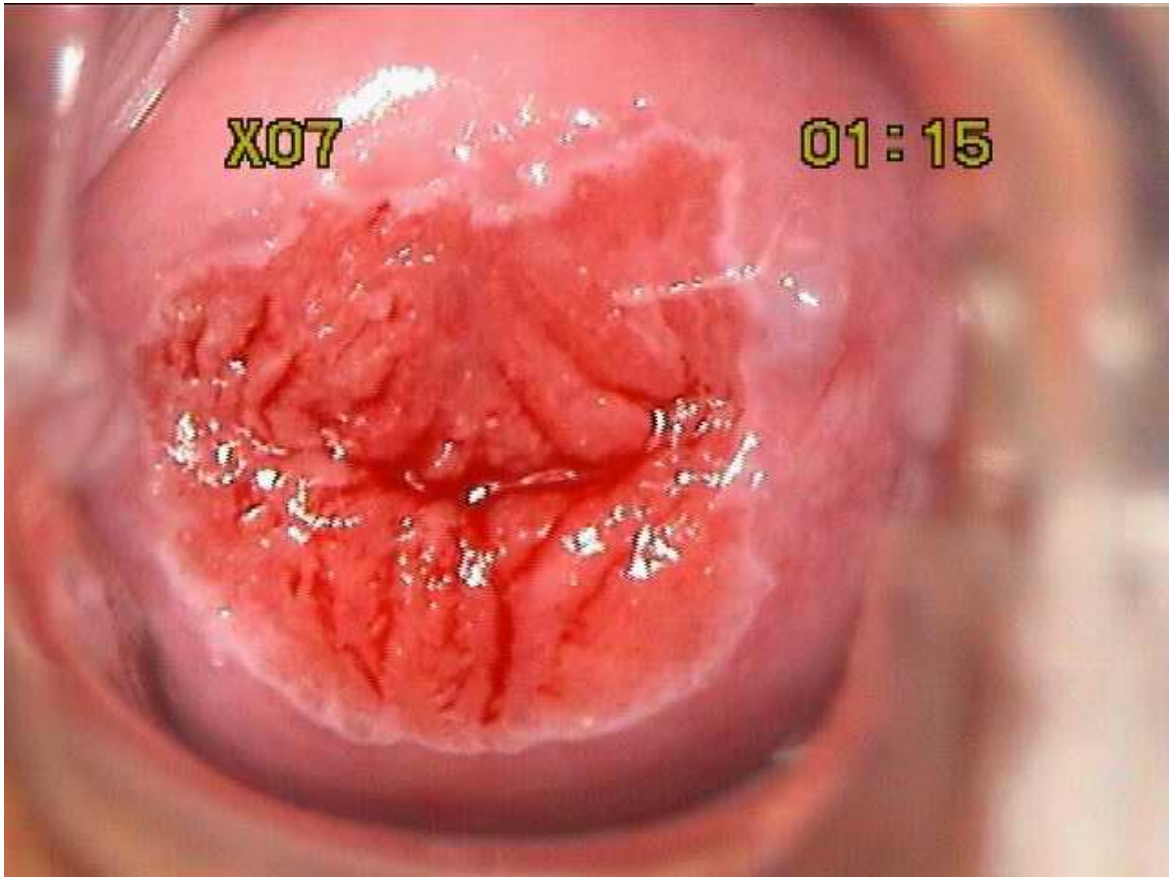
Cervical ectropion



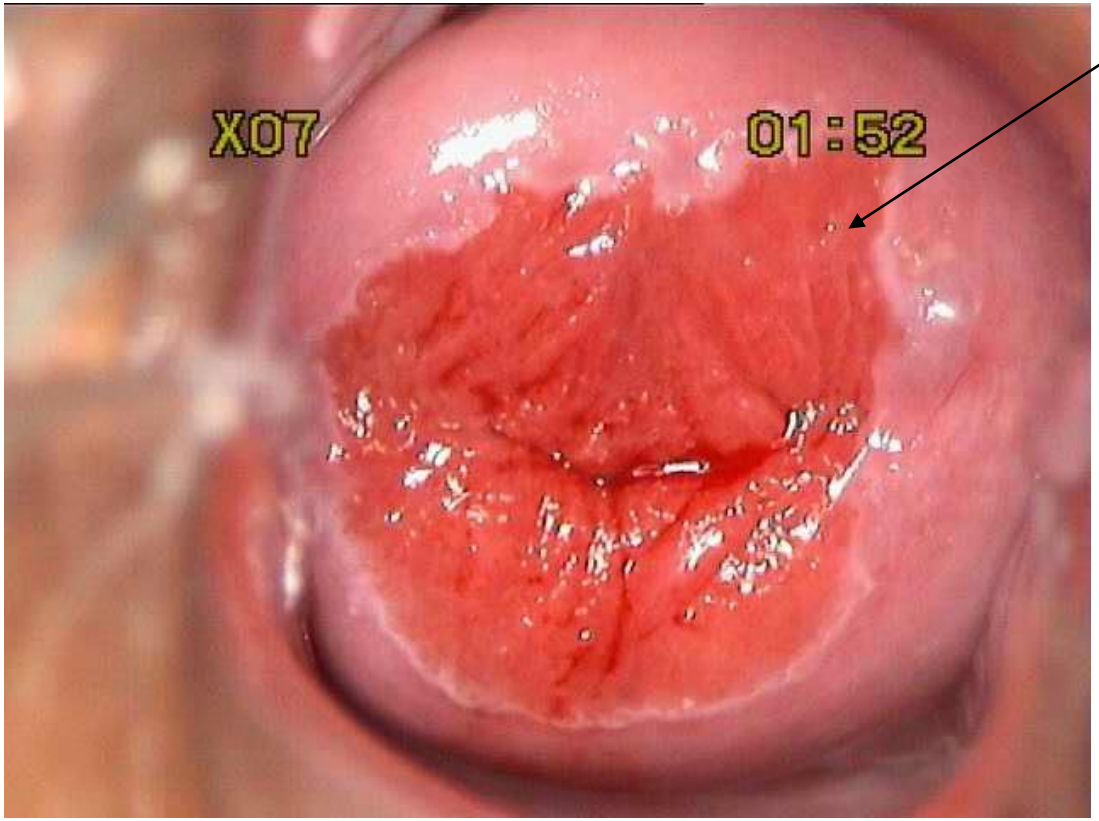
Cervical ectropion/Acetic acid reaction for 60 seconds



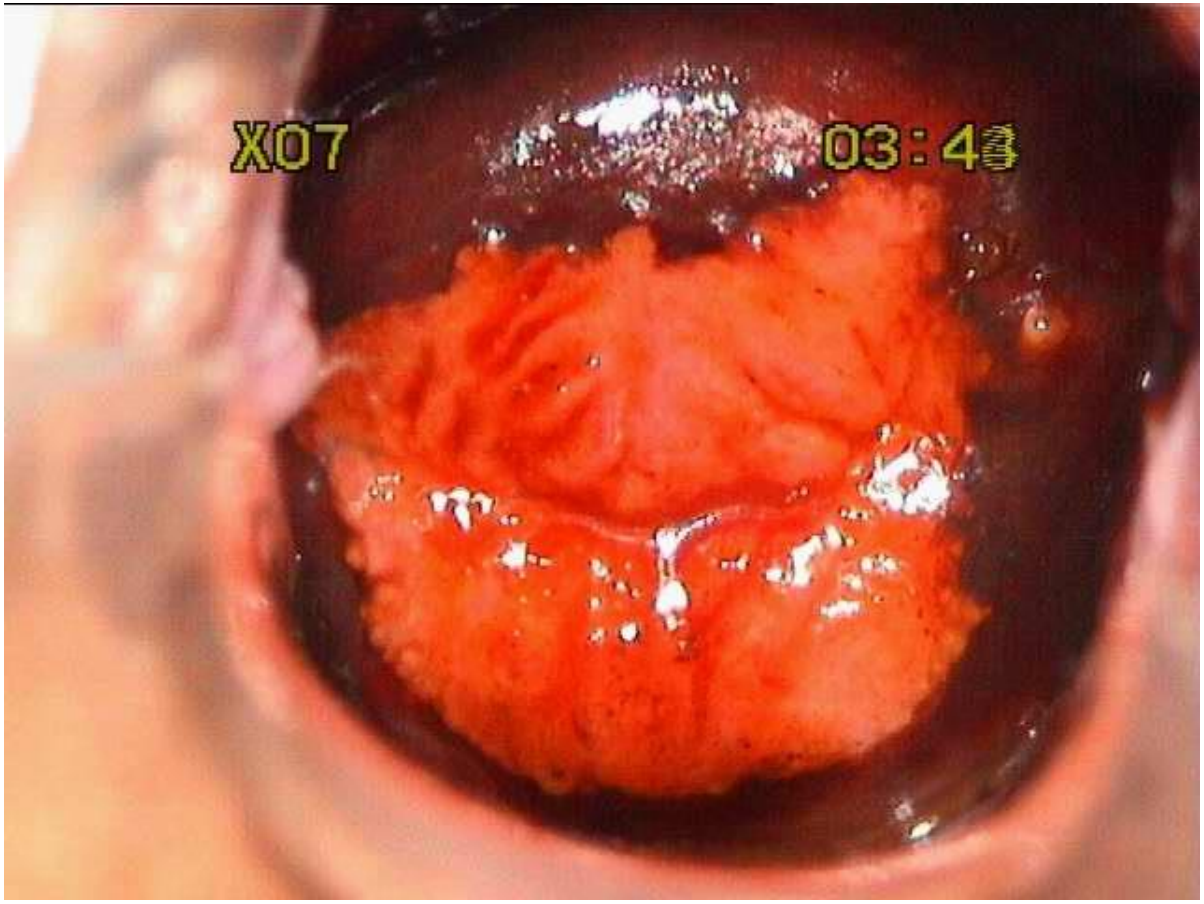
Cervical ectropion/Acetic acid reaction for 60 seconds



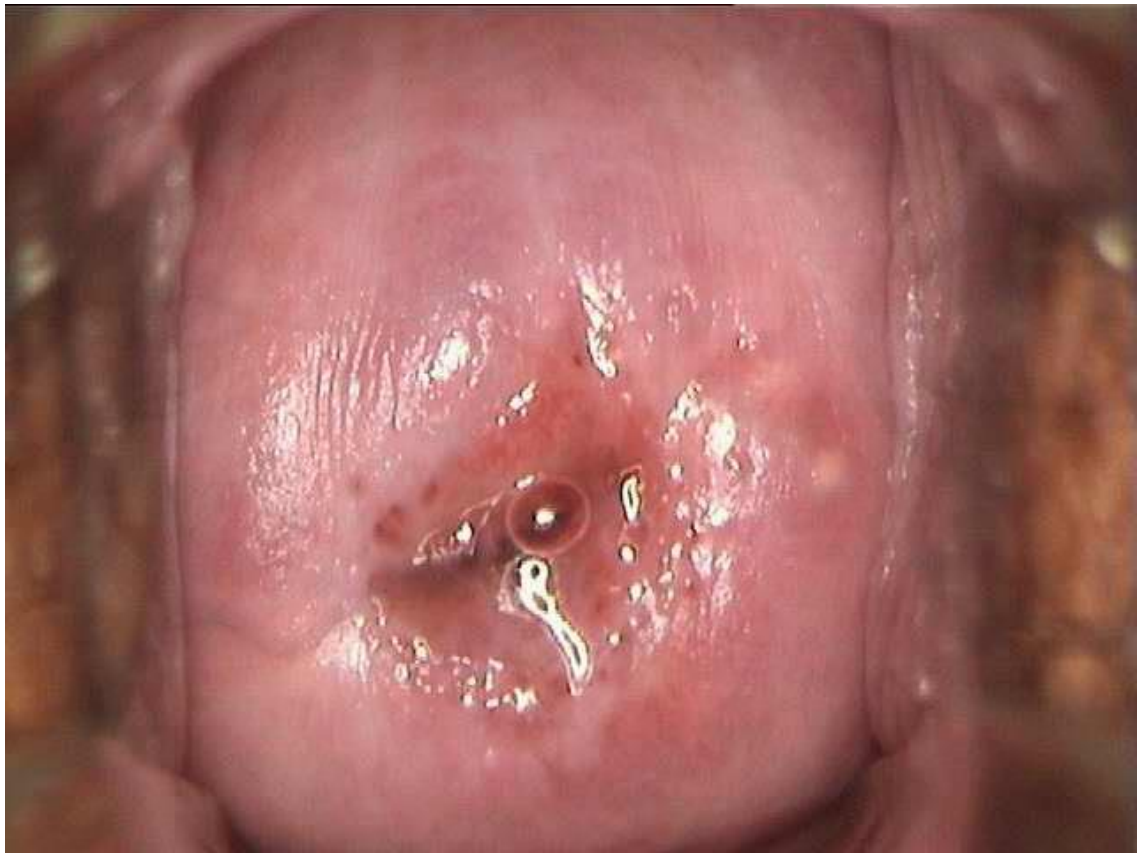
Cervical ectropion/Acetic acid reaction for 120 seconds



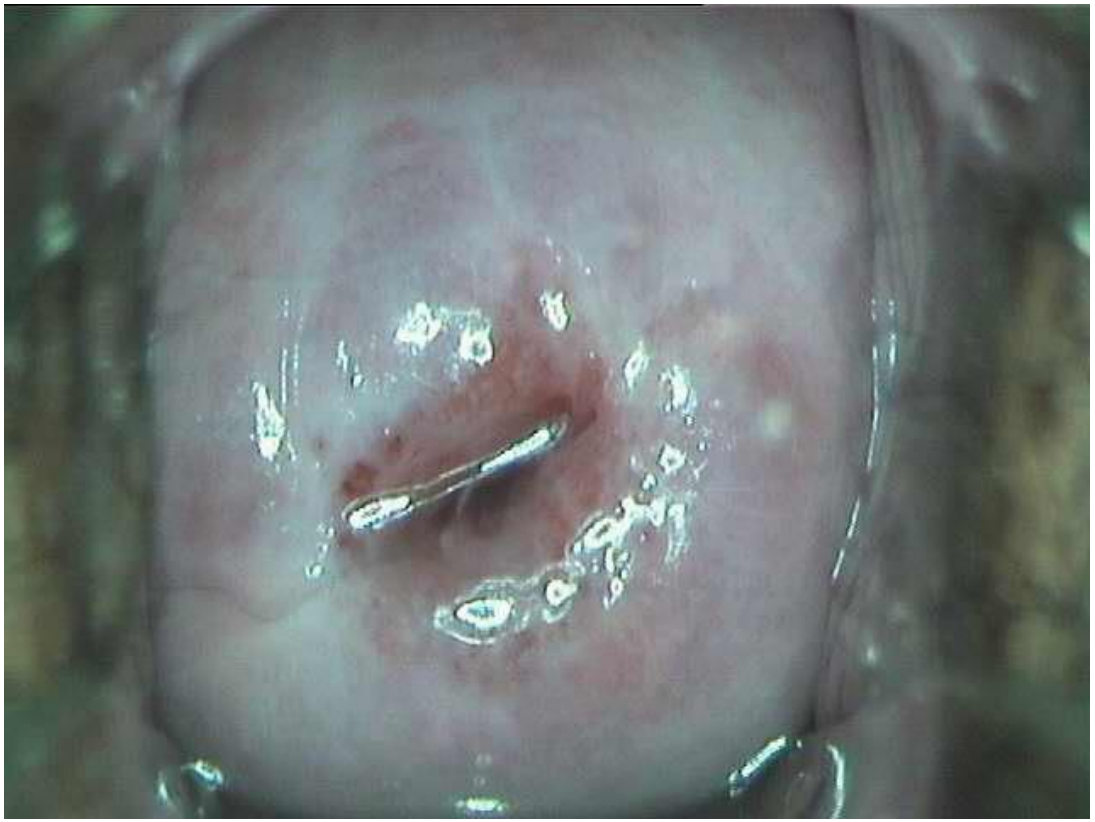
Cervical ectropion/Iodine staining



CIN1(The Flat acetowhite epithelium is progressively aggravated)



CIN1/Green light



CIN1/Acetic acid reaction for 60 seconds

Flat acetowhite epithelium

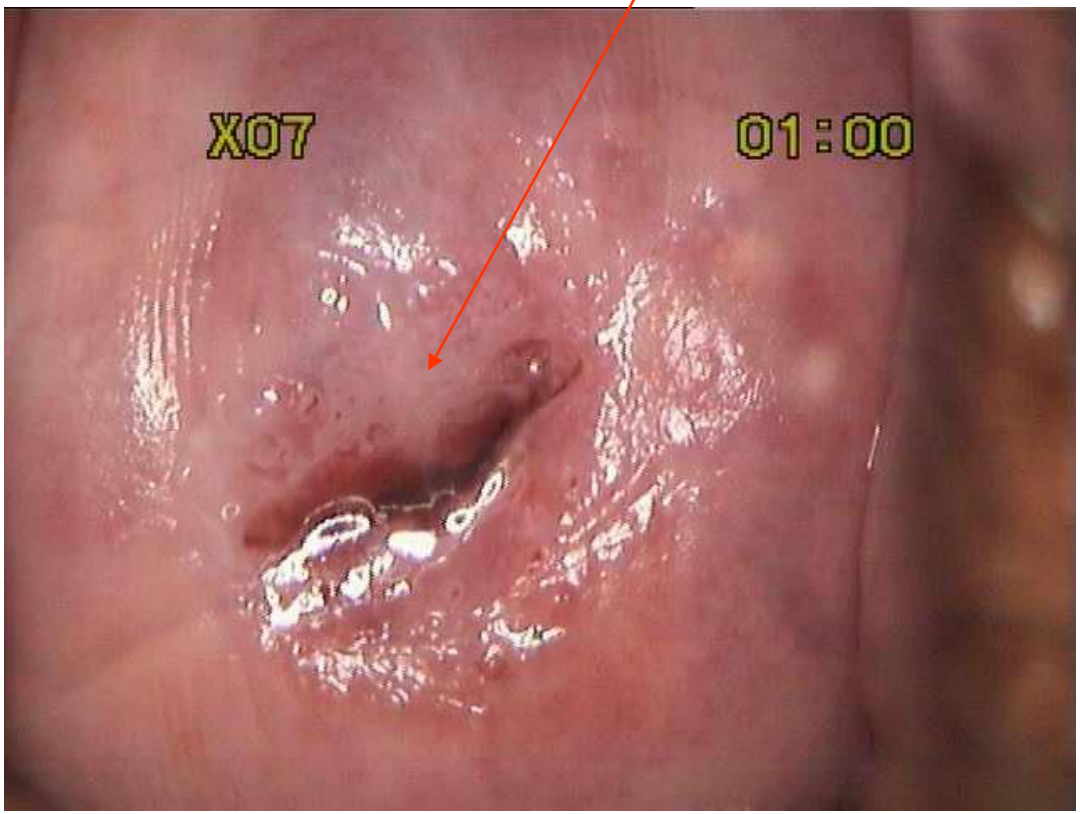
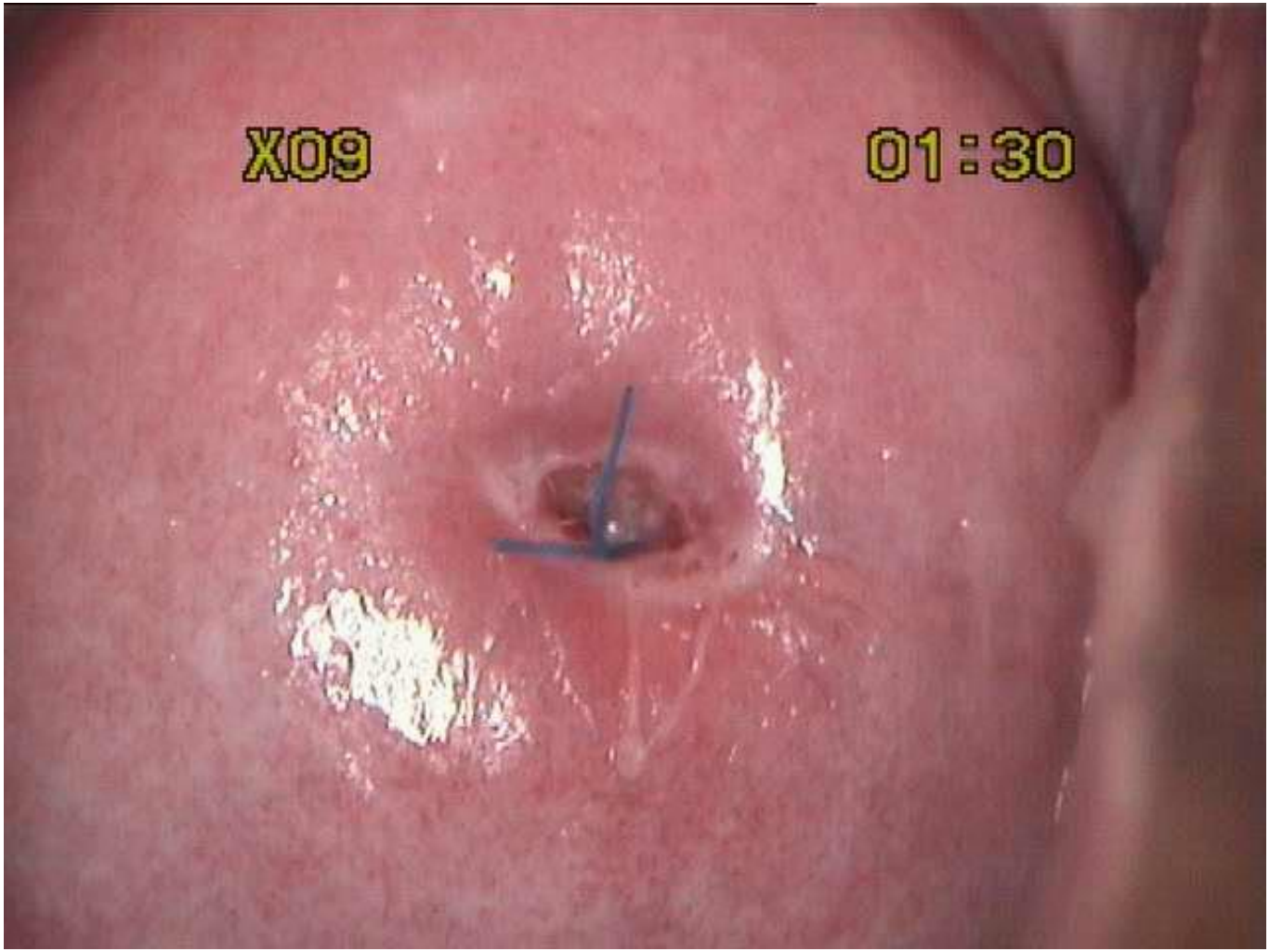
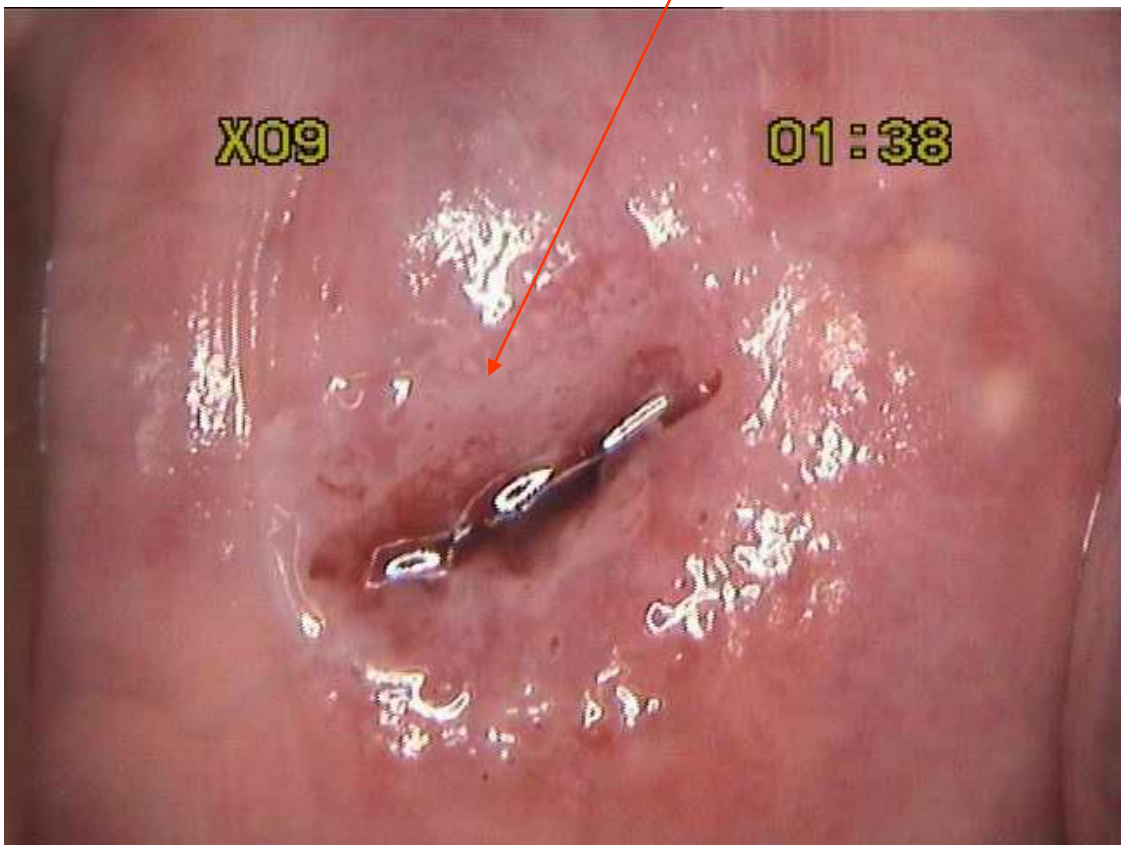


Image of acetic acid reaction of normal cervix



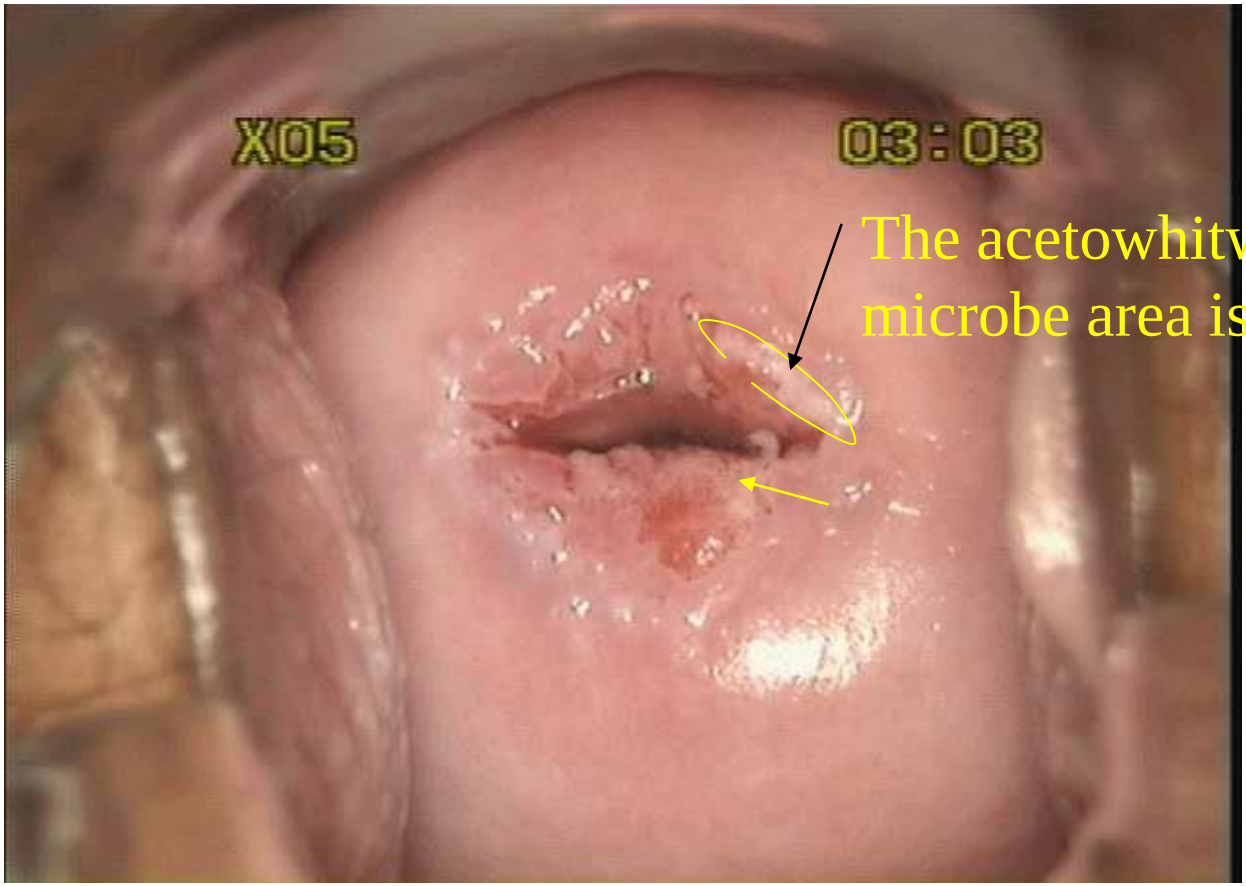
CIN1/Acetic acid reaction for 90 seconds

White epithelial thickening

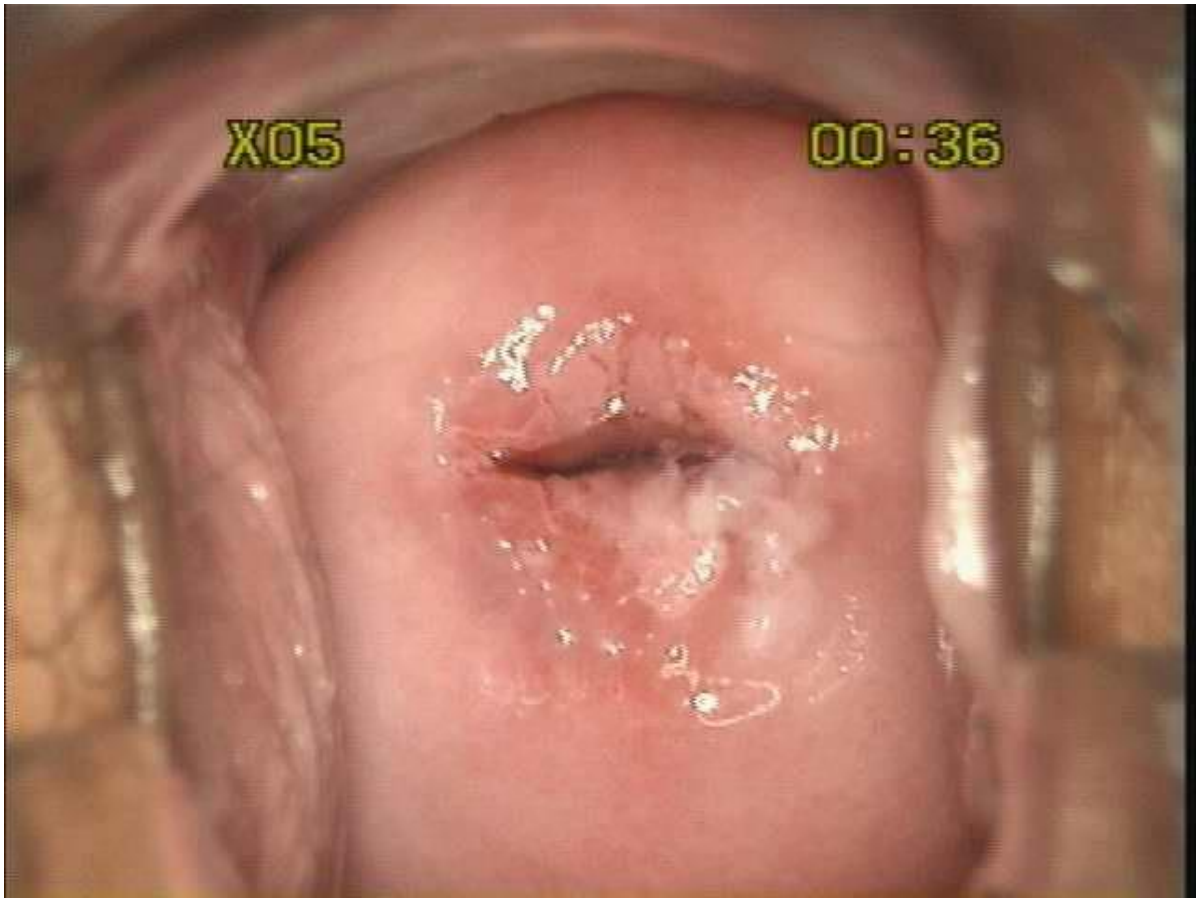


CIN2(Atypical)

CIN2(Atypical)

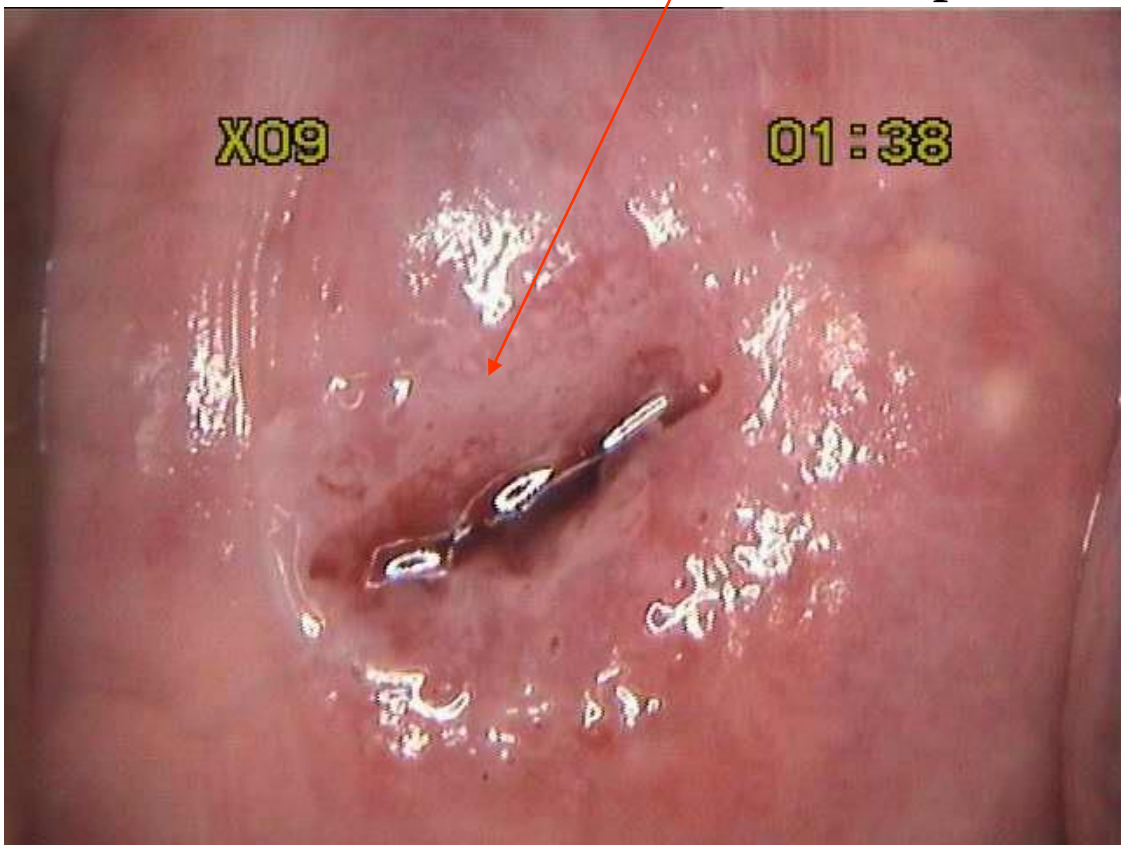


CIN2(Atypical)/Acetic acid reaction for 30 seconds



CIN1/Acetic acid reaction for 90 seconds

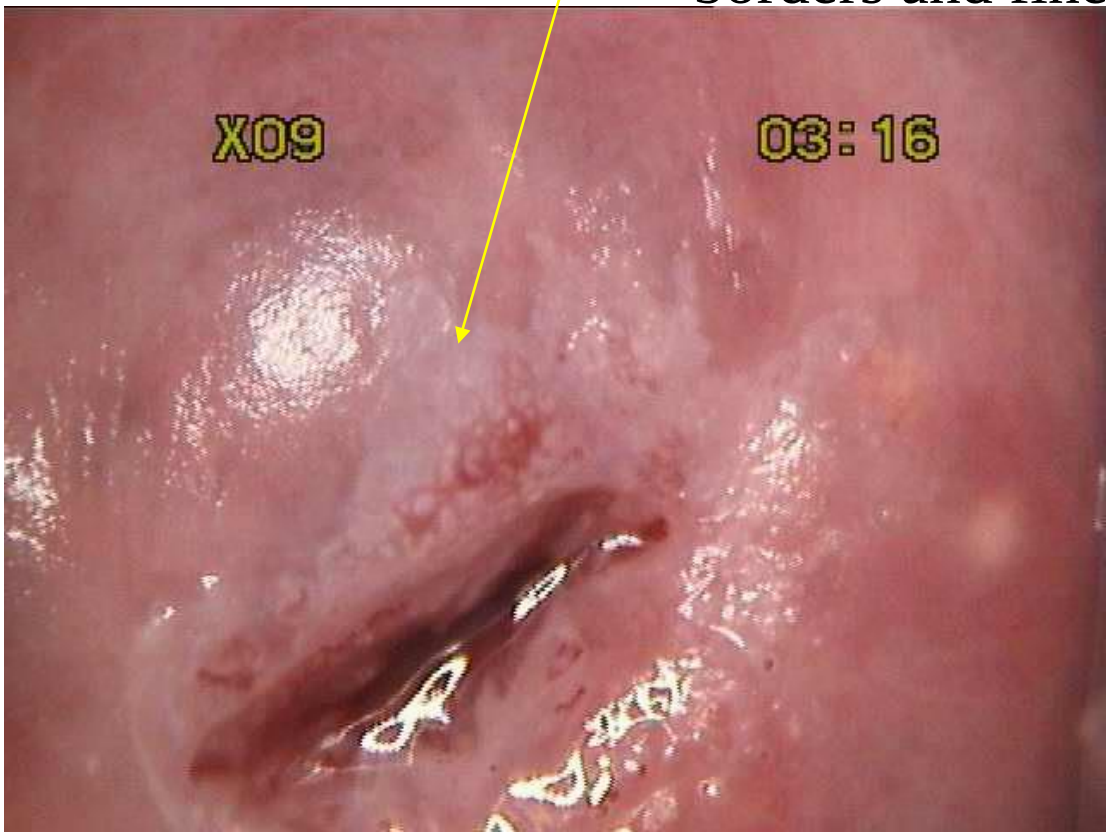
White epithelial thickening



For white epithelium with incomplete borders, ECC is needed.

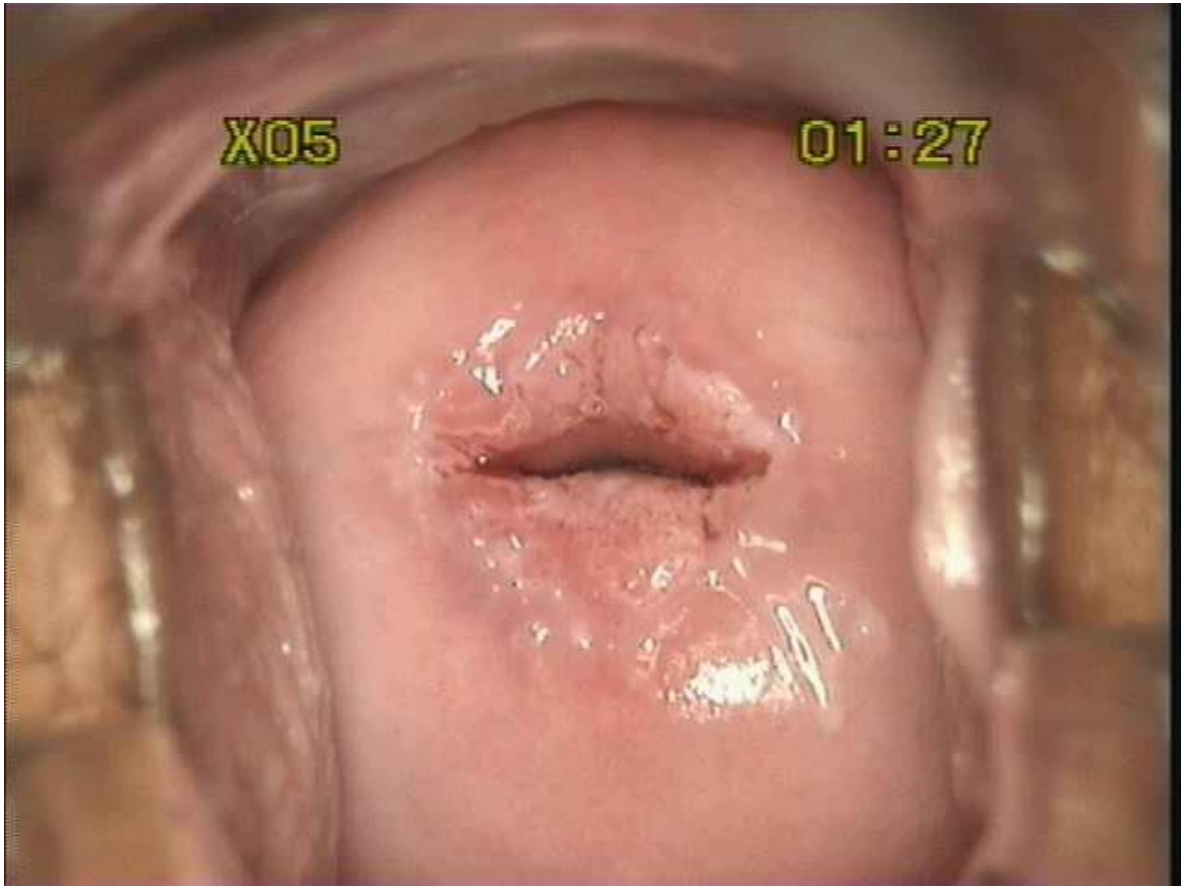
CIN1/Acetic acid reaction for 180 seconds

The white epithelium has clear borders and fine mosaic

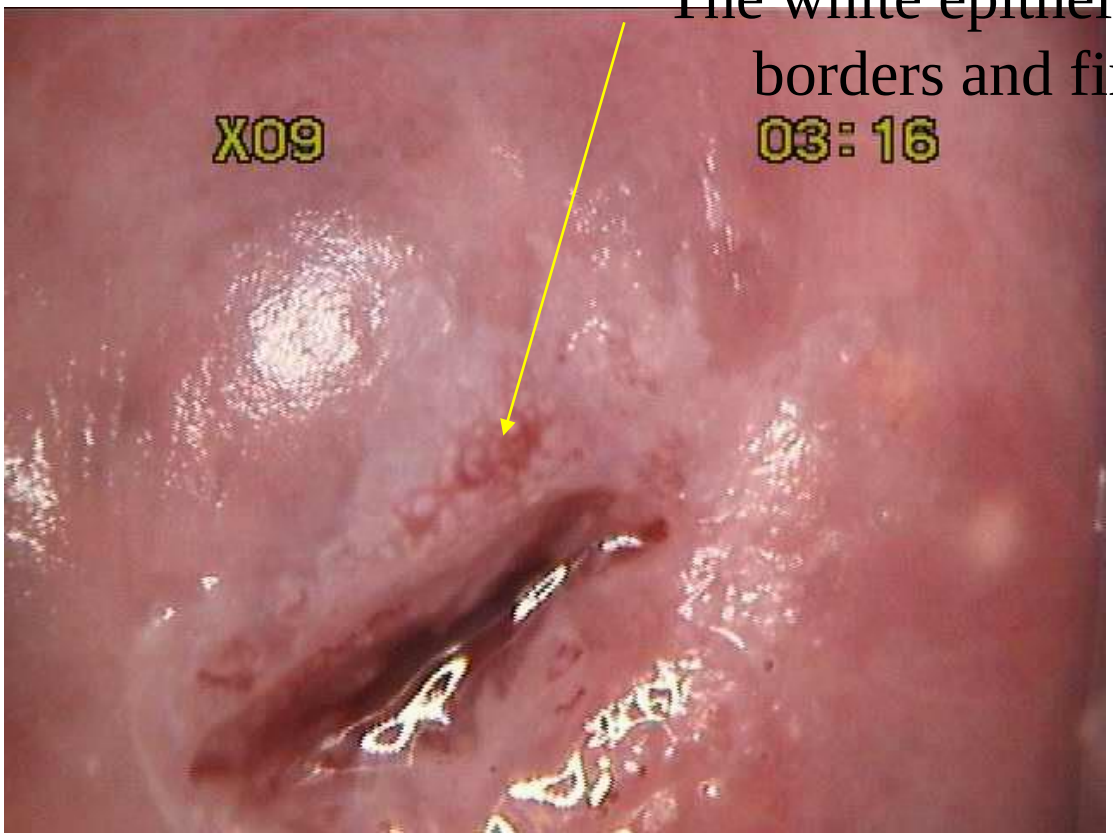


CIN1/Iodine staining

CIN2(Atypical)/Acetic acid reaction for 90 seconds

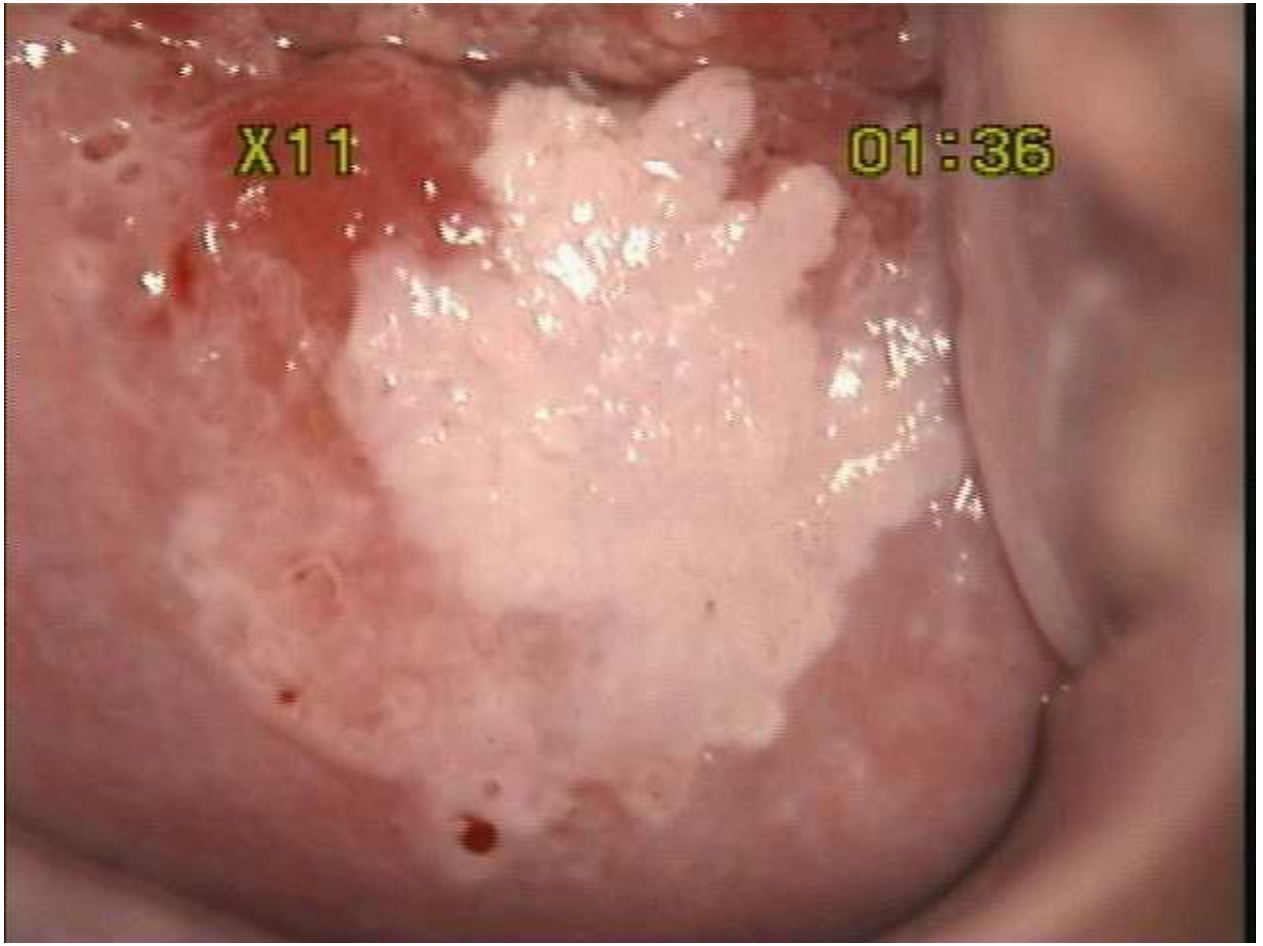


CIN1/Acetic acid reaction for 180 seconds

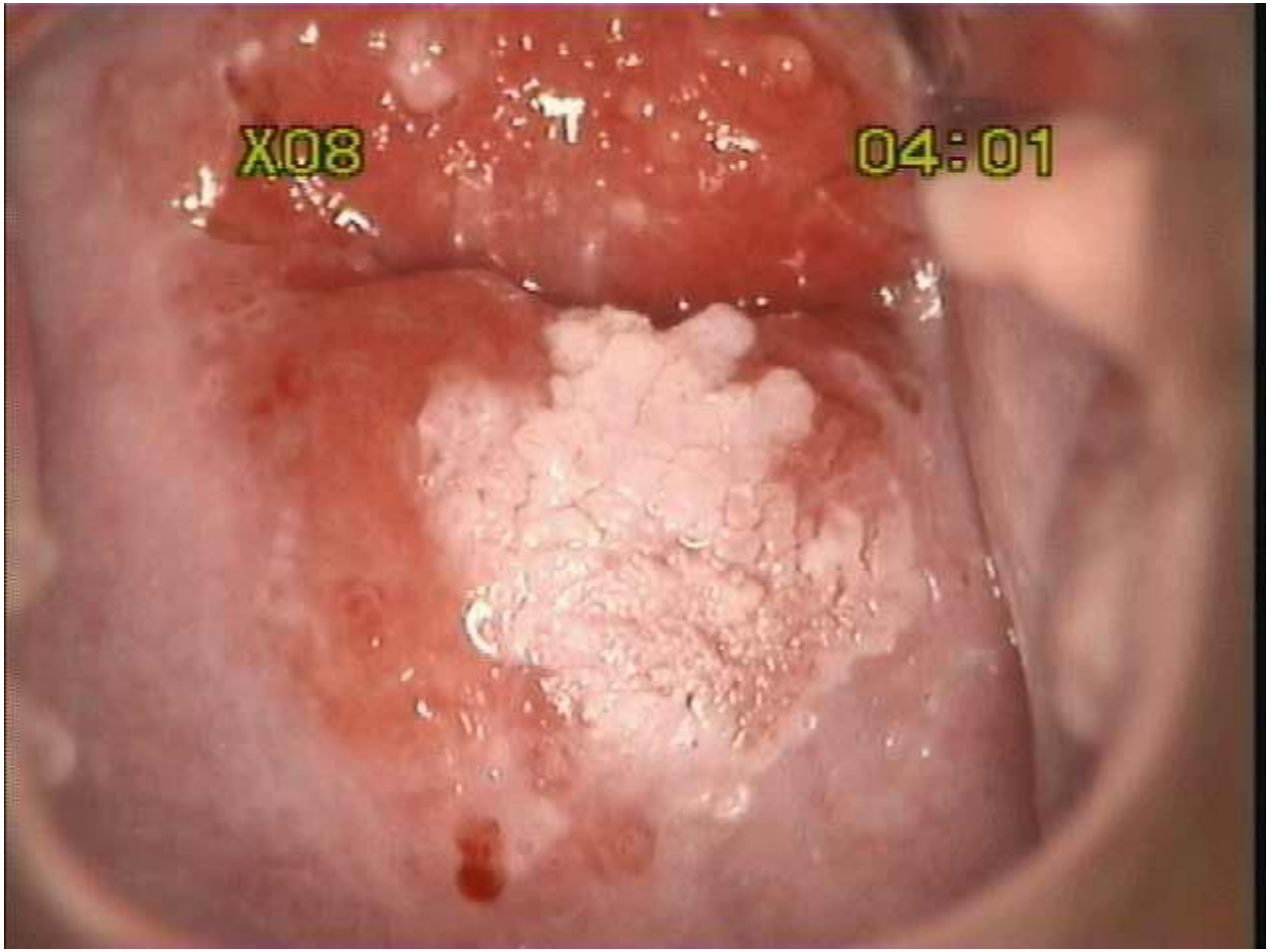


The white epithelium has clear borders and fine mosaic

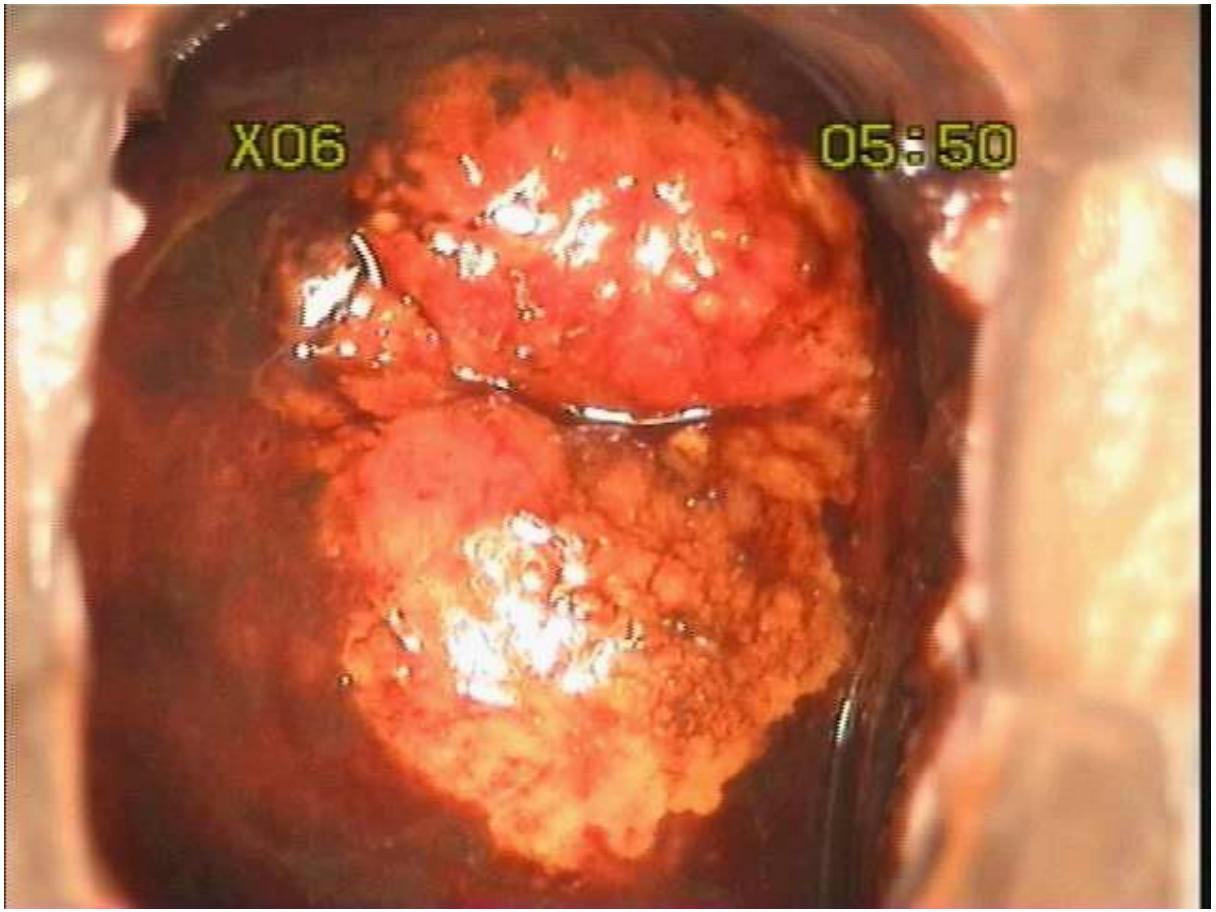
CIN2/Acetic acid reaction for 90 seconds



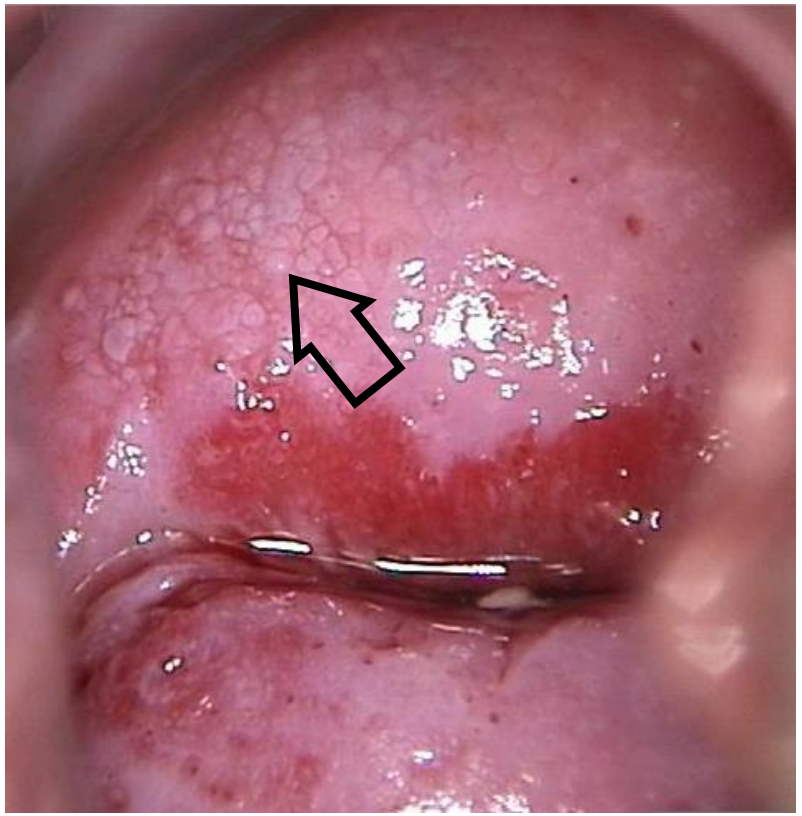
CIN2/Acetic acid reaction for 4 minutes



CIN2/Iodine staining



Differentiation of benign/malignant lesions



The mosaic on the white epithelium is obvious after applying acetic acid, but it disappears quickly in a short time

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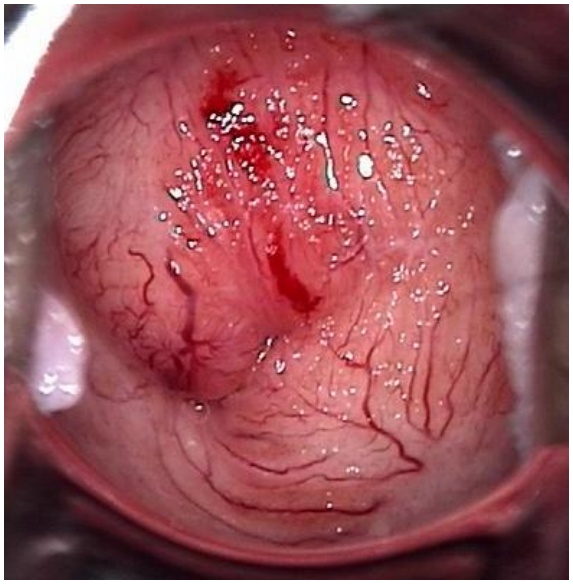
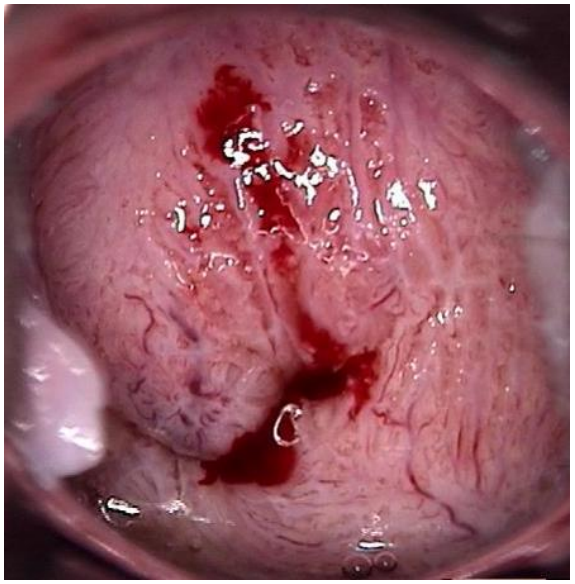
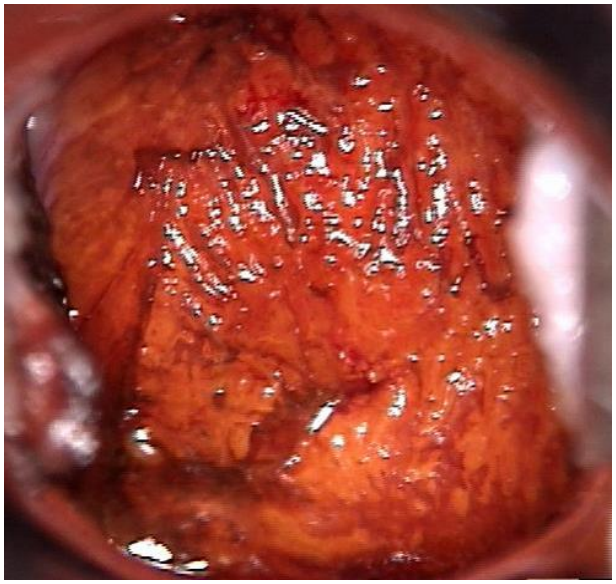
Differentiation of benign/malignant lesions



Before applying acetic acid



2 minutes after applying acetic acid



After applying the compound iodine solution

The same image may have different pathological results

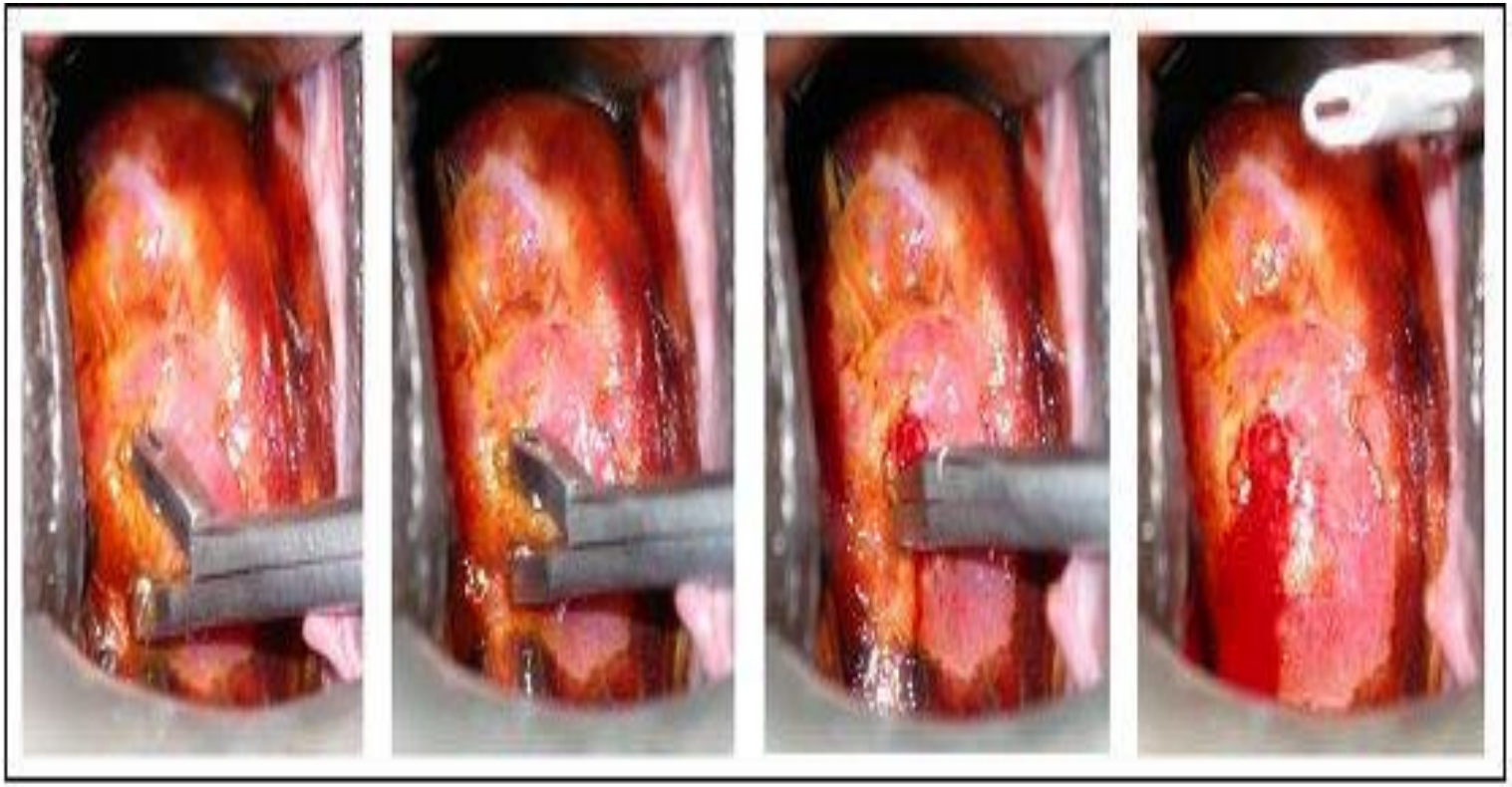
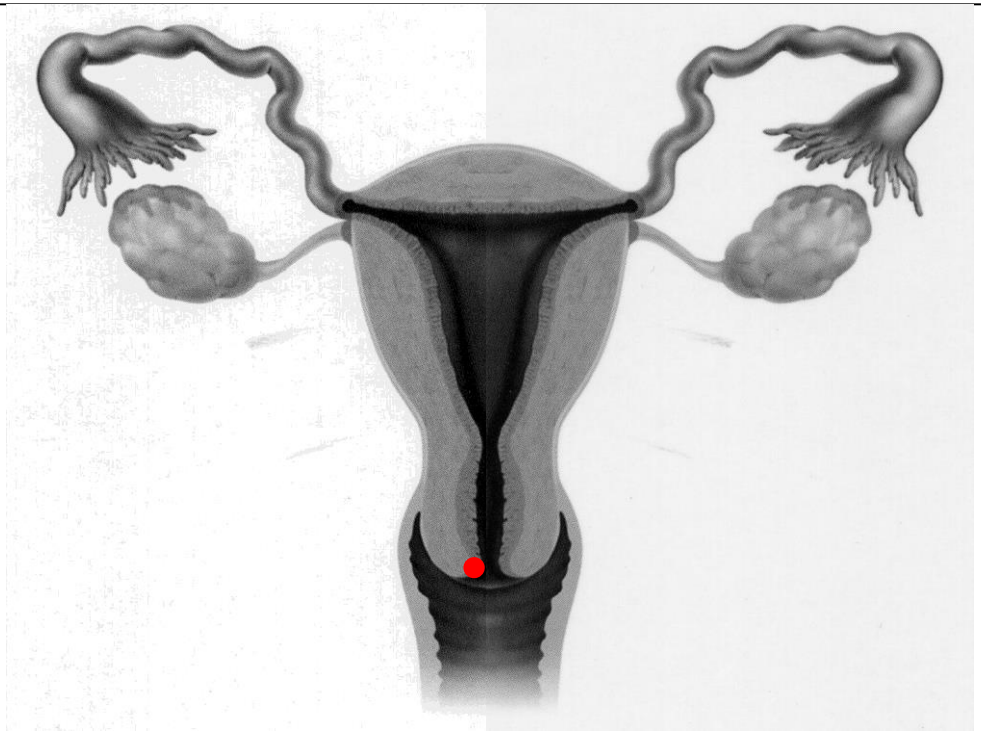
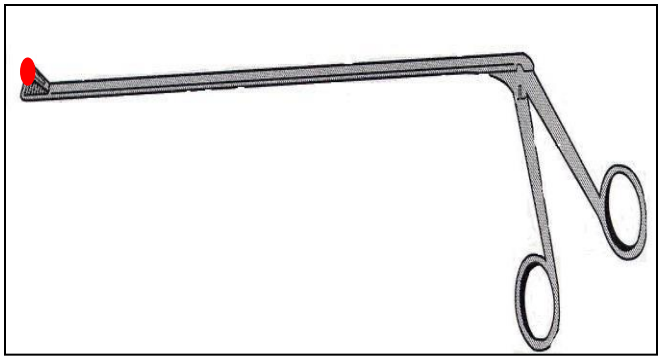


FIGURE 5.2: Biopsy technique: A toothed and sharp cutting biopsy forceps should be used for biopsy. Firmly apply the biopsy punch onto the cervix with the jaws wide open; fix the lower lip of the biopsy punch and close the jaws completely. Cutting the specimen should be carried out by quick and firm closure of the jaws. Repeated cutting and rotation of the forceps should be avoided, as this can crush the tissue sample. The removed specimen should be immediately placed in formalin. The biopsy site may be cauterized with Monsel's paste.

cervical biopsy





Thankyou