

Colposcopy: An Evidence-Based Update

Lee T. Dresang, MD

Colposcopy is a diagnostic procedure, most commonly used in the diagnosis of cervical intraepithelial neoplasia and lower genital tract carcinoma. In this article, evidence-based management strategies are updated with discussion of the 2001 American Society for Colposcopy and Cervical Pathology Consensus Guidelines. Practice management issues include methods to improve cervical cancer screening rates, coding and billing, and telemedicine. Textbooks, CD-ROMs, and courses are listed for new learners and experienced providers who want to update and sharpen their skills. (J Am Board Fam Pract 2005;18:383–92.)

Worldwide, cervical cancer is the second leading cause of cancer death among women.¹ Introducing cervical screening programs to areas without them results in a 60% to 90% reduction in cervical cancer rates within 3 years.² In the United States, Papanicolaou (Pap) screening has been used since the 1940s and colposcopy since the 1970s.³ Cervical cancer remains the 10th leading cause of cancer death among US women with approximately 13,000 new cases and 4,100 deaths in 2002.² This evidence-based update on colposcopy covers indications, technique, management recommendations, practice management issues, and available resources.

Indications for Colposcopy

Recommendations for when to perform colposcopy have changed with the 2001 American Society for Colposcopy and Cervical Pathology (ASCCP) Consensus Guidelines. Table 1 lists colposcopy indications, the most common being an abnormal Pap. Figure 1 illustrates recommendations for the management of abnormal cytology according to 2001 ASCCP Consensus Guidelines.⁴

Atypical Squamous Cells

The 2001 Bethesda system subdivides atypical squamous cells (ASC) into atypical squamous cells

of undetermined significance (ASC-US) and ASC-“cannot exclude high grade squamous intraepithelial lesion” (ASC-H).⁵ ASC-H is an indication for colposcopy. For ASC-US, providers may repeat cervical cytology at 4 to 6 and 12 months, perform human papillomavirus (HPV) DNA testing, or proceed to immediate colposcopy. Colposcopy is recommended if the repeat cytology is ASC-US or greater, or HPV testing is positive for high risk types (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 59, and 68).⁶

2001 ASCCP Consensus Guidelines recommend HPV testing for management of ASC-US.⁴ A 2002 cost-effectiveness study found reflex HPV testing for high risk DNA types for all ASC-US Pap results using liquid-based cytology “provides the same or greater life expectancy benefits and is more cost-effective than other management strategies.”⁷

Low Grade Squamous Intraepithelial Lesion and High Grade Squamous Intraepithelial Lesion Terminology

Pap results were first classified as low grade squamous intraepithelial lesion (LSIL) and high grade squamous intraepithelial lesion (HSIL) through the 1988 Bethesda system; the LSIL/HSIL terminology remains unchanged in the 2001 Bethesda system.⁵ LSIL refers to cervical intraepithelial neoplasia (CIN)-1/mild disease. HSIL incorporates the previous categories of CIN-2/moderate dysplasia, CIN-3/severe dysplasia and carcinoma in situ. The new LSIL/HSIL nomenclature is “a more reliable, reproducible way to classify lesions with malignant

Submitted, revised, 1 April 2005.

From the University of Wisconsin Medical School, Department of Family Medicine, St. Luke's Family Practice Residency, Milwaukee, Wisconsin.

Conflict of interest: none declared.

Corresponding author: Lee T. Dresang, MD, Associate Professor, 1230 W. Grant Street, Milwaukee, WI 53215 (e-mail: ldresang@fammed.wisc.edu).

Table 1. Indications for Colposcopy

Abnormal Papanicolaou
ASC-US*
ASC-US twice
ASC-US with high risk HPV types
ASC-H
LSIL
HSIL
AGC
Cervical lesion
Condyloma accuminata
Polyp
Vaginal lesion
Warts
Ulcers
Vulvar lesion
Genital warts
Ulcer
Mole concerning for melanoma
Follow-up LEEP, cryotherapy, cone biopsy
Intrauterine diethylstilbestrol exposure
Sexual partner with genital warts or condyloma accuminata
Sexual abuse

* ASC-US, atypical squamous cells of undetermined significance; HPV, human papillomavirus; LSIL, low grade squamous intraepithelial lesion; HSIL, high grade SIL; AGC, atypical glandular cells; LEEP, loop electrosurgical excision procedure.

potential.”⁸ The SIL, CIN, and dysplasia terminology can be used for cytology (Papanicolaou) and histology (biopsy) results. With the SIL terminology of the Bethesda system, “CIN or dysplasia terminology can be used, either as a substitute for SIL or as an additional descriptor.”⁵ 2001 ASCCP Consensus Guidelines principally use SIL terminology for cytology results and CIN terminology for histology results.^{4,9}

Low Grade Squamous Intraepithelial Lesion

Patients with LSIL cytology should be evaluated with a colposcopy. HPV testing is not recommended for LSIL cytology because 83% of patients with LSIL are positive for high risk HPV types.¹⁰ Repeat cytology is not recommended for LSIL.

High Grade Squamous Intraepithelial Lesion

HSIL cytology can be evaluated with colposcopy or treated directly with a “see and treat” procedure such as loop electrosurgical excision procedure (LEEP). Because a “see and treat” approach may lead to over-treatment, it is best reserved for patients at risk for loss to follow-up.⁴

Cervical treatment options include ablation procedures (cryotherapy) and excisional procedures (LEEP, laser, and cold-knife conization). LEEP

can be subdivided into large loop excision of the transformation zone (LLETZ) and LEEP conization, involving a deeper endocervical sample through the use of a second loop. Cervical conization procedures (LEEP, laser, and cold-knife) can be diagnostic and/or therapeutic. The LEEP used in a “see and treat” approach to HSIL is usually a LLETZ, which is both diagnostic and therapeutic.

Atypical Glandular Cells

The 2001 Bethesda system replaced the term atypical glandular cells of uncertain significance (AGUS) with the term atypical glandular cells (AGC), with the subclassifications: not otherwise specified (NOS), favor neoplasia, endocervical adenocarcinoma in situ (AIS). The risk of premalignant or malignant disease is 9% to 41% for AGC NOS Papanicolaou results vs 96% for AGC favor neoplasia.¹¹ All AGC Pap results should be evaluated with a colposcopy and endocervical sampling, with the exception that women with atypical endometrial cells should be initially evaluated with endometrial sampling. In the absence of atypical endometrial cells, endometrial sampling is indicated for AGC results if the patient is over age 35 or bleeding irregularly.⁴

Sexual Abuse

Colposcopy is often used for documenting sexual abuse. Some colposcopes allow photography. The hymen is carefully examined for signs of trauma. The green filter can bring out avascular areas caused by scarring.^{12,13}

Cervical Polyp

“Polyps can be neoplastic, and may be the presenting sign of cervical neoplasia or endometrial cancer. They should be biopsied or removed for histologic evaluation.”¹⁴ If endocervical polyp origin is not evident on colposcopy, a transvaginal pelvic ultrasound should be performed: some polyps protruding from the cervix may originate high in the uterus.

Suspicious Lesions of Genital Track

Suspicious lesions (including warts, plaques, and ulcers) of the genital track (cervix, vagina, and vulva) should be investigated with colposcopy re-

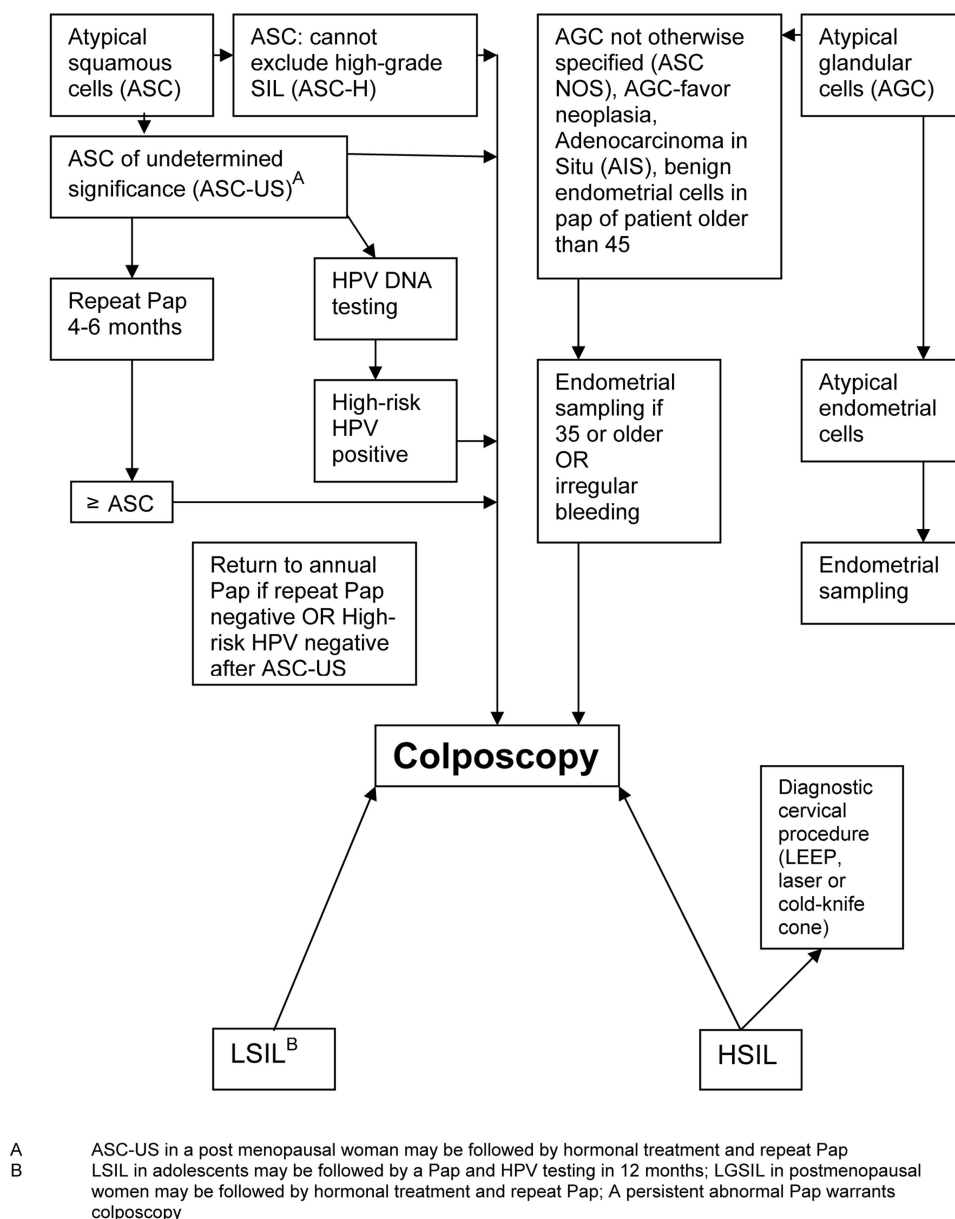


Figure 1. Recommendations for Management of Women with Cytological Abnormalities According to 2001 ASCCP Consensus Guidelines.

gardless of Pap results. It is possible to have cancer despite a normal Pap.¹⁵

Technique

A comprehensive review of anatomy, pathophysiology, and colposcopic technique is beyond the scope of this paper, but can be obtained through the resources listed in Tables 2 and 3. Figure 2 illustrates the appearance of acetowhite changes, punctation, and mosaicism with the application of 3% to 5% acetic acid. Evidence supporting the

sleeved cytobrush (Figure 3) as an alternative to an endocervical curettage (ECC) and colposcopic technique in pregnancy, adolescence, and menopause are discussed below.

Cytobrush versus Endocervical Curettage

A study since the 2001 ASCCP Consensus Guidelines showed that a cytobrush with a sleeve (straw) is more sensitive and less painful, with less specimen inadequacy. A cytobrush is rotated 360 degrees briskly 5 times and pulled back into the straw

Table 2. Colposcopy Books

Category	Reference	Description	Price
Introductory book	Sellers JW, Sankaranarayanan R. Colposcopy and treatment of cervical intraepithelial neoplasia, a beginners' manual. Intl. Agency for Research on Cancer, 2003.	144 pages; introductory manual; may help implementation in developing countries	\$20.50
	Soutter P, Soutter WP. A practical guide to colposcopy (Oxford Medical Publications). Oxford University Press; 1997.	272 pages; guide for those setting up a colposcopy clinic; ways of helping to minimize patient anxiety suggested	\$158.82
	Luesley D, Shafi M, Jordan J (editors). Handbook of colposcopy, 1st Ed. Lippincott, Williams & Wilkins Publishers; 1996.	164 pages; based on course run by the British Society of Colposcopy and Cervical Pathology; introduction for beginners	\$67.50
Atlas and textbook	Baggish MS, Baggish M. Colposcopy of the cervix, vagina, and vulva: a comprehensive textbook. Mosby, Inc.; 2003.	384 pages; textbook and atlas; color photos; discussion of colposcopy of the cervix, vagina and vulva followed by case illustrations	\$149.00
	Colposcopy: a medical dictionary, bibliography, and annotated research guide to internet references. Icon Health Publications; 2003.	152 pages; terms related to colposcopy; bibliography, internet resources	\$34.95
	Prendiville W, Ritter J, Tatti S. (Editors). Colposcopy: management options. WB Saunders Company; 2003.	160 pages; textbook and atlas; 120 color photographs	\$79.95
	Apgar S, Spitzer M, Brotzman GL, Ignatavicius DD. Colposcopy: principles and practice: an integrated textbook and atlas. 1st ed. WB Saunders Company, 2002.	512 pages; textbook and atlas; color photos; highlights correlations between cytology, colposcopy and histology	\$99.00
	Burghardt E, Pickel H, Girardi F. Primary care colposcopy: textbook and atlas, 1st Ed. Thieme Medical Publishers; 2002.	168 pages; textbook and atlas; equipment, training, exam techniques, normal and abnormal colposcopic findings, differential diagnosis and treatment	\$61.62
	Singer A, Monaghan JM, Chong S. Lower genital tract precancer: colposcopy, pathology and treatment, 2nd Ed. Blackwell Science Inc.; 2000.	323 pages; textbook and atlas; new section on AIDS and chapter on pathology	\$230.95

before removing. This technique may prevent contamination of the endocervical sample with ectocervical disease. Specimen inadequacy was 2% compared with 22% with an ECC.¹⁶

Colposcopy in Pregnancy

ECC is contraindicated during pregnancy. Ectropion (eversion) of the cervix with migration of the transformation zone (eversion of endocervical epithelium) may lead to an increased percentage of satisfactory colposcopies during pregnancy. When the everted columnar cells are exposed to the vaginal environment, they undergo metaplasia. This may increase the frequency of normal acetowhite changes noted. The incidence of CIN is similar in pregnant and non-pregnant women.¹⁷

The purpose of colposcopy during pregnancy is to detect severe dysplasia or cancer. Unless invasive cancer is identified, treatment is unacceptable. Le-

sions that do not appear severe in nature need not be biopsied. Serial cytology and colposcopy should be performed throughout pregnancy with biopsy of worsening lesions or with cytology indicating invasive disease. It is important that patients return for a colposcopy at least 6 weeks after delivery.⁴

Colposcopy in Adolescents

In general, a diagnostic excisional procedure (LEEP, laser, or cold-knife conization) is recommended for patients with HSIL cytology but a normal or CIN-1 histology. In adolescents, it is acceptable to observe CIN-2 histology with repeat colposcopy every 4 to 6 months for 1 year if the endocervical sample is negative and the patient accepts the risk of occult disease. If the HSIL Pap result persists, a diagnostic excisional procedure is recommended.⁴

Table 3. Colposcopy CD-ROMs

CD-ROM	Content	Ordering Information	Price
Brotzman G, Spitzer, Apgar B. Colposcopy image library. National Procedures Institute; 2003.	Over 800 colposcopic images linked to 31 key terms; demonstrate over 3000 colposcopic features	American Society for Colposcopy and Cervical Pathology, 20 West Washington Street; Suite 1, Hagerstown, MD 21740, 800-787-7227, http://www.asccp.org/bookstore.shtml#	\$170 ASCCP members; \$190 non-members
Spitzer M, Jones H, Runowicz CD, Waggoner SE. Advanced colposcopy American College of Obstetrics and Gynecology/American Society for Colposcopy and Cervical Colposcopy; 2002.	Interactive tutorials and 26 case presentations; 2001 Bethesda system terminology	American Society for Colposcopy and Cervical Pathology, 20 West Washington Street; Suite 1, Hagerstown, MD 21740, 800-787-7227, http://www.asccp.org/bookstore.shtml#	\$175 ASCCP members; \$195 non-members
American Academy of Family Physicians. Colposcopy for the family physician; 1998	Video and audio clips, searchable text documents, interactive test	American Academy of Family Physicians (AAFP), 11400 Tomahawk Creek Parkway, Leawood, KS 66211, 800-944-0000, http://www.aafp.org/x18319.xml	\$110 AAFP members; \$140 non-members
Anderson M, Jordan JA, Morse AR, Sharp F. Integrated colposcopy: for colposcopists, histopathologists and cytologists. Lippincott, Williams & Wilkins Publishers; 1997.	Module 1: cytology, colposcopy and histology; Module 2: ~1000 color images; Module 3: over 30 cases	www.amazon.com	\$325

Colposcopy after Menopause

Postmenopausal atrophy can result in abnormal cytology. A postmenopausal woman with an LSIL Pap result may undergo estrogen treatment followed by repeat Pap every 4 to 6 months. Estrogen cream is applied intravaginally each evening for 4 weeks and stopped 1 week before repeat cytology. Postmenopausal patients with LSIL undergoing estrogen treatment may return to annual Pap after 2 normal results. An ASC or more severe abnormality on Pap after estrogen treatment should be evaluated with colposcopy. Recommended management of HSIL cytology is not effected by menopausal status.⁴

Because of hormonal changes, many postmenopausal women will have an unsatisfactory colposcopy. A colposcopy is considered unsatisfactory if the entire transformation zone cannot be visualized and if the distal end of a lesion extending into the endocervical canal cannot be visualized. In postmenopausal women, the former is often true. Estrogen treatment described in the previous paragraph will often cause enough ectropion of the

endocervical cells to result in a satisfactory examination.⁴

Follow-Up of Histology or Colposcopy Results

2001 ASCCP Consensus Guidelines for managing histology are depicted in Figure 4.⁹

Unsatisfactory Examination

Management of an unsatisfactory colposcopic examination depends on cervical cytology and histology. An unsatisfactory examination following HSIL warrants a diagnostic excisional procedure. In addition, a diagnostic excisional procedure is recommended after an unsatisfactory examination with biopsy proven CIN-1, CIN-2, or CIN-3. If colposcopic histology is normal and cytology is less severe than HSIL, repeating a Pap at 6 and 12 months, HPV testing at 1 year, or a Pap and colposcopy at 1 year are all acceptable.⁹ An unsatisfactory examination in a post-menopausal woman is addressed in the Colposcopy after Menopause section above.

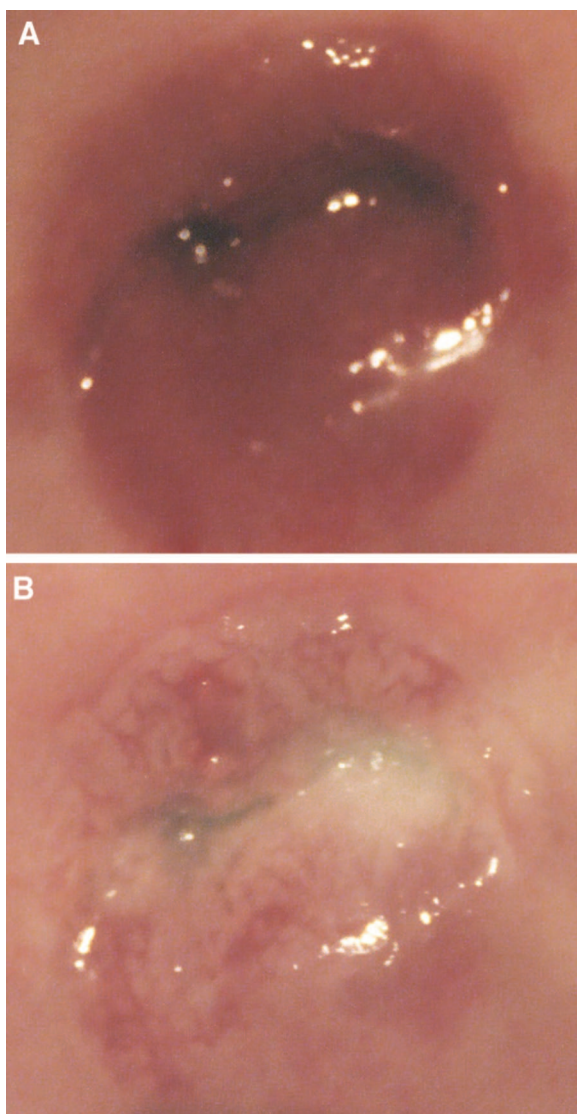


Figure 2. Cervix before and after Application of Acetic Acid.

Normal

Additional testing is indicated after a normal colposcopy to help avoid missed pathology. A satisfactory colposcopy negative for dysplasia following HSIL, AGC favor neoplasia (FN) or endocervical AIS warrants a diagnostic excisional procedure, preferably a cold-knife cone for AGC FN and AIS. Repeat Pap every 4 to 6 months until 4 consecutive negative results are obtained is the recommended follow-up of a normal, satisfactory colposcopy after AGC NOS cytology. The same examination, following ASC or LSIL cytology, warrants repeating a Pap at 6 and 12 months, HPV testing at 1 year, or a Pap and colposcopy at 1 year.⁹

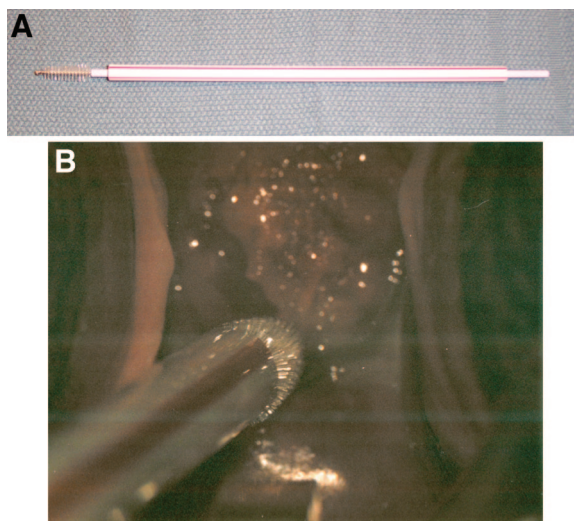


Figure 3. Cytobrush with Sleeve.

CIN-1

When colposcopy is satisfactory, observation or treatment of biopsy confirmed CIN-1 is acceptable. Acceptable observation options include: (1) repeat Pap at 6 and 12 months, (2) HPV testing at 12 months, and (3) repeat Pap and colposcopy at 12 months. Acceptable treatment modalities include: (1) cryotherapy, (2) laser ablation, and (3) LEEP. Endocervical sampling is recommended before ablation of CIN-1.⁹

CIN-2,3

Observation with biopsy confirmed CIN-2,3 is unacceptable, except in special circumstances including adolescents with CIN-2 and pregnant patients. When colposcopy is satisfactory and the endocervical sample is negative, excision and ablation are acceptable. With recurrent CIN-2,3, excisional modalities are preferred. In immunosuppressed individuals, such as those with the human immunodeficiency virus, biweekly, topical vaginal 5-fluorouracil may be used after treatment to reduce the risk of recurrent cervical dysplasia.⁹

Cancer

A woman with micro or invasive cancer on colposcopic directed biopsy should be referred to an appropriate specialist.

Practice Management

Colposcopy practice management issues include strategies to increase Pap screenings, follow-up of results, and coding and billing.

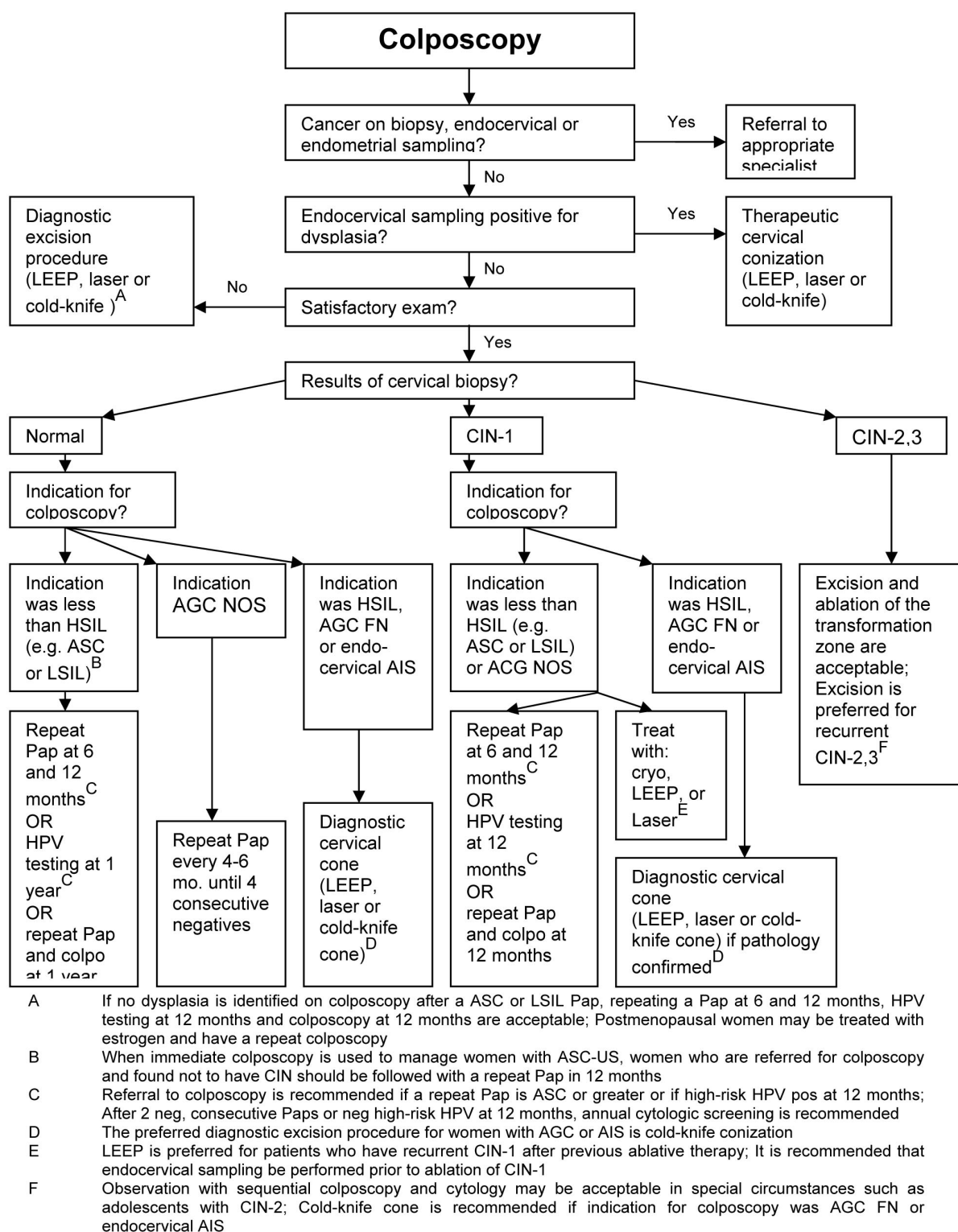


Figure 4. Management of Colposcopic Findings.

Increasing Pap Screenings

Screening with Pap to know when colposcopy is indicated is as important as providing colposcopy

when indicated. Of US women with cervical cancer, 50% have never had a Pap and another 10% have not had a Pap in the 5 years before diagno-

Table 4. Colposcopy ICD-9 Codes²⁴

ICD-9 Code	Description
078.11	Condyloma accuminata
078.19	Genital warts
616.50	Vulvar ulcer
616.8	Cervical ulcer
622.1	Abnormal Papanicolaou test
622.7	Polyp of cervix
624.8	Vulvar mole no specific diagnosis
654.60	Abnormality of cervix in pregnancy
995.53	Sexual abuse
V01.7	Sexual partner with genital warts or condyloma accuminata

sis.¹⁸ Evidence supports patient reminders as one way of increasing Pap rates.¹⁹

Computerized Tracking Systems

Many health systems are able to track whether registered patients are up to date on their Pap screening and whether they have followed up on

any abnormal results. Tracking systems can alert patients to the need for an appointment and can alert providers to patients who may otherwise be lost to follow-up with dangerous consequences.

Telemedicine and Rural Practice

Telecolposcopy involves a local provider taking colposcopic images (still and/or video) which are transmitted electronically to an expert colposcopist for interpretation and recommendations. The distant reading of the images may be real-time or delayed.²⁰ Barriers to telecolposcopy include: “the initial cost of capitalization, reimbursement, and licensing challenges, as well as the threat of malpractice.”²¹ In remote rural areas, colposcopy performed by local providers is less costly than telemedicine with expert consultation.²² However, colposcopists’ and patients’ satisfaction with telecolposcopy is high. In one study, over 95% of women who lived more than 25 miles from a referral center would rather have telecolposcopy locally than to drive to the referral center.²³

Table 5. Colposcopy CPT codes^{25–27}

CPT Code	Description of Examination	Medicare Prof Fee When Performed in Facility	Medicare Prof Fee When Performed in Clinic	Medicaid WI Physician Fee
56820	Colposcopy of the vulva	81.73	106.36	—*
56821	with biopsy(s)	112.93	143.45	—*
57420	Colposcopy of the entire vagina, with cervix if present	86.86	111.48	—*
57421	with biopsy(s)	120.61	152.17	—*
57452	Colposcopy of the cervix including upper vagina	81.73	108.44	—*
57454	With biopsy(s) of the cervix and endocervical curettage	126.85	153.21	90.47
57455	With biopsy(s) of the cervix	109.65	140.17	—*
57456	With endocervical curettage	102.68	132.51	—*
57460	With loop electrode biopsy(s) of the cervix	158.96	325.81	294.88
57461	With loop electrode conization of the cervix	187.96	357.57	—*
57500	Biopsy, single or multiple, or local excision of lesion, with or without fulguration (separate procedure)	56.4	132.36	56.20
57505	Endocervical curettage	85.24	98.08	59.80
57511	Cryocautery, initial or repeat	125.91	141.87	67.90
57522	Loop electrode excision	230.93	289.21	298.00
58100	Endometrial sampling (biopsy)	84.68	105.84	54.69
99170	Colposcopy of perineum	85.96	127.58	132.52

* No fee listed in schedule; fee based on individual consideration, medical consultant.

Note: fees are for Wisconsin. A geographic adjustment factor (GAF) between 0.84 and 1.30 is multiplied by a national figure to calculate state value.

ICD-9 Codes and CPT-4 Codes and Charges

Please see Tables 4 and 5 for colposcopy-related outpatient codes and charges.

Resources

Colposcopy resources include books (Table 2) and CD ROMs (Table 3). The American Academy of Family Physicians (AAFP) and ASCCP regularly hold colposcopy courses, which can be found on their respective web sites: www.aafp.org and www.asccp.org. The ASCCP offers a Colposcopy Mentorship Program, which requires a minimum of 25 supervised colposcopies, with at least three high-grade findings, and successful completion of a written and slide examination. Documentation of successful program completion is awarded, but there is no certification for colposcopy.

Conclusions

Colposcopy is an important component of cervical cancer screening. An evidence-based approach to colposcopy requires familiarity with 2001 ASCCP Consensus Guidelines. By following these guidelines and reviewing new evidence as it develops, family physicians can play a valuable role in cervical cancer screening with Papanicolaou tests and colposcopies, an approach that has reduced cervical cancer rates by 75% in the United States.

References

1. Koliopoulos G, Martin-Hirsch P, Paraskevaidis E, Arbyn M. HPV testing versus cervical cytology for screening for cancer of the uterine cervix. Cochrane Gynaecological Cancer Group. Cochrane Database of Systematic Reviews, 2004.
2. US Preventive Services Task Force. Screening for cervical cancer: recommendations and rationale. *American Family Physician* 2003;67:1759–66.
3. Spitzer M, Apgar B, Brotzman G, Krumholz BA. Residency training in colposcopy: a survey of program directors in obstetrics and gynecology and family practice. *Am J Obstet Gynecol* 2001;185:507–13.
4. Wright TC Jr, Cox JT, Massad LS, Twiggs LB, Wilkinson EJ. Consensus guidelines for the management of women with cervical cytological abnormalities. *JAMA* 2001;287:2120–9.
5. Solomon D, Davey D, Kurman R, et al. Forum Group Members. Bethesda 2001 Workshop. The 2001 Bethesda System: terminology for reporting results of cervical cytology. *JAMA* 2002;287:2114–9.
6. Wright T, Schiffman M, Solomon D, et al. Interim guidance for the use of human papillomavirus DNA testing as an adjunct to cervical cytology for screening. *Obstet Gynecol* 2004;103:304–9.
7. Kim JJ, Wright TC, Goldie SJ. Cost-effectiveness of alternative triage strategies for atypical squamous cells of undetermined significance. *JAMA* 2002;287:2382–90.
8. The cervix: colposcopy: high grade cervical intraepithelial neoplasia: cytology, histology, and colposcopy. American Society for Colposcopy and Cervical Pathology. <http://www.asccp.org/edu/practice/cervix/colposcopy/highgrade.shtml>. Site last visited March 28, 2005.
9. Wright TC Jr, Cox JT, Massad LS, Carlson J, Twiggs LB, Wilkinson EJ. 2001 Consensus guidelines for the management of women with cervical intraepithelial neoplasia. *Am J Obstet Gynecol* 2003;189:295–304.
10. The ASCUS-LSIL Study (ALTS) Group. A randomized trial on the management of low-grade intraepithelial lesion cytology interpretations. *Am J Obstet Gynecol* 2003;188:1393–400.
11. Levine L, Lucci JA, Dinh TV. Atypical glandular cells: new Bethesda terminology and management guidelines. *Obstet Gynecol Survey* 2003;58:399–406.
12. Britton H, Hansen K. Sexual abuse. *Clin Obstet Gynecol* 1997;40:226–40.
13. Hobbs C, Wynne J. Use of colposcope in examination for sexual abuse. *Arch Disease Childhood* 1996;75:539–42.
14. The cervix: colposcopy: colposcopic appearance of benign lesions. American Society for Colposcopy and Cervical Pathology. <http://www.asccp.org/edu/practice/cervix/colposcopy/benign.shtml>. Site last visited March 28, 2005.
15. Dresang LT. Cervical cancer with a normal Pap. *WMJ* 2003;102:4.
16. Boardman LA, Meinz H, Steinhoff MM, Heber WW, Blume J. A randomized trial of the sleeved cytobrush and the endocervical curette. *Obstet Gynecol* 2003;101:426–30.
17. Palle C, Bangsboll S, Andreasson B. Cervical intraepithelial neoplasia in pregnancy. *Acta Obstet Gynecol Scand* 2000;79:306–10.
18. Nuovo J, Melnikow J, Howell L. New tests for cervical cancer screening. *Am Fam Physician* 2001;64:780–6.
19. Tseng DS, Cox E, Plane MB, Hia KM. Efficacy of patient letter reminders on cervical cancer screening. A meta-analysis. *J Gen Intern Med* 2001;16:563–8.
20. Ferris DG, Litaker MS, Macfee MS, Miller JA. Remote diagnosis of cervical neoplasia: 2 types of telecolposcopy compared with cervicography. *J Fam Pract* 2003;52:298–304.

21. Susman J. Telemedicine marches on: the efficacy of remote telecolposcopy (Editorial). *J Fam Pract* 2003; 52:264.
22. Bishai DM, Ferris DG, Litaker MS. What is the least costly strategy to evaluate cervical abnormalities in rural women? Comparing telemedicine, local practitioners, and expert physicians. *Med Decis Making* 2003;23:463–70.
23. Harper DM, Moncur MM, Harper WH, Burke GC, Rasmussen CA, Mumford MC. The technical performance and clinical feasibility of telecolposcopy. *J Fam Pract* 2000;49:623–7.
24. Puckett CD. The educational annotation of ICD-9-CM, 5th Ed. Reno (NV): Channel Publishing Ltd.; 2003.
25. American Medical Association. Current Procedural Terminology: 2004. Chicago (IL): AMA Press; 2003.
26. Medicare Fees based on Medicare Part B Physician Fee Schedule. http://www.wpsic.com/medicare/provider/pricing_fees.shtml. Site last visited March 28, 2005.
27. Medicaid Fees based on WI Medicaid Fee Schedule. <http://dhfs.wisconsin.gov/medicaid4/maxfees/maxfee.htm#medicaid>. Site last visited March 28, 2005.