COLPOSCOPY IN THE 21ST CENTURY

Nancy D. Kellogg, MD
Associate Professor of Pediatrics
University of Texas Health Science Center at San Antonio
Medical Director
Alamo Children's Advocacy Center

The use of photocolposcopy is a recent development in the field of child sexual abuse. Research articles and references to photodocumentation with colposcopes in the evaluation of child sexual abuse first appeared in the 1980s (Teixeira, 1981; Woodling, 1986; Heger, 2000). In these initial studies, photocolposcopy was touted as an investigative tool; various studies (Teixeira, 1981; Norvell, 1984; Woodling, 1986) reported that the colposcope increased detection of genital injuries by 10 percent to 40 percent. The availability of photographic evidence for legal proceedings also garnered much interest and support for this technology.

Once introduced, photographic documentation of child sexual abuse examinations quickly became an accepted standard of care. The recognition of the colposcope as a valid diagnostic tool provided an important benefit to the child as the review of photographs replaced the need for repeat examinations (Heger, 2000). In addition, the colposcope offered unique advantages over other sources of magnification and photography. These advantages and features include an excellent light source, a variety of magnification options, direct measurement of hymenal orifice dimensions, photography (Emans, 2000) and various options for hands-free image capture (for example, foot pedal shutter release). By 1990 the benefits of photocolposcopy were recognized by most centers specializing in child abuse (Heger, 2000). In a survey study of 122 experienced clinicians, 85 percent used photocolposcopes (Kellogg and Adams, 2001, in preparation).

As the range of clinician knowledge and expertise has broadened, the need for peer review of photodocumentation has increased.

Photodocumentation has provided a valuable adjunct for studies of normal anogenital anatomy and patterns of genital injuries and healing (Emans, et al, 1987; Herman-Giddens, 1987; Pokorny and Kozinetz, 1988; McCann, et al, 1989; McCann, 1990; Berenson, 1991; Kellogg and Parra, 1991; McCann, et al, 1992; Berenson, et al, 1993; McCann and Voris, 1993; Adams, 1996). As understanding of normal anogenital anatomy improved, the proportion of sexual assault examinations with "positive" findings decreased, as did the importance of colposcopy as an investigative tool. However, photodocumentation with colposcopes has remained an important research tool and has become important in teaching and peer review of examination findings.

Technological improvements have significantly enhanced the use of the colposcope as a teaching tool. Most colposcopes have a video attachment capability enabling the student to more readily view the genital anatomy on a computer monitor during an examination. Still images or video clips can be captured and viewed immediately following an examination. This review demonstrates variations in anatomy associated with different examination techniques and different magnifications. The learning experience can then be supplemented with a review of colposcopic slides or photographs and discussion of documentation and interpretation of pertinent examination findings. The availability of different magnifications (for example, 7.5x, 15x, 30x) enables the student to more accurately assess and interpret various findings. For example, human papillomavirus lesions may be detected earlier with 15x magnification (Kellogg and Parra, 1995) than with lower or no magnification. A green filter may accentuate areas of increased or decreased vascularity such that scars become more apparent. The digital video camera attachment can be removed from the colposcope and used to photograph physical abuse or assault injuries. Immediate feedback from the computer monitor allows the clinician to adjust image quality and focus during the examination; the image also can be printed immediately following the examination if investigative agencies require such documentation. New software systems enable the clinician to create patient files of images from sexual abuse examinations, images from physical abuse examinations, and any demographic or abuse-related information. If a patient returns for subsequent evaluations, the clinician may directly compare previous and subsequent images to assess changes in examination findings.

As the range of clinician knowledge and expertise has broadened, the need for peer review of photodocumentation has increased. Studies (Sinal, et al, 1997; Paradise, et al, 1999) have documented a lack of consensus among clinicians in the interpretation of genital and anal findings. The greatest discrepancies in agreement are among less experienced clinicians and in the interpretation of nonspecific findings (e.g., erythema, excoriations) or variations in normal anatomy (Sinal, et al, 1997; Paradise, 1999). Peer review of colposcopic images provides opportunities for

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expert consultation, discussion of research articles, and improvement in consensus of opinions regarding examination findings. Peer review also provides professional support in an emotionally burdensome area of pediatrics with a high turnover rate among relatively few trained clinicians. Peer review may indirectly contribute to sustaining involvement and building expertise among clinicians by providing a means for professional and emotional support.

As we enter the 21st century, the use of colposcopy for peer review has expanded. Telemedicine provides a cost-effective, accessible and efficient means of consultation among experienced "hubs" and remote "satellite" sites. The use of telemedicine for child sexual abuse examinations has emerged from the need of less experienced, remotely located clinicians to consult with more experienced clinicians and the desire of experienced clinicians to more readily exchange and analyze case data to further knowledge and research in this field (Kellogg, Lamb, Lukefahr, 2000). Images and case data are transmitted modem-to-modem or encrypted and transmitted over the Internet. At least seven states have established telemedicine systems for consultation and review of colposcopic images (Kellogg, Lamb, Lukefahr, 2000).

Telemedicine also poses technical and legal challenges. Most statewide telemedicine systems have reported inexperience with the technology and lack of technical support resulting in underutilization of the telemedicine equipment and consultation capabilities (Kellogg, Lamb, Lukefahr, 2000). Legal issues include the following:

- maintenance of patient record confidentiality both within the facility and when images are transmitted to, or received from, other sites;
- need for patient consent when sharing information through telemedicine;
- need for license reciprocity in other states when consulting across state lines; and
- liability of the consultant in the care rendered to the patient by the consulting remote site clinician.

While at least 13 states have legislated insurance reimbursement, most will reimburse only live interactive telemedicine consultation (Grigsby and Sanders, 1988), not "store-and-forward" reviews of images commonly used for sexual abuse evaluations. The success of telemedicine systems for child sexual abuse examinations will likely depend on the establishment of a technical, financial and professional infrastructure that encourages and maintains clinician involvement.

The use of photocolposcopy does not ensure clinician competence or accuracy. The usefulness of this tool is dependent upon the quality and extent of training provided to the user. Accurate *photodocumentation* depends on the clinician's examination skills and appropriate utilization of technology. Accurate *interpretation* of photographs depends on the clinician's knowledge of normal and abnormal anogenital anatomy, experience, and availability of an experienced consultant.

The evolution of photocolposcopy use for child sexual abuse has kept pace with the advancement of medical knowledge in this field. This technology has provided significant enhancements in the detection, documentation, legal representation, research, clinician training, and case peer reviews of child sexual abuse. Photocolposcopy will likely play a role in future developments, which include improvements in the consistency of clinician documentation and interpretation of examination findings, a greater emphasis on peer review, and the development of statewide telemedicine networks.

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