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Master Colposcopy



Interpreting Blood Vessel Patterns In Colposcopy

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Blood vessel patterns are diverse. At colposcopy, they are best studied using a variety of magnifications before the application of acetic acid (which hides them) and with the blue/green filter (which accentuates them). Their characteristics are extremely valuable for identifying the different benign and diseased entities and differentiating between colposcopic mimics.

Normal, original squamous epithelium of the cervix is pink and smooth. It demonstrates fine, regular vessels but at times no vascularity is evident. This normal vascularity can be altered due to atrophy which can produce petechial hemorrhages, from inflammatory conditions like *Trichomonas vaginalis* (Figure 1) and elevated hormone states (such as pregnancy and oral contraceptive use).

Columnar epithelium on the ectocervix is termed an ectopy. Its underlying villous structures and their papillary projections are delineated after acetic acid application. They remain very transparent in the absence of metaplasia even after acetic acid. Each villous structure contains an afferent and efferent blood vessel that appears looped when viewed sagittally. When the vessels are viewed end-on they look like red dots with pale acetowhite halos because of their central location within the individual villi (Figure 2). The vascular patterns that are seen in metaplasia, cervical intraepithelial neoplasia (CIN), adenocarcinoma in situ (AIS) and cancer (CA) come from the vessels of the villi.¹⁻³

In metaplasia, the angioarchitecture varies with the stage of the metaplastic process. In immature metaplasia numerous forms are seen, including tree-like (a large central vessel with lateral branches), character writing-like, taproot-like and reverse mosaic forms (dilated vessels within areas of immature metaplastic epithelium). The vessels in a matured transformation zone (t-zone) are long, regularly branching vessels, some with anastomoses, tapering tap root-like forms with or without anastomoses (Figure 3), long parallel vessels, incomplete loops around crypt openings and central vessels with radial, tapering shapes like pin-wheels, sometimes anastomosing.

In the development of CIN, the central, looped hairpin-like capillaries of the villi become incorporated into the dysplastic epithelium. Dilatation and proliferation of the resulting punctate and mosaic patterns increase with the degree of neoplastic change. CIN 1 lesions may have no punctation or mosaicism or simply a fine regular pattern. CIN 2/3 lesions have irregular, coarse, well-defined, elevated vessel areas with considerable variation in intercapillary distance (Figure 4). Fracturing of these punctate and mosaic patterns is an early colposcopic warning sign of squamous microinvasion or cancer. Vessels resulting from tumor angiogenesis are corkscrew-like, waste thread-like (tendrill-like), spaghetti-like, tadpole-like or they exhibit atypical networks and atypical branching (Figure 5). The vascular patterns of condylomatous excrescences, if viewed sagittally, demonstrate waste thread-like (tendrill-like), character writing-like and looped and bifid formations (Figure 6). When they are viewed end-on, predominately dot-like and bifid formations are seen.

Other entities seen colposcopically with characteristic angioarchitecture are glandular lesions (noted for their absence of punctation, mosaicism and corkscrew vessels) having waste thread-like, tuberous root-like, character writing-like and single and multiple dot-like vessel patterns; post-radiation with its uniform spatial distribution of corkscrew-like and waste-thread forms (Figure 7); decidual tissue with its uniform spatial distribution of waste thread-like vessels; post-conservative treatment (cryo, laser, electrosurgery) appearances sometimes showing uniform, fine, radial linear lines or dotted lines; and granulation tissue with its whorled or long, uniform tapering vessels (Figure 8).

Differentiating colposcopic presentations from their mimics requires an understanding of blood vessel patterns. Studying them is an essential exercise.

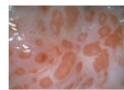


Figure 1. Colposcopy of a trichomonas infection involving the squamous epithelium of the cervix. The darkened, focal red areas are referred to as "flea-bitten" and/or "strawberry" spots.



Figure 2. Villous structures of an ectopy viewed end-on demonstrating red dots with pale acetowhite halos. The dots are central looped capillaries within the individual villi.

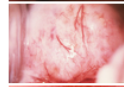


Figure 3. Long tapering taproot-like blood vessels in a matured t-zone.

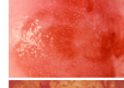


Figure 4. Coarse, elevated, irregular intact mosaicism and punctation within a CIN 3 (severe dysplasia/carcinoma in situ) lesion.

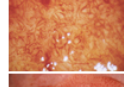


Figure 5. Fracturing of a previously intact mosaic pattern with the production of predominately corkscrew-like and waste thread-like (tendrill-like) vessels in a squamous cell carcinoma.

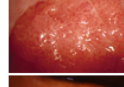


Figure 6. Cervical condyloma demonstrating a variety of blood vessel types: bifid, waste thread-like (tendrill-like), character writing-like and dot-like.

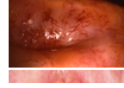


Figure 7. The classic corkscrew-like and waste thread-like (tendrill-like) blood vessels in a now normal cervix years after radiation for squamous cell cancer.

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He subspecialized in surgical gynecologic oncology. He has published extensively in the peer-reviewed literature and has contributed chapters to a variety of textbooks and developed numerous CDs on colposcopy and lower genital tract disease. He has taught at hundreds of postgraduate courses. He has lectured in over 30 different countries (some of them many times).

Dr. Wright has received national and international scientific awards, most notably the American Society for Colposcopy and Cervical Pathology's Distinguished Scientific Achievement Award and his university's Dean's Award of Excellence for Innovation in connection with his introduction of carbon dioxide laser surgery to gynecology in Canada. He was honored with ACOG's Commemorative Medal for Excellence in Teaching. Dr. Wright's department recently established the V. Cecil Wright Lecture to be given at its annual oncology day.

Recently, Dr. Wright served as the colposcopy trainer for GlaxoSmithKline Biologicals - Belgium in their standardization program for the phase III trials of their HPV vaccine. He has been an educational consultant and provider of educational materials to Merck Frosst Canada regarding the development of their HPV vaccine. Dr. Wright continues writing, teaching, and serving as an invited speaker.

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Figure 8. The well recognized vessel pattern of granulation tissue of the vaginal vault after hysterectomy.

Credits

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- ¹ Staffl A. Angiogenesis of cervical neoplasia. In Apgar BS, Brontzman GL, Spitzer M (eds). Colposcopy Principles and Practice 2nd edition. Philadelphia: Saunders Elsevier, 2008.
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