

Inexpensive Digital Photography in Clinical Dermatology and Dermatologic Surgery

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Digital photography can be used to follow clinical improvement in a variety of dermatoses, document pre and postoperative results, and document histologic findings from skin biopsies. Images may be printed as part of text documents and can be filed in conventional medical charts. Images can be transmitted via electronic mail rapidly and to any location. We have found digital photography to be relatively inexpensive and a powerful tool to enhance dermatologic practice.

We sought an inexpensive and easy to use system for recording clinical photographs, microscopic images, and surgical pre and postoperative images useful for dermatologists, dermatopathologists, and dermatologic surgeons with no photographic experience. The following report outlines a system that we believe offers a convenient and inexpensive alternative to the many costly specialized systems available for purchase.

Report

Dermatologists learn about the manifestations of skin diseases by studying images. One century ago, wax images and moulages were popular instructional tools. With the advent of simple photographic systems, color atlases and illustrated textbooks soon became the standard reference materials for students of dermatology. Many dermatologists became adept at photography and could skillfully document patients' progress, surgical results, and cases with teaching value. Many other dermatologists found it difficult to

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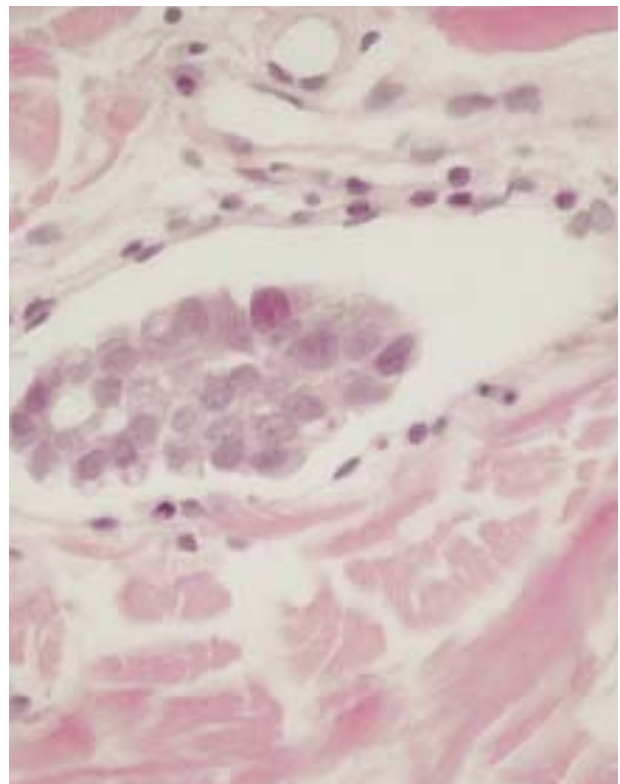


FIGURE 1. Metastatic breast carcinoma filling dilated lymphatics.

consistently produce high-quality photographs. Organizing photographs so that they would be easy to retrieve was another important practical consideration, and the cost of materials, film, filing space, and clerical help was also significant.¹ Computer technology has now made photography accessible to individuals with a limited budget and minimal photographic knowledge. Once an initial investment is made, many of the new systems available can be maintained at minimal cost other than paper de-



FIGURE 2. Surgical defect of the right nose after microscopically controlled surgery.

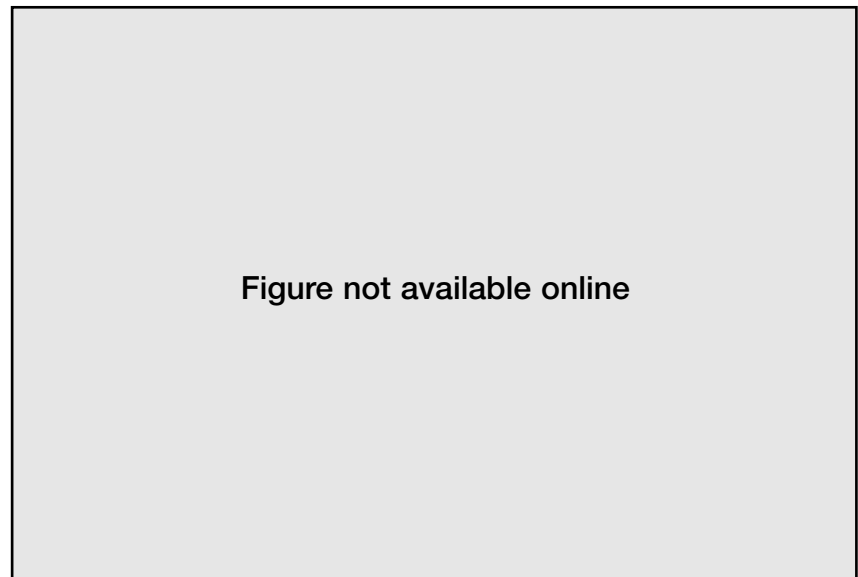


FIGURE 3. Complex closure used for repair.

signed for an inkjet printer and the costs of ink cartridges and toner.

The properties of digital camera systems that make them invaluable are the low overall cost of operations, the ability to incorporate photographs into documents such as consultation reports, and the absence of any prerequisite photographic skills. Images are first seen on a viewfinder just as with a video camcorder. When the appropriate image is in focus and the ambient lighting is optimal, the image is saved to a disk or the hard drive. Images can be stored and forwarded in minutes to be reviewed and printed by other practitioners with the utmost ease. A variety of different formats have been developed to store image data. Our camera saves images as a Joint Photographic Experts Group (JPEG) file. The JPEG format compresses the

data into a smaller file size by discarding nonessential data for displaying the image.

Digital images have been shown to be comparable to photographs with regard to clinical informativeness.² Digital images can substitute for clinical examination in teledermatology³ and have been used to prepare emergency room staff when receiving patients from motor vehicle crashes.⁴ Images with a minimal resolution of 768 x 512 x 24 may help the researcher to recognize relevant details from source images.⁵ Larger images may be useful for medical records, but may take longer to download over e-mail. Because our intent is to include images in the medical record and in documents such as consultation reports, download time and the time needed to print on an inkjet printer

CONTINUED ON PAGE 106

CONTINUED FROM PAGE 104

have not been of primary concern. Telemedicine also brings up implications with regard to insurance underwriting, liability, and confidentiality issues that we have not yet addressed. Although we have shown a high degree of accuracy in making microscopic diagnoses with our images over e-mail, this comes from years of collaboration and identifying fields of interest that allow for a diagnosis. A high degree of trust is needed in assuming that the necessary fields of interest have been transmitted, and we still review actual sections before signing out consultation cases.

The components that we use in our system include:

- A digital camera that stores images on a standard 3.5" high-density IBM-compatible diskette with accompanying software for image retrieval and modification (SONY Mavica FD71 [640 x 480 pixel resolution], \$479.99)
- A color inkjet printer (Epson Photo 700 [1,400 DPI], \$300)
- A digital camera designed for use with microscopic images (Pixera Corporation, \$1,200)
- A high-resolution large-screen color monitor (Vivitron) (optional)
- A personal computer with a Pentium processor (Gateway)

We are able to include microscopic images in pathology reports (Figure 1) and give referring physicians an appreciation for the surgical defects resulting from microscopically controlled surgery (Figure 2) as well as the type of complex closures needed for repair (Figure 3). We have also used digital cameras to store images from epiluminescence microscopy. We expect that as we computerize our medical records, these images will become an invaluable addition to the patient's medical record. Our digital images have been of high

enough quality to be used for publication in peer-reviewed journals, and files can be sent by e-mail to our local photolaboratory to be incorporated into color slides or computer-generated teaching slides, as well as professional posters for presentation.

One could argue that the technology used in digital cameras will become less expensive and more efficient. Although this is certainly the case, the low cost and ease of use are already sufficient to provide a compelling reason to use this technology. We find that we take more photographs quicker and easier than ever before. The images are stored on either a hard drive, 3.5" diskette, or writable CD. Digital photography is easy to use, provides better documentation, and is relatively inexpensive.

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