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BIOPSY 1-2-3 in Dermatologic Surgery: Improving Smartphone use to Avoid Wrong-Site Surgery

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Abstract

The smartphone has become a ubiquitous tool in modern culture. Given the current high quality of smartphone cameras, they should be considered a valuable tool for the dermatologic surgeon in the pre-operative consultation. The purpose of this technical note is to describe a methodology using smartphone camera technology to improve the process for capturing biopsy site photographs and including those photos in decision making to maximize cutaneous surgical outcomes. This technical note describes a three-step procedure (**BIOPSY 1-2-3**) to simplify and standardize the protocol for capturing a biopsy site photograph using the patient's own smartphone. The steps are also intended to improve the resolution and value of the image. A case example is provided. Using the steps of **BIOPSY 1-2-3**, the case example biopsy site image is clearly identified compared to a less structured image. Using **BIOPSY 1-2-3**, biopsy site images taken by patient-owned smartphone cameras can empower and involve patients in their care, improve image quality, and reduce medical errors.

Keywords

Cutaneous surgery; Digital photography; Mohs micrographic surgery; Skin cancer; Surgical site; Wrong-site surgery

Introduction

The smartphone has become a ubiquitous tool in modern culture. In 2011, 83% of Americans were estimated to have cellular phones (1). These devices have applications to entertain, assist in navigation, and receive electronic messages; they can also monitor health by logging sleep duration, heart rate, steps taken, calorie intake, and exercise. Healthcare professionals use smartphones to replace pagers, assist in gait evaluation, and monitor medications (2). Additionally, they may be used to monitor ulcers in amputees or reduce the incidence of wrong-site surgeries in dermatologic surgery (1,3,4). With the current high quality of smartphone cameras, they should be considered a valuable tool for the dermatologic surgeon in the pre-operative consultation.

Wrong-site surgery has been identified as one of the most common adverse events (13.1%) reported by The Joint Commission (TJC) (4). To reduce these errors, TJC has implemented a “Universal Protocol,” thereby mandating pre-procedure verification, surgical site marking, and a “time out” to prevent surgical errors (5). Wrong-site surgeries are also a common cause of medical malpractice lawsuits affecting fellowship-trained Mohs surgeons (14.3%) (6). Identifying the correct biopsy site is complicated by background sun damage, adjacent skin conditions, biopsy technique (e.g., deep scallop versus superficial shave), and the amount of time between the biopsy and planned curative procedure (7). Biopsy sites often heal very well and can be difficult to locate, leading many patients to refuse an excision or at least question the need for another procedure as in the case example in Figure 1. An estimated 25% of patients presenting for Mohs Micrographic Surgery (MMS) could not correctly identify their biopsy sites (8). While a pre-operative biopsy may result in complete tumor removal in 15% to 42% of cases, identification of the correct surgical site is imperative to ensure definitive treatment of most cutaneous neoplasms (9,10). Given the previously identified value of patient involvement and the ease of access to smartphone technology and digital photography, the purpose of this project was to describe a methodology to improve the process for capturing biopsy site photographs and including those photos in decision making to maximize cutaneous surgical outcomes.

Methods

Many of the problems encountered with a biopsy site selfie (BSS) may be overcome by using a key strategy we have named **BIOPSY 1-2-3**. The three steps of the technique are as follows:

1. First, it is optimal to have **one** other person take the photo.
2. Next, make sure there are **two** anatomical land marks in the image.
3. Finally, verify there are **three** photos of each site.

With each biopsy site, have **one** person who is not the patient take the photograph to avoid problems inherent with a BSS. This is recommended because often the secondary self-facing camera on the smartphone device is typically inferior to the primary camera, which results in lower quality photographs. Also, BSSs tend to be excessively zoomed in and out of focus. Having someone else take the picture with the patient's device allows the picture to be taken

with the primary camera at an adequate distance. The pictures can be taken at home by the patient's family member or even at the office by the patient's nurse at the time of their visit. Always mark the area that was, or is about to be, biopsied, as in Figure 2 of the case example. Use a dark pen, highlighter, or marker to circle the lesion to distinguish between two nearby dyspigmented patches at a later date. Next, have **two** body parts (e.g., ear and nose) or **two** joints (e.g., elbow and wrist) visualized in at least **two** of the pictures. Lastly, have at least **three** pictures of every site. It is best if each photograph is taken from a different vantage point to ensure the site can be isolated from nearby lesions or background skin changes. Always zoom in to review each photograph. Delete the photo(s) and re-take them if they are out of focus or otherwise unsatisfactory. Consider repeating the technique with each biopsy site on the day of biopsy or at any time within the first week after the biopsy, which will still provide tremendous benefit at follow-up.

Results and Discussion

The outlined steps (Figure 3) are simple and should improve biopsy site photography to facilitate improved outcomes and reduce medical errors. The case example highlights the value in a systematic approach for this process. Photography has become the gold standard in the pre-operative evaluation of dermatologic surgery and has been shown to reduce wrong-site surgeries. Furthermore, pre-operative photography has been shown to facilitate patient confidence in the treatment of the appropriate surgical site (7). Given the popular nature of smartphones today, patients may be encouraged to participate in their own care by using their own cell phone cameras to document the biopsy site and assist in the identification of the appropriate surgical site.

Nijhawan et al. found the use of BSSs was crucial in correctly locating the surgical site in 21% of referred cases. This study also noted that the use of BSSs empowered patients to be active participants in their own care. Moreover, delaying surgery to confirm the correct biopsy site was minimized, and unnecessary re-biopsies were avoided (8). However, the BSS has several limitations. For example, a biopsy site on the scalp or back may be difficult to self-photograph, or the patient may have difficulty using a smartphone due to arthritis or lack of hand dexterity. There are also problems with the photos themselves. For instance, photos may be out of focus or excessively zoomed in, resulting in too few anatomical landmarks to facilitate location. Finally, patients may be resistant to taking a BSS picture.

Conclusion

Although dedicated high-resolution cameras would be ideal for biopsy site photography, many referring physicians do not send pictures with their consultations. Some physicians may not integrate photography into their practice, and others simply have the printed photographs on a paper chart and have not converted to electronic medical record systems (EMRs). Whether the referring and consulting physician has adopted EMRs or not, another obstacle is that EMRs are not universal and do not link or synchronize data. Even if all EMRs were fully integrated, there would still be a potential to violate the Health Insurance Portability and Accountability Act (HIPAA) if the photos were released. Therefore, the only truly universal form of photography that would not violate HIPAA and could go to every

patient visit would come from the patient's own smartphone device. Smartphones may one day provide a real-time, universal, and fully integrated EMR platform between clinicians and patients. However, until a more reliable system is in place, **BIOPSY 1-2-3** serves as a simple solution to a common problem in dermatologic surgery today.

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Figure 1.

Patient presented for MMS for a biopsy-proven squamous cell carcinoma on his “right temple” that healed well and is difficult to locate. He initially refused treatment but eventually rescheduled, and the lesion was excised using MMS. Note the biopsy site is difficult to confidently locate because of background solar damage, rhytids, and scarring.

Figure 2. Smartphone photograph of the planned biopsy site taken prior to shave removal. Note that the lesion is circled and at least two anatomic landmarks are present.

Figure 3. BIOPSY 1-2-3 steps