

An Angled Mirror Device Facilitates Measurement of Skin Lesion Height

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Heights of skin lesions such as keloids, hypertrophic scars, certain tumors, and reconstructed breast nipples are commonly measured. Various reports have demonstrated methods using a ruler, calipers, or devices such as ultrasound or three-dimensional scanners.^{1,2} However, there have been no new inventions involving an observation method from the side or of the measurement procedure itself. We devised a very simple and inexpensive device that can easily record and measure the height of skin lesions, using a mirror angled 45 degrees to the skin surface. One edge of the mirror has a normal 1-mm scale, and the surface of the mirror has a scale that is expanded by $\sqrt{2}$.

The sides of the target lesion must be properly mirrored to take photographs or measure their height. First, one side of this mirror is placed next to the base of the target. Next, we look into the mirror tilted 45 degrees from the right above and adjust the mirror's tilt so that one side of the mirror placed next to the lesion matches the horizontal alignment wire on the mirror. This mechanism confirms an angle of 45 degrees to the floor, and the height can be measured by reading the scale expanded $\sqrt{2}$ times on the mirror's surface (Fig. 1).

Using this device, one can simultaneously photograph the target object's top and side or measure the vertical height very easily; it is not necessary to look at the target from the side, as usual, and the height of the lesion can be measured by direct reading of the scale on the mirror's surface (Fig. 2). (See Video [online], which displays usage of the tool, and shows the structure and how to adjust the mirror surface angle at 45 degrees to the floor and read the $\sqrt{2}$ stretched scale on the mirror surface.)

This device permits easy observation of the lesion from the side and measurement of its height at a glance. A lateral view or height measurement of protruding parts of the human body is necessary for follow-up and treatment evaluation.¹ Conventionally, in addition to the

direct measurement method, methods using devices such as ultrasound or a three-dimensional scanner have been reported, but the measurement method itself has not attracted much interest.²

Body measurements using mirrors are sometimes reported, and a way to properly capture the object in a mirror is needed.³ We have reported a method to observe and photograph parts of the body from various sides, using a special mirror.^{4,5} This device is very simple in principle, and anyone can easily understand how to use it. It also features a stretched scale on the mirror surface to directly read the vertical height. Since it is a very simple structure, it can also be used during surgery if properly sterilized.

Some limitations include that this tool is suitable for relatively small lesions, and measurement accuracy should be further examined from the optical aspect. Second, it is difficult to apply this tool if the base of the lesion is not flat. In conclusion, we believe that this new device will bring new developments and applications to the recording of side views and heights of target body parts, such as skin lesions and protrusions, in the medical field.

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DISCLOSURE

The authors have no financial or other conflicts of interest to declare in relation to the content of this article.

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Received for publication September 4, 2020; accepted September 14, 2020.

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Plast Reconstr Surg Glob Open 2020;8:e3233; doi: 10.1097/GOX.0000000000003233; Published online 25 November 2020.)

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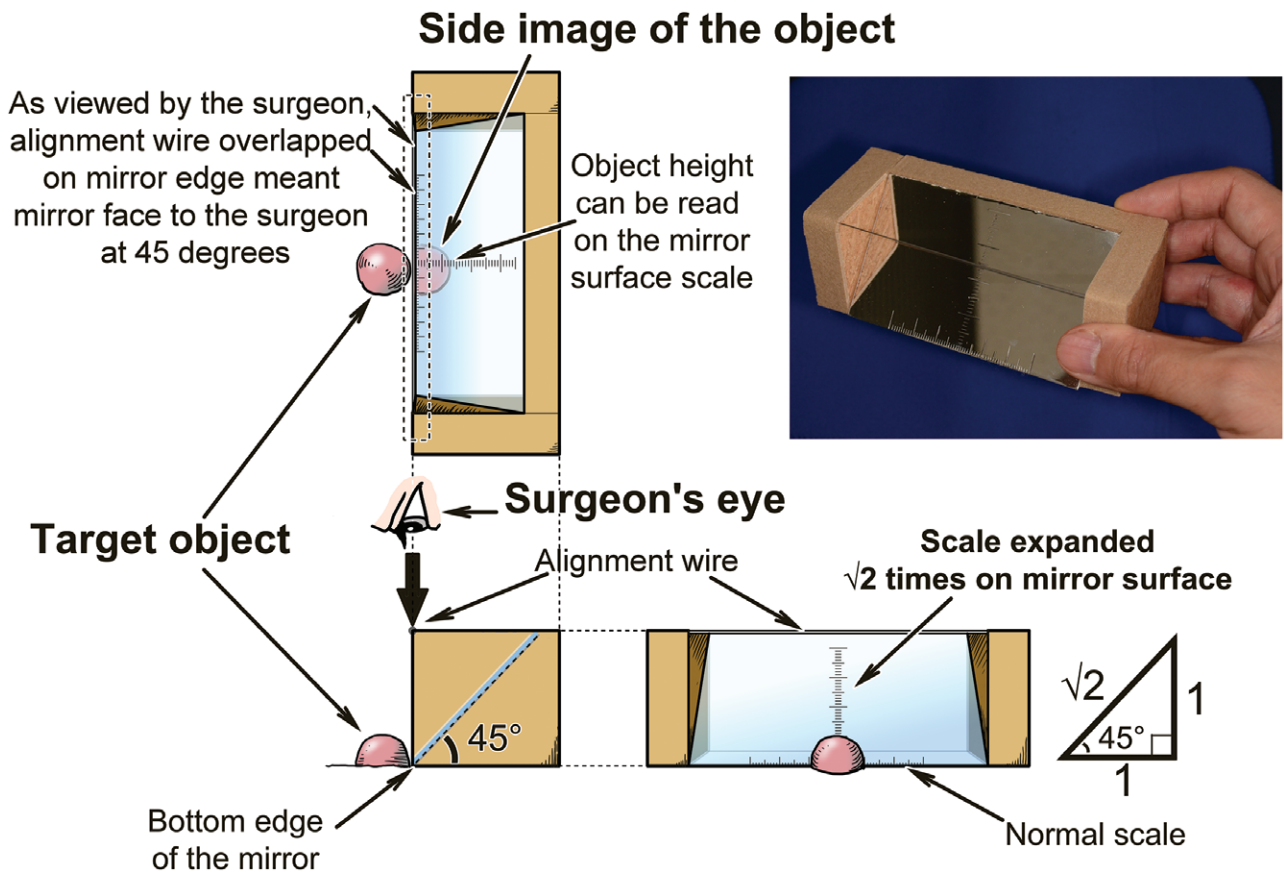


Fig. 1. The overview of the angled mirror system and its structure. Note that the mirror is fixed at 45 degrees to the floor.

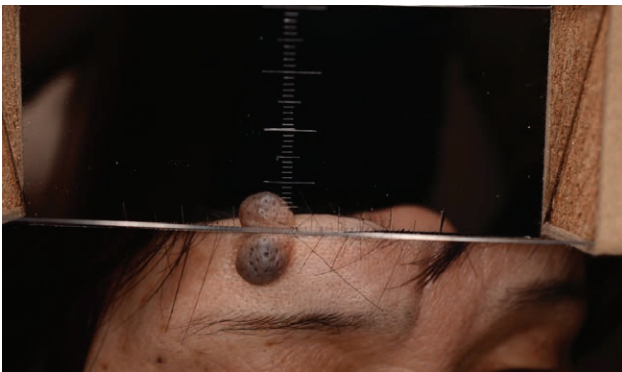


Fig. 2. Using the device applied to the forehead, a pigmented nevus of a 76-year-old woman can be photographed from two directions, and the vertical height can be measured using the mirror surface scale.