

Use of a smartphone repair microscope for microsurgical suturing simulation

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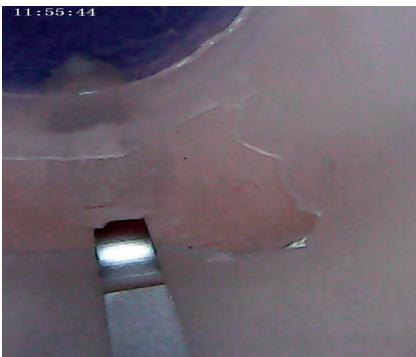


Figure 1: Scleral flap fashioning with a crescent blade.



Figure 2: A trabeculectomy flap marked in red with a releasable suture in situ.



Figure 3: Set up of microscope.

Suturing ocular tissues under microscopic guidance is a skill that has declined in frequency, with the majority of cataract operations being sutureless. With the recent COVID-19 outbreak, training opportunities in theatre have declined further, given elective surgery cancellations. Subsequently, trainees may find limited opportunities to develop their skills in this area. As services return to normal, trainees may find that resuming live surgery is somewhat daunting. Simulation can play an important role in practising suturing, so that when the opportunity arises to perform scleral or corneal surgery, the trainee is able to undertake this with some degree of familiarity.

Unfortunately, high specification operating microscopes are not readily available, and even surgical loupes can be a costly investment. However, we have found that an inexpensive smartphone repair microscope can act as a worthy substitute. Above are two pictures taken by a KKmoon digital microscope, showing a trainee performing trabeculectomy flap creation and suturing on a Philips studio trabeculectomy simulation eye (www.phillipsstudio.co.uk/eyes). The microscope has a screen which is used instead of eyepieces. Although this does mean that depth perception is lost, the microscope allows for the development of microsurgical suturing skills, finger and wrist manipulation, that then develops muscle memory. Where the technology has particular use is in seeing how knots

lie, investigating how much tension can be exerted on different suture types and analysing basic suturing techniques. Another advantage of these microscopes is the potential facility to record and take photos, which surgical loupes cannot do. This can then be used as evidence of simulation for the trainee's portfolio. With most simulation microscopes the depth of focus and magnification must be hand adjusted, which means that the microscopes may be slightly out of focus when operating in different planes. Although the smartphone repair microscope does still require hand adjustment of focus depth, I found that having a screen to view rather than individual eyepieces seemed to be less asthenopic than some of the simulation microscopes I have used. The microscope has a built-in illumination source and relatively large zoom range, so the quality of images is good. The lack of depth perception is a drawback, I think particularly for simulating intraocular surgery and perhaps some of the more complex corneal lacerations this could limit the utility of the microscope. However, for simulating repair of linear corneal lacerations and trabeculectomy flap formation the microscope seemed to perform well. There are many models of similar microscopes for online purchase (ours was obtained through Amazon) that typically retail for around £40. Although not a perfect substitute for an operating microscope, similar models of smartphone repair microscopes offer a low-cost way of developing microsurgical skills.

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