



# Technical Section

TECHNICAL NOTES & TIPS

## TECHNICAL NOTES

### Use of webcam as arthroscopic training model for junior surgical trainees

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#### BACKGROUND

An increasing proportion of elective orthopaedic procedures are being performed arthroscopically. However, the steep learning curve and reduced operative exposure following the introduction of the European Working Time Directive has left junior doctors with limited opportunities to acquire arthroscopic skills. We report a simple and inexpensive arthroscopic training model using webcam.

#### TECHNIQUE

We attached a webcam at 30° tilt to one end of outer sheath of an embolectomy catheter. After connecting this assembly to a computer, an illuminated cardboard box was used to simulate a knee arthroscopic model. Tasks of increasing complexity can be performed such as following along straight lines, complex figures or contours of three-dimensional objects. A second portal in the

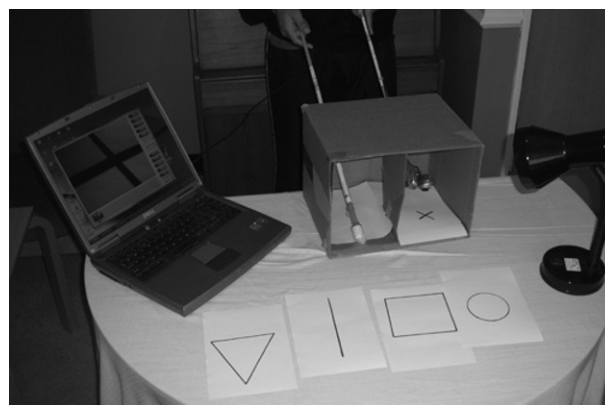


Figure 2 Assembly of webcam in the trainer box attached to a computer.

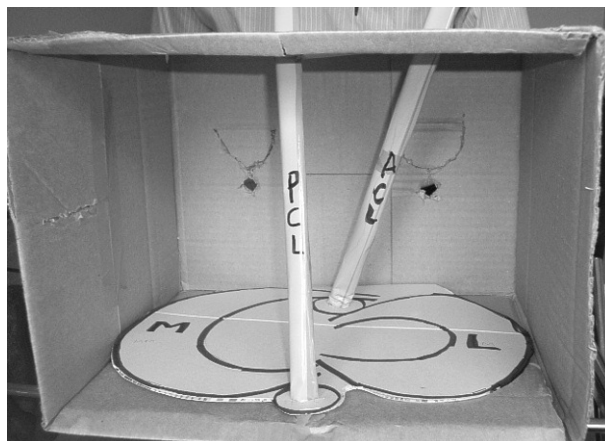


Figure 3 A simple model of the knee representing compartments and the cruciate ligaments.



Figure 1 A webcam attached to outer plastic sheath of an embolectomy catheter.

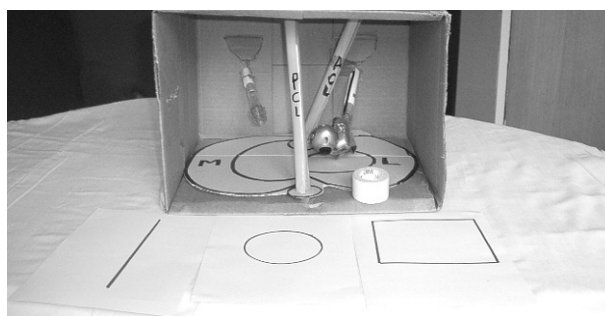


Figure 4 Triangulation and movements between the compartments.

box can be used for inserting another rod for achieving triangulation and manoeuvring the webcam around simulated cruciate ligaments in the box allowed mimicking movement between compartments of knee.

**DISCUSSION**

Commercial arthroscopic models have a limited availability and are expensive. Use of webcam has been explored for laparoscopic skills training,<sup>1</sup> but a similar application has not been reflected in arthroscopy. Although the picture definition is not as good, the assembly is inexpensive costing around £10. Moreover, it is extremely simple to make and can be used repetitively with most computers beyond the confines of an operating theatre. Although this can hardly be a substitute for performing arthroscopy on real patients, it can improve triangulation skills and hand-to-eye co-ordination.

**Reference**

1. Chung S, Landsittel D, Chon C, Christopher N, Fuchs G. Laparoscopic skills training using a webcam trainer. *J Urol* 2005; **173**: 180–3.

**Acetate templating for total hip arthroplasty using PACS**

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**BACKGROUND**

Templating is the method where a surgeon calculates the correct-sized prosthesis from a pre-operative radiograph.<sup>1–3</sup> Digital radiography and PACS (Picture Archiving and Communications System) create images of variable magnification. This has led to expensive software to allow templating. We present a simple method to allow acetate templates to be used on PACS images.

**TECHNIQUE**

An anteroposterior pelvis X-ray is 20% (± 6%, 2 SDs) magnified as the X-ray plate is separated from the hip by buttock muscles and fat.<sup>4</sup> Acetate templates are, therefore, 20% oversized (e.g. Corail hip). A digital anteroposterior pelvis image is taken by the same method but uses a ‘digital’ plate. The size of the displayed image depends on the screen size and resolution of the screen. The image can be further magnified or shrunk. This variation in size makes it difficult to template. PACS systems have a calibration tool, displayed as an unmagnified measure. A ruler can be fixed to the screen (we used the plastic ruler packaged with a skin marker). The display is



**Figure 1** Calibration of image magnification using plastic ruler.



**Figure 2** Acetate templates being used on PACS image.

magnified or shrunk until 5 cm on the screen equals 5 cm on the ruler (Fig. 1). The digital image is now 20% oversized and equates to a hard copy X-ray (Fig. 2). To prove this, Figure 3 shows the postoperative film with the chosen template perfectly superimposed, confirming the digital image is 20% oversized.

**DISCUSSION**

With the change to digital radiography, many hospitals no longer print hard-copy films. This method provides an alternative to expensive digital software that is as effective as hard-copy templating.