TECHNICAL SECTION:
Technical notes and tips

Technical note

How can a handful of water assess basic laparoscopic skills?

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The future of laparoscopic skills' training and assessment outside the operating room seems to be advancing firmly towards computer-based technology. However, much progress still remains to be made in this field before it can replace existing modalities. Furthermore, the high costs of virtual reality systems currently renders them unattractive to many less well-off centres. Thus, there remains a place for cheaper, traditional, if slightly primitive means of training.[1]

We have designed a simple model for use within a video-trainer that tests many of the basic skills fundamental to laparoscopy. The model is very cheap, costing no more than $1 (£0.70, €l) and easy to make. Although not entirely new to the surgical community, our model, which is based on a water-filled yellow surgical glove, entails more interesting and challenging features. A 6-inch piece of plastic drip tubing filled with red dye and its ends sealed by heat is tied over the median sagittal plane of the palm of the glove. Two thin lines 5 mm apart are marked in the middle part of the tube, which represents a blood vessel. This glove is then covered with a second clear latex glove on which a series of circles (we used 20, 22, 24 and 26 mm diameters) are marked and shaded. The markings on the 'vessel' should lie within the middle of the marked rings (Fig. 1).

The task is to cut out a circle within the 2-mm wide shaded zone using a laparoscopic grasper and scissors, then apply a clip directly over each of the two markings on the 'vessel' by

Figure 1 Laparoscopic training model.

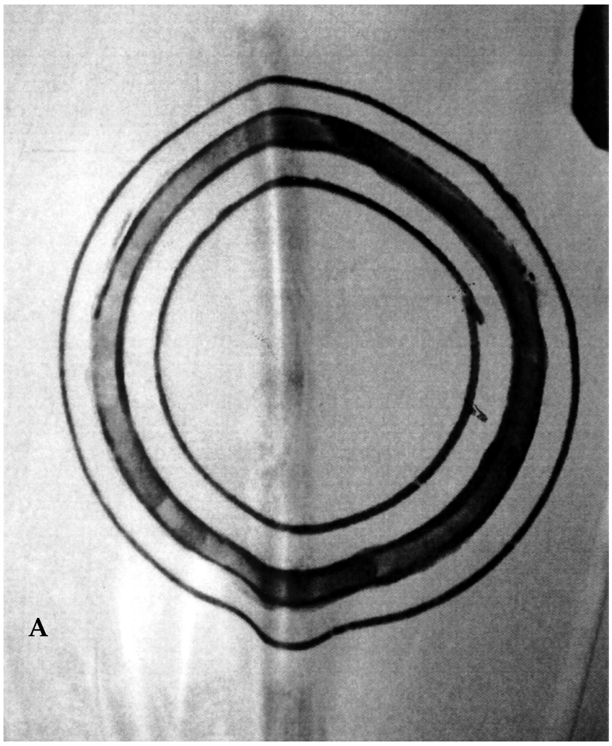

Figure 2 The final product.

means of a clip gun. Cutting the vessel half way between the two clips completes the task (Fig. 2). The clip-gun and scissors are exchanged when required.

It incorporates a simple error scoring system for objective assessment of skills. The end product provides a permanent record of performance, thus enables identification of weaknesses in skills by the trainer and the trainee at a later date if necessary.

The performance is analysed and scored in terms of major and minor errors; each cut beyond the inner and outer rings, each misapplied clip, and perforation of the model constitute a major error, and each cut just outside the shaded zone but within the outer and inner rings, and each inaccurately applied clip constitute a minor error.

We utilised the task in conjunction with the Imperial College Surgical Assessment Device (ICSAD), a validated, readily available and relatively cheap device comprising a motion tracking system (Isotrack H [Polhemus], Virtual Presence, UK) and a software package for recording the data (Track 3D™) and for analysing it (Track™).[2] This provided additional objective measures of surgical dexterity in terms of number of movements made and distance travelled by both hands as well as the time taken to complete the task.

In essence, the task involves delicate manipulation of the model, grasping, cutting. and clip-applying, thereby testing the main psychomotor skills that a laparoscopic surgeon must acquire to perform competently. There is certainly scope for this model to incorporate additional simple elements to test other skills. For example, a small piece of cotton wool glued in and placed around the vessel could be used to simulate fat that requires delicate dissection before the cystic artery and duct may be accessed and, of course, adding tubes with different dyes may also simulate other structures.

Filling the glove with water is designed to simulate the dangers of heavy handedness; a perforated glove could just as well mean a perforated gall bladder or bowel, or damage to the bile duct, liver or a blood vessel, all having potentially serious consequences. The error scoring system reflects the seriousness of being imprecise; deviation from the cutting zone of more than a few millimetres could again have dire consequences, just as a misapplied clip to the cystic artery may.

We believe that, while the model is very simple, the actual task is challenging and fun to do, demanding considerable thought and manual dexterity to complete accurately and efficiently. Trainees would be able to practice the task repeatedly without supervision and monitor their own progress.[3,4] Alternatively, the model could provide a useful assessment tool on basic skills courses and highlight underperformance.

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Technical tips

Emergency treatment of ankle fracture dislocations – a reliable technique for early reduction

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Ankle fracture dislocations must be reduced at the earliest opportunity to prevent pressure necrosis of the skin overlying the medial malleolus and osteochondral injury to the talar dome. Reduction can be effected with ease and with minimal analgesia if the gastrocnemius–soleus complex is relaxed. Patients are asked to flex the hip and the knee to 90°. They should be lying flat with no rotation at the hip joint. With the knee passively supported by an assistant, longitudinal traction on the calcaneus results in a palpable clunk and a dramatic improvement in pain (Fig. 1).

Figure 1 Technique for reduction of ankle fracture

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Prevention of spectacle movement when operating

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During an operation, spectacles may slip forwards on the head of a surgeon or assistant. This can cause immense frustration and proper re-adjustment to the satisfaction of the individual often means re-scrubbing. Commercial spectacles are not usually designed to remain reliably on the wearer's head with the neck in flexion. We present a simple method to avoid this problem by routinely wrapping the superior ties of face masks around the arms of spectacles in front of the ears before securing as normal at the back of the head. Glasses have never fallen during the total of 10 years that we have used this technique. This procedure is equally useful when wearing eye-protectors, even those designed specifically for surgical use. We recommend this method for preventing the slippage of spectacles.

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Steroid injection of the knee – is it in yet? Green's sign

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Injecting steroid into the knee joint is a blind procedure. It is sometimes difficult to be certain that the injection is intra-articular and the anterior soft tissue structures or synovial folds have not been injected, if a suprapatellar injection site is used.

In the past, the accuracy of intra-articular injection has been assessed using air as a contrast medium and then obtaining a radiograph of the joint to confirm the presence of air in the knee.[1,2] However, the presence of air in the joint can be confirmed on moving the joint.

To improve the accuracy of injection, a standard anterolateral arthroscopy portal can be used with the knee in flexion. By adding 1 ml of air to the injection of steroid and local anaesthetic and then injecting under aseptic conditions, subsequent movement of the knee from flexion to extension causes this air to move which is audible confirming correct placement of the injection.

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A new hollow anal dilator

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We describe a new device for decompression of functional anorectal obstruction. It is particularly effective in patients with enterocolitis after definitive surgery for Hirschsprung's disease or congenital anorectal anomalies.

The dilator, made of polyoxymethylene copolymer (Tecaform), has a solid core, rounded tip and comfortable handle. The 'sleeve' has a small flange for ease of use and prevents full insertion into the rectum. The dilator is assembled and inserted into the anus; the central part is then removed, leaving the hollow tube in place to allow decompression of faeces and flatus. After usage, the dilator is washed with warm soapy water.

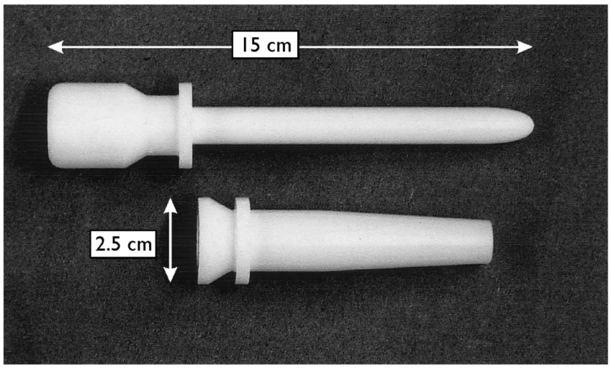

Figure 1 The hollow dilator in two parts.

This dilator was manufactured by the Medical Physics Department of the Royal Victoria Infirmary. For further information, contact Rob Beckwith.

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Displaced paediatric supracondylar fractures of the humerus – a sticky solution

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Holding a closed reduction of a displaced supracondylar fracture during Kirshner-wire fixation is challenging. Wilkins[1] described the use of surgical adhesive tape to hold the elbow hyperflexed and thus lock the achieved reduction (Fig. 1). Over 2 years, we treated 10 patients, mean age 5.6 years (range, 2–11 years), with displaced supracondylar fractures (9 Gartland III, 1 Gartland II) using this technique with crossed k-wires. If anatomical closed reduction was possible (8 patients), the reduction was never lost. There were no complications despite non-sterile tape use and we recommend this technical tip. Alternatively, cut strips of sterile adhesive operative-field sheets can be used.

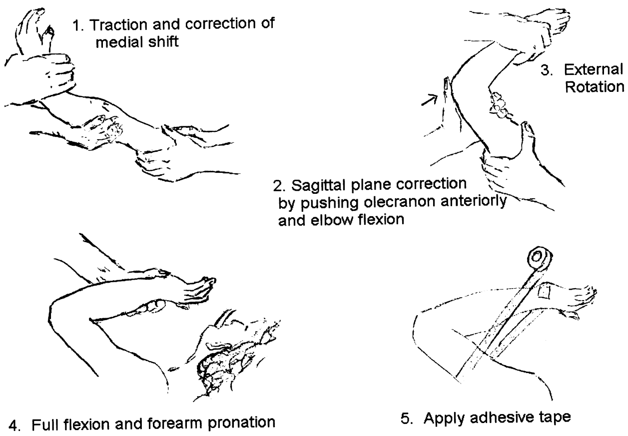

Figure 1 Use of adhesive tape in holding a closed reduction of a displaced supracondylar fracture.

Reference

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Securing the head during shoulder surgery – a new and cost effective method

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Shoulder surgery in the 'beach-chair position' requires the head to be secured to the operating table or head extension to prevent surgical and anaesthetic complications due to intra-operative head movement. This has generally been carried out using adhesive tapes across the forehead. This can cause painful skin reactions of the forehead and eyes. It also requires relatively large amounts of expensive tape. If the patient requires postoperative shoulder immobilisation, the body strap from the immobiliser can be used to secure the head. It is a non-adhesive, stretchy, strap with Velcro fastening. It offers secure, reliable support to the head (Fig. 1).

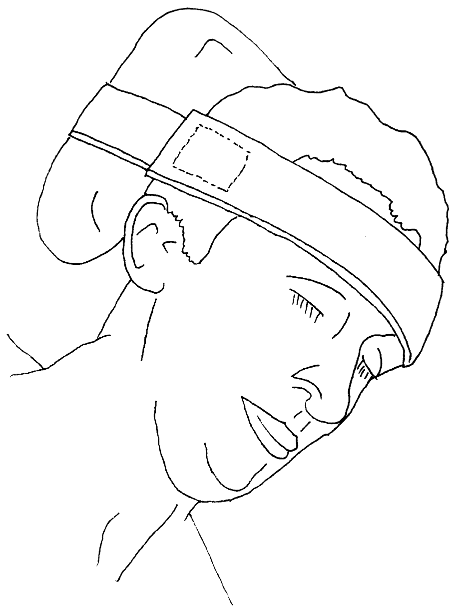

Figure 1 The head is secured circumferentially to the head support with the body strap

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