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PRACTICAL PEARL

A low fidelity eye model for lateral canthotomy training

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A B S T R A C T

We introduce a low-fidelity, low-cost, reusable training model for the lateral canthotomy procedure. We believe that this trainer has the potential to improve clinicians' knowledge and skill of the procedure, especially when cost or access to higher-fidelity trainers is prohibitive.

African Relevance

- This article describes a novel low-cost medical education approach, appropriate to many African contexts.
- It is an easily-reproducible solution for teaching a low occurrence, high risk procedure.

Introduction

Permanent vision loss is a rare but serious complication of orbital trauma. The most reversible cause of traumatic blindness is acute ocular compartment syndrome (AOCS), usually secondary to retrobulbar haemorrhage (RBH), intra-orbital oedema or more rarely orbital emphysema [1]. Timely diagnosis of AOCS and surgical decompression by lateral canthotomy of the ocular compartment has been shown to decrease the incidence of permanent blindness. Obtaining and maintaining procedural competency can be difficult due to the low incidence of RBH and AOCS, and the lack of access to trainers. This article discusses the construction and utilisation of a reusable non-cadaveric model, which simulates the orbital anatomy and can be used to teach and practice the lateral canthotomy procedure.

This low-fidelity eye model was invented to provide clinicians with hands on training in the lateral canthotomy procedure on a reproducible non-cadaveric model. Although cadaveric models have been shown to be effective, their use has limitations: the procedure can only be performed once or twice per cadaver, and at high cost. Porcine models and commercially available high-fidelity trainers share the same limitations. This is especially problematic in resource-limited areas where it may be cost prohibitive to obtain cadavers or commercial trainers. Our low-cost reproducible low-fidelity eye model is a potential solution to this problem and can be made from materials readily available in many countries.

Methods

Construction and utilisation of the low-fidelity eye model is demonstrated in the following figures and instructions. The items required are described in Box 1 and Fig. 1.

Box 1

The items required to construct the low-fidelity eye model.

- 1 standard size table tennis ball.
- 10 ml Ziploc recyclable container.
- Pressure foam tape.
- Scotch tape.
- Transpore tape 3 M™.
- Silk tape.
- Tape roll.
- Rubber band.
- Scissors.
- Scalpel.

Model assembly

Step 1: Cut out a rectangular-shaped hole on the base of the container with a scalpel, insert the ball into the container approximating to the rectangular hole made (Fig. 2A and B). Support the ball with tape.

Step 2: Cut the circular rubber band at one point so that you have a straight band. Then bisect the middle third of the rubber band lengthwise, to simulate the inferior and superior limbs of the lateral canthus tendon (Fig. 3).

Step 3: Cut two pieces of Transpore 3 M™ tape, fold each and place

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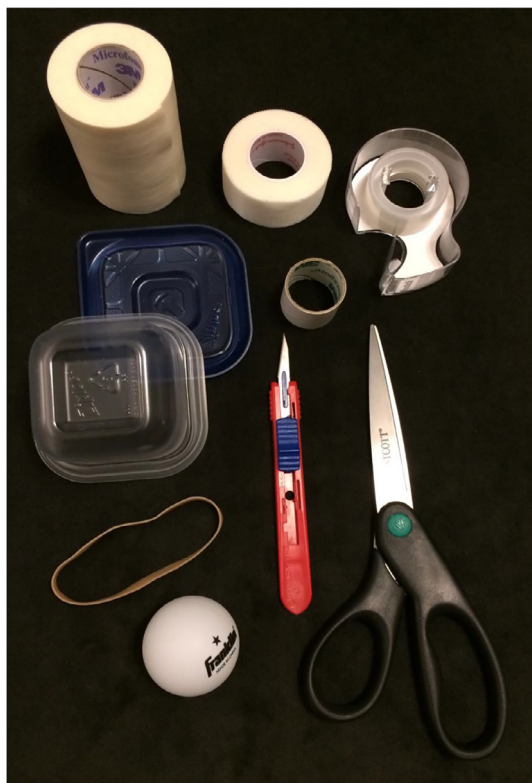


Fig. 1. Items needed.

at the 12 and 6o'clock positions of the rubber band bisections (Fig. 4).

Step 4: Begin construction of the soft tissue of the orbit by cutting two pieces of foam tape. Then cut out two small flaps near the lateral margins of the tape and fold them down. You are now left with three flaps: one large middle flap, and two small side flaps (Fig. 5A and B).

Step 5: Place the pieces of foam tape on the 6o'clock and 12o'clock positions of the rubber band. Position the lateral edges of the small flaps in front of the point of rubber band bisection then fold the middle portion of the foam tape over the rubber band (Fig. 6A and B).

Step 6: Place the adjusted foam tape on the inferior edge of the tape, then repeat Step 7 for the foam tape placed on the superior edge. Take the tape hanging off the 6o'clock and 12o'clock positions and tape to the container. Place Transpore 3M™ tape around the foam tape on the superior and inferior edges of the orbit (Fig. 7A and B).

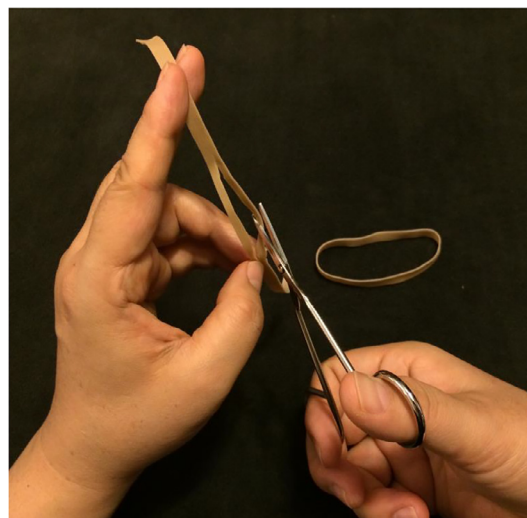


Fig. 3. Step 2 of assembly.

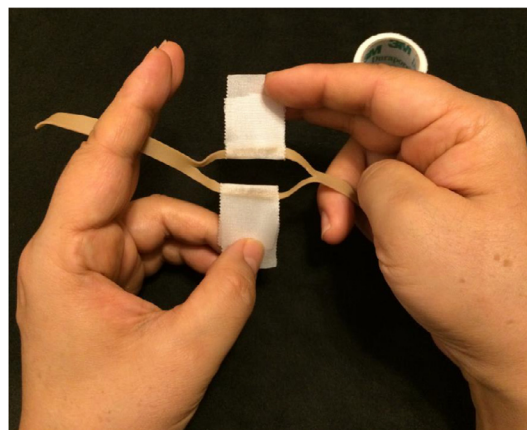


Fig. 4. Step 3 of assembly.

Model demonstration

For the model demonstration, you will need a haemostat, a pickup, a pair of scissors and a syringe with a 25 gauge needle (+/-) containing saline solution.

Step 1: Inject the saline (simulated local anaesthetic) into the lateral crease of tape (Fig. 8A).



A



B

Fig. 2. A and B Step 1 of assembly.

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