A simple trainer for thoracoscopic spinal surgery

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Abstract

Video-assisted thoracoscopy (VATS) is fast becoming the standard of care for spinal deformity in children. However, it is an extremely demanding procedure with a steep learning curve. Attendance at formal instructional courses can be very expensive, but is essential to gain exposure to this valuable technique. We describe a simple thoracoscopy trainer developed specifically for the training of spinal procedures in less affluent countries. The use of such a simply constructed trainer is a tremendous cost saver. In our initial trials, we found that the trainees felt more confident when doing procedures on patients after attending an instructional course on our simple trainer. This trainer can be set up at any hospital or rural centre that has laproscopic, thoracoscopic or arthroscopic facilities. We conclude that a simple thoracoscopy trainer can be constructed inexpensively and be used successfully to instruct orthopaedic trainees.

Key words: trainer, thoracoscopic surgery

Introduction

Video-assisted thoracoscopy (VATS) is fast becoming the standard of care for spinal deformity in children. However, it is an extremely demanding procedure with a steep learning curve (Blackman, 1993; Crawford *et al.*, 1995; 1999; Gonzales *et al.*, 1995; Jackson, 1996; Newton *et al.*, 1997; Regan *et al.*, 1993; Waisman & Saute, 1997). Attendance at formal instructional courses can be very expensive, but is essential to gain exposure to this valuable technique (Crawford *et al.*, 1995; Reagen JJ, Texas Back Institute, *per comm*). We describe here a simple thoracoscopy trainer developed specifically for the training of spinal procedures in less affluent countries.

The first objective of the study was to develop a simple thoracoscopy trainer. This was to enable trainees in less affluent countries, who did not have any prior operating exposure to orthopaedic thoracoscopic procedures, get an orientation of the anatomy and confidence in performing orthopaedic procedures via a thoracoscope. The specifications for the trainer determined to be essential are as follows: (i) simple construction, (ii) portable, (iii) inexpensive, (iv) reliable, (v) realistic, (vi) can be used at any facility, (vii) constructed from readily available local material, and (viii) ideally suited for teaching facilities with very limited resources e.g. in underdeveloped nations, or rural hospitals.

The second objective of the study was to determine if prior exposure to this simple thoracoscope in laboratory conditions increased the confidence of these trainees, and improved their performance when actually performing these procedures on patients in the operating room.

Materials and Methods

The trainer (Fig. 1) was constructed from the following: (i) polystyrene base to hold model, (ii) model skeleton of thoracic torso including spinal column, ribs, scapulae, (iii) polyethylene to simulate lungs, (iv) cardboard to simulate diaphragm, and (v) polyethylene covering simulating skin.

The trainer was tested on 10 senior orthopaedic trainees (3rd and 4th year Open Masters Programme). The trainees were asked to perform the following tasks:

(1) Identify the *anterior axillary line* and *mid axillary line*
(2) Identify the *4th*, *6th* and *8th rib* at these lines as portal of entry
(3) Insert instruments through 4 portals: i.e. *camera, fan retractor, suction/irrigation and pituitary/kerrison rongeur*
(4) Deploy fan retractor to move lung and locate spine
(5) Identify specific disc spaces with camera (Fig. 2), and triangulate with probe or rongeur
(6) Rotate camera to visualize ribs that cause hump (Fig. 3), and triangulate with probe and rongeur in simulated excision of the hump

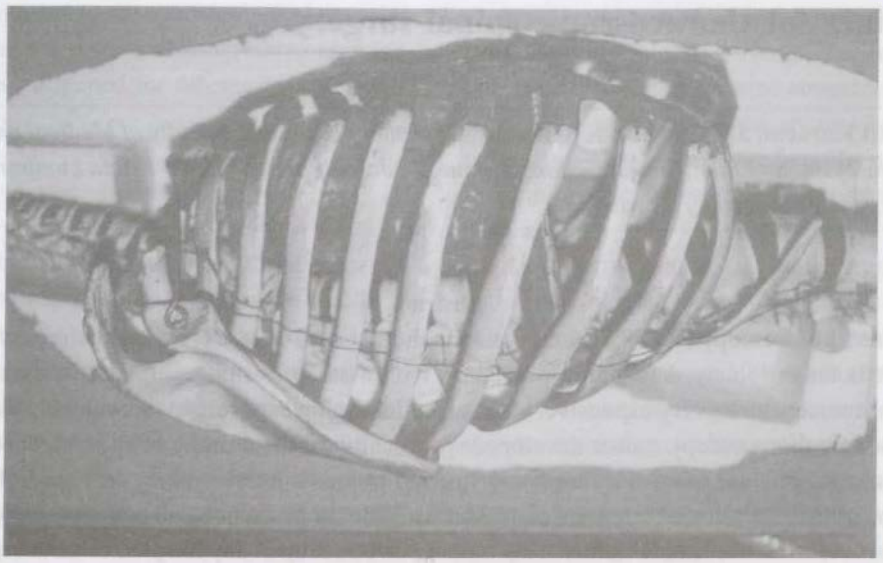

Figure 1. Model of Trainer set up without simulated skin.

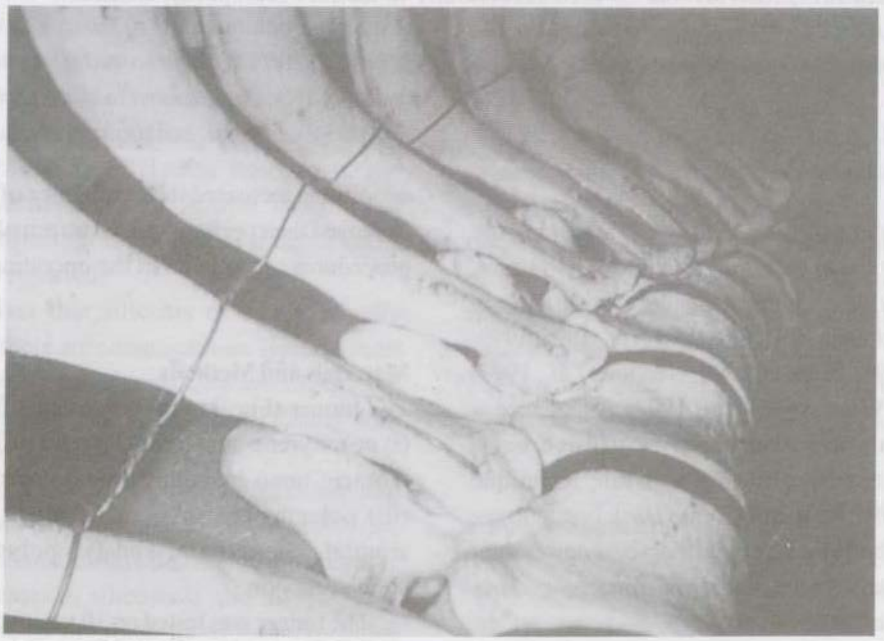

Figure 2. Identifying disc space on the model.

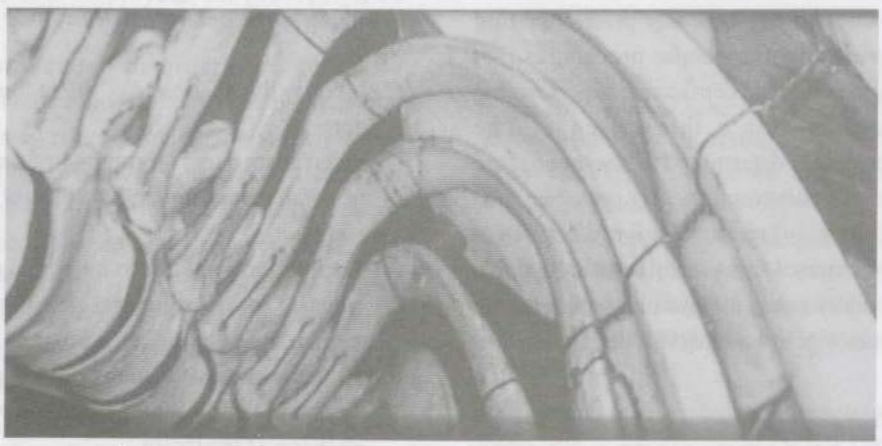

Figure 3. Visualising rib hump in the model.

(7) Pick up objects within the thoracic cavity with these instruments, demonstrating dexterity and techniques used in standard orthopaedic thoracoscopic procedures.

Results

The cost of making the trainer was RM 100 (US$ 26.30). The thoracic skeleton was on loan from the host orthopaedic department. The trainer is portable and can be deployed anywhere with minimal resources.

All 10 trainees completed the exercises satisfactorily, each completing the given tasks within 5 minutes. All 10 trainees felt that the exposure on the model gave them the necessary confidence to perform orthopaedic thoracoscopic procedures. Six of the 10 trainees were tested on patients in the operating room. All 6 trainees managed to identify entry points for portals, make the portals, insert instruments, retract lung, identify disc spaces, triangulate within the thoracic cavity; and manoeuvre the camera and instruments to resect rib hump via intrathoracic approach.

Discussion

The cost of attending instructional courses for skills like orthopaedic thoracoscopy has been escalating in recent times and is prohibitive for many trainees in orthopaedic centres in the less affluent world. The use of such a simply constructed trainer is a tremendous cost saver. Although not as elaborate as some of the commercial models available in the market, it is only a fraction of the cost. While attendance at instructional courses cannot replace apprenticeship and observation of the 'master at work', and actual experience on the job, the exposure at these courses is essential for purposes of credentialing and to gain confidence (Regan JJ, Texas Back Institute, *per comm*). In our initial trials, we found that the trainees felt more confident of themselves when doing procedures on patients after attending an instructional course on our simple trainer. This trainer can be set up at any hospital or rural centre that has laproscopic, thoracoscopic or arthroscopic facilities. In conclusion, a simple thoracoscopy trainer can be constructed inexpensively. This simple inexpensive trainer can be used successfully to instruct orthopaedic trainees.

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