

Endotrainer

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Abstract

Introduction: To improve the psychomotor skills and dexterity of a budding surgeon endotrainer exercises are essential. Several endo trainer of varying shape and functionality are available in the market, but are very costly, in a quest to find a cost effective alternative the visual system can be forgone by making the roof and sides transparent.

Materials and Methods: This article entails the components involved in developing the indigenous transparent endotrainer using acrylic material in Dept of General surgery, Sapthagiri Medical College, Bangalore in 2024.

Results: Conventional endotrainer are non transparent, which necessitates the need for a visual system, this endotrainer does not require a Monitor and web cam by making the roof transparent, ensuring hand eye coordination is maintained. Offering a 3 Dimensional vision without the requirement of an energy source.

Conclusion: The present endotrainer is transparent on two sides and without a visual system, does not require an energy source, easily portable and cost effective especially for young budding surgeons.

Keywords: Endotrainer, Suturing exercises.

INTRODUCTION

Training in minimal access surgery has always been difficult In developing countries due to limited resources, non availability of formal skill labs and lack of trained endo surgeon, to help

trainees.² intracorporeal knotting and suturing are essential components for laparoscopic surgery To improve psychomotor skills and dexterity, endo trainer exercises are essential, surgeons may have seen the procedure but not actually performed or assisted to understand the difference of 2D vision and haptics. Several endo trainers available with varying shape are very costly and it will be difficult for the budding surgeons, trainees. In the quest for cheaper endo-trainer the visual system can be forgone making the roof and two sides with transparent material, in this situation there is no requirement for the visual system. The device is simple, cheap, custom made, easily portable, non-energy consuming. Thus it enables to practice laparoscopic techniques.¹ A self made endo trainer also inculcates self interest in practicing more and shortening the learning curve.⁵

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MATERIALS AND METHOD

There are 2 main components Involved in our endo-trainer

- The endo-trainer box
- Hand instruments - needle holder, mary land forceps and scissors.

Different shapes of Endo trainer that are available are oval, body shape, turtle shape rectangular shape, etc our model is a rectangular shaped The endo-trainer is rectangular in shape, there are different modalities are available. Our endo trainer is made up of transparent acrylic material on the roof, trainee side, other sides being opaque. The length of the endo-trainer should be 250 mm, breadth should be 300 mm, height should be 150 mm The camera port is in the center and the working ports are on the either side of the camera at a distance of 7.5 cm, so that the angle of manipulation will be 60 degrees at the tip of the working end. Port placements are in accordance to baseball diamond concept of laparoscopic surgery, adequate, manipulation angle and elevation angle are also taken into consideration Ports sites are pre made at the top at a distance of 5 cm from the edges of the endo trainer. 2 more port sites are made at the surgeon's side at a distance of 5 cm from the base of the endo trainer. At least 2 surfaces should be transparent, one being the top and the other towards the trainee. The top of the Endo trainer can be open and closed from one side as it fixed by hinges on the other side. this is to facilitate to keep the suturing pad, suture material inside the endo trainer.

The suture pad is placed on an elevated slopping platform, which slopes towards the trainee. It can also be fixed to the roof to allow practice of advanced laparoscopic skills Suture pad has three layers which replicates the texture and toughness of the skin. it is realistic, durable and reuseable making it cost effective.

Suturing exercises

The length of the suturing material should be about 15 to 20 cm as a longer length creates difficulty in handling the suture material. The needle length should be 20- 30 mm.

Endo trainer Exercises

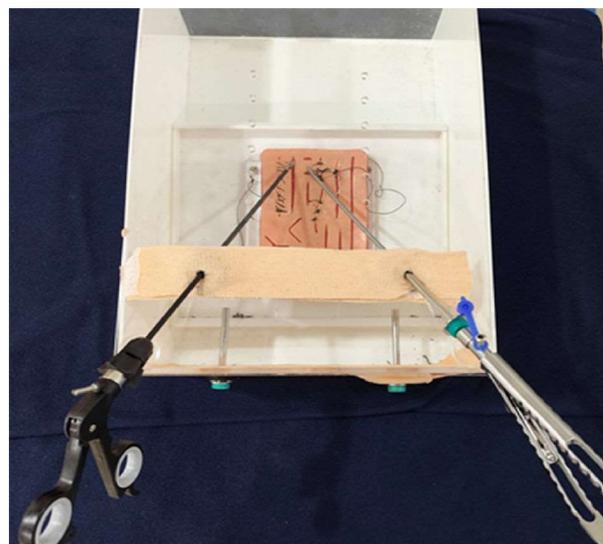


Fig. 1: Suturing & Knotting



Fig. 2: Ball dropping (Source: Dr. M Ramesh, B.E.S.T Institute & Research Centre)



Fig. 3: Block arranging & Thread passing

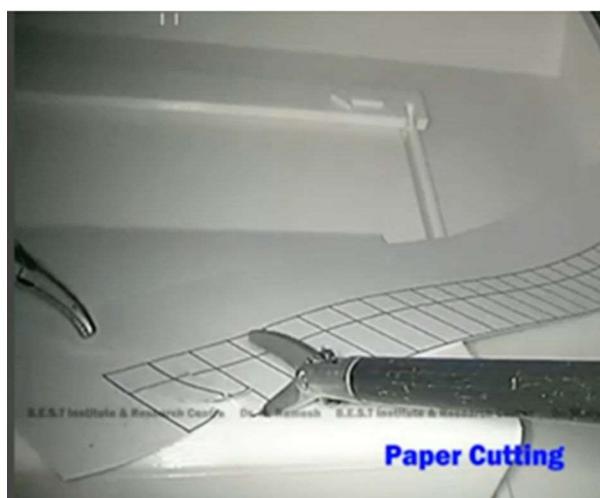


Fig. 4: Paper cutting

DISCUSSION

While surgical simulators are being produced in ever increasing numbers there is confusion on how to use simulators to teach the skills, so there is a need to make training objective and competency based, the conventional endo trainer are non-transparent, which necessitates the need for a visual system (webcam and monitor).

The cardboard endo-trainer uses a mobile camera, mobile screen as a monitor system enabling a 2D vision and necessitating the use of electrical source. The use of cardboard offers pliability at the port holes, but the lifespan of the materials used (cardboard, thermocol), although the cardboard Endo trainer is cost effective, it has not taken into account the cost of the mobile visualization system In comparison with our acrylic.

The advantage of this endo-trainer is it offers a 3D vision, without the need of any electrical source, no visual system is offered.

The disadvantage in our endo trainer the hand eye coordination is maintained whereas real time surgery the hand eye coordination is lost.

CONCLUSION

The present endo trainer is transparent on two sides and without a visual system don't require an energy source, easily portable and are cost effective especially useful for young budding surgeons

Contents	Card board Endo trainer	Conventional Endo trainer	Our Endo trainer
Monitor and web cam	Mobile phone screen	Wall mounted monitor	Not required
Hand eye coordination	Detached	Detached	Maintained
Roof	Non transparent	Non transparent	Transparent
Portability	Portable	Non portable	Easily portable
Source of energy	Required	required	Not required
Durability	Non-durable	Durable	Durable
Cost effectiveness	Cost effective	Expensive	Cost effective

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