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Device model for training of laparoscopic surgical skills

Modelo de dispositivo para treinamento de habilidades operatórias em laparoscopia

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A B S T R A C T

The authors present a especially constructed, lightweight, collapsible, portable and low cost model device for skills training in laparoscopic.

Key words: Education, Medical. Training/education. Teaching Materials.

INTRODUCTION

The surgeon's skill is fundamentally acquired through continuous practice. The knowledge and the proper training of the surgical technique cannot only improve the experience but also avoid complications in surgical procedures[1].

Despite new surgical techniques such as laparoscopy and robotic surgery, which are important milestones in the history of medicine and surgery, the critical surgical times – dieresis, hemostasis and synthesis – remain unchanged and need to be taught[2,3]. However, despite the existence of non-organic models, such as virtual simulators and black boxes, these resources are not available to most physicians, training traditionally following an apprenticeship-based model in the operating room, an approach that can be time consuming, costly[4,5] and unethical due to the potential harm to the patient resulting from the training surgeon's inexperience[6].

Moreover, the Brazilian surgery training centers, mostly institutions of the public health system, lack funds for investment in educational technologies.

Therefore, based on the importance of surgical technique practical learning, and to facilitate the initial training in developing laparoscopy skills, we created a device model.

DESCRIPTION OF THE DEVICE

This is a device for simulating situations similar to those found in surgery, such as gripping structures, dissection, ligatures and tissues suturing.

The model was built in white acrylic and consists of three faces: front face (1), left lateral face (2) and right lateral face (3), all put together by a set nuts and bolts (4) for ease of transport and portability (Figure 1). All faces have holes (5) for the passage of laparoscopic instruments (Figure 1).

On the front side there are a rectangular opening (6) and a perpendicular support (7) for accommodating tablets and the like, to capture images and indirect

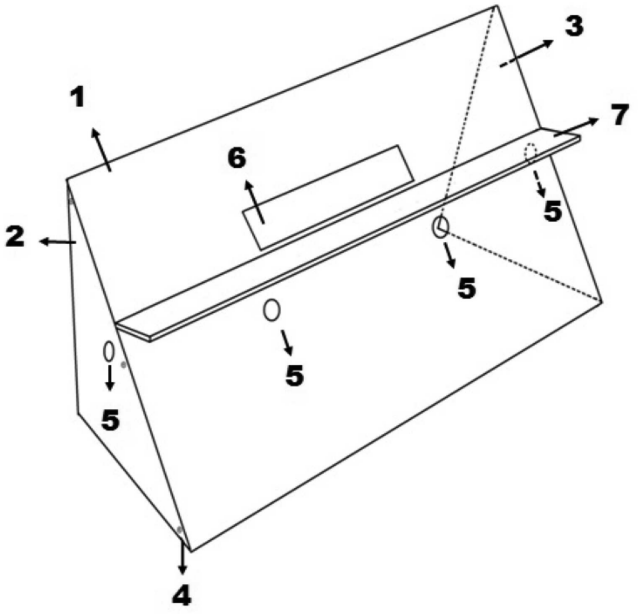

Figure 1 - *Training model of laparoscopic skills in perspective.*

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visualization of the movements by the practitioner, as occurs in real surgical procedures (Figure 2).

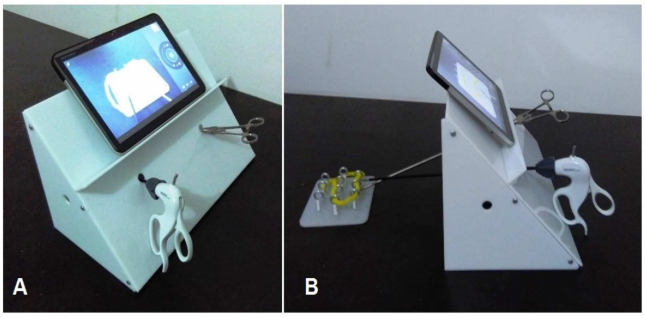

Figure 2 - *Representation of the model for training of laparoscopic skills in use. A) model in perspective. B) model in profile.*

DISCUSSION

The black boxes traditionally known consist of closed or half open containers of wood or plastic, with holes for insertion of instruments and fixed or mobile micro cameras for visual control of the tasks performed with the instruments[7].

Although there are other inexpensive devices as an alternative to more sophisticated simulators used in large training centers[8-11], we believe such devices have some limitations: they are usually made as heavy containers with large size, rendering transport and mobility difficult; they often require an interior light source, generated by another device or an external light nearby, hampering portability; furthermore, in most cases they require the use of trocars for manipulation of laparoscopic instruments.

Aimed at solving these limitations, we developed the model. Despite lacking its own lighting apparatuses, it requires no exclusive light sources for use, only needing ambient lighting. The traditionally used microcamera follows as an alternative however, it was essentially replaced by the camera of tablets, mobile phones and the like, which, aided by free applications available, even allow one to wirelessly send the images captured in real time to monitors or TV sets, further contributing to the portability and providing vision similar to the actual procedure. As for the holes for insertion of laparoscopic forceps, we found an excellent correlation in their dimensions, capable of avoiding the variation of unwanted linear motion of the instruments shaft caused by the lack of a fixed support point in large holes in relation to the diameter of the forceps and the very limited angular movement in just orifices in relation to the diameter of the instrument. Consequently, we avoided the need of rubber membranes and / or use of trocars, which increase production costs.

The formation of a surgeon is complex, since it requires knowledge of the natural history of the disease, clinical diagnosis, additional exams, the choice of treatment and opportunity of its application, besides mastering the surgical technique to be employed to achieve the ultimate goal, the patient's healing[12].

The creation of the presented model, of low production cost, showed a viable option for purchase by institutions and individuals, proving to be of great value to education and training for those interested in minimally invasive surgery.

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R E S U M O

Os autores apresentam um modelo de dispositivo para treinamento de habilidades em laparoscopia de original construção, leve, desmontável, portátil e de baixo custo.

Descritores: *Educação Médica. Capacitação/educação. Materiais de Ensino.*

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