The New Laparoscopic Proctocolectomy Training (in Soft Cadaver)

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Objectives: *The purpose of the present study was to evaluate the quality of preservation (tissue plane, named vessels identification, consistency of colon and rectum), quality of performing procedures, difficulties and problems and finally the satisfaction of surgeons in laparoscopic proctocolectomy in soft cadaver.*
Setting: *Colorectal Division, Department of Surgery and Surgical Training Center, Department of Anatomy, Faculty of Medicine, Chulalongkorn University.*
Design: *Prospective descriptive study*
Material and Method: *10 soft cadavers were scheduled for laparoscopic proctocolectomy. The procedures (colon - rectum mobilization and named vessels identification) were performed by 14 experienced surgeons (8 colorectal surgeons) and assisted by surgical residents. The quality of preservation, successfulness and the satisfaction in performing the procedures were recorded using questionnaires for evaluation.*
Results: *The preservation was very good in every aspect especially tissue plane between colon, mesocolon and retroperitoneum which was clearly dissected, same as fascia propria of rectum. The named vessels and the tissue consistency were very well preserved and tolerated to laparoscopic equipment handling. The surgeons were satisfied with the tissue handling and dissections. There were two difficulties, the first was air leakage but simply corrected with purse string suture and the second was unflavored smell which was not concerned. Laparoscopic proctocolectomy could be completely performed in soft cadaver.*
Conclusion: *Laparoscopic proctocolectomy could be performed in soft cadavers with great satisfaction. Repeated practice is possible, so the surgeons can gain their experiences outside the operating theatre. This success may shorten the learning curve and may be the new era in cadaver- based training.*

Keywords: *Laparoscopic proctocolectomy, Soft cadaver, Training*

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Laparoscopic proctocolectomy is a part of the advanced laparoscopic surgery, not only the laparoscopic skills but also the familiarity with the anatomy and tissue plane is needed, especially in cancer surgery which oncologic principles must not be compromised. Recently, the American society of colon and rectal surgeons approved that laparoscopic colectomy for curable cancer is equivalent in cancer related survival to open surgery when performed by experienced surgeons who have passed the learning curve[1]. How to start the laparoscopic proctocolectomy is the question for practicing surgeons who have no experience in this rather new technique.

Nowadays, most practicing surgeons attend a 2 to 3 days intensive course of advanced laparoscopic procedures offering both didactic and hands-on experience and in additional exposure to clinical cases by attending with laparoscopic expertise[2]. After that they try to start the operations in the living model with self confidence and the back up plan is conversion to conventional procedure. Are there any other solutions? Practicing outside operating theatre, in the same situa-

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tion but not the livings, is the answer. That means cadaveric base training may be the best but there are further problems; availability, cost, durability and unbeatable smell.

The Department of Anatomy, Faculty of Medicine, Chulalongkorn University has developed special techniques for cadaveric preservation which we call "soft cadaver". The soft cadaver has been developed in Faculty of Medicine, Chulalongkorn University since 1998; at first it was perfectly suited for the musculoskeletal systems. The later generation has dramatically improved including the internal organ preservation which is widely accepted. To accomplish the requirement for the multimodality integration in laparoscopic proctocolectomy training the authors would like to evaluate the quality of preservation, quality of performing surgical procedures, difficulties and problems and the satisfaction of surgeons.

Material and Method

The present study was a prospective descriptive study. Fourteen experienced (8 colorectal) surgeons from center hospitals in Thailand were invited to attend the hands-on workshop at Chulalongkorn Surgical Training Center Ten soft cadavers were set for laparoscopic proctocolectomy including right colon, left colon, sigmoid colon and low anterior resection. The theater was fully equipped with laparoscopic suite including vascular sealing systems. Surgeons and teams were gowned. Umbilical port was introduced under direct vision. CO2 gas was insufflated at 13 -15 mmHg. Working space was created and maintained. Other ports and instruments were inserted. Laparoscopic technique was applied in steps and the procedures were performed.

All the procedures were performed in the medial to lateral approach, started with main vessels

Fig. 1, 2 Photographs of the Laparoscopic Proctocolectomy Training in Soft Cadaver. The theater was fully equipped with standard laparoscopic sets. Surgeons and teams were gowned

Fig. 3, 4 Photograph of steps in laparoscopic technique applying

identification and ligation then dissected along the tissue plane between mesocolon and retroperitoneum. For low anterior resection, the procedures started with inferior mesenteric artery ligation then fully mobilized left colon, ligated inferior mesenteric vein and finally mobilized the rectum along the fascia propria till pelvic floor. No anastomosis was accomplished because in the authors' view the main interest of these operations is mobilization and for cost saving the authors prefer extracorporeal anastomosis except for low anterior resection. All attendants had experience in laparoscopic cholecystectomy but laparoscopic proctocolectomy. However, they had already studied the procedures from VDO-CD. All assistants were the surgical residents. Each station was supervised by colorectal surgeons who performed more than 20 cases in laparoscopic proctocolectomy. After their operations finished, the questionnaires (topics as shown in Table 1-4) were filled and collected immediately.

Results

Based on the attendants' evaluations, the tissue preservation was impressive. All the colon and rectum were alike the fresh organs, not only the coloration but also the anatomical plane, the good organ consistency, well laparoscopic-equipment-handling tolerance and good tactile feedback. The procedures proceeded continuously as if they were the fresh tissues. The mean results were shown in Table 1.

The procedures were completely performed; port introduction, working space creation, tissue plane dissection, and every laparoscopic technique was successfully applied. The mean result was shown in Table 2.

There were some difficulties such as air leakage with could be overcome by the fixation suture. The smelling was quite a small magnitude. The abdominal wall had good extensibility which providing a good working space. The video-visual system was clear without fogging effect but some interference from the skin wax which was easily cleared (Table 3).

All participants were satisfied with the procedures in all aspects. The mean satisfactory score was of 3.72 (Table 4).

Table 1. The satisfaction score in the quality of organ preservation in laparoscopic proctocolectomy in soft cadaver (1 as poor and 5 as excellent)

Quality of organ preservation	Score (mean)
- Organ coloration	3.9
- Tissue plane	4.2
- Colon preservation	3.9
- Organ consistency	3.9
- Organ handling toleration	3.9
- Degraded tactile feedback	3.7

Table 2. The satisfaction score in the surgical procedures in laparoscopic proctocolectomy in soft cadaver (1 as poor and 5 as excellent)

Surgical procedures	Score (mean)
- Port introduction	3.6
- Working space creation	3.6
- Tissue plane dissection	4.2
- Laparoscopic technique applying	3.7
- Successfulness of procedure	5.0

Table 3. The laparoscopic score in the difficulties and problems in laparoscopic proctocolectomy in soft cadaver (1 as poor and 5 as excellent)

Difficulties and Problems	Score (mean)
- Smelling	3.0
- Air leakage	2.6
- Video-vision interference	3.6

Table 4. Participant satisfaction score in laparoscopic proctocolectomy in soft cadaver

Participant satisfaction	Score (mean)
- Integration of skill into practicing	5
- Beneficial from training	5
- Overall the procedures	5

Discussion

The learning curve needs at least 20 cases varies from laparoscopic skill, the familiarity with tissue plane, the number of cases, etc[1]. To minimize these numbers, the laparoscopic skill should be earned outside the operating theatre. Many modalities were introduced such as video based, box trainer, computer based, the minimally invasive trainer virtual reality (MIST-VR) or animal based.

Despite the trend moves toward the simulator development, there is no consistency with independent appropriate model, some are impractical and the cost is sometimes prohibitive[11]. Besides focusing on surgical skill achievement, the familiarity with the particular surgical anatomy and the challenges of

degraded tactile feedback could be partly acquired in the animal model, however there is a significant difference in anatomy. In addition, the personnel capable in administrating animal general anesthesia is needed[4]. MIST-VR is a valid tool for the training in the laparo-scopic psychomotor skill and capable for evaluating the skill, which necessary in laparoscopic surgery but lack of important tactile feedback[9]. Cadavers offer the most realistic training model but remain expensive, limited in quantity, and they would be available only for a specific purpose[3].

Most centers prefer hand-to-hand teaching, which means they should have enough cases in each procedure. The patient safety, the standard philosophy in the treatment and the patient well being are the most important issues to be concerned. To decrease uneventful complications, the familiarity with the particular surgical anatomy and the degraded tactile feedback should be the step before the starting in the theatre.

From the present study; the soft cadaver has been proved to be possible for the laparoscopic proctocolectomy. The abdominal wall has a good extensibility which provides appropriate working space. All the intra-peritoneal organs look alike the fresh organs not only the consistency but also the anatomical plane and the named vessels. They are well tolerated to laparoscopic equipment handling and have a good tactile feedback during dissection. Each step; port introduction, working space creation and tissue dissection are the same as in the livings with high satisfaction. There are some difficulties but can be easily corrected and smelling is bearable.

Practicing in soft cadaver can provide a wider opportunity for all surgeons to gain their expertise in the new techniques. Harmonized with other trainers, these will shorten the clinical learning curve and maximize the patients' benefit.

Conclusion

From the authors initial attempt to evaluate the surgeons' satisfaction in the laparoscopic proctocolectomy training in soft cadaver, the authors are certain this is the excellent incorporation of all needed for the competency in the key of the procedure. The authors believe that successful integration of the basic and advanced laparoscopic skills into the soft cadaver setting may be the evolution of surgical training.

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การฝึกผ่าตัดลำไส้ใหญ่และทวารหนักแบบใหม่ (ในอาจารย์ใหญ่แบบนิ่ม)

จิรวัฒน์ พัฒนะอรุณ, สุเทพ อุดมแสวงทรัพย์, ชูชีพ สหกิจรุ่งเรือง, ธันวา ตันสถิตย์, กษยา ตันติผลาชีวะ, อรุณ โรจนสกุล

วัตถุประสงค์: *เพื่อประเมินความพอใจด้านคุณภาพการเก็บรักษาอวัยวะ (แนวระนาบเนื้อเยื่อ(tissue plane), เส้นเลือด, ความหนาแน่นของเนื้อเยื่อลำไส้ใหญ่และทวารหนัก), คุณภาพในการทำหัตถการ, อุปสรรคและปัญหาในการผ่าตัดลำไส้ใหญ่และทวารหนักโดยการใช้กล้องส่องในอาจารย์ใหญ่แบบนิ่ม*

สถานที่: *หน่วยศัลยศาสตร์ลำไส้ใหญ่และทวารหนัก, ภาควิชาศัลยศาสตร์ และศูนย์ฝึกผ่าตัด ภาควิชากายวิภาค คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย*

รูปแบบ: *prospective descriptive study*

วัสดุและวิธีการ: *ทำผ่าตัดลำไส้ใหญ่และทวารหนักโดยการใช้กล้องส่องในอาจารย์ใหญ่แบบนิ่ม 10 ราย โดยศัลยแพทย์ผู้มีประสบการณ์ 14 ราย (8 รายเป็นศัลยแพทย์ลำไส้ใหญ่และทวารหนัก) โดยมีผู้ช่วยเป็นแพทย์ประจำบ้านศัลยศาสตร์ หัตถการที่ทำ ได้แก่ การตัดเลาะลำไส้ใหญ่และทวารหนัก และการหาเส้นเลือด เมื่อสิ้นสุด หัตถการศัลยแพทย์ตอบแบบประเมินผลด้านคุณภาพการเก็บรักษาเนื้อเยื่อและอวัยวะ ความสำเร็จของหัตถการและความพึงพอใจ สามารถทำการผ่าตัดได้สำเร็จ*

สรุป: *การผ่าตัดลำไส้ใหญ่และทวารหนักโดยการใช้กล้องส่อง สามารถจำลองทำได้ในอาจารย์ใหญ่แบบนิ่ม สามารถทำซ้ำ ๆ ได้ เป็นทางเลือกหนึ่งซึ่งมาใหม่ในการฝึกผ่าตัด เพิ่มประสบการณ์แก่ศัลยแพทย์*