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Case Report

An ergonomic modification of the American position for laparoscopic cholecystectomy in a rural setting

Philip Umman[1]*, Clyde R. Menezes[2], Ashish Bosco[2], Nandakumar Menon[2]

Department of Surgery, [1]Believers Church Medical College Hospital, Tiruvalla, Kerala, [2]ASHWINI, Gudalur Adivasi Hospital, Gudalur, Tamil Nadu, India

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***Correspondence:**
Dr. Philip Umman,
E-mail: philip.umman@gmail.com

ABSTRACT

Laparoscopic cholecystectomy (LC) is the gold standard for the treatment of symptomatic gallstone disease. As a result of the significant investments in setting up a laparoscopy unit and training nursing staff in laparoscopic techniques, the cost of laparoscopic surgery is higher. However, the urban poor and rural population of India stand to benefit most from laparoscopy, owing to the shorter recovery times and reduced post-operative pain. The American and French positions have been described for laparoscopic cholecystectomy. Studies on ergonomics in laparoscopy deal mainly with issues related to the operating surgeon. There is not much literature on the issues faced by the team members during laparoscopy, especially in resource constrained settings. The authors propose a modification of the American position for LC, which enhances comfort and vision for the scrub nurse and also helps the surgeon guide the novice staff in LC.

Keywords: Ergonomics, Laparoscopic, Cholecystectomy, Team positioning

INTRODUCTION

Laparoscopic cholecystectomy (LC) is the gold standard for the treatment of symptomatic gall stone disease.[1] Low post-operative morbidity, lower incidence of wound infection and rapid recovery after surgery and anesthesia make LC the better approach when compared to open cholecystectomy.[2]

The standard four port cholecystectomy is routinely practiced by most surgeons. Reduced port and single port laparoscopic cholecystectomy are also performed when the surgeon feels that the learning curve has been overcome. Two positioning methods for team members have been described. These are the American and the French positioning systems. The French positioning requires the patient to be in lithotomy position. The American positioning system is more widely used by surgeons in India. However, no significant difference has been found in the ergonomics between the two positions.[3] The literature however, focuses heavily on the chief operating surgeon without considering the other team members involved. The standard American position of team members for LC is as shown in Figure 1.

CASE REPORT

The authors trialed a new positioning system by moving the position of the scrub nurse to the right of the operating surgeon with the instrument table between the operating surgeon and the scrub nurse. The position is highlighted in Figure 2. We call this the Gudalur modification of the American position.

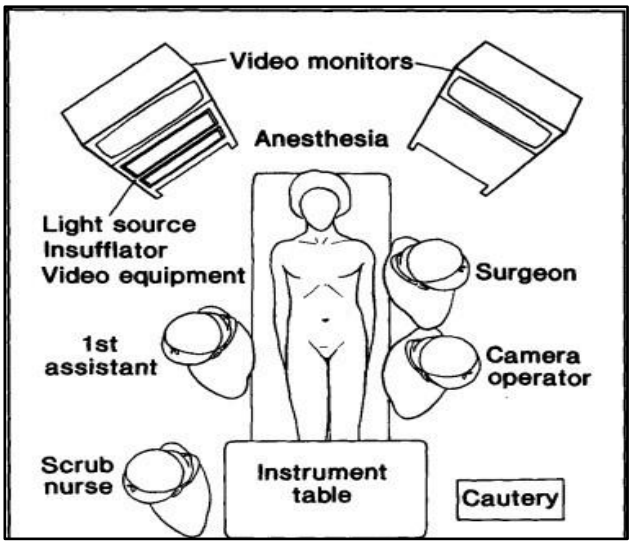

Figure 1: Standard American position for laparoscopic cholecystectomy with two monitors.

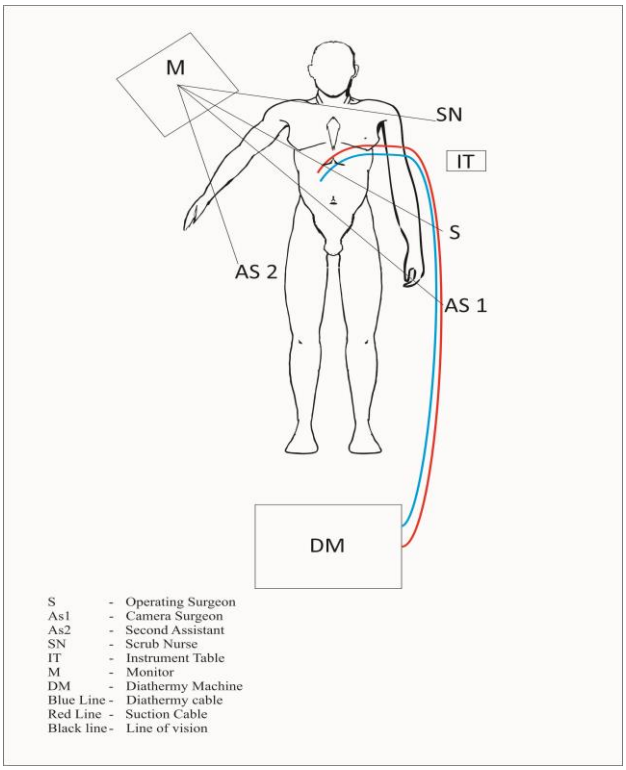

Figure 2: Gudalur modification of the American position.

Using this technique, we have operated on 11 cases of LC and one case of laparoscopic para-aortic node biopsy. The mean operating time for LC was 90 minutes. All the cases could be characterized as difficult LC using criteria described by Vivek et al.[1] Ten patients were females and one male. The age range was from 22 to 57. All patients had at least one episode of acute cholecystitis earlier which had been managed conservatively. There were no patients operated on for biliary colic. Three of the patients had previous history of caesarean section. Blood loss was minimal except in one case with liver capsule tear during dissection. Bleeding could be stopped by applying Surgicel (Ethicon). None of the patients required blood transfusion. There were no major surgical complications. The longest follow up period is one year and the shortest was one month. All cases were done using a zero degree (0°) telescope. Only monopolar and bipolar diathermy were used as energy devices. Two of the cases had additional ligature of the cystic duct in view of large cystic duct. There were no conversions during this period. The operative time ranged from 75 to 120 mins. For the same level of difficult LC operated on by the first author in his own institution, there was no significant difference in operative times, intraoperative or postoperative complications.

RESULTS

Compared to the standard American position for four port laparoscopic cholecystectomy, the Gudalur modification did not lead to increased operative times or adverse outcomes. This is even with the confounding factor of operating using a zero degree telescope and lack of advanced energy sources and team members not experienced in laparoscopy. There was less stress on the nursing assistant while connecting cables and during change of instruments in the working ports.

DISCUSSION

There are vast disparities in financial and technical resources across the length and breadth of the country. Initial investments in laparoscopy are high, especially in hospitals in more remote settings. One study found that around 42% of the costs in LC were due to investments in the operating room and on instruments. [4]

Where laparoscopy has been adopted in rural areas and smaller towns, there are limitations to contend with. The standard American position though widely used, imposes several constraints during the procedure. This is truer for the nursing assistant, as is often the case in a rural or resource limited setting. To reduce costs, the majority of surgeons perform laparoscopic surgeries with only one monitor. The assistants, including the person driving the camera, may comprise of nursing staff and theater technicians.[5] Surgical assistants often have no training in laparoscopy, leading to longer operative times. It is necessary for the operating surgeon to help his team members quickly overcome the learning curve so as to move on to advanced laparoscopic surgery.[6]

In addition to ergonomic constraints, there are certain practical problems faced. Most surgeons use the epigastric port as the main working port (right hand). This is usually a 10 mm port and requires reconnecting diathermy cables during the various phases of dissection. For these instrument changes, the scrub nurse has to lean across the patient to connect the cables over the umbilical port which holds the telescope, light cable and carbon

dioxide tubing. The entanglement of cautery cables or suction tubes over the light cable and carbon dioxide tube is a common occurrence. In addition, there is also a significant gas leak during inefficient instrument changes through the 10 mm epigastric port. Lastly, single monitor display systems are arranged for the best possible view for the operating surgeon. This results in a poor view of the monitor for the scrub nurse, leading to cervical and lumbar strain.

LC, as is true for any surgery, is based on good team work. We found the following advantages to our modification of the positions of team members. The new position allowed the scrub nurse to easily connect the diathermy cables to the operating instruments. As the instrument table is near the surgeon, he/she can keep the exiting instrument on the trolley while the scrub nurse blocks the reducer to prevent air leak and is ready to introduce the next instrument. This reduces both the gas volumes used during surgery and time wasted in interchange of instruments.

When a single monitor is used, the scrub nurse has a very poor view of it in the standard positioning. The Gudalur modification of the standard system overcomes this problem by placing the nurse on the same side as the surgeon. This allows her a clear and direct view of the monitor without having to turn her neck.

This positioning is also useful if the surgeon is attempting a three port LC. It should be noted that the scrub nurse is to the right of the operating surgeon in the French position of doing LC but the instrument table is to her right. In the modified position proposed by the authors, the instrument table is between (and slightly behind) the operating surgeon and the scrub nurse. This is also useful in centers where laparoscopy is not done routinely, as it will enable the surgeon to help the scrub nurse identify the current instrument required.

The above issues may not be relevant in higher centers with trained nursing staff and high-end equipment. We have also not studied the volume of gas used during LC in this position compared to the standard American position, for equivalent duration of surgery.

CONCLUSION

The Gudalur modification of the American positioning system for LC is advantageous in resource limited settings for several reasons. This system makes better use of the single monitor for laparoscopic surgery by improving the viewing angles for all team members. This saves on initial costs involved in setting up the operating room for laparoscopic surgery. In addition, the relative positions of the scrub nurse and surgeon allow for hassle-free changing of instruments, and management of cables, tubing etc. This is of great significance in setups with fewer staff and technicians. The positioning system allows the surgeon to more easily train the staff and assistants in identifying instruments.

The authors believe that this modification of the standard American position is far more practical and feasible in the rural setting, with respect to setting up and for training purposes. There is not much literature on the ergonomics of team members' positioning during laparoscopic surgery. Having been carried out in a secondary level hospital in rural India, the new positioning system will have to be validated in high volume centers with trained nursing staff exposed to high end laparoscopic procedures, in order to confirm the benefits of this approach and compare the same to the standard American position.

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