A Prospective, Single-Arm, Single-Center, Case Series to Determine the Feasibility of Safe Skill Transfer for Transabdominal Preperitoneal (TAPP) Repair Utilizing a Hands-On Mentorship Model

Masashi YAMAZAKI1, Eiji NOMURA1, Kazunori UCHIDA2, Shigeo HIGAMI3, Wataru NOGUCHI3, Shuji UDA1, Soichiro YAMAMOTO1, Kosuke TOBITA1, Masaya MUKAI1 and Hiroyasu MAKUUCHI1

1Department of Gastroenterological and General Surgery, Tokai University Hachioji Hospital
2Department of Endoscopic Surgery, Takanobashi Central Hospital
3Department of Emergency and Critical Care, Tokai University Hachioji Hospital

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Objectives: It is difficult to introduce laparoscopic surgery in institutions with a small number of patients, and surgical training relies heavily on mentors to produce well-trained surgeons. The aim of this study was to determine whether implementation of a hands-on mentorship model could provide safe skill transfer for transabdominal preperitoneal (TAPP) repair.

Methods: A trainee who had no experience with TAPP repair underwent operative tutorials until the mentor judged that the trainee could carry out the operation independently. Ten patients who underwent an elective TAPP repair were prospectively enrolled in this study.

Results: No cases had over 5 mL of bleeding, intraoperative/postoperative complications, or recurrence. There were significant differences in operation times between the first 4 cases and the later 5 cases, except for a bilateral inguinal hernia case.

Conclusion: A prospective, single-arm, single-center, case series showed the feasibility of safe skill transfer for TAPP repair using a hands-on mentorship model.

Key words: Inguinal hernia, Mentorship, Transabdominal preperitoneal (TAPP) repair

INTRODUCTION

Laparoscopic surgery, including cholecystectomy and many other operations, is thought to be a less invasive procedure that has become prevalent in Japan since the 1990s [1, 2]. After the operative procedures and associated medical devices were developed, many clinical studies provided evidence that laparoscopic surgery is a useful procedure [3]. As a result, the indications for laparoscopic surgery increased to include various diseases, and a fixed operative procedure has been developed. On the other hand, inguinal hernia repair is one of the most common surgical procedures performed worldwide [4]. The standard method for inguinal hernia repair has changed dramatically [5]. Recently, the procedure of laparoscopic hernia repair has been adopted for patients with inguinal hernia [6, 7]. Furthermore, many patients have begun to request the procedure, because of some advantages, including less postoperative pain, a shorter recovery period, earlier return to daily activities and work, and better cosmetic results [8, 9]. When we began to introduce this procedure, the educational system and technology transfer of laparoscopic surgery were discussed avidly, and a few reports concerning this area were published. Some researchers reported that using the Objective Structured Assessment of Technical Skills (OSATS) to assess the surgical skills of trainees in the operating room was feasible and effective [10]. Because the numbers of inguinal hernia patients differed among institutions, it became clear that the introduction of laparoscopic surgery is difficult in institutions with a small number of patients. Surgical training relies heavily on mentors to produce well-trained surgeons [11]. As we introduced the technique of laparoscopic inguinal hernia repair (LIHR) to our institute, we tried to determine whether implementation of a hands-on mentorship model could provide safe skill transfer of the techniques required. In addition, mentorship involves operative tutorials by especially experienced surgeons. In this study, the usefulness of mentorship for skill transfer was prospectively investigated.

PATIENTS AND METHODS

A surgeon with 10 years of postgraduate experience was selected as the trainee. He had performed laparoscopic gastrointestinal and colorectal surgery, as well as open inguinal hernia repair, but had neither seen nor performed LIHR. As an expert in LIHR, a mentor who had 10 years of experience as a surgeon, especially transabdominal preperitoneal (TAPP) repair, was selected.

In our institute, the trainee underwent operative tutorials until the mentor judged that the trainee could...
carry out TAPP repair independently. Specifically, the trainee was involved in 10 TAPP repairs, observing the first 5 cases and carefully performing the remaining 5 cases under the mentor’s supervision, taking between 90 minutes and 120 minutes for the procedures. The number of cases to reach the plateau of the learning curve was reported to be 10–50 for LIHR [12, 13].

RESULTS

DISCUSSION

Laparoscopic surgery has been gaining increasing popularity worldwide. Inguinal hernia surgery is one of the most common surgical procedures performed worldwide, and the standard method for inguinal hernia repair has changed with the introduction of synthetic mesh and laparoscopic technique [4, 5].
Compared with open repairs, LIHR has some advantages, including less postoperative pain, a shorter recovery period, earlier return to daily activities and work, and better cosmetic results [8, 9]. On the other hand, in the beginning of the 1990s, laparoscopic hernia repair was controversial because various studies reported early recurrence rates and various medical misadventures [7]. For the performance of safe laparoscopic surgery, various efforts have been made in the field of surgical education and instruction. Nevertheless, even though training with a simulator and/or in a dry laboratory has been done, many cases of actual operative experience are needed to learn the surgical procedures. Furthermore, in order to estimate the status of learning, times to reach the plateau of the learning curve were studied, and operation time, blood loss, conversion rate, complication rate, and various rating scales were found to be indicators [14–16]. The number of cases to reach the plateau of the learning curve was reported to be 9–35 for laparoscopic cholecystectomy [14–16] and 10–50 for LIHR [12, 13]. Because the somatotype of the patients easily affects the results, one can only conclude that making an estimate is difficult.

In actual operative situations, the operations are often carried out under the mentor’s direct supervision [17]. If the trainee has the abilities to perform fundamental procedures and the mentor’s advice is appropriate, the trainee himself could perform the operation following the mentor’s advice without developing an understanding of the anatomy and achieving adequate comprehension and judgment for accurate operative procedures. Because there may be discrepancies between the mentor’s appreciation of the trainee’s

### Table: Summary of perioperative data

<table>
<thead>
<tr>
<th>Item elevated</th>
<th>Data (n = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected side (right/left/both)</td>
<td>6/3/1</td>
</tr>
<tr>
<td>Age (years)</td>
<td>68.3 ± 14.2 (43–83)</td>
</tr>
<tr>
<td>Patient height (cm)</td>
<td>163.8 ± 4.5</td>
</tr>
<tr>
<td>Patient weight (kg)</td>
<td>59.7 ± 8.4</td>
</tr>
<tr>
<td>Performance status (0/1)</td>
<td>4/6</td>
</tr>
<tr>
<td>Type of hernia (external/internal)</td>
<td>4/7</td>
</tr>
<tr>
<td>Operation time (minutes)</td>
<td>94.8 ± 18.9 (60–137)</td>
</tr>
<tr>
<td>Amount of bleeding (&gt;5ml)</td>
<td>0</td>
</tr>
<tr>
<td>Intraoperative complications (%)</td>
<td>0</td>
</tr>
<tr>
<td>Hospital Stay (days)</td>
<td>5.9 ± 2.3 (4–12)</td>
</tr>
<tr>
<td>Postoperative complications (%)</td>
<td>0</td>
</tr>
<tr>
<td>Recurrence (%)</td>
<td>0</td>
</tr>
</tbody>
</table>

**Figure** Changes in operation times

There are significant differences in the operation times between the first 4 cases and the last 5 cases, except for the case of bilateral inguinal hernia (J).
comprehension and the trainee’s actual understanding, these discrepancies are important. It is important that the mentor understand the trainee’s attainment level as it provides a good opportunity for the mentor to devise the contents and methods of his approach to advising the trainee. This concept is called mentorship, and it means continuous guidance or counseling for the trainee (protégé) by the mentor [18]. Mentorship is thought to be a concept that provides the trainee with an opportunity for quick and effective learning of knowledge and skills, and it provides the mentor with the chance to reconfirm his own knowledge and skills, as well as the possibility of discovering a new perspective and new ways of thinking. In recent years, mentorship has been studied in various fields. This study was carried out to clarify the possibility of the safe introduction of LIHR. At least 10 patients had to be enrolled to undergo LIHR based on the numbers needed to master the technique [12].

In the present study, the following points were considered crucial: 1) careful preservation of the epigastric vessels and vas deferens using a combination of dissection by the square-shaped gauze and the USAD; 2) clarifying the confluence portion between the inguinal ligament and Cooper’s ligament; 3) paying attention to the corona mortis as important knowledge; 4) fixation of the mesh medially over the pubic tubercle next to Cooper’s ligament and superiorly to the abdominal wall using ProTack™ (CovidienTM); and 5) a sufficient field of view provided by adequate direction and traction as a meaningful skill. In this way, the trainee was thought to be able to reach a technical level close to that of the mentor.

Because the numbers of inguinal hernia patients differ among institutions, it became clear that the introduction of laparoscopic surgery is difficult in institutions with a small number of patients. With hands-on mentorship, the possibility of more effective and safer skill transfer appears possible. Although only 10 cases were included in the present study, the operation times decreased significantly, and the learning curve might be observed if time were one of the indicators. However, the relationship between the mentorship and the learning curve was not sufficiently evaluated. Apart from the investigated items, there were no significant differences between the operation time for the 5 cases done by the mentor and that for the last 4 cases, excluding case F, done by the trainee. Although this was an investigation of a small number of cases and the first operation by the mentor was performed without haste to maximize its educational value, the acquisition of sufficient understanding by the trainee through the mentorship might have significantly decreased the operation time. A mentor with higher skills in the specific field is more likely to effectively and safely transfer skills promptly.

In conclusion, a prospective, single-arm, single-center, case series showed the feasibility of safe skill transfer for TAPP repair using a hands-on mentorship model. Training for other kinds of operations should be similarly examined in order to determine the efficacy of mentorship.

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**REFERENCES**