

ORIGINAL

Mesh-Airtight-Preperitoneum : a simple method for confirming mesh placement in transabdominal preperitoneal repair of inguinal hernia

Yasuhiro Yuasa, Hiroshi Okitsu, Masakazu Goto, Yuta Matsuo, Hiroshi Edagawa, Osamu Mori, Ryotaro Tani, Shunsuke Kuramoto, Mayumi Ikeuchi, and Atsushi Tomibayashi

Tokushima Red Cross Hospital, Department of Digestive Surgery, Tokushima, Japan

Abstract : We devised a method for confirming the position of mesh placed during transabdominal preperitoneal repair (TAPP) of an inguinal hernia. The preperitoneum is sufficiently detached, and the mesh is fixed in place as usual. Before completely closing the peritoneum, pressure is applied from outside the body and inside the abdominal cavity to remove as much air as possible from the detached preperitoneum ; the peritoneum is then sutured using a V-Loc™ closure device so that it does not constrict. By releasing the pressure all at once, the airtightness of the preperitoneum is maintained, and the position of the mesh can be observed through the translucent peritoneum. This method, called Mesh-Airtight-Preperitoneum (MAPP), could become widely used as a simple technique for confirming mesh position in TAPP. *J. Med. Invest.* 63 : 270-273, August, 2016

Keywords : Inguinal hernia, laparoscopy, transabdominal preperitoneal approach, surgical mesh

INTRODUCTION

The transabdominal preperitoneal approach (TAPP) is a method for repairing an inguinal hernia from inside the abdominal cavity and has become widely used in recent years. The procedure involves making a laparoscopic incision of the peritoneum, detaching the inguinal floor, placing mesh in the preperitoneum, and closing the peritoneum.

Initially, due to the small area of detachment, small meshes of 11×6 cm were used (1). To prevent recurrence, mesh sizes were gradually increased (2). In Europe and the United States, mesh sized 15×10 cm or larger has been reported to reduce recurrence rates (3). To accommodate this, the inguinal floor must be detached to a precise degree, and the mesh needs to be placed properly. However, proper placement of the mesh could only be confirmed after the patient recovered from anesthesia. There is not the useful report and it is routine to gradually lower the pneumoperitoneum pressure while controlling mesh and is performed in forceps by a localization method of the mesh.

Here, we report a simple method termed Mesh-Airtight-Preperitoneum (MAPP) developed by our department to confirm mesh position during TAPP.

MATERIALS AND METHODS

TAPP

In our department, to conduct TAPP, the surgeon stands opposite the affected side and creates three ports, one at the umbilicus and one each on the left and right sides of the abdomen, sized 12 mm, 5 mm, and 5 mm, respectively. A 5-mm flexible scope is inserted into the abdominal cavity from the affected side for observation

(Figure 1). Regardless of the hernia's shape or whether it is on the left or right, an electro-surgical hook knife is used to make an incision of the peritoneum from the lateral side of the inner inguinal ring. After confirming the gonadal blood vessels and vas deferens (uterine round ligament) from the lateral side, the field of view is developed by placing traction on the medial umbilical fold and dissecting near its border with the abdominal wall using an electro-surgical knife.

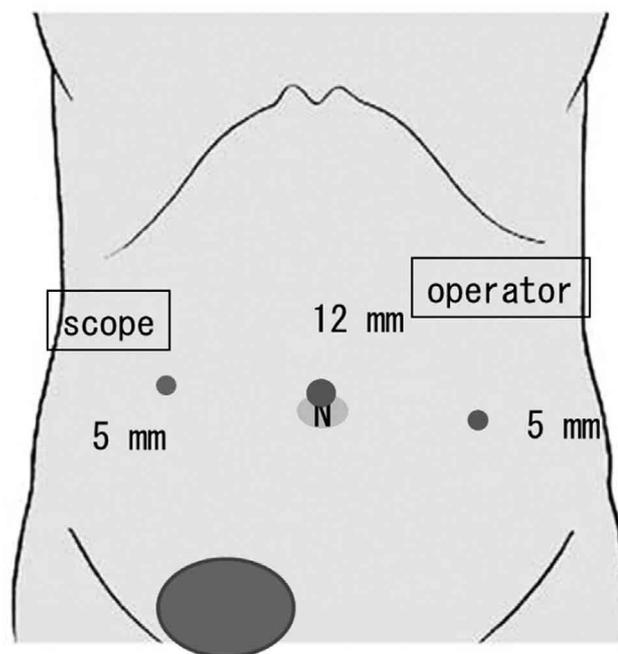


Figure 1. Port positions. The ports of 12 mm, 5 mm, and 5 mm are placed such that they form a triangle with the hernia at the apex. Note that the figure is for a right-sided inguinal hernia.

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Address correspondence and reprint requests to Yasuhiro Yuasa, Irinokuchi 103, Komatsushimacho, Komatsushima, Tokushima Prefecture, 773-0001 Japan, and Fax : +81-885-32-6350.

To fully reconstruct the myopectineal orifice, the range for detachment should be at least 3 cm larger than the hernia orifice (Figure 2) (4, 5). A 15×10 or 13×9-cm mesh is then fixed in place (Figure 3a), the peritoneum is closed, and the procedure is finished (Figure 3b).

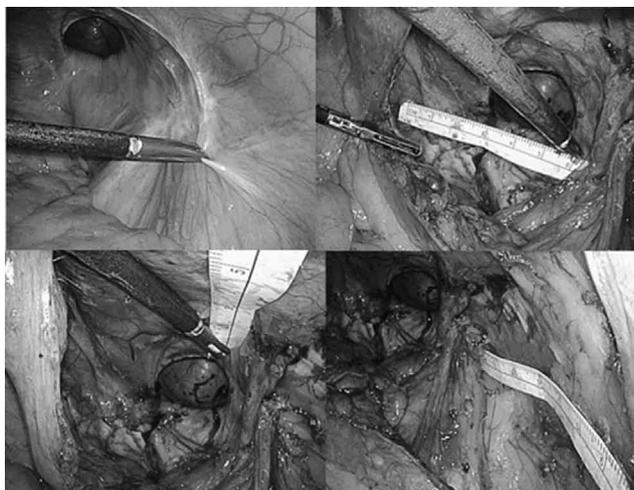


Figure 2. Range of preperitoneal detachment. The detachment is at least 3 cm larger than the hernia orifice. Note that the figure is for a right-sided internal inguinal hernia.

MAPP

Here, we describe the technique we devised to easily confirm mesh position. To prepare, first the peritoneum is closed as usual using V-Loc™, but this is done with only enough tightness so the peritoneum does not constrict or by not completing the last stitch. Air is then removed by placing pressure on the preexisting hernia from outside the body (Figure 4a) and using gauze to apply gentle pressure on the preperitoneum from inside the abdominal cavity (Figure 4b). Air is fully eliminated by temporarily reducing abdominal air pressure to around 4 mm Hg. While maintaining pressure, abdominal air pressure is returned to normal, and then by

releasing manual pressure at the same time (Figure 4c), airtightness of the preperitoneum were preserved and causes the lateral peritoneum to become convex. The position of the mesh can then be observed through the translucent peritoneum (Figure 4d).

RESULTS

The patients' characteristics were summarized in Table 1. Twenty six patients, who underwent TAPP by the same surgeon Y. Y. were retrospectively analyzed from February to September, 2014. Mesh covered the peritoneum, and completely exfoliated in all cases and did not need the labor in particular. However it was not always completely visible. The success of this surgical procedure had tendency in large existing hernias, but may not be as successful in women or with smaller hernias.

DISCUSSION

TAPP is a method of repairing inguinal hernia via the abdominal cavity that has become widely used in recent years. The procedure involves fully detaching the inguinal floor from inside the abdominal cavity, then placing the mesh in a suitable position.

This method was first reported in 1982. Initially, the hernia orifice was closed using clips (6). The surgical style currently in use is based on a 1992 report by Arregui *et al.* (1). In Japan, it was started after Matsumoto *et al.* reported laparoscopically opening and fixing mesh in the preperitoneum (7). In 1994, TAPP was covered under insurance, which led to a temporary increase in its use ; however, an anterior approach that was developed later became the mainstream method. However, recent improvements in image quality and standardization of manipulations in laparoscopic surgery have resulted in a reconsideration of the usefulness of TAPP. In 2012, a survey by the Japan Society for Endoscopic Surgery found that over 20% of inguinal hernia cases were repaired laparoscopically (8).

For the sake of preventing recurrence, the size of the mesh has gradually increased since the initial report ; recently, mesh of at least 15×10 cm has been recommended (9). In addition, it has become important to ensure the preperitoneum is detached neither too much nor too little and to place the mesh in an appropriate position. Normally, after placing the mesh and closing the peritoneum, the detached peritoneum forms a convex shape in the abdominal

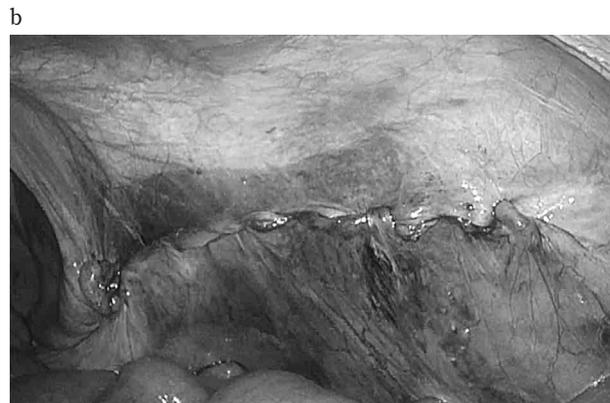
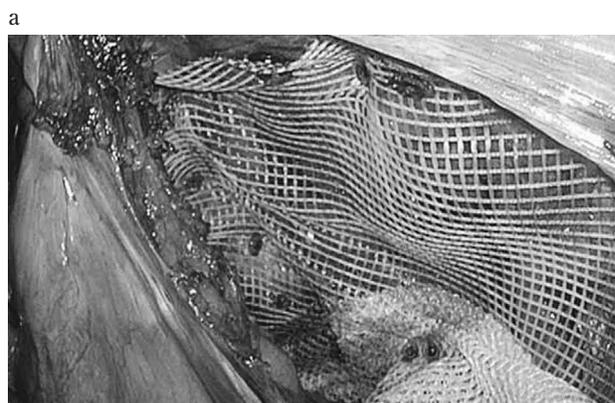


Figure 3.
a : The mesh is fixed in preperitoneum.
b : Immediately after suturing the peritoneum, the peritoneum is convex to the abdominal cavity.

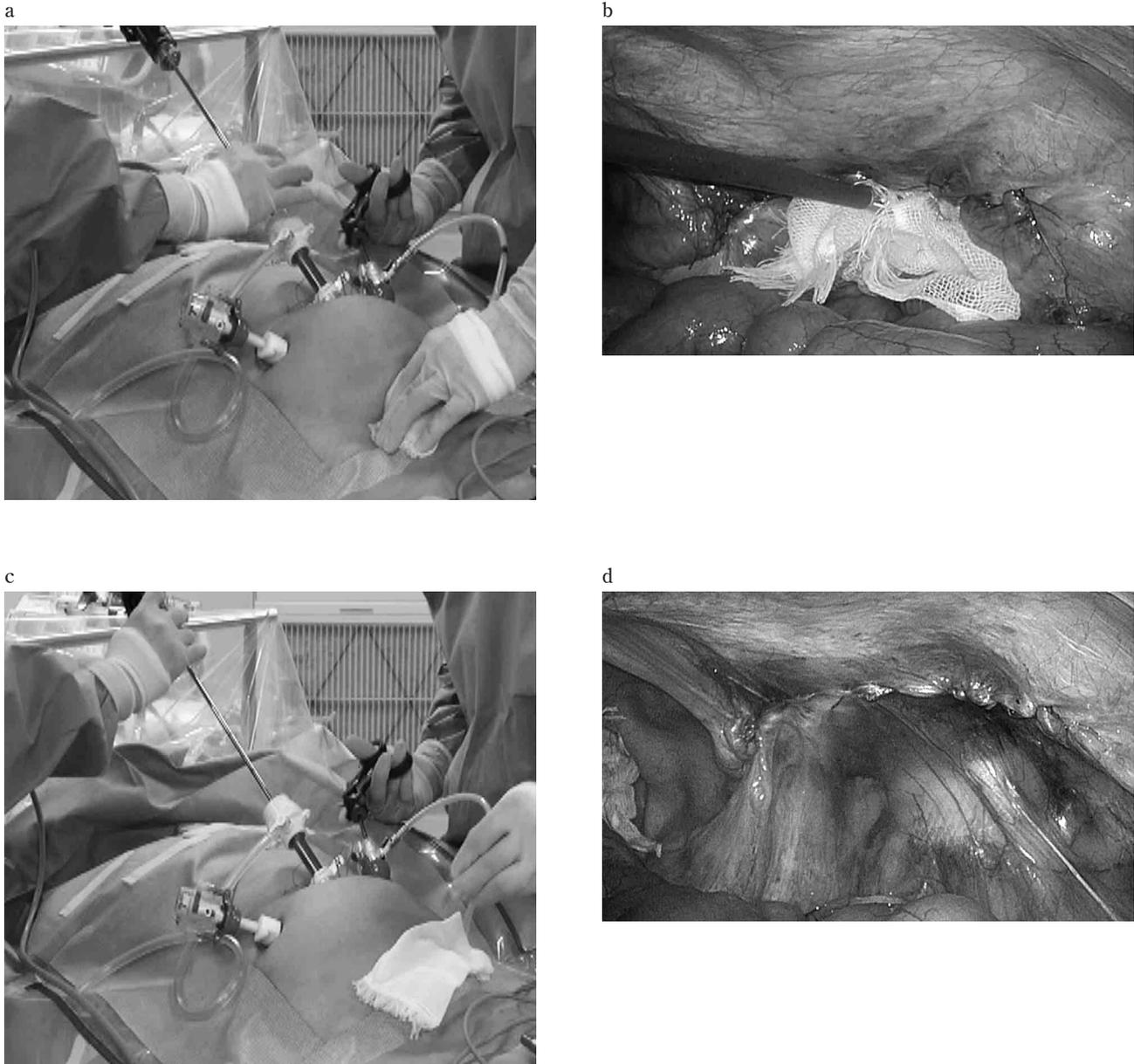


Figure 4.

a : Eliminating air from the preperitoneum. Pressure is manually applied on the hernia from outside the body. This reduces abdominal air pressure to about 4 mm Hg.

b : Eliminating air from the preperitoneum. Simultaneous to the manipulation in Figure 4a, pressure is applied using gauze from inside the abdominal cavity.

c : Releasing the pressure. The hand that had been applying pressure is removed when abdominal air pressure returns to normal.

d : Mesh-Airtight-Preperitoneum is completed. The mesh is visible through the peritoneum.

cavity, making it difficult to confirm the position of the mesh, including whether it has folded, which can lead to recurrence. Applying pressure to the abdomen to release abdominal air is thought to cause the mesh to adhere closely the detached peritoneum as well as to cause tissue to permeate the mesh. However, this cannot be confirmed until the patient recovers from anesthesia.

There is not the useful report and it is routine to gradually lower the pneumoperitoneum pressure while controlling mesh and is performed in forceps by a localization method of the mesh so far.

We devised MAPP to address the lack of a method for confirming the position of mesh during surgery after suturing the peritoneum. The keys to MAPP are having a sufficient range of detachment and

avoiding tight closure of the peritoneum such that applying pressure does not eliminate the air and temporarily reduce the abdominal air pressure, so air is fairly eliminated from the preperitoneum. With larger existing hernias, the airtightness of the preperitoneum is maintained when pressure is released, which, I think, makes the peritoneum and mesh fit better and makes confirmation easier.

CONCLUSION

We reported on MAPP, a method for confirming the position of mesh placed during TAPP. This method does not require special

Table 1. patients' characteristics who underwent "MAPP"

patient	diseased side	hernia type*	gender	age	hernia size (cm)	mesh size (cm)	MAPP
1	right	1	male	77	15	15×10	success
2	right	1	male	49	7	13×9	success
3	right	1	male	80	4	13×9	success
4	right	1	male	63	4	15×10	success
5	right	1	male	51	3	15×10	success
6	right	1	male	26	4	15×10	success
7	right	1	male	61	5	15×10	success
8	right	1	male	58	4	13×9	failure
9	right	1	male	65	7	15×10	success
10	right	1	male	54	3	15×10	success
11	right	1	female	55	3	15×10	success
12	right	1	male	71	3	15×10	success
13	right	2	male	38	4	15×10	success
14	right	2	male	82	6	15×10	success
15	left	1	male	66	3	15×10	success
16	left	1	male	72	4	15×10	success
17	left	1	female	33	2	15×10	failure
18	left	1	male	78	6	15×10	success
19	left	1	male	64	2	15×10	failure
20	left	1	male	71	4	15×10	failure
21	left	2	male	62	4	15×10	success
22	left	2	male	62	6	15×10	success
23	left	2	male	79	7	15×10	failure
24	left	2	male	77	4	15×10	failure
25	left	2	male	66	4	15×10	success
26	left	2	male	64	2	15×10	failure

*JHSclassification

equipment, is not time-consuming, and is simple, so it can be used widely.

CONFLICT OF INTEREST STATEMENT

The authors report no conflict of interest.

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