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CASE REPORT
Reconstructive

The Internal Oblique Muscle Flap with Synthetic Mesh Reinforcement for a Large, Contaminated Abdominal Wall Defect

Shiho Watanabe, MD*
Hisashi Sakuma, MD†
Hikaru Kono, MD*
Ayano Shimono, MD‡
Naoki Matsuura, MD§

Summary: We report a case of a large mediocaudal abdominal defect in contaminated circumstances with no residual rectus abdominis muscle that was reconstructed using an internal oblique muscle flap with large-pore polypropylene mesh reinforcement. The internal oblique muscle flap can reconstruct the lower abdominal midline without leaving any additional conspicuous scar. Previous studies showed that large-pore polypropylene mesh in contaminated wounds has a minimal difference in terms of infection rate, and less frequent occurrence of hernia, compared even with biological meshes. We believe that this method could be a strong and cosmetically satisfying option for large mediocaudal abdominal wall reconstruction. *(Plast Reconstr Surg Glob Open 2020;8:e3083; doi: 10.1097/GOX.0000000000003083; Published online 23 September 2020.)*

Large central abdominal defects have an 11%–30% risk for hernia occurrence; therefore, they require a strong reconstruction. Primary fascial closure with mesh reinforcement is currently the standard of care; however, when rectus abdominis muscle is lost in full-thickness, or if no other fascia is available, muscle flap reconstruction is the second treatment choice.[1] The main concerns related to the use of muscle flaps such as tensor fasciae latae, anterolateral thigh, vastus lateralis, and gracilis flaps[1] are inevitable scarring in another part of the body and their vulnerability. From a previous report, 40% of abdominal wall defects reconstructed by tensor fasciae latae alone results in hernia; therefore, combining them with mesh repair should be considered.[2]

In this report, we demonstrate a case of a large, contaminated mediocaudal abdominal defect that was reconstructed by using an internal oblique muscle flap with large-pore mesh reinforcement. This is a strong and safe method to deal with huge abdominal defects, without creating any additional scarring, even in contaminated circumstances.

*From the *Department of Plastic and Reconstructive Surgery, Keio Gijuku University Hospital, Tokyo, Japan; †Department of Plastic and Reconstructive Surgery, Tokyo Dental College Ichikawa General Hospital, Chiba, Japan; ‡Department of Plastic, Reconstructive and Aesthetic Surgery, Saitama Medical Center, Saitama, Japan; and §Department of Plastic and Reconstructive Surgery, Toho University Sakura Medical Center, Chiba, Japan.*

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CASE REPORT

A 64-year-old woman had a recurrence of mucinous ovarian carcinoma in her abdominal wall 1 year after the surgical resection and adjuvant chemotherapy. Therefore, total resection was planned, and the abdominal wall was reconstructed. An elastic subcutaneous mass measuring 2.6 × 2.0 cm was observed just cranial to the pubis and invaded the rectus abdominis muscle.

Tumor resection was performed by gynecologists. During the procedure, a part of the large intestine was injured and repaired. The rectus abdominis muscle was resected in its full thickness and width bilaterally from the navel to the pubic bone, exposing the medial margin of the external oblique muscle. The surgical margin was 2.5 cm on all sides, resulting in a defect measuring 9 × 7 cm (Fig. 1).

We consecutively dissected just above the rectus sheath bilaterally from the costal margin to the pubis, making longitudinal incisions similar to those of the components separation method. We exposed the internal oblique muscle by dissecting below the external oblique muscle. We designed a 12 × 7-cm-sized flap based on the right internal oblique muscle. We, then, made an incision along the costal margin and dissected the right internal oblique muscle from the transversus abdominis muscle to identify the deep circumflex iliac artery dorsal to the muscle (Fig. 2). The lateral edge of the flap extended to the thoracolumbar

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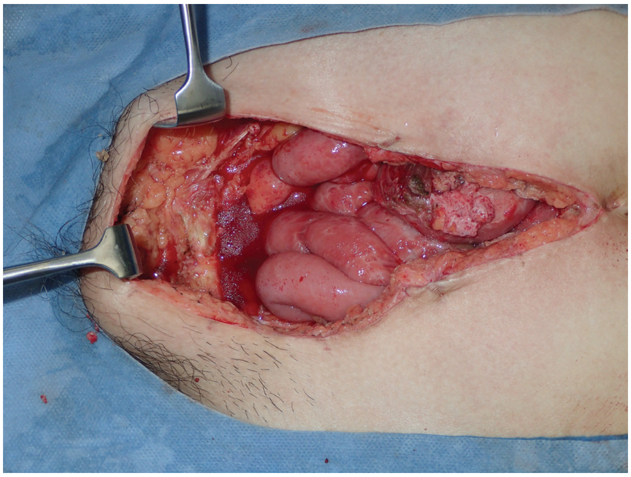

Fig. 1. Photograph showing the abdominal defect after the tumor dissection. The rectus abdominis muscle was resected in its full thickness and width.

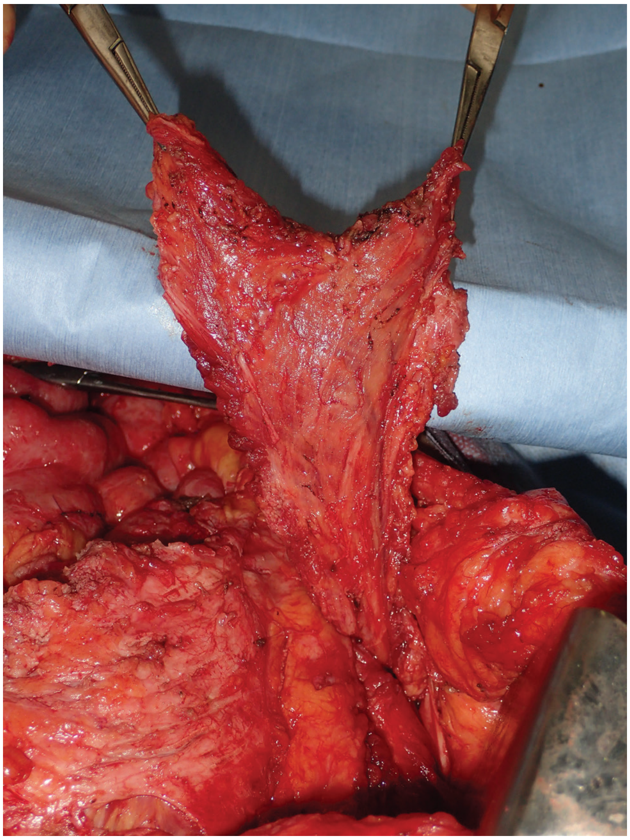

Fig. 2. Elevation of the pedicled internal oblique muscle flap. Vascular pedicle is pointed out by the forceps.

fascia and the iliac crest. The flap was transplanted to the defect area subperitoneally and attached to the surrounding muscles and the periosteum of the pubic bone (Fig. 3). Then, we placed a large-pore polypropylene mesh on both the flap and the donor site, as reinforcement. The skin was directly closed. The patient was discharged from the hospital at 23 days postoperatively, with no complication. Postoperative care involved only wearing of an abdominal bandage. No tumor recurrence, hernia or bulging of the mesh, or infection occurred within 2 years after operation (Fig. 4).

DISCUSSION

The internal oblique muscle flap was first described by Ramasastry et al.[3] in 1984. It is based on the ascending branch of the deep circumflex iliac artery, which rises from the external iliac artery. The flap is used for the reconstruction of the anterior perineum, lower abdominal midline, ipsilateral groin, and trochanteric regions as a pedicled flap, and its maximum size is 10 × 20 cm. According to Rohrich and colleagues, this flap should be a good choice for covering lower abdominal wall defects with a size of <20 cm.[4] An important advantage of this flap is that it can avoid any additional scars.

The components separation method, which is commonly used for abdominal wall reconstruction, was not feasible if performed alone in this case because of the complete loss of the rectus abdominis muscle. Thus, we used this technique just to make the defect smaller.

Mesh repair is the standard procedure for reconstruction of the abdominal wall. From a previous pig experiment, in terms of mesh integration, shrinkage, and elongation, a synthetic large-pore mesh is suitable for large abdominal wall defects.[5] However, fascial closure is needed to avoid mesh from attaching directly to the intestine. A small-pore composite mesh can be set intraperitoneally; however, its infection rate is reported to be high (10.2%), even in clean wounds, and needs removal in most cases.[6] Although some surgeons may prefer a biological mesh, it possibly costs 10 times more than the synthetic mesh and its hernia occurrence rate in contaminated wounds is up to 35%, especially higher in the pelvic region.[7] Thus, mesh repair alone seemed to be inappropriate.

As outlined in the guidelines for emergency repair of complicated abdominal hernias by the World Society of Emergency Surgery,[8] even when compared with a biological mesh, a nonabsorbable synthetic large-pore mesh in contaminated wounds has minimal difference in terms of infection rate, and the occurrence of hernia is less frequent.[8] Also, in rat experiments, nonabsorbable synthetic meshes did not change the infection rate. The nonabsorbable synthetic large-pore mesh does not promote infection because pores >70 μm allow the white blood cells and macrophages to reach the bacteria, which are often <1 μm.[9]

Considering these points, we decided to transplant the internal oblique muscle flap to provide a deep-layer coverage and to place a large-pore mesh as reinforcement. According to a previous report, combining mesh repair with posterior fascial closure or coverage helps offset the tension on the fascial closure and provide biomechanical strength to the native tissue.[10] We considered that this technique not only prevents infection or direct attachment of the mesh to the intestine, but also enables biocompatible abdominal wall reconstruction, with strength and elasticity being similar to those of the natural abdomen.

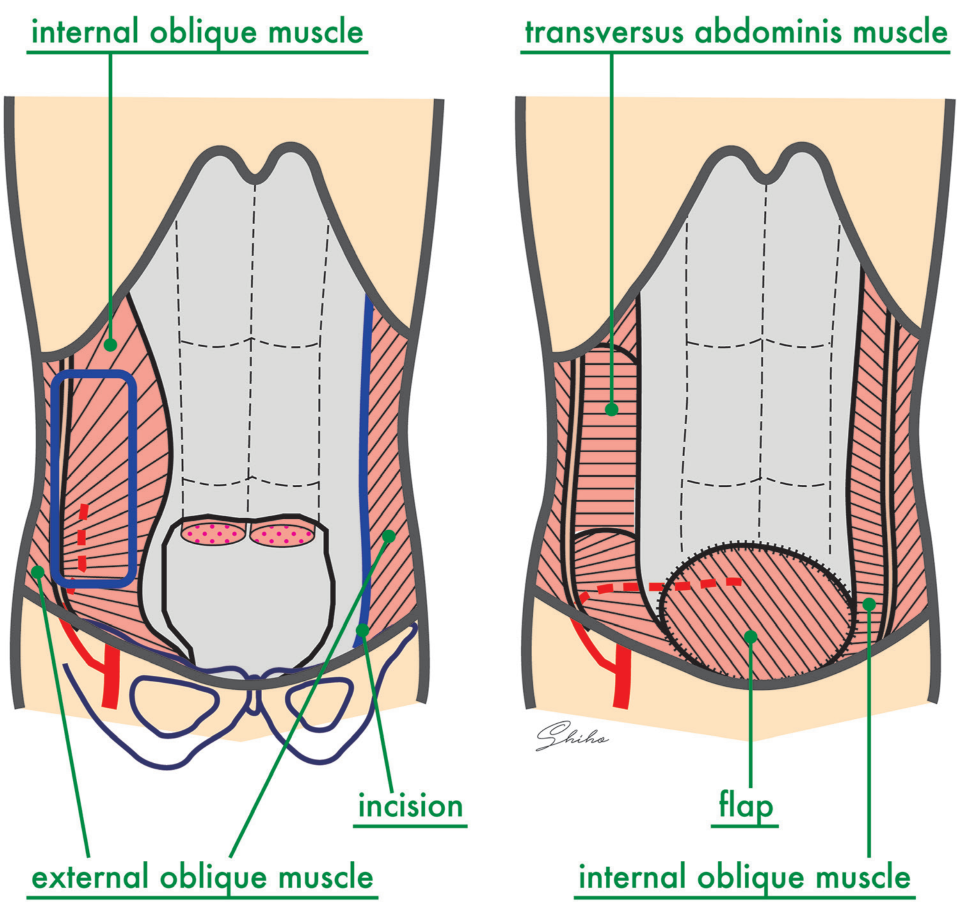

Fig. 3. The schema of the procedure. A, Flap design. B, The flap was set into the defect.

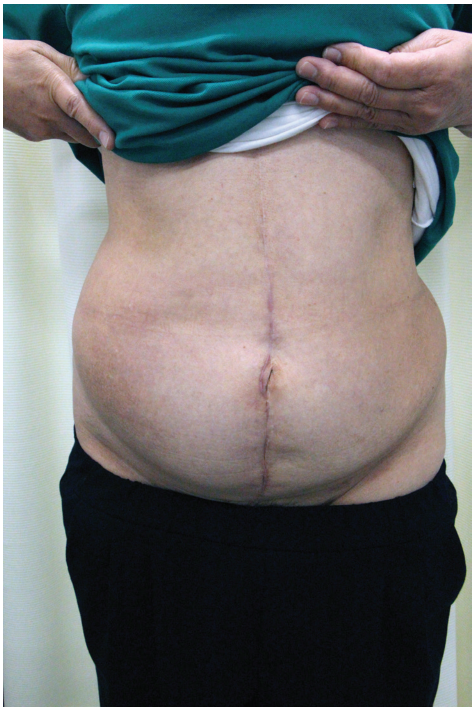

Fig. 4. Postoperative photograph of the patient 6 months after the surgery.

To evaluate the indication, we should preoperatively inspect the history of patients to ascertain whether their internal oblique muscles are intact.

CONCLUSIONS

The internal oblique muscle flap with large-pore mesh repair could be a strong and cosmetically satisfying option for large mediocaudal abdominal wall reconstruction. Given that we described only 1 case and that long-term follow-up and no formal evaluation of scarring were done, future studies involving more cases and multidisciplinary analyses are needed.

Shiho Watanabe, MD
Department of Plastic and Reconstructive Surgery
Keio Gijuku University Hospital
35 Shinanomachi, Shinjukuku
Tokyo 160-8582, Japan
E-mail: swatanabe.3210@gmail.com

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