

Clinical Research

## Transperineal Repair of Secondary Perineal Hernia Using a Mesh with a Memory-recoil Ring

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### Abstract

**Objectives:** The aim of this study was to evaluate the effectiveness of transperineal repair of secondary perineal hernia (SPH) using a mesh with a memory-recoil ring.

**Methods:** Seven patients with SPH who underwent transperineal repair (TPR) between July 2010 and May 2022 were retrospectively analyzed. TPR was performed using a mesh with a memory-recoil ring.

**Results:** All SPHs developed after abdominoperineal resections in patients with anorectal malignancies. The median longitudinal and transverse diameters of the hernia orifice were 8 (7-10) cm and 6 (5-7) cm, respectively. In all cases, the mesh was fixed to the ischial tuberosity, residual levator muscle, coccygeus muscle, and coccyx after thorough dissection of the sac. The median operation time was 154 (142-280) min. Perioperative complications occurred in 2 cases (29%). One was enterotomy, which caused postoperative mesh infection requiring extraction of the mesh. The other was vaginal injury, which resulted in vaginal fistula but closed spontaneously. The median postoperative length of stay was 9 (5-14) days. No recurrence was observed during a median follow-up of 35 (9-151) months.

**Conclusions:** TPR using a mesh with a memory-recoil ring is safe, feasible and promising technique for SPH repairs.

### Keywords

perineal hernia, abdominoperineal resection, hernia repair, mesh with a memory-recoil ring

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### Background

Secondary perineal hernia (SPH) following previous intrapelvic surgeries is defined as the protrusion of intraabdominal contents through an acquired musculofascial defect in the pelvic floor[1]. The incidence of SPH has been reported in the 0.8-27% of patients following abdominoperineal resection (APR)[2-6]. Multiple factors have been thought to be responsible for the development of SPH such as obesity, previous hysterectomy, advanced rectal cancer, a large pelvic outlet in women, excessive length of small bowel mesentery, coccygeal resection and smoking[7-9].

Although several surgical techniques have been described for SPH repair, most reports were case reports with short-term follow-up periods. This was also the reason why consensus has not been established on the optimal surgical management of SPH. The challenges of SPH repair relate to the unique anatomical location, that is, the anterior aspect of the hernia orifice is the vagina/prostate and there is no available “good stuff” for adequate closure of the orifice. Furthermore, both in open and in laparoscopic approaches, either transabdominal or transperineal, access to the hernia orifice is difficult and often requires troublesome adhesiolysis. For these reasons, surgical outcomes following SPH repairs have

**Table 1.** Patients' Demographics and Operative Outcomes.

Case No	1	2	3	4	5	6	7
Measurement							
Age (years)/Sex	74/M	75/M	78/F	74/M	71/M	74/M	72/F
BMI (kg/m <sup>2</sup> )	22.3	19.1	22.4	23.7	25.6	25.9	28.4
ASA	2	2	2	2	1	2	2
smoking	-	-	-	-	-	+	-
Indication of index APR	Rectal cancer	Rectal cancer	Rectal cancer	Rectal cancer	Rectal cancer	Anal canal cancer	Rectal cancer
Type of approach in APR	open	open	lap	lap	lap	lap	lap
Postoperative perineal wound infection	+	-	+	+	-	+	-
Interval between index APR and first hernia development (months)	N/A	6	3	N/A	N/A	29	84
Recurrent perineal hernia	First	N/A	N/A	Second	First	N/A	N/A
Interval between first previous perineal hernia repair and recurrence (months)	6	N/A	N/A	0.5	3	N/A	N/A
Indication of perineal hernia repair	pain	pain	pain	pain	discomfort	discomfort	pain
Size of hernia orifice (longitudinal/transverse, cm)	10/7	8/7	7/6	7/6	8/6	8/6	7/5
Size of mesh used (longitudinal/ transverse, cm)	11/14	11/14	11/14	8/12	8/12	8/12	8/12
Operation time (min)	280	260	182	142	142	154	123
Postoperative hospital stay (days)	7	12	11	8	8	12	3
Perioperative complication	-	-	Intraoperative vaginal injury Postoperative vaginal fistula	-	-	Intraoperative enterotomy Postoperative mesh infection	-
Seroma formation	-	-	-	+	+	-	-
Follow-up (months)	151	101	49	21	17	N/A	9

lap: laparoscopic, N/A: not applicable

been unsatisfactory; the pooled recurrence rate was 22% (range 0-57%) with the mean follow-up of 27 months, and the incidence of overall complications was 33%[10].

A mesh with a memory-recoil ring was introduced for repairs of groin and incisional hernias. This mesh can be easily unrolled and attached to the abdominal wall with no or minimal fixation necessary thanks to its self-expansion properties. We first adopted this type of mesh for transperineal repair (TPR) of SPH because fixation in the anterior part of hernia can be omitted and performed just dorsally to the vagina/prostate. In the present study, we describe the results and technical aspects of TPR using a mesh with a memory-recoil ring with a median follow-up of 35 months.

### Patients and Methods

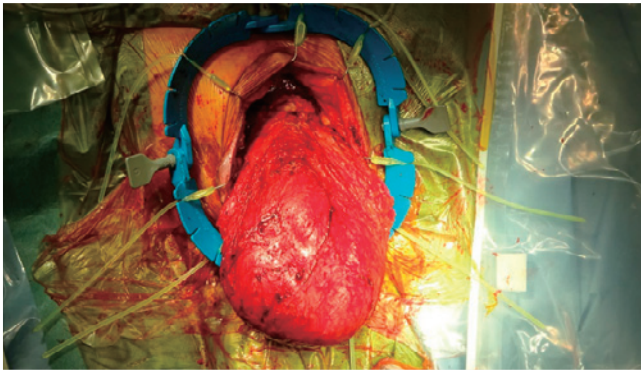
Upon an approval of the institutional review board (30-117), 7 patients with SPH who underwent TPR using a mesh with a memory-recoil ring at the Jikei University Daisan Hospital from July 2010 to May 2022 were retrospectively analyzed. Written informed consent was obtained from the patients for publication of this manuscript. Table 1 presents the demographic data of all enrolled patients. The most frequent underlying disease prior to SPH was rectal cancer (86%), and perineal pain was the most common indi-

cation for SPH repair (71%).

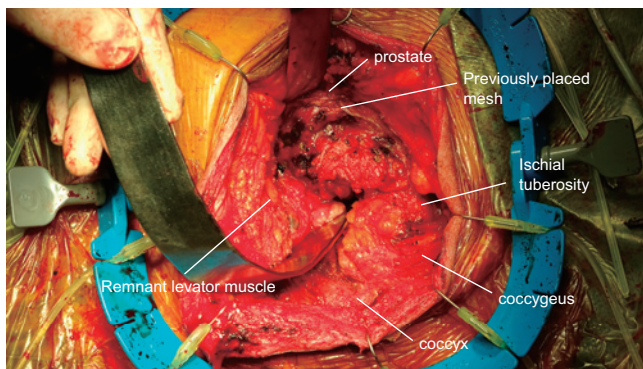
Patients were asked to visit our outpatient clinic for clinical examination 2 weeks, 3 months and 1 year after SPH surgery, and then annually. CT was taken 3 months and 1 year after the SPH operation and then annually. The outpatient examination was asked if patients have any uncertain of hernia recurrence about the repair.

### Surgical technique

Under general anesthesia, patients were placed in the modified lithotomy position and the surgical field was prepared. An elliptical incision was made around the previous perineal scar. The hernia sac was dissected (Figure 1) and its contents reintroduced into the abdominal cavity. The hernia sac was preserved as much as possible and left *in situ*. Lone Star<sup>®</sup> self-retaining retractor system (CooperSurgical Inc, CT, USA) was used to obtain a deeper view of the surgical field. Dissection was continued to the level of the levator ani muscle insertion laterally and anteriorly, within the space dorsal to the vagina/prostate, and posteriorly towards the coccyx (Figure 2). In all cases, Bard<sup>®</sup> Kugel<sup>®</sup> Patch (Figure 3), size S (8.0 × 11.76 cm) or M (11.0 × 14.0 cm), (BD, Warwick, RI, USA) was used. The mesh was placed to cover the hernia defect and fixed with interrupted non-absorbable sutures (0-Prolene) (Ethicon, Johnson & Johnson,

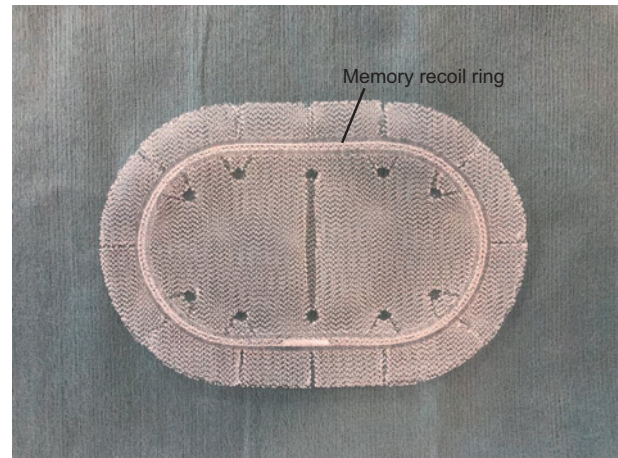


**Figure 1.** The operative view after thorough dissection of the hernia sac.



**Figure 2.** The operative view after inversion of the sac into the abdominal cavity.

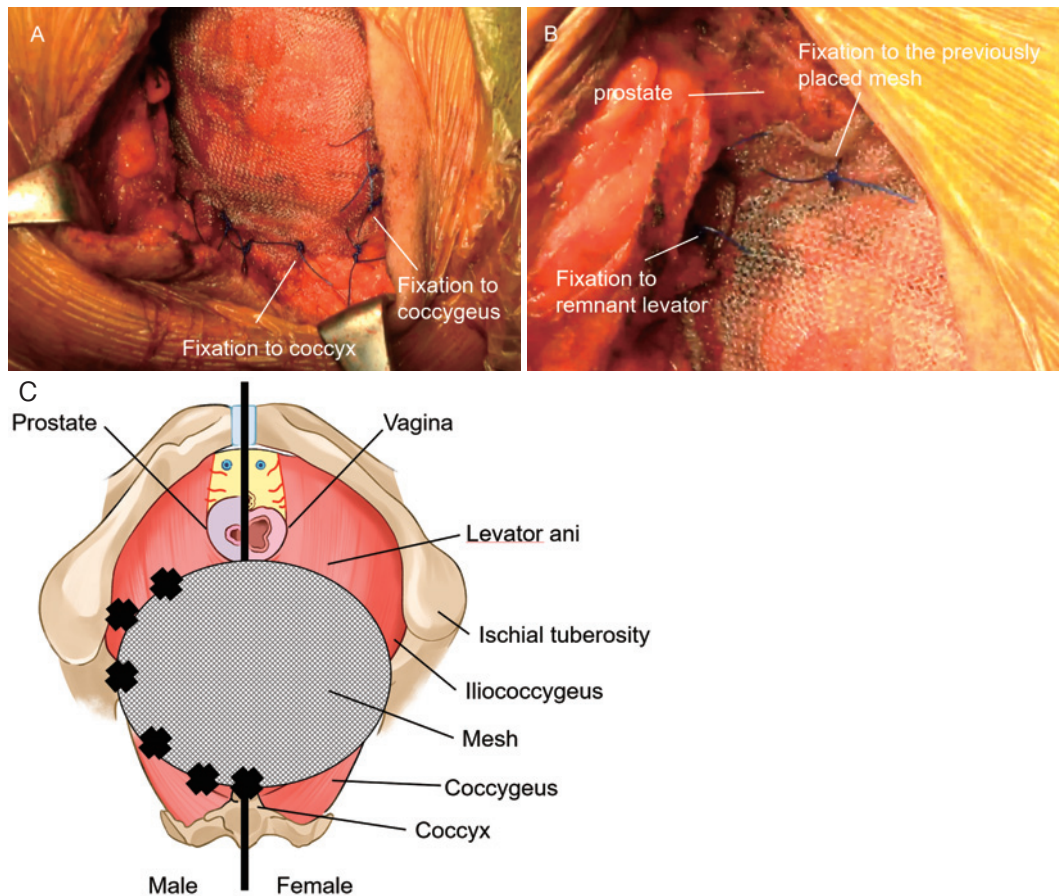
Livingston, Scotland, UK) laterally to the remaining levator muscle tissue and ischial tuberosity, and posteriorly to the coccygeal muscle and coccyx (Figure 4). The mesh was not fixed anteriorly, since no sufficient fixable tissue was present dorsally to the vagina/prostate. In two cases of recurrent hernia following intraperitoneal onlay mesh (IPOM) repair, the previously placed meshes were found during dissections: one was dislocated behind the prostate and the other protruded from the pelvic floor (Figure 5). In the former case, a new mesh was sutured to the previously placed mesh, and in the latter, a new mesh was placed to overlap the previous mesh and fixed to the surrounding strong structures. In the case of re-recurrent hernia, the mesh was not observed in the dissected field and a new mesh was placed and fixed in the usual fashion for SPH. Following placement of a suction drain in contact with the mesh to prevent fluid collections, subcutaneous tissue and skin were closed in two layers. In one case, the mesh had to be placed after performing a simple closure of a small incidental bowel injury without significant spillage.



**Figure 3.** Kugel patch.

## Results

The demographic data of all patients are listed in Table 1. Among 7 patients, there were 5 men and 2 women; 6 were after APR for rectal cancer and 1 was after APR for anal canal cancer. The median age at the time of repair was 74 years (range 71-78 years) and the median body mass index was 23.7 kg/m<sup>2</sup> (range 19.1-28.4 kg/m<sup>2</sup>). Two patients had history of preoperative chemoradiotherapy. The index APR procedure was performed with laparoscopic approach in 5 cases and open approach in 2 cases. In 4 cases, surgical site infection on the perineal wound occurred after APR. The interval between APR and the onset of the first SPH was in the range of 3-84 months. Three cases were recurrent, in 2 cases it was the first recurrence after IPOM repair and in one case it was the second, in which the first operation was repair with a musculocutaneous flap using the gluteus maximus and the second was laparoscopic IPOM. The interval between the last hernia repair and recurrence was in the range 0.5-3 months. The indications of SPH repair were perineal pain in 5 cases and perineal discomfort in 2 cases. Sizes of hernia defects were similar in all case and ranged from 7-10 cm (longitudinal diameter) to 5-7 cm (transverse diameter) measured in the lithotomy position. The median operation time was 154 min (range, 123-280 min). The post-operative median hospital stay was 8 days (range, 3-12 days). Intraoperative complications occurred in two cases, one was incidental enterotomy of the small bowel severely adhered to the hernia sac and the other was vaginal injury. In the former, the injured part of the bowel was closed under the direct vision. Spillage of the content to the surgical field was not observed and mesh repair was successfully completed. However, the patient developed high fever and the drain fluid changed from serous to purulent on the post-operative day 4. The emergency operation was performed with the diagnosis of mesh infection, and the mesh was extracted. In the latter case, the injured vagina was closed us-



**Figure 4.** The operative view after mesh fixation (recurrent perineal hernia after intraperitoneal onlay mesh repair).

A: posterior view; the mesh was fixated to the coccyx and the coccygeal muscle.

B: anterior view; the mesh was fixated to the remaining tissue of the levator ani and the previously placed mesh (if it did not exist, no fixation was performed).

C: Schematic explanation of mesh placement and fixations.

X marks indicate fixations.

ing absorbable sutures. Postoperatively, the vaginal fistula developed but resolved with conservative treatment within 3 months. Seroma formation was encountered in 2 cases, and in both, it spontaneously resolved within 3 months after operations. There was no recurrence with median follow-up of 35 (9-151) months.

## Discussion

The basic rule in hernia repair techniques is to close the hernia orifice with “good stuff”, supportive tissue surrounding the orifice. However, there is no usable “good stuff” in the anterior part of SPH, dorsally to the vagina/prostate, making the repairs complex. Primary suture, muscular layer-incorporating flap repair or mesh (synthetic, biologic) repair are usually applied methods of SPH repairs, and they are performed either via transabdominal (open, laparoscopic or robotic) or transperineal approach. Mesh repair has been a

recommended surgical technique due to the lower recurrence rate compared to other methods, but no consensus has been established regarding preferable surgical approach (transabdominal or transperineal). In transabdominal techniques, IPOM repair is usually utilized but since the anterior part of the hernia orifice is directly adjacent to the vagina/prostate, strong fixation is inevitably impossible and wide meshes are usually sutured directly to the peritoneum. However, concerning the outcomes of this technique, we remain rather skeptical, because prolapse of the intrapelvic organs such as urinary bladder can occasionally occur (Figure 5). Furthermore, transabdominal approaches have been related to higher risks of perioperative complications due to operative difficulties caused by previous postoperative intraabdominal and intrapelvic adhesions; pooled data demonstrated higher rates of complications for transabdominal approaches compared to transperineal ones (39% [14-67%] and 31% [19-44%], respectively)[10]. Therefore, the transperineal tech-



**Figure 5.** Sagittal section of abdominal CT scan after transabdominal perineal hernia repair.

White triangle: The urinary bladder sliding out from the pelvic cavity.

White single arrow: previously placed mesh.

White double arrows: recurrent perineal hernia.

nique has been selected as a method of choice for SPH repair, because adhesions do not interfere during dissection towards the hernia orifice; however, even after mesh repairs, the recurrence rates have been far from satisfactory (20% [12-29%])[10]. Following SPH repairs, the mesh must sustain direct pressure in standing and/or sitting positions and therefore, the mesh's strength becomes an important factor of surgical outcome. The mesh's weakness and breakability are probably the reasons why recurrence rates continue to be very high after repairs with biologic meshes[11]; therefore, durable meshes and sufficient fixations are preferable. Having considered all of the above-mentioned characteristics and difficulties of SPH repair, we used a mesh with a memory-recoil ring and placed it transperineally. Originally, the mesh with a memory-recoil ring was introduced for repairs of inguinal hernias. Since it does not require fixation, its benefits including lower rate of postoperative pain have been demonstrated. In our surgical technique, the mesh was fixed to structurally strong tissue elements in all parts of hernia orifice except the dorsal aspect of vagina/prostate, and recurrences did not develop during the median follow-up period of 35 months. This no-recurrence observation period was longer than those reported in the literature, where average reported period before recurrence was 17 months following SPH repair[11]; our results indicate effectiveness of our TPR technique.

In regard to surgical site occurrences (SSO), transperineal approach has been clearly associated with higher rate of

complications (19% [10-29%]) compared to transabdominal approach (6% [0-18%]). In our series, there were 2 patients (29%) with SSO: in one, intraoperative incidental enterotomy led to mesh infection and in the other, intraoperative incidental injury of the vaginal wall caused postoperative vaginal fistula. In our TPR technique, while dissecting the hernia sac the surgical field becomes relatively deep and its anterior aspects tend to be poorly visible. Indeed, in the 2 cases with intraoperative internal organ injury, injuries occurred in the anterior aspects of the hernia orifice. Our TPR technique utilizes the features of inlay or onlay repair in regard to mesh placement and since the memory-coil ring fills into the gap space anteriorly (dorsally to the vagina/prostate), deep dissection of the hernia sac possibly may be not necessary. Seroma formation is another complication of TPR for secondary perineal hernia and occurs with higher incidence in cases with larger hernia sacs, which postoperatively leave larger "dead spaces". Seroma developed in 2 cases in our series and in both cases spontaneously resolved within 3 months after surgery. Since postoperative seroma may lead to SSO, some authors recommend a "hybrid" repair technique with tissue flap reconstruction combined with mesh repair as a treatment choice for SPH with a large hernia sac[11].

Placing a mesh after closure of the hernia orifice has been recommended by some authors and has become one of recent trends in abdominal incisional hernia repair[12]. The hernia orifice is closed not only to reduce hernia recurrence, to reduce risks of early and late postoperative complications (seroma formation, mesh bulging and others) but also to reinforce the supportive function of the abdominal wall. In SPH repairs, the fascial defect in the remaining levator ani is occasionally closed, but if the defect is large, such procedure becomes practically impossible and becomes limited to only selected patients. During closure of hernia, direct suturing may be technically difficult and future application of robot-assisted techniques may widen the range of available surgical methods[13].

Concerns about meshes with non-absorbable memory-recoil rings may exist in regard to long-term safety. Some authors reported bowel complications related to self-expanding meshes in intraperitoneal only mesh ventral hernia repair[14,15]; however, in extraperitoneal hernia repair, there have been no reports demonstrating complications due to ring breakage.

Small number of patients and retrospective analysis are the two limitations of the present study. However, in regard to SPH treatment, there are no valid comparative trials and only case reports or case series are available in the literature. The largest case series study for SPH examined 36 cases, in which only 15 cases were repaired with the same technique[16], and were followed with a median period of 12.7 months. Notwithstanding its limitations, we believe that

the present study adds valuable findings, since it presents outcomes of SPH patients operated with the same type of mesh and the same operative approach, and who were followed for the median period of approximately 3 years. Furthermore, this is the first report on SPH repair using a mesh with a memory-coil ring and no postoperative hernia recurrence, indicating that our TPR technique is promising and effective.

### Conclusion

Our TPR using a mesh with a memory-coil ring is safe and feasible with no recurrence observed during the mid-term follow-up. The presented TPR seems to a promising method in SPH repair.

#### Acknowledgements

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#### Conflicts of Interest

There are no conflicts of interest.

#### Author Contributions

Katsuhito Suwa wrote the manuscript. Takanori Kuroguchi, Takuro Ushigome, Hiroya Enomoto, Tomoyoshi Okamoto, and Ken Eto made substantial contributions to the conception and design of the study, and they were involving in drafting the manuscript and revising it critically for important intellectual content. All authors declare that they contributed to this article and that they all approve its final submitted version.

#### Approval by Institutional Review Board(IRB)

Approval code issued by the institutional review board of the Jikei University: 30-117

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