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Laparoscopic-Assisted Combined Transabdominal-Transsacral Resection of a Presacral Epidermoid Cyst: A Case Report

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Abstract

Epidermoid cysts of the presacral space are rare congenital lesions with a potential for malignant transformation, necessitating complete surgical resection with negative margins. The selection of an appropriate surgical approach should be guided not only by tumor size but also by anatomical complexity, particularly the proximity of the tumor to critical structures such as the rectum and pelvic autonomic nerves. A 48-year-old woman was referred to our department after a cystic lesion anterior to the coccyx was incidentally identified on whole-body computed tomography (CT). Pelvic magnetic resonance imaging (MRI) revealed a 49-mm cystic lesion in close proximity to the lower rectum and coccyx, with no evidence of invasion. As malignancy could not be excluded, complete surgical resection was planned. Given the intimate anatomical relationship of the tumor with the lower rectum, coccyx, and pelvic splanchnic nerves, we selected a laparoscopic-assisted combined transabdominal-transsacral approach despite the tumor measuring less than 5 cm. Laparoscopic rectal mobilization facilitated precise dissection between the tumor and the rectum under magnified visualization, with reliable preservation of the pelvic splanchnic nerves. The tumor was subsequently excised en bloc with the coccyx via a gluteal incision. The postoperative course was uneventful, and the patient was discharged on postoperative day 8 without complications. Pathological examination confirmed a diagnosis of epidermoid cyst with negative resection margins. At eight months postoperatively, there are no signs of recurrence or bowel and bladder dysfunction. This case demonstrates that anatomical complexity should take precedence over tumor size in selecting a surgical approach for presacral tumors. The laparoscopic-assisted combined transabdominal-transsacral approach enabled safe and complete resection with preservation of pelvic autonomic nerve function and represents a valuable surgical strategy for presacral tumors presenting complex anatomical relationships.

Categories: General Surgery
Keywords: developmental cyst, epidermoid cyst, laparoscopic surgery, presacral tumor, transabdominal-transsacral approach

Introduction

Epidermoid cysts arising anterior to the sacrum are a type of developmental cyst originating from embryonic remnants and are predominantly diagnosed in middle-aged women [1,2]. Although most developmental cysts are benign, there is a rare risk of malignant transformation, necessitating complete surgical resection with adequate clear margins. Epidermoid cyst, one of the developmental cysts, has a predilection for the presacral space, and transsacral resection is frequently performed. However, depending on the location and size of the tumor, a transabdominal approach may be required, and the selection of an appropriate surgical approach is critical to achieving complete resection. We herein report a case of laparoscopic-assisted combined transabdominal-transsacral resection of an epidermoid cyst located anterior to the coccyx.

Case Presentation

A 48-year-old woman presented to the neurology department with a chief complaint of muscle weakness in the right hand fingers. A whole-body CT scan performed for muscle evaluation incidentally identified a cystic lesion to the left of the rectum, leading to her referral to our department. Digital rectal examination revealed a soft, elastic mass palpable to the left of the rectum. No bowel habit abnormalities or perianal findings were observed. Her medical and family histories were unremarkable. Laboratory findings, including tumor markers, showed no remarkable abnormalities.

Contrast-enhanced CT demonstrated a cystic lesion at the pelvic floor anterior to the coccyx, located between the coccyx and the rectum and in close contact with the rectal wall (Figure *1*).

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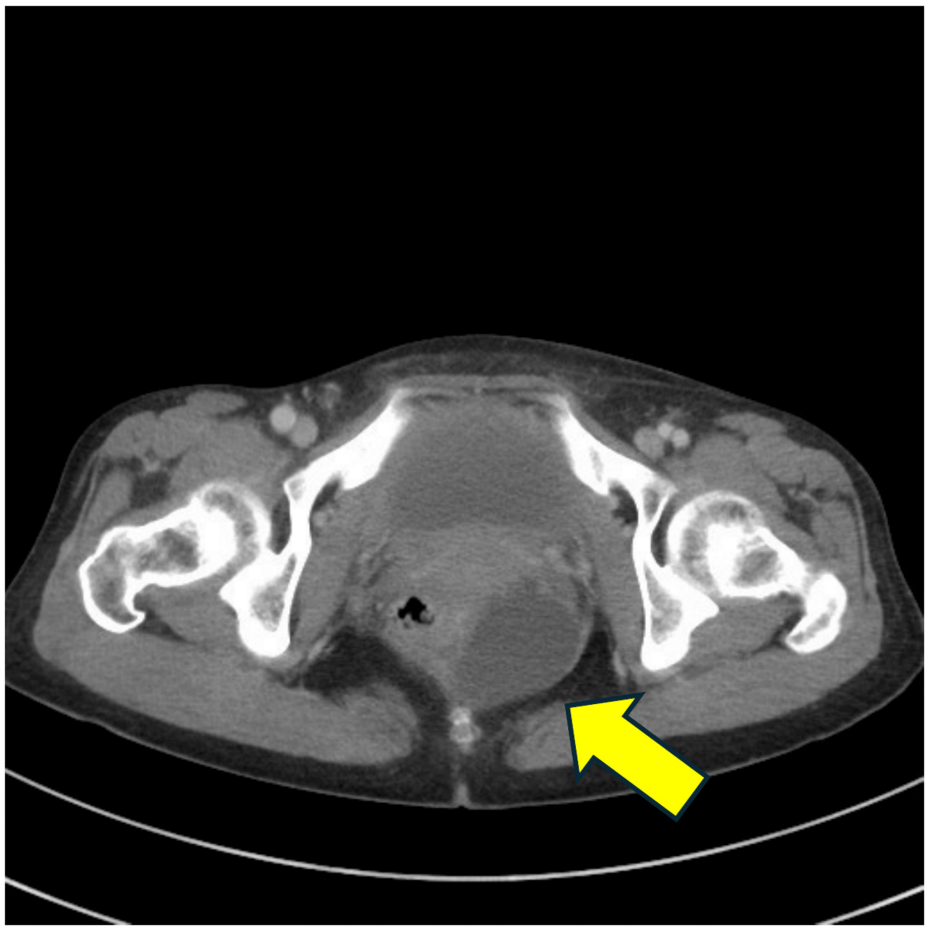


FIGURE 1: Contrast-enhanced CT findings of the presacral cystic lesion

The cystic lesion is located between the coccyx and the rectum, in close contact with the rectal wall (arrow).

Pelvic MRI revealed a cystic lesion measuring 49 mm in maximum diameter to the left of the rectum, cephalad to the levator ani muscle (Figure *2*).

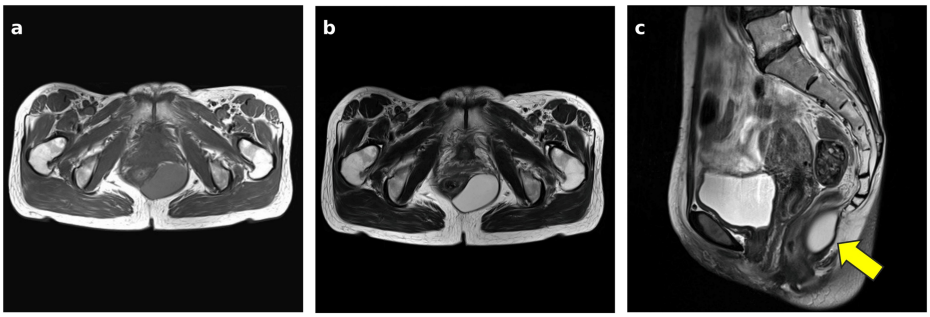


FIGURE 2: Pelvic MRI findings of the presacral cystic lesion

The cyst contents show low signal intensity on T1-weighted axial images (a) and high signal intensity on T2-weighted axial images (b). Sagittal T2-weighted images demonstrate the relationship between the tumor, coccyx, and levator ani muscle (arrow) (c). The border between the cyst and the rectal wall is well-defined.

The border between the cyst and the rectal wall was well-defined, and no imaging findings suggestive of rectal invasion or involvement of adjacent organs were identified. The cyst contents showed low signal intensity on T1-weighted images and high signal intensity on T2-weighted images, suggesting fluid with higher viscosity than simple serous fluid. No obvious solid components or septal structures were identified. Based on these findings, the differential diagnoses included tailgut cyst and mucinous adenoma. As malignancy could not be excluded, a decision was made to proceed with complete surgical resection. Given

the close proximity to the rectum, laparoscopic transabdominal-transsacral resection was planned.

The patient was initially placed in the lithotomy position, and the laparoscopic procedure was performed using five ports (Figure 3A).

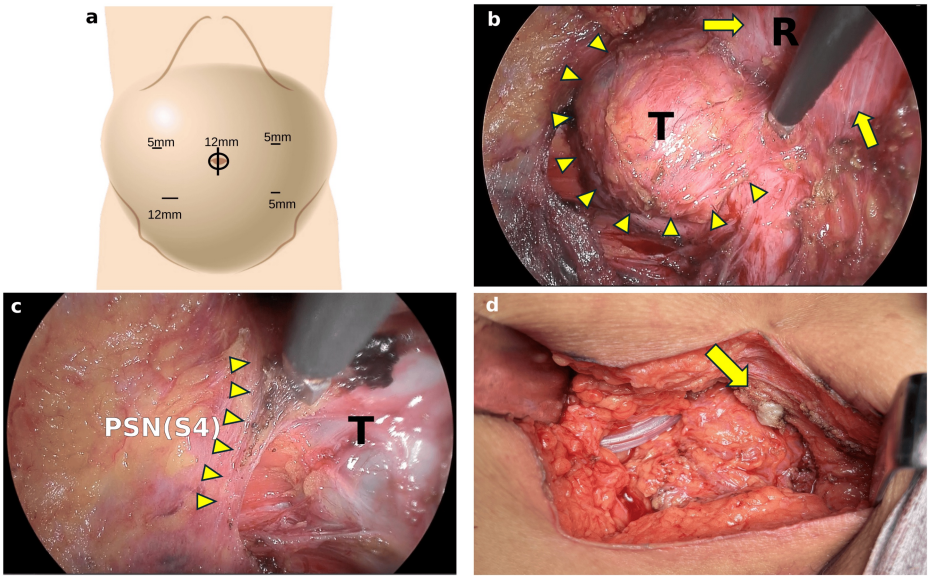


FIGURE 3: Intraoperative findings

(a) Port placement in the lithotomy position. Image credits: Hirofumi Suzumura. Figure prepared using Microsoft PowerPoint (Redmond, WA, USA). (b) Laparoscopic view showing dissection between the posterior rectal wall (arrow) and the anterior aspect of the tumor (arrowhead). R, rectum; T, tumor. (c) Laparoscopic view showing the S4 pelvic splanchnic nerves (arrowhead) successfully preserved after dissection from the tumor. PSN, pelvic splanchnic nerves; T, tumor. (d) The tumor was excised en bloc with the coccyx via a gluteal incision. The arrow indicates the level of coccygeal resection.

Peritoneal incision of the rectosigmoid colon was initiated at the level of the sacral promontory, and rectal mobilization was carried out along the mesorectal fascia down to the pelvic floor, allowing identification of the cephalad aspect of the tumor (Figure 3B). While retracting the rectum anteriorly, circumferential mobilization of the rectum was performed down to the level of the coccyx, and the plane between the anterior surface of the tumor and the posterior wall of the rectum was sufficiently dissected. The posterior aspect of the tumor was also found to be separable from the anterior surface of the sacrum. Dissection between the tumor and the bilateral pelvic splanchnic nerves (PSN) was successfully performed, ensuring reliable nerve preservation (Figure 3C). Circumferential mobilization of the rectum was completed down to the level of the upper anal canal, and the laparoscopic procedure was concluded.

The patient was then repositioned to the jackknife position. An oblique gluteal incision of approximately 8 cm was made from the left gluteal region toward the coccyx, rather than a midline parasacrococcygeal incision. We chose this approach because we considered that an oblique incision would better distribute wound tension and reduce the risk of wound contamination due to its greater distance from the anal region. Circumferential dissection was performed along the tumor capsule. As the tumor was in direct contact with the coccyx on preoperative imaging and intraoperative findings, coccygectomy was performed to achieve complete R0 resection and minimize the risk of local recurrence. The tumor was excised en bloc with the coccyx (Figure 3D). A closed negative-pressure drain was placed through the gluteal incision, and the wound was closed. The total operative time, including time for patient repositioning, was 277 minutes, with an estimated blood loss of 65 mL. The resected specimen was a cystic lesion measuring 49 × 40 mm and containing a gray, porridge-like substance (Figure 4A).

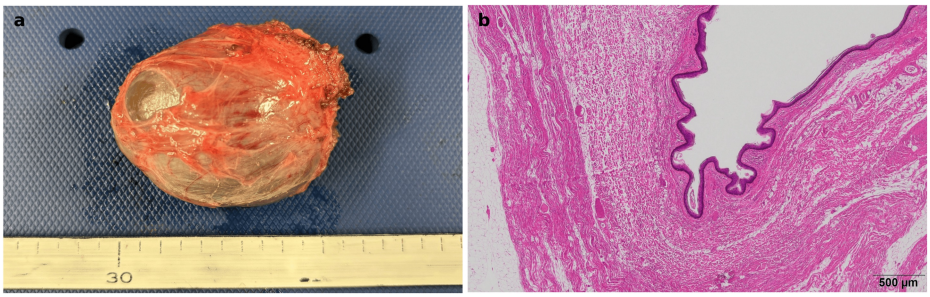


FIGURE 4: Pathological findings of the resected epidermoid cyst

(a) Macroscopic view of the resected specimen showing a cystic lesion measuring 49 × 40 mm and containing a gray, porridge-like substance. (b) Microscopic view showing the cyst wall lined by stratified squamous epithelium without atypia, with melanin deposition in the basal layer (hematoxylin and eosin staining).

The postoperative course was uneventful. The drain was removed on postoperative day 6, and the patient was discharged on postoperative day 8 without any complications. Pathological examination revealed that the cyst wall was lined by stratified squamous epithelium without atypia, with melanin deposition observed in the basal layer of the squamous epithelium, leading to a final diagnosis of epidermoid cyst (Figure *4B*). No definitive evidence of malignancy was identified, and the resection margins were negative (R0 resection). It has now been eight months since the surgery, and there are no signs of recurrence. Based on patient-reported symptoms, no bowel or bladder dysfunction was reported by the patient at eight months postoperatively. Sexual dysfunction was not formally assessed in this case, which represents a limitation of this report. We acknowledge that eight months is a relatively short follow-up period for recurrence surveillance, and regular imaging follow-up is planned at our institution.

Discussion

Presacral epidermoid cysts are rare congenital lesions originating from embryonic remnants. Hawkins et al. defined cystic tumors arising from developmental errors during embryogenesis as "developmental cysts," and classified them histologically into three types: dermoid cyst, epidermoid cyst, and mucus-secreting cyst (tailgut cyst) [3]. Their reported incidences are 47.5%, 40%, and 12.5%, respectively. Both dermoid and epidermoid cysts originate from misdirected ectodermal elements and contain caseous material; however, epidermoid cyst is characteristically unilocular and lacks skin appendages. In the present case, the absence of skin appendages confirmed the diagnosis of epidermoid cyst. Preoperative imaging is generally insufficient to differentiate between these entities, and pathological examination is required for a definitive diagnosis. Most epidermoid cysts are asymptomatic and are frequently discovered incidentally on CT or MRI [4], as was the case in the present patient. These cysts carry a potential for malignant transformation to squamous cell carcinoma, and six such cases have been reported in Japan [5,6]. Because preoperative biopsy and fine-needle aspiration cytology carry risks of tumor dissemination and infectious complications [7], a definitive tissue diagnosis is often unavailable before surgery. Furthermore, recurrence following incomplete resection has been reported even in the absence of malignancy [8], and the pathogenesis of malignant transformation remains unclear, although chronic epithelial irritation from cyst inflammation has been proposed as a contributing mechanism [5]. Given that malignancy cannot be definitively excluded preoperatively, complete en bloc resection of the tumor including its capsule, with negative margins, is the cornerstone of treatment. A search of the Ichushi-Web database (Japan Medical Abstracts Society) was conducted using Japanese-language keywords equivalent to ‘epidermoid cyst’ and ‘presacral region’. Articles published between 1983 and 2025 were included, and conference abstracts and duplicate reports of the same case were excluded. This search identified 56 reported cases in the Japanese literature. Including the present case, a total of 57 cases were reviewed. The mean patient age was 49 years (range: 21-83 years), with a female predominance (male-to-female ratio 18:39). The most common presentation was incidental discovery (28%), followed by pain-related symptoms (26.3%). Mean tumor diameter was 91 mm (range: 30-300 mm).

The selection of an appropriate surgical approach is critical to achieving complete resection while minimizing functional impairment. Although the conventional size criterion proposed by Böhm et al. recommends a combined transabdominal-transsacral approach for lesions ⩾5 cm [9], and Stewart et al. recommended transabdominal or combined approaches for tumors exceeding 10 cm [10], we contend that anatomical complexity should take precedence over tumor size alone in surgical decision-making. In the present case, although the tumor measured only 49 mm, its intimate contact with the lower rectum, coccyx, and bilateral PSNs rendered a purely transsacral approach insufficient. A transsacral approach alone raised concerns regarding the risk of rectal injury, capsular disruption, and nerve damage - all of which could compromise both oncological and functional outcomes. These anatomical considerations, rather than tumor size per se, were the primary determinants in selecting a combined transabdominal-transsacral approach, and we believe this principle should guide surgical planning for deep pelvic tumors presenting similar anatomical challenges. Although the tumor was located at the S5-coccyx level, which theoretically falls

within the anatomical threshold for a posterior-only approach based on the commonly cited rule that lesions whose upper border lies below S3 can generally be accessed via the posterior approach alone, the intimate contact between the tumor and the posterior rectal wall, combined with the need for reliable PSN preservation, led us to select a combined approach. We believe that anatomical complexity and proximity to critical structures should take precedence over level-based criteria alone in such cases.

The technical synergy achieved by combining the laparoscopic transabdominal and transsacral approaches was central to the success of this procedure. In the transabdominal phase, laparoscopic rectal mobilization was initiated at the sacral promontory and carried out along the mesorectal fascia to the pelvic floor, allowing identification of the cephalad aspect of the tumor. The rectum was then mobilized circumferentially down to the level of the coccyx, establishing a safe dissection plane between the posterior rectal wall and the anterior surface of the tumor. Critically, dissection between the tumor and the bilateral PSNs was completed under magnified laparoscopic visualization, ensuring reliable nerve preservation. The laparoscopic phase was concluded once circumferential mobilization of the rectum had been completed down to the level of the upper anal canal - the point at which sufficient working space had been secured to allow safe and complete tumor extraction via the subsequent transsacral approach. This clearly defined technical endpoint facilitated a seamless and safe transition between the two phases of the procedure. A total of eight cases of laparoscopic-assisted combined transabdominal-transsacral resection for presacral tumors have been reported in the Japanese literature, including the present case (Table *1*).

Author	Year	Age	Sex	Pathology	Tumor size (mm)	Location	Ports	Operative time (min)	Blood loss (ml)	Postoperative dysfunction
Baba [11]	2014	38	F	Teratoma	80	S2-C	5	Unknown	Unknown	none
Kawasaki [12]	2017	59	F	Epidermoid cyst	180	S1-C	5	420	200	none
Suda [13]	2017	65	F	Epidermoid cyst	80	S3-C	5	249	17	none
Suwa [14]	2018	64	M	Tailgut cyst	34	S2-5	5	305	359	none
Kawahara [15]	2022	36	F	Tailgut cyst	65	S5-C	5	331	Minimal	none
Takenaka [16]	2022	52	F	Teratoma	85	S4-C	5	297	133	unknown
Imanishi [17]	2023	34	F	Epidermoid cyst	78	S5-C	5	259	Minimal	none
Present case	2026	48	F	Epidermoid cyst	49	S5-C	5	277	65	none

TABLE 1: Reported cases of laparoscopic-assisted combined transabdominal-transsacral resection for presacral tumors in the Japanese literature

S, sacrum; C, coccyx. Location indicates the vertebral levels spanned by the tumor (e.g., S2-C: from the second sacral vertebra to the coccyx)

While this review is limited to the Japanese literature, international reports of laparoscopic and robotic combined approaches for presacral tumors have also been published, further supporting the feasibility of minimally invasive strategies for this challenging anatomical location. As demonstrated in these cases, a unidirectional approach alone raises concerns regarding injury to adjacent organs and postoperative dysfunction, whereas the bidirectional combined approach effectively compensates for the limitations of each individual approach.

The present case demonstrates that a laparoscopic-assisted combined transabdominal-transsacral approach represents a safe, reproducible, and minimally invasive surgical strategy for presacral tumors presenting with complex anatomical relationships, even when tumor size falls below the conventional 5-cm threshold. The key clinical lesson is that the decision to adopt a combined approach should be guided primarily by the anatomical proximity of the tumor to critical structures - including the rectum, coccyx, and pelvic autonomic nerves - rather than by size alone. We believe this approach has broad applicability for deep pelvic benign tumors presenting similar challenges, and should be considered as the preferred strategy when a purely transsacral approach is deemed insufficient to ensure safe and complete resection with functional preservation.

Conclusions

We performed laparoscopic-assisted combined transabdominal-transsacral resection for a presacral epidermoid cyst measuring 49 mm - below the conventional 5-cm threshold - in which the intimate anatomical relationship with the lower rectum, coccyx, and PSNs necessitated a combined approach. This case highlights that anatomical complexity, rather than tumor size alone, should guide the selection of surgical approach for presacral tumors. Complete resection with negative margins is essential given the risk of malignant transformation, and careful selection of a surgical approach that balances oncological radicality with functional preservation is critical. The laparoscopic-assisted combined transabdominal-transsacral approach described here is safe and minimally invasive, and should be considered as a viable option in selected cases where a purely transsacral approach is deemed insufficient, taking into account individual tumor anatomy, operative expertise, and available institutional resources.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Hirofumi Suzumura, Yoko Adachi, Takahisa Yoshikawa, Seigo Yukisawa, Hiroharu Shinozaki

Acquisition, analysis, or interpretation of data: Hirofumi Suzumura

Drafting of the manuscript: Hirofumi Suzumura

Critical review of the manuscript for important intellectual content: Yoko Adachi, Takahisa Yoshikawa, Seigo Yukisawa, Hiroharu Shinozaki

Supervision: Hiroharu Shinozaki

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Institutional Review Board of Saiseikai Utsunomiya Hospital issued approval 2025-27. This study was conducted in accordance with the ethical standards of the Declaration of Helsinki (as revised in Brazil 2013). **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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