Anterior-only Partial Sacrectomy for en bloc Resection of Locally Advanced Rectal Cancer

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Abstract

Study Design Case report.

Objective The usual procedure for partial sacrectomies in locally advanced rectal cancer combines a transabdominal and a posterior sacral route. The posterior approach is flawed with a high rate of complications, especially infections and wound-healing problems. Anterior-only approaches have indirectly been mentioned within long series of rectal cancer surgery. We describe a case of partial sacrectomy for en bloc resection of a locally advanced rectal cancer with invasion of the low sacrum through a combined transabdominal and perineal approach without any posterior incision.

Methods Through a midline laparotomy, the tumor was dissected and the sacral osteotomy was performed. Once the sacrum was mobile, the muscular attachments to its posterior wall were cut through the perineal approach. This latter route was also used to remove the whole specimen.

Results The postoperative period was uneventful in terms of infection and wound healing, but the patient developed right foot dorsiflexion paresis that completely disappeared in 1 month. Resection margins were negative. After a follow-up of 18 months, the patient has no local recurrence but presented lung and liver metastases.

Conclusion In cases of rectal cancer involving the low sacrum, the combination of a transabdominal and a perineal route to carry out the partial sacrectomy is a feasible approach that avoids changes of surgical positioning and the morbidity related to posterior incisions. This strategy should be considered when deciding on undertaking partial sacrectomy in locally advanced rectal cancer.

Keywords

- ▶ partial sacrectomy
- ▶ rectal cancer
- ▶ abdominoperineal resection
- ▶ en bloc resection
- ▶ abdominosacral resection

Introduction

Tumors involving the sacrum are rare.¹ The most common tumors requiring sacrectomy are primary sacral tumors and locally advanced rectal cancer infiltrating the sacrum.² The optimal primary therapy for these latter cases includes en bloc resection of the tumor together with the structures adherent to the tumor.³ There is evidence that this approach improves overall survival and local control.⁴ When the coccyx or sacrum

are involved, a total (all of S1), subtotal (at S1), or partial (at or below S3) sacrectomy has to be performed.⁵ Sacrectomies are still a challenge for the surgeon, as all of them exhibit a high rate of complications, such as neurologic, urinary, infectious, and wound-healing complications.^{5–7} To achieve an abdominoperineal resection together with a partial sacrectomy, the most common approach has been the abdominosacral technique described by Wanebo and Marcove.⁸ This procedure implies an anterior approach for the abdominoperineal

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amputation and a posterior route to accomplish the sacral osteotomy and resection. This means a change of patient position during surgery and the additional morbidity related to a posterior approach. Anterior-only approaches are indirectly mentioned in literature within long series of rectal cancer surgery.⁹

We report a successful partial sacrectomy through a one-stage abdominoperineal approach without posterior exposure of the sacrum and with delivery of the specimen through the perineal incision. We discuss the feasibility of this exposure.

Case Report

Case Presentation

A 73-year-old woman with a history of surgically resected pT2N0 gallbladder cancer had been previously diagnosed with stage IIIC rectal cancer. Neoadjuvant chemoradiotherapy was administered, with little response. Preoperative computerized tomography (CT) scan and magnetic resonance imaging (MRI) showed in proximity to uterus invasion of the mesorectal fat and the sacrum at S4 and S5, predominantly on the right side (→Fig. 1A, B, and C), with two left internal iliac adenopathies (of less than 1.2 cm) and one in the mesorectal fat (0.5 cm). There was no neurologic impairment, and the sphincters were intact.

Surgical Technique

Under general anesthesia and continuous electromyographic control, the patient was placed in the lithotomy position. A

digital rectal exam showed the tumor was at 5 cm of the anal verge, infiltrating the posterior wall of the vagina and very adherent to the sacrum. Together with digestive system surgeons, a midline laparotomy was performed. Internal iliac vessels and the midsacral artery and vein were ligated. Common iliac and external iliac vessels were isolated and safeguarded. The proximal sigmoid was divided. The cut end was used as a handle to aid with the dissection of the posterior part of the rectum down to S4, as it was fixed to the sacrum. As the vagina was invaded by tumor, hysterectomy and posterior vaginectomy were performed and included in the specimen. S1, S2, and S3 foramina were identified. S2 and S3 roots were carefully dissected. The right S3 root was sacrificed, as no electrical activity was shown. With a high-speed drill, a horizontal osteotomy was performed through the S3 vertebral body, lower to the left S3 foramina and at the level of the right one. Once in the canal, no thecal sac was encountered, and the remaining roots were transected. The canal was sealed with bone wax, muscle, and fibrin sealant. The posterior wall of the sacrum was also osteotomized with a drill. While this field was being developed, the perineal phase was being advanced.

A perineal typical elliptical incision including the external sphincter muscle was made and monopolar cautery was used to cut the ischiorectal fascia. After coagulating the inferior hemorrhoidal vessels, the tip of the coccyx was exposed and the levator ani, transverse perinei, and rectourethralis muscles were divided. The muscular attachments of the gluteus maximus muscle were taken down with the monopolar coagulator to expose the lateral distal sacrum.

Fig. 1 Preoperative images of a patient with a rectal cancer involving S4 and S5. (A) Axial T1-WI magnetic resonance imaging (MRI) showing invasion of the low sacrum. (B) Axial computed tomography scan demonstrating sacral bone destruction. (C) Sagittal MRI depicting a rectal mass and the sacral segments affected. This image has been used as a scheme to demonstrate the transabdominal route, necessary to gain control of the internal iliac vessels, to dissect the superior and most of the anterior part of the tumor and to do the sacral osteotomy. The perineal route was utilized to dissect the inferior part of the tumor, the coccyx, and the inferior and posterior part of the sacrum.

Fig. 2 Intraoperative photographs of the surgery. (A) Surgical field through the transabdominal approach at the end of the resection. The arrow points to the gloved surgeon's finger coming through the perineal approach along the posterior part of the sacrum. The finger can be seen through the osteotomy. (B) Surgical specimen being delivered through the perineal approach. The arrow points to one hand that was introduced through the transabdominal field and that is showing through the perineal incision after accompanying the specimen during the final resection. (C) Surgical specimen demonstrating the rectal tumor fixed to the lower sacrum.

Detachment of the muscles proceeded up to the level of the sacral osteotomy (►Fig. 2A).

Finally, the lateral part of the sacrum was dissected by cutting the insertion of the pyramidalis muscle and the sacrotuberous and sacrospinous ligaments. Once free, the whole specimen (including rectum, uterus, and the posterior part of the vagina) was removed en bloc through the perineal incision (►Fig. 2B and 2C). No instrumentation was required as the sacroiliac joint was not damaged. A Vicryl mesh (Ethicon, Inc., Norderstedt, Germany) was fixed to prevent perineal hernia. A colostomy was then performed. Two Blake drainages were left in place.

Postoperative Course

The extent of sacral resection is shown in ►Fig. 3A, B, and C. The only postoperative complication was right dorsiflexion paresis that disappeared completely after 1 month. No infection or wound dehiscence occurred. Urinary incontinence was complete after section of S3 unilaterally and S4 and S5 bilaterally. Surgery lasted for 10 hours. Blood loss was 1,200 mL. Pathologic examination revealed negative resection margins. Hospital stay was 11 days. After 18 months of follow-up, the patient is completely ambulatory and has no local recurrence but has developed lung and liver disease.

Discussion

Appropriate surgical management of locally advanced rectal cancer includes multivisceral resection,^{3,10,11} as there is a high probability of leaving residual disease at the local site

because of tumor adherence or fixation. En bloc resection of adjacent organs or structures adherent to the tumor avoids separating the adhesions, in which tumor is found between 40 and 84% of the cases,³ and is the only way to achieve an R0 resection in locally advanced cases. This aggressive management provides better local control and survival.⁴ Nevertheless, 5-year survival is more dismal and has been reported between 52 and 64%, mainly due to distant metastases.^{12,13} Like in our case, the presence of lymph node involvement seems to be associated with a worse prognosis.¹³ Whether the liver and lung metastases that appeared come from the rectal or the gallbladder disease is uncertain.

In cases of locally advanced rectal cancer, the usual technique (Wanebo technique) to perform a partial sacrectomy is a combined anterior and posterior approach. The anterior field is developed through a transabdominal exposure or both a transabdominal and perineal approach to carry out an abdominoperineal amputation. Curiously enough, sacral resection through the perineum is not the regular procedure for low sacrectomy. This approach undoubtedly has several advantages. It is fairly easy to develop as no major vessels are in relation with the posterior wall of the sacrum up to S3. Furthermore, it avoids changing the position of the patient, which is cumbersome in a lengthy procedure. It also avoids a posterior incision, which is usually subjected to a high risk of dehiscence and infection (25 to 46%).¹⁴ Nevertheless, in our case, as an abdominoperineal amputation was done, the risk of infection due to proximity to the passage of feces is much lower.

There are several caveats to take into account. We anatomically preserved both S2 roots and one S3. The other S3 root,

Fig. 3 Postoperative computed tomography scan depicting the lower sacral resection. (A) Three-dimensional reconstruction. Note asymmetry of resection (lower on the left side to respect one S3 root, as the tumor was higher on the right side). (B, C) Axial and sagittal images showing extent of resection. No stabilization was required.

which was severed, did not show any electrical activity in the intraoperative electromyographic control. Nevertheless, urinary incontinence ensued. Both the parasympathetic pelvic nerve, which supplies the detrusor fibers, and the somatic pudendal nerve, which innervates the external urethral sphincter, originate from the sacral cord at S2–S4.¹⁵ Some cases have been described in which the preservation of both S2 roots was enough to maintain urinary continence.⁶ This is why, together with the preservation of the bladder and ureters, a urinary diversion procedure such as a double-barreled wet colostomy was not planned from the beginning.^{16,17} Notwithstanding, Guo et al reported a strong association between S3 nerve root integrity and continence: more than 30% of their patients with unilateral S3 nerve root resection showed incontinence, and 75% of those with bilateral S3 nerve root severance were incontinent.¹⁴ In our case, the patient was rendered incontinent despite preservation of both S2 roots and one S3.

The patient had transient distal paresis. Similar complications have been described, and traction injury to the lumbosacral plexus or L5 nerve root have been invoked as causes of the deficit.¹⁸

This anterior-only approach was intended for a locally advanced rectal cancer in which an abdominoperineal resection was planned. Partial sacrectomies in primary tumors are one limitation of the applicability of this procedure, as in these cases the rectum and the anal region are to be preserved, and no perineal incision is usually undertaken.¹⁹ Whether some form of sphincter-preserving technique can be done to access the anterior part of the sacrum through the perineal approach in case of a low sacral primary tumor remains speculative.²⁰

High sacrectomies that require spinopelvic fixation are another limitation of this technique. The anterior part of the S1 level can be exposed through the transabdominal approach, and, through the perineal approach, dissection could be probably extended higher. Nevertheless, biomechanical studies show that sacral resections through S1 may damage more than a 70% of the sacroiliac joint and therefore cause a significant decrease of stiffness and both compressive and rotational instability.^{21,22} Any sacrectomy above the S1–S2 junction requires a spinopelvic fixation, whereas resections at or below S2 do not need further stabilization. As spinopelvic fixation is performed through a posterior approach, in high sacrectomies our perineal incision is rendered unnecessary.

Body mass index definitively has to be taken into account when indicating this anterior-only approach and can be also considered as a relative limitation of this technique. There is some evidence in literature that obese patients encounter more wound-healing complications in perineal approaches done specifically for abdominoperineal resections.²³

Conclusion

We believe that in cases of rectal cancer involving the low sacrum, in which a perineal amputation has to be done, the combination of a transabdominal and perineal route is a feasible approach that avoids changes of surgical positioning and the morbidity related to posterior incisions. The dissection of the posterior wall of the lower sacrum and the removal of the surgical specimen can be easily accomplished through the perineal route. This strategy should be considered when deciding on undertaking partial sacrectomy in locally advanced rectal cancer.

Disclosures

None

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