


## Case Report

# Laparoscopic total pelvic exenteration combined with transanal total mesorectal excision for locally advanced prostate cancer with rectal infiltration

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### Abbreviations & Acronyms

ADT = androgen deprivation therapy  
 CT = computed tomography  
 MRI = magnetic resonance imaging  
 PET = positron emission tomography  
 PSA = prostate-specific antigen  
 TaTME = transanal total mesorectal excision  
 TPE = total pelvic exenteration

**Introduction:** Intensive treatment is typically considered for very high-risk patients with locally advanced prostate cancer and an expected survival time of 5 years or longer. Herein, we report a case of locally advanced prostate cancer with rectal infiltration treated with laparoscopic total pelvic exenteration combined with transanal total mesorectal excision.

**Case presentation:** A 73-year-old man presented with a ring-shaped mass around the rectum. He was diagnosed with prostate cancer with rectal infiltration and underwent laparoscopic total pelvic exenteration combined with transanal total mesorectal excision following neoadjuvant androgen deprivation therapy. Twenty-two months postoperatively during ongoing androgen deprivation therapy, no biochemical recurrence was observed.

**Conclusion:** To our knowledge, this is the first report of a laparoscopic total pelvic exenteration combined with transanal total mesorectal excision for prostate cancer with rectal infiltration. We believe this surgery may be considered a new option for high-risk prostate cancer patients with rectal infiltration.

**Key words:** laparoscopic surgery, metastasis, pelvic exenteration, prostate cancer, transanal endoscopic surgery.

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## Keynote message

Intensive treatment is typically considered for very high-risk patients with locally advanced prostate cancer and an expected survival of 5 years or longer. This condition is challenging to treat with conventional surgical approaches because of the limited surgical field. Herein, we report a case in which prostate cancer with rectal involvement was successfully resected with transanal total mesorectal excision.

## Introduction

A combination of TPE and ADT is one of the preferable treatment options for locally advanced prostate cancer with rectal infiltration. Laparoscopic TPE combined with TaTME allows safe and adequate margins for highly advanced lower rectal cancer with accurate anatomy.<sup>1</sup> In this case report, we present the surgical treatment of a TPE combined with TaTME performed for a ring-shaped rectal infiltration of prostate cancer.

## Case presentation

A 73-year-old man with a history of laparoscopic sigmoidectomy for sigmoid colon cancer reported to our hospital with a pelvic mass detected by follow-up CT, but without any complaint (Fig. 1a). MRI revealed heterogeneous contrast effect on the tumor (Fig. 1b). PET-CT showed no obvious metastasis to other organs or lymph nodes. Whereas carcinoembryonic antigen at initial presentation was slightly higher than the normal limit, at 5.5 ng/mL, PSA was high at 53.61 ng/mL. Colonoscopy revealed no mucosal lesions in the rectum. However, cystoscopy revealed mild mucosal irregularity in the bladder neck, but no infiltration.

Trans-perineal prostate and mesorectum biopsies were performed, and both revealed prostatic adenocarcinoma with a Gleason score 5 + 4. After diagnosing prostate cancer, we decided to treat the patient with neoadjuvant ADT followed by TPE. After 9 months of goserelin acetate combined with bicalutamide, preoperative his PSA decreased to 0.89 ng/mL and CT and MRI revealed significant tumor shrinkage (Fig. 2a,b). After joint review with a colorectal surgeon, TPE combined with TaTME was administered because the tumor was circumferentially located in the perirectal mesentery. The operation time was 4 h and 49 min, and the estimated blood loss was 260 mL. Grossly, the tumor was completely resected along with the bladder, prostate, rectum, and part of the tailbone. Microscopy revealed diffuse infiltration of atypical cells and cribriform formation of oval cells throughout the prostate, seminal vesicles, rectus muscle, anal sphincter, and submucosa of the bladder (Fig. 3a). External iliac lymph nodes were resected, but no metastases were detected. Immunohistochemical staining was negative for CK7 and CK20, but positive for AR and NKX3.1, consistent with prostate cancer infiltration (Fig. 3b). On the left ventral side of the prostate, the resection margin was positive. No severe complications were observed except for a Clavien-Dindo Grade II level urinary tract infection, and the patient was discharged on postoperative day 15. Adjuvant radiation therapy was planned but could not be performed due to the intestinal tract's proximity to the irradiated area postoperatively. Twenty-two months

postoperatively, the patient continued ADT with no evidence of serum PSA elevation or tumor recurrence on imaging.

## Discussion

Prostate cancer commonly metastasizes to the lymph nodes, bones, lungs and invades to the bladder, but rarely to the rectum, despite its anatomical proximity to the prostate.<sup>2</sup> Using autopsy studies, Bowrey demonstrated rectal involvement of prostate cancer in only 4% of patients.<sup>3</sup> The infrequency of rectal involvement in prostate cancer has been attributed to Denonvillier's fascia, which is located between the seminal vesicles and the rectum. Denonvillier's fascia serves as a solid barrier to the posterior invasion of prostate cancer.<sup>4,5</sup>

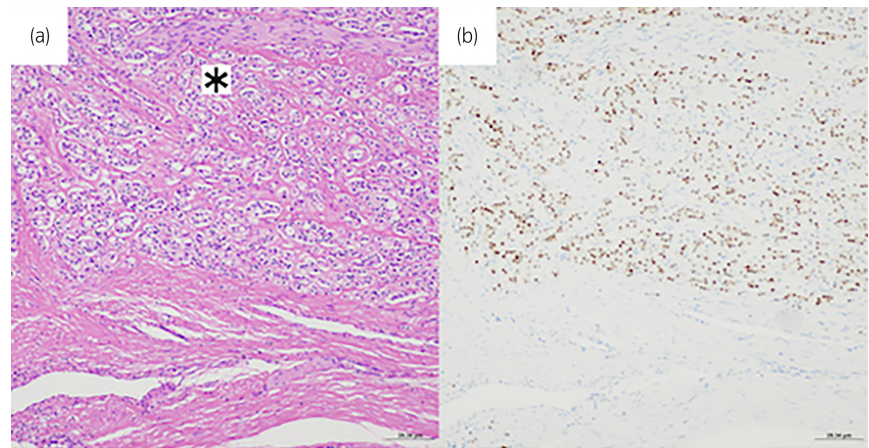
Because of the rarity of rectal involvement, few cases have been reported to date. Furthermore, several studies reported the poor prognosis.<sup>6</sup> In one study, the overall survival rate of prostate cancer with rectal involvement at 1, 3, and 5 years was approximately  $68.3\% \pm 5.3\%$ ,  $54.4\% \pm 7.2\%$ , and  $38.8\% \pm 11.1\%$ , respectively ( $\% \pm$  standard error).<sup>7</sup> In another study comparing 86 patients with rectal infiltration of prostate cancer, the median survival was 15 months (95% confidence interval 14–16 months) and the mean survival was 19 months (95% confidence interval: 14–23 months).<sup>3</sup> Given the advanced state of disease, ADT is the first-line treatment for locally advanced prostate cancer with rectal invasion. However, TPE combined with ADT reportedly prolongs the overall



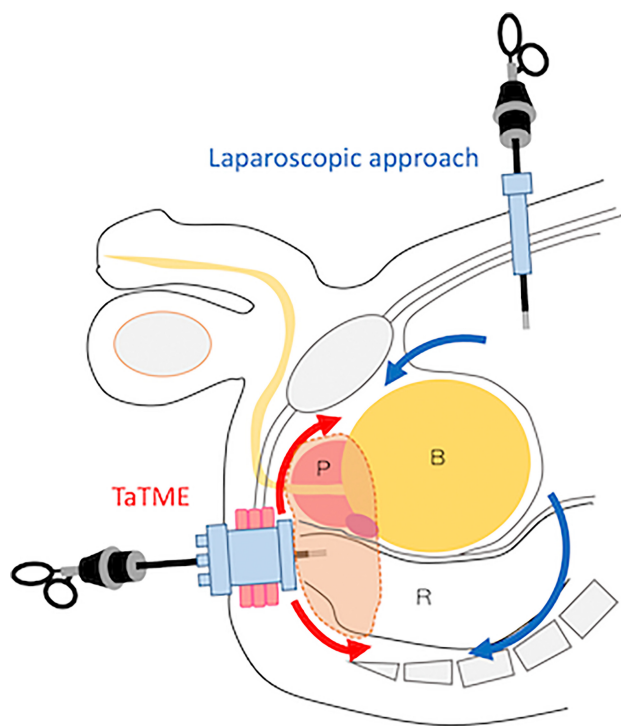
**Fig. 1** (a) Axial-enhanced CT reveals a mass surrounding the rectum. (b) The dynamic contrast-enhanced magnetic resonance imaging shows a heterogeneous contrast effect on the tumor.



**Fig. 2** (a) CT and (b) diffusion-weighted imaging magnetic resonance imaging reveal tumor shrinkage after preoperative hormone therapy.



**Fig. 3** Histopathological findings. (a) Cribriform structure composed of oval cells, nerve infiltration (\*). (b) Tumor cells show positive staining for NKX3.1.



**Fig. 4** Schema of laparoscopic TPE with TaTME. P, prostate; B, bladder; R, rectum. The area circled in orange shows the extent of tumor infiltration.

survival, especially in patients not treated with ADT.<sup>7</sup> The key concept of TPE is an en-bloc resection of the prostate, seminal vesicles, bladder, rectum, and anus. Our patient had no history of ADT before the prostate cancer was detected. Moreover, we expected that complete resection would be highly difficult by radical prostatectomy or a transabdominal approach alone, because the tumor originated from the prostate, surrounded the rectum in a ring shape, and invaded the supporting tissues deep in the pelvic region. Therefore, we selected TPE combined with TaTME following adjuvant ADT as a treatment strategy.

In rectal surgery, TaTME including transabdominal laparoscopic assistance is becoming an increasingly preferred approach because when it is performed in a two-team approach, the distal margin is longer and the surgical duration

is reduced (Fig. 4).<sup>1</sup> In intrapelvic surgery, where the field of view and surgical space are limited, TaTME provides excellent visualization of the anatomical and surgical planes and allows for accurate dissection. In this case, the concept of TaTME was fully utilized to complete the surgery in a short time and with a small amount of blood loss. To our knowledge, this is the first report of a TPE using TaTME for locally advanced prostate cancer with colorectal infiltration. Although the tumor was exposed on the outside of the prostate gland, it did not recur after continued ADT and careful follow-up.

Due to the short follow-up period of 22 months, it is difficult to articulate how much TPE contributed to avoid the recurrence. However, TPE enables us to radically resect the tissues, which can be the source of future recurrence, and reducing the tumor mass can improve the efficacy of adjuvant systemic ADT.<sup>7</sup>

## Conclusion

We have described a case of locally advanced prostate cancer with rectal infiltration that was resected using a novel approach utilizing TaTME.

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## Author contributions

Ryo Andy Ogasawara: Conceptualization; writing – original draft. Naoya Okubo: Conceptualization; writing – original draft. Yasukazu Nakanishi: Supervision; writing – review and editing. Naoki Imasato: Writing – review and editing. Kohei Hirose: Writing – review and editing. Madoka Kataoka: Writing – review and editing. Shugo Yajima: Writing – review and editing. Koji Ikeda: Writing – review and editing. Masaaki Ito: Supervision; writing – review and editing. Hitoshi Masuda: Supervision; writing – review and editing.

## Conflict of interest

The authors declare no conflict of interest.

## Approval of the research protocol by an Institutional Review Board

Not applicable.

## Informed consent

Informed consent was obtained from the patient.

## Registry and the Registration No. of the study/trial

Not applicable.

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