Robotic Salvage Seminal Vesciculectomy for radio-recurrent prostate cancer post LDR brachytherapy following multiple negative trans-perineal biopsies

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\textbf{ARTICLE INFO}

\begin{itemize}
\item Prostate cancer
\item Biochemical recurrence
\item Brachytherapy
\item Local recurrence
\item Robotic salvage seminal vesciculectomy
\end{itemize}

\textbf{ABSTRACT}

Multi-parametric Magnetic Resonance Imaging (mp-MRI) and prostate membrane specific antigen positron emission tomography (PSMA-PET) CT scan in prostate cancer has led to enhanced detection of local and metastatic recurrence post-radiotherapy. A 59-year-old man presented with biochemical relapse following low dose rate brachytherapy for ISUP 2 T1cN0M0 prostate cancer (PCa). Despite strong biochemical and radiological evidence of radio-recurrent PCa in his right seminal vesicle, serial transperineal biopsies revealed benign tissue. He proceeded to Robot Assisted Salvage Seminal Vesciculectomy (RSSV) as a diagnostic procedure without complication. Histo-pathology confirmed a 23 × 17 × 13mm focus of Gleason 4 + 4 adenocarcinoma in the SV with clear surgical margins.

\textbf{Funding}

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

1. Introduction

Prostate cancer (PCa) is the second most diagnosed cancer in men with approximately 1.3 million cases diagnosed globally per annum.\textsuperscript{1} In Australia, 27% of men who undergo active treatment receive a form of radiotherapy.\textsuperscript{2} The application of multi-parametric Magnetic Resonance Imaging (mp-MRI) and prostate membrane specific antigen positron emission tomography (PSMA-PET) CT scan has led to enhanced detection of local and metastatic recurrence post-radiotherapy. This may lead to increased recognition of unusual patterns of disease recurrence for which there is little data to guide management.\textsuperscript{3} We present the case of a man with an isolated seminal vesicle (SV) recurrence and highlight some of the challenges in his management.

2. Case presentation

A 59-year-old man was referred to urology with biochemical recurrence of PCa. Six years earlier, he presented with a PSA of 7.5 μg/mL and was diagnosed with Gleason 3 + 4 (ISUP 2) T1cN0M0 intermediate-risk PCa in four of sixteen cores. He underwent low-dose-rate seed brachytherapy without complications aside from transient Grade 1–2 rectal toxicity. Post-treatment nadir was satisfactory at 1.25 μg/mL, however he failed to attend follow up after two years. He was referred by his GP 4 years later (6 years post-treatment) when his PSA rose to 2.845 μg/mL, with a doubling time of two years.

A 68-Ga PSMA-PET demonstrated a single avid focus (SUV 12.2) at the tip of the right SV(Fig. 1). Mp-MRI was consistent with the PSMA-PET, demonstrating a focal 15mm region of low signal intensity on T2, with enhancement and marked diffusion restriction (Fig. 2). The patient proceeded to trans-perineal (TP) template prostate biopsies, along with targeted biopsies of the right SV. The histology demonstrated radiation-affected prostate tissue and benign SV tissue. Given the negative biopsy results, he was managed with PSA surveillance. His PSA further rose to 3.45 μg/mL, and he was referred to an external urologist for MR-US software fusion targeted biopsy of the SV. He underwent seven targeted biopsies which again revealed benign SV tissue.

This presented a management dilemma as there was strong biochemical and radiological evidence of local SV recurrence, however this could not be confirmed on histology. Nine months later, a further PSA increase to 4.55 μg/mL prompted a repeat PSMA-PET scan. This demonstrated a corresponding increase in the avidity of the SV lesion (SUV 14.8), as well as new sub-centimetre avid nodes in the right proximal internal iliac and right distal internal iliac nodes (SUV 3.9 and 2.8).
respectively). The case was discussed at a multi-disciplinary meeting and the radiation oncology team felt that salvage external beam radiotherapy (EBRT) to the SV and pelvic nodes was inappropriate without histological confirmation of recurrence and an adequate dose could not be safely delivered to ablate the large volume of SV tumour without toxicity to the adjacent rectum, right ureter and posterior bladder. The patient therefore proceeded to a diagnostic Robotic Salvage Seminal Vesiculectomy (RSSV).

The surgical technique was initially identical to the posterior approach for a robotic radical prostatectomy. A horizontal incision was made 1cm above the recto-vesical fold, then the dissection was carried anteriorly until the right vas deferens and SV were identified. The SV dissection was performed medially, then posteriorly, then anteriorly. This provided optimal access and exposure of the SV pedicle and tip, which was divided between clips. The lateral aspect of the SV was dissected to its prostatic junction and transected. The procedure was performed solely for diagnostic confirmation of malignancy, therefore the left SV was not excised as there was no pre-operative clinical suspicion of bulky disease. The operative console time was 60 minutes, blood loss was 50mL and the patient was discharged the following day. There were no complications. Histo-pathology confirmed a 23 × 17 × 13mm focus of Gleason 4 + 4 adenocarcinoma with clear surgical margins. PSA was 0.80 at 6 weeks, consistent with low-volume nodal disease seen on PSMA PET. He was subsequently referred for consideration of pelvic EBRT for the pelvic nodes.

3. Discussion

PSMA-PET CT accurately detects small PCa recurrences. With increased utilisation of PSMA-PET, patients with biochemical recurrence of uncertain location on conventional imaging will have sites of recurrence identified, and identification of those patients with atypical sites of disease recurrence may facilitate targeting of biopsies and salvage therapies. The identification of isolated SV recurrence may increase with mp-MRI and PSMA-PET CT, therefore treatment paradigms for managing it must be developed. RSSV is a valid option which provides histological diagnosis, and in cases of isolated recurrence, may have therapeutic benefit, either cure or prolonged freedom from BCR.

Previous case reports have demonstrated technical feasibility of SV excision via an open approach. A robotic approach conveys a significant advantage due to ease of access to and visualization of the SV’s posterior to the bladder, plus the usual benefits of minimally invasive surgery, i.e. reduced pain, blood loss, wound complications, length of stay and faster return to normal activities. This is supported by a recent 17 patient case series of RSSV that also reported minimal morbidity. One of their patients had radiological evidence with negative biopsies; the remaining 16 had positive biopsy prior to surgical excision. They authors reported a progression free survival rate of 53% at 3 years post RSSV.

4. Conclusion

This case has changed our practice. In future, we would advocate for RSSV earlier in the clinical course in those with isolated SV recurrence concordant on mp-MRI and PSMA. In the case of our patient, the delay of three years from BCR to RSSV may have compromised the chance of cure, given the rise in PSA from 2.85 μg/mL to 4.55 μg/mL and progression from low-volume SV-confined disease to nodal disease on PSMA-PET. RSSV is a safe and technically feasible means of confirming histological diagnosis in radiological SV recurrence with negative TP biopsy. Whilst larger, prospective studies would be ‘ideal’ before incorporating RSSV into clinical practice, in our opinion the rarity of isolated SV recurrence, the combined diagnostic and potential therapeutic benefit and the minimal morbidity make RSSV a valid procedure for isolated SV recurrence suspected on both mp-MRI and PSMA-PET.
Declaration of competing interest

None.

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