Focal low dose-rate brachytherapy for low to intermediate risk prostate cancer: preliminary experience at an Australian institution.

Elliot Anderson[1], Lloyd Smyth[2], Richard O'Sullivan[3,4], Andrew Ryan[5], Nathan Lawrentschuk[6,7,8,9], Jeremy Grummet[1,10], Andrew See[2]

1 Department of Surgery, Central Clinical School, Monash University, Melbourne, Australia. 2 Icon Cancer Centre, Richmond, Australia. 3 Healthcare Imaging Services, Richmond, Australia.4 Department of Medicine, Monash University, Melbourne, Australia.5 TissuPath Specialist Pathology Services, Mount Waverley, Australia.6 Division of Cancer Surgery, Peter MacCallum Cancer Centre, Melbourne, Australia. 7 Department of Urology, Royal Melbourne Hospital, Melbourne, Australia.8 Department of Surgery, University of Melbourne, Melbourne, Australia.9 EJ Whitten Centre for Prostate Cancer Research, Epworth Healthcare, Melbourne, Australia.10 Epworth Healthcare, Richmond, Victoria, Australia.

Introduction

Focal treatment for prostate cancer is a hybrid approach combining ablative treatment of the involved prostate gland and continued active surveillance of the unaffected gland. Low dose-rate (LDR) brachytherapy can be used as a lesion-targeted focal therapy, however, further studies are required to support its use.

Aims

The aim of this study is to evaluate the dosimetry, toxicity and oncological outcomes of men receiving lesion-targeted focal LDR brachytherapy for low to intermediate risk prostate cancer.

Methodology

This is a retrospective cohort study of twenty-six men with unifocal, low to intermediate grade PCa diagnosed on a combination of multiparametric-MRI and targeted plus template transperineal biopsy, who received focal LDR brachytherapy at a single institution. Brachytherapy involved a single monotherapy implant using iodine-125 seeds to deliver a prescribed dose of 145 Gy to the index lesion.

Results

The mean focal planning target volume as a percentage of the prostate volume was 24.5%. The percentage of the focal gross tumour volume receiving 100% of the prescription dose was 100% for 12 patients and ≥98% for 18 patients (Figure 1). The median follow-up for toxicity and biochemical control outcomes was 23.1 (IQR 19.1–31.3) and 24.2 (IQR 17.9–30.0) months, respectively. Grade 2 urinary and erectile toxicities were reported by 29.2% and 45.8% of patients, respectively, with resolution of urinary symptoms to baseline by last follow-up. There were no grade ≥3 urinary or erectile toxicities or grade ≥2 rectal toxicity (Figure 2). All 21 patients who underwent a repeat multiparametric-MRI and transperineal biopsy at 12–24 months post-treatment were negative for clinically significant disease and 25 (96.2%) patients were free from biochemical failure (Figure 3).

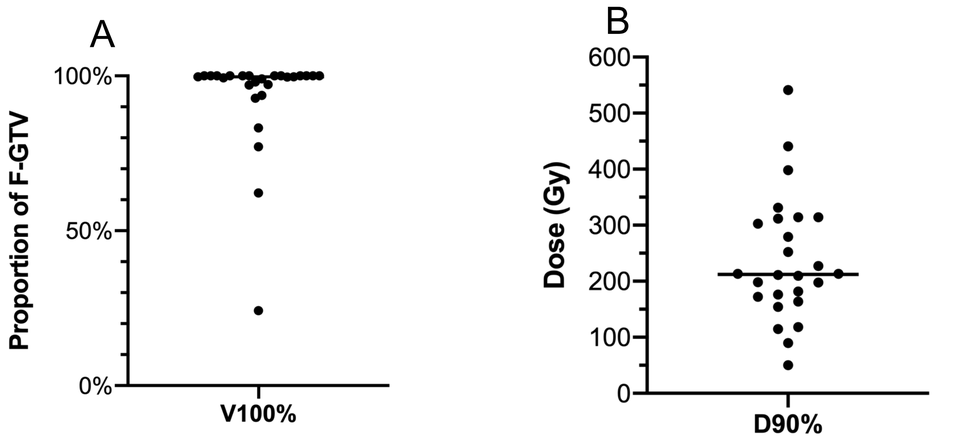

Figure 1: Post-implantation target dosimetry. The volume of the focal lesion receiving 100% of the prescription dose (A) and the dose to 90% of the focal lesion (B).

Results (cont.)

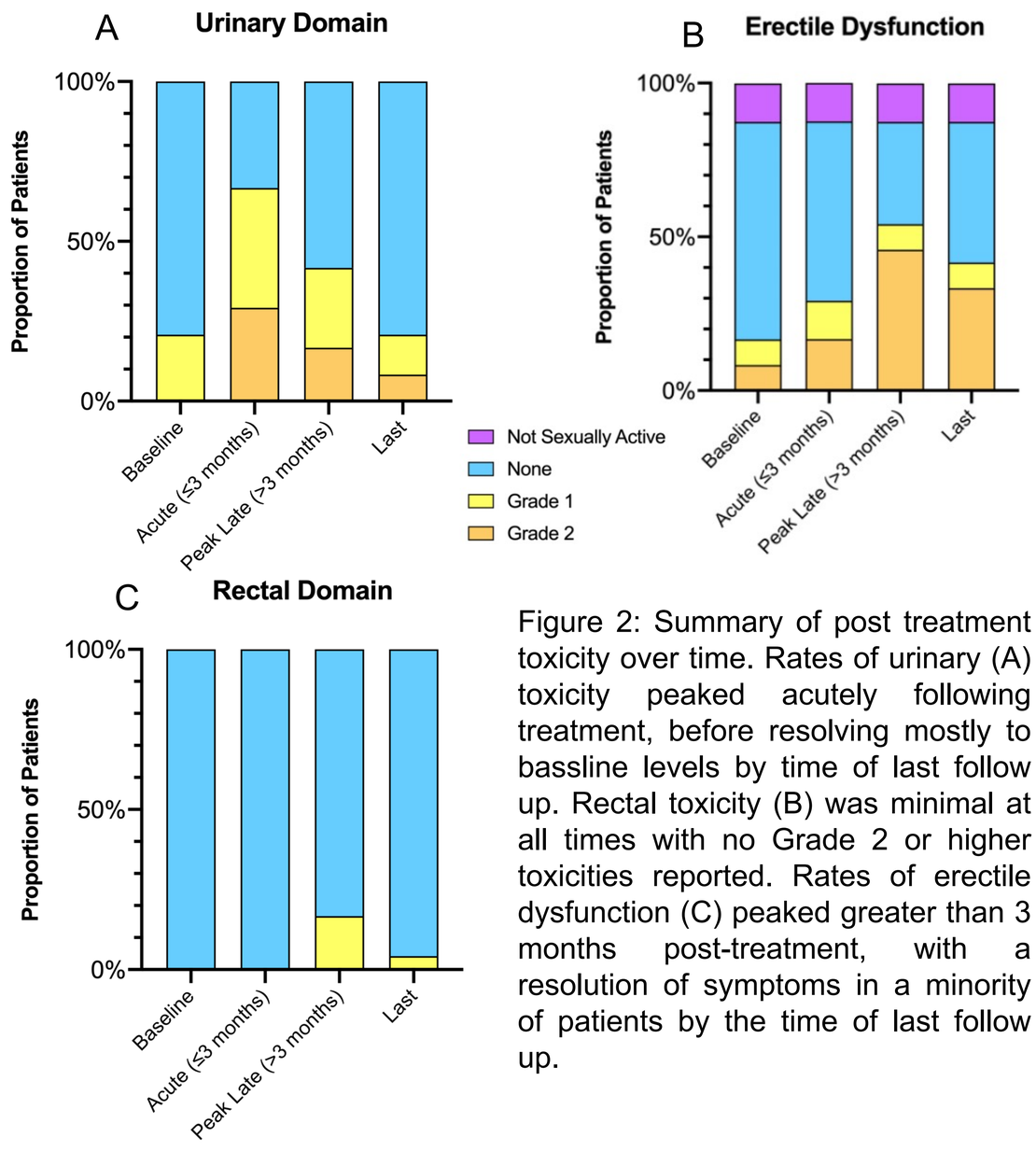

Figure 2: Summary of post treatment toxicity over time. Rates of urinary (A) toxicity peaked acutely following treatment, before resolving mostly to bassline levels by time of last follow up. Rectal toxicity (B) was minimal at all times with no Grade 2 or higher toxicities reported. Rates of erectile dysfunction (C) peaked greater than 3 months post-treatment, with a resolution of symptoms in a minority of patients by the time of last follow up.

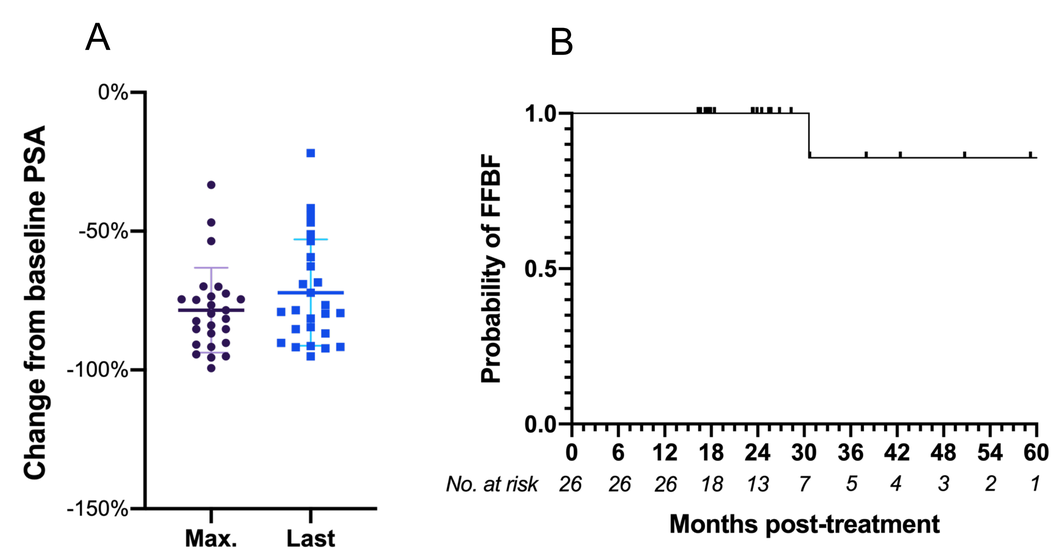

Figure 3: PSA outcomes following focal LDR brachytherapy. (A) Maximum and last change PSA from baseline. (C) Kaplan-Meier curve showing the probability of free from biochemical failure (FFBF).

Conclusions

Focal LDR brachytherapy is associated with a favourable toxicity profile and a high rate of control of significant prostate cancer at 12-18 months post-treatment. We have commenced the LIBERATE prospective registry in focal LDR brachytherapy based on the highly encouraging outcomes of this initial experience.