Poster Session 9: Testes, Penile and Miscellaneous Oncology
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MP-09.01
Genitourinary melanoma: Gender disparities in incidence and survival from an analysis of 1586 patients in SEER

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Objectives: Primary genito-urinary (GU) melanoma is a rare disease that is poorly characterized. We utilized a large population-based cancer registry to examine the epidemiology and outcomes among men and women.

Methods: The Surveillance, Epidemiology, and End Results (SEER) database (1973-2010) was used to identify cases by tumor site and histology codes. The associations between demographic, clinical, and pathological characteristics with disease specific survival (DSS) was examined.

Results: A total of 1586 histologically-confirmed cases of primary GU melanoma were identified with a median age of 69 years (IQR 55-80). The incidence of primary GU melanoma among males and females was 0.20 and 1.80 cases per million, respectively. Overall, 60% of patients had localized disease at presentation and 90% underwent cancer-directed surgery. 5-year disease specific survival (DSS) among males and females was 69% and 50% respectively. 5-year DSS by site was 69%-penile, 69%-scrotal, 58%-vulvar and 27%-vaginal. Males and females with melanoma of the urinary tract (bladder, urethra, or kidneys) had 5-year DSS of 63% and 35%, respectively. On multivariate analysis, female sex, higher age, higher stage, and lymph node involvement were associated with decreased survival.

Conclusions: GU melanoma is almost ten times more common among women owing largely to a relatively high prevalence of vaginal disease. GU melanoma portends a worse prognosis in females than males for reasons that require further evaluation.

MP-09.02
Institution at orchiectomy and progression on active surveillance for clinical stage 1 germ cell tumours

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Introduction and Objectives: Following orchiectomy, active surveillance has been widely adopted as the initial management for clinical stage (CS) IA non-seminoma germ cell tumours (NSGCT) and is adopted by most centers for CS IB disease. Previous studies have demonstrated that institution volume and experience are associated with improved outcomes for various malignancies, including testicular cancer. However, it is unknown whether institution of orchiectomy is associated with progression on AS for CSI germ cell tumours.

Methods: 460 patients (1980 – 2011) with CS1 NSGCT and 355 patients (1998 – 2014) with CS1 seminoma in whom institution of orchiectomy was noted and managed with AS at the Princess Margaret Cancer Centre were identified. The association between institution of orchiectomy (Princess Margaret vs. Other) and time to progression on AS was analyzed using multivariable Cox proportional hazards models.

Results: Patients undergoing orchiectomy at Princess Margaret for NSGCT were significantly less likely to have pure EC in orchiectomy pathology (OR 0.33, p=0.008) or CSIB disease (OR 0.47, p=0.0138). In seminoma cases, tumour size, presence of rete testis invasion, or CS did not differ significantly between institutions. In NSGCT, median follow-up was 5.4 years, 27% progressed on AS, and institution of orchiectomy was not associated with time to progression in either univariate (HR 0.79, p=0.33) or multivariable analysis (HR 1.01, p=0.97). In seminoma, median follow-up was 4.7 years, 12% progressed on AS, and similarly institution of orchiectomy was not associated with progression (univariate: HR 0.87, p=0.74; multivariable: HR 0.99, p=0.98).

Conclusions: Outcomes on AS after orchiectomy for CSI germ cell tumours are comparable at an institution specializing in testicular cancer care compared to non-specialized institutions. While this aspect of testicular cancer care appears safely managed among different institutions, data from previous studies have demonstrated that complex cases of testicular cancer should be managed by multi-disciplinary teams at specialized centers.

MP-09.03
Randomized controlled trials in testicular cancer: A demographic and quality assessment

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Introduction and Objectives: Randomized controlled trials (RCT) provide the strongest evidence to justify interventions in patients. However, trials with inadequate methods are associated with bias and exaggerated treatment effects. A search of the literature was conducted to review RCTs in testicular cancer (TC) to assess demographic and trial reporting quality patterns over time.

Methods: MEDLINE and CENTRAL were queried for TC RCTs from 1989 - 2014. For each RCT identified, demographic variables and reporting quality indicators were analyzed. Trials were divided into two groups based on year of publication (1989 – 2001 vs. 2002 - 2014). Quality indicators were compared between the groups using Poisson regression modelling.

Results: 37 RCTs were identified, of which 25 (68%) were published from 1989 - 2001 and 12 (32%) were published from 2002 - 2014. The majority of RCTs were published in medical journals (95%) as opposed to surgical (3%) or radiation-focused (3%) journals, involved chemotherapy as the intervention (59%) and had a medical oncologist as the first author (89%). The majority were conducted in patients with metastatic disease (76%) and in 15 (41%), non-seminoma was the histology. Accrual for 11 (30%) RCTs was closed early. 'Randomization' was present in the title for 29 (78%) RCTs and descriptions of blinding, method of randomization, power calculation, and trial support were present in 19%, 32%, 68%, 65% of RCTs, respectively. Industry support was described in 5 RCTs. RCTs published between 2002 – 2014 had significantly longer accrual periods (mean 6.2 vs. 3.7 years, p=0.013), were significantly more likely to have 'randomized' in the title (OR 1.47, p=0.036) and include a power calculation (OR 1.92, p=0.003), while the number of patients randomized and other reporting quality indicators did not differ significantly between the two groups.

Conclusions: In the recent 13-year period of literature in TC, fewer RCTs were published though the quality improved compared to the preceding 13-year period. Though the TC cure rate is high, many areas warrant further investigation through RCTs, particularly in minimizing treatment burden. Urologists can play an important role in trial design, recruitment, and execution, and ensuring trial methodology and reporting quality are prioritized.

MP-09.04

Patient, disease and treatment characteristics of extragonadal primary germ cell tumour in two Canadian tertiary cancer centres

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Introduction: Extragonadal germ cell tumours (EGCT) are a heterogeneous group with distinct natural history and responses to treatment modalities. We sought to evaluate characteristics and survival outcomes in men with EGCTs.

Methods: We performed a retrospective analysis on a consecutive list of men diagnosed with EGCT in two Albertan tertiary cancer centres between 1990 and 2013. Demographic characteristics and outcomes, stratified by primary site, were evaluated.

Results: 69 cases were identified; median age, 29 (range 15-76); 48 (70%) non-seminomatous. 22 (39%) belonged to IGCCCG favourable risk group; 4 (7%), intermediate; 31 (54%), poor. 30 (43%) had MPs; 29, treated with first-line BEP. 17 (57%) relapses occurred, of whom 3 achieving long-term survival. 17 (25%) had a CNS primary, with 8 (47%) classic germinoma; 5 (29%) had IGCCCG intermediate or poor risk disease. 7 (41%) received primary chemotherapy alone; 5 (29%) received primary RT alone and 5 (29%) patients received both. 19 (28%) had a retroperitoneal primary. All patients received first-line chemotherapy; all but 2 received BEP. 8 (42%) patients had surgical resection. 3 patients (5%) had other or unknown primary. 5-year overall survival (5YOS) was 51% for all; 41% for mediastinal; 73% for CNS; 50% for retroperitoneal (log-rank 5YOS p=0.10). The factors that correlated with decreased survival were elevated AFP (p=0.01) and/or HCG levels (p=0.03), lung metastasis (p=0.01), and IGCCCG risk group (p=0.009).

Conclusions: EGCT is a rare but important subset of GCT. Patients with EGCTs, despite aggressive treatments, still have poorer outcomes than gonadal primary.

MP-09.05

Do retroperitoneal extragonadal germ cell tumors exist?

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Introduction and Objective: Extragonadal germ cell tumor (EGCT) sites have been described in midline structures such as the pineal gland, mediastinum, sacrococcyx and retroperitoneum. Although retroperitoneal (RP) EGCT comprises 30-40% of EGCT, its true existence has been questioned. The only study published is by Studer et al., which indicates that RP EGCT may be non-existent. Our study evaluates the existence of RP EGCT at our centre.

Methods: Data from all men between 1980 and 2014 treated at the London Regional Cancer Program with chemotherapy for testicular GCTs were reviewed retrospectively. We included all patients (pts) thought to have primary RP EGCT at the time of initial diagnosis defined as pts with pathologically defined GCT and no evidence of GCT in the testes by physical exam or ultrasound.

Results: 18 men with a diagnosis of RP EGCT were reviewed. 4 were excluded due to incomplete ultrasound or reports suggesting malignancy. The 14 remaining pts had negative or non-specific ultrasound findings. Average age was 34 yrs and BEP chemotherapy was used most often in 10 (71%) pts. Of these, 8 (57%) pts had prophylactic orchiectomy based on the primary landing zone of the RP mass. 3 (21%) pts had viable malignancy on final pathology and 5 (36%) had evidence of fibrosis or burnt out tissue consistent with a testicular primary. The remaining 6 (43%) pts did not have orchiectomy, but had an ultrasound consistent with scar. Ten (71%) pts underwent post-chemotherapy RP lymph node dissections and of these, none had corresponding pathologically normal testicular tissue.

Conclusion: Although the study size is limited, our study confirms that RP EGCTs do not exist but are instead metastatic disease from a testicular primary tumor. This suggests that viable germ cell tumors in testicles of pts presumed to be primary RP EGCT may be a sanctuary site of residual disease. The clinical implications of performing orchiectomy in pts with fibrosis only is however unclear.

MP-09.06

Adjunctive procedures and organ loss during post-chemotherapy retroperitoneal lymph node dissection

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Introduction: Center volume may correlate to improved organ salvage in aggressive nodal extirpation implicit with post-chemotherapy retroperitoneal lymph node dissection (PC-RPLND) for testis cancer. We aim to quantify rates and identify risk factors for adjunctive procedures and organ loss in PC-RPLND in a contemporary database.

Methods: Billing codes (CPT/ICD-9) identified men with an index diagnosis of testis cancer undergoing RPLND in the Marketscan® database (2007-11). Codes for receipt of chemotherapy or >1 inpatient testis cancer admission defined a subgroup most likely to represent correctly classified PC-RPLND. Rates of nephrectomy and adjunctive procedures (table) were quantified by billing codes. Center volume was defined by state and 3-digit zip codes. Multivariable logistic regression determined risk factors for adjunctive procedures or organ loss.

Results: 1,704 eligible men, median age 41 (range 8-65), were identified. For those with/without adjunctive procedures/organ loss, median length of stay was 7 (IQR 5-11) compared to 5 days (IQR 3-7) (p<0.001), respectively. Given the comparative rarity of primary RPLND (versus PC-RPLND) in the years of study, we consider results separately for the entire cohort (PC-RPLND$_{all}$) and the subgroup most likely to represent PC-RPLND (PC-RPLND$_{sub}$) (Table 1). 11 centers had top 25th percentile case-specific volume (>6 cases/year). For the PC-RPLND$_{sub}$ group, <75th percentile was associated with an increased risk of receiving an adjunctive procedure (OR 16.4, 95% CI 1.9-142.9) and organ loss (OR 19, 95% CI 2.2-173.0). For PC-RPLND$_{all}$, <75th percentile volume was not associated with adjunctive procedures (OR 2.1,95% CI 0.95-4.6) or organ loss (OR 1.9, 95% CI 0.83-4.0).

Conclusions: CPT codes identify non-trivial rates of adjunctive procedures/organ loss among PC-RPLND$_{all}$ and PC-RPLND$_{sub}$ patients. Higher

Table 1. MP-09.06.

Procedure	PC-RPIND$_{all}$ (N=1,704) N (%)	PC-RPIND$_{sub}$ (N=189) N (%)
Any adjunctive procedures	281 (16.5)	47 (25.9)
Nephrectomy	158 (9.3)	29 (15.3)
Vascular repair/reconstruction	160 (9.4)	28 (14.8)
Hepatic resection	34 (2)	6 (3.2)
Splenic resection	32 (1.8)	6 (3.2)
Bowel resection	40 (2.4)	5 (2.7)
Pancreatic resection	20(1.2)	1 (0.5)
Tube thoracostomy	14 (0.8)	2 (1.1)
Thoracotomy	10 (0.6)	1 (0.5)
Bowel stoma creation	11 (0.7)	1 (0.5)

center volume is associated with decreased rates of adjunctive procedures/organ loss in the men most strictly classified as PC-RPLND. If confirmed, identifying organ-sparing techniques from high volume centers is indicated.

MP-09.07

Readmissions to secondary hospitals and failure-to-rescue following major urologic cancer surgery

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Objectives: Centralizing certain urologic cancer surgeries has been suggested to reduce mortality and morbidity. While outcomes vary among hospitals, this may be partly attributed to differences in the failure-to-rescue (FTR) complications. We compared FTR rates between patients readmitted to their index surgery hospital with those readmitted to a secondary hospital.

Methods: We accessed the Washington State Comprehensive Hospital Abstract Reporting System from 2009-2013. ICD-9 codes identified patients who underwent radical prostatectomy (RP), radical cystectomy (RC), partial nephrectomy (PN), radical nephrectomy (RN) and retroperitoneal lymph node dissection (RPLND) for malignancy. FTR in this analysis was defined as death following readmission within 90 days of the index surgery. Primary (PH) and secondary hospitals (SH) were defined using hospital identifiers linked to unique admissions. Multivariable logistic regression models were used to identify factors associated with FTR.

Results: 11,536 patients underwent urologic cancer surgery, with 10% (range: 6-37%) readmitted within 90 days of surgery. 61% were readmitted to their PH, although this varied according to procedure type. The likelihood of readmission to the PH decreased with increasing hospital volume ($p<0.0001$). The FTR rate when presenting to the PH was 1.5% compared with 6.6% at a SH ($p=0.002$). Controlling for age, sex, comorbidities and hospital volume, the readmission hospital was independently associated with FTR (OR 0.39, 95% CI 0.21-0.74 for PH versus SH).

Conclusions: Hospital readmissions within 90 days of major urologic cancer surgery are associated with a low FTR rate; however, patients readmitted to a SH experienced higher FTR than those readmitted to their original hospital. These findings may inform clinical decision-making around hospital transfers and aid future quality improvement initiatives to reduce the morbidity associated with complex urologic oncology surgeries.

MP-09.08

Penile cancer: Perspective from a Canadian tertiary care centre

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Introduction and Objectives: Penile squamous cell carcinoma (SCC) is rare in North America, however the morbidity can be devastating. This analysis represents the first reported penile cancer experience of a tertiary care centre in Canada. We hope to not only inform on current treatment regimens but also draw attention to the complete lack of institutional data from many Canadian centers.

Methods: We carried out a retrospective review of all patients who received care at our centre for penile SCC from 2005 until the present time. Epidemiological and clinical data were collected for all patients including age, smoking history, circumcision status, BMI, TNM staging, tumour pathology, treatment history and oncologic outcomes. Survival analysis was performed using Kaplan-Meier methods for stage comparison.

Results: We identified 42 patients who were treated at our centre for penile SCC. The median age was 66 years old (range 22-92). Median BMI was 30.7. 66% had a history of smoking. 97% were uncircumcised prior to adulthood. 29% underwent excisional biopsy, 40% had partial penectomy and 31% had total penectomy. 5 patients with high risk tumors underwent modified inguinal lymph node dissection (ILND), while 7 patients had radical ILND for clinically palpable disease. 7 patients received adjuvant chemotherapy and/or radiotherapy (RT), while 7 received these modalities for palliation. Median cancer specific survival (CSS) was significantly correlated to pT stage, pN stage, tumour grade, and cN stage at presentation. Median follow up was 20 mo (Range 1 to 98 mo).

Conclusions: These findings confirm the poor CSS of patients with positive lymph nodes in penile SCC. Patients with pN0 after ILND had a durable CSS. Risk factors for penile SCC were confirmed as elevated BMI, positive smoking history, and lack of circumcision. This first epidemiologic report on penile SCC from a Canadian tertiary care center should be expanded to other national centers to inform treatment decisions.

MP-09.09

Establishing a new animal model for pre-clinical drug testing in testicular germ cell tumors

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Introduction and Objectives: The hallmark for treatment of metastatic germ cell tumors (GCT) of the testis is the overwhelming ability to cure patients with cisplatin regimens. Unfortunately, for those patients who present with cisplatin resistant tumors, outcomes continue to be dismal. There exists an immense need for novel drug therapies to be identified in pre-clinical models followed by phase 2 clinical trials. We proposed an innovative drug testing platform using tumor xenografts on the chorioallantoic membrane (CAM) of ex ovo avian embryos.

Methods: 577MF, N2102ep, NT2 and 1156QE cell lines (Dr. Peter Andrews, Sheffield, UK) were grown to confluence with DMEM+10% FBS media (Wisent). Cell pellets were collected and 10ul of each cell suspension containing the cells and Basement Membrane Matrix LDEV-Free, BD Matrigel (BD Bioscience) in a 1:1 ratio were implanted into the CAM of ex ovo avian
embryos. The CAM was prepared for implantation. CAMs were incubated at 37C for 6-7 days and then submitted to contrast enhanced ultrasound imaging. Two ultrasound modalities were used during this study: High resolution anatomical B-mode scans and power Doppler vascular contrast enhanced imaging scans in order to obtain both volumetric measurements and vascularization % of the tumors.

Results: The CAM model was able to accommodate all cell line derived tumors representing embryonal carcinoma, teratoma, yolk sac tumor, choriocarcinoma, and seminoma. The tumor engraftment rates ranged from 71-88%. The average tumor volumes, as measured by B-mode ultrasound, ranged from 3.8-46.3%. B-mode images were acquired using a 40 MHz linear array. The average vascularity (or blood volume) ranged from 3.1-10.9% using power Doppler imaging. Doppler images were acquired using the same 40 MHz linear array transmitting at 32 MHz in power Doppler mode. All tumors were confirmed via histologic evaluation at the completion of the experiment.

Conclusions: The proposed pre-clinical model offers an exciting opportunity to test novel drug therapies in testicular GCT. This model offers high engraftment rates and the primary readout of tumor response can be documented via fluorescence macroscopic imaging of the tumor, ultrasound imaging of tumor perfusion rates and histological analysis of tumors collected at endpoint.

MP-09.10

Movember/Prostate Cancer Canada initiative to develop a web-based platform with an integrated electronic-library and disease management support system to ameliorate survivorship experience

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Introduction and Objectives: Prostate cancer (PCa) survivors face multiple challenges in their cancer journey. A Pan-Canadian web-based platform has been developed to ameliorate the survivorship experience . One intervention involves management of urinary and bowel toxicity of treatment.

Methods: We developed an electronic library on toxicity of radical prostatectomy (RP) and radiation therapy (RT) with integrated application to monitor the user profile providing individually-tailored information to aid in improving knowledge of treatment choices and toxicities.

Results: We reviewed available resource and identified several deficiencies in content and relevance. Over 25 videos developed by MD Conversation were rated independently by two urologists and only 6 (< 25%) were deemed suitable for inclusion after modification. Additional material included pamphlets developed by CUA.

This library is integrated with tracking tools developed in consultancy with NEXJ (web system designer) with capacity to assess the transfer of knowledge, impact of intervention on quality of life and healthcare utilization. For baseline knowledge assessment we developed treatment-specific questionnaires for RT and RP. To assess the impact of intervention we have developed structured patient interviews in addition to Expanded Prostate Cancer Index Composite for Clinical Practice (EPIC-CP), Cancer Behavior Inventory (CBI-B), EQ-5D-5L and International Prostate Symptom Score (I-PSS). For effective integration of the intervention into clinical practice we will periodically organize group discussions with care providers. This forum will be conducted with the KE-DS methodology in order to identify challenges to ensure wider dissemination.

Parallel clinical trials for evaluation of the library are conducted at London, ON and Victoria, BC, each with 80 patients undergoing curative treatment. We are comparing patient satisfaction, self-efficacy, healthcare resource utilization and urinary/ bowel function in men with access to the library versus those with standard of care.

Conclusion: Survivorship is a vital component of PCa care. Significant gaps exist in the supportive services and knowledge. This trial should provide functional testing and validation of the eLibrary. Significant initial resource investment is required for customization of this platform, but over time will provide a sustainable, cost-efficient, and accessible health service that will complement a nationally integrated program.

MP-09.11

Surveillance of incidental small testicular masses and the risk of malignancy

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Introduction and Objectives: Scrotal ultrasound (US) is readily available and commonly employed in the evaluation of men with scrotal complaints and infertility. (Toren et al, *J Urol* 2010; **183**:1373-77) Previous reports have noted an increasing number of incidental small hypoechoic lesions discovered using scrotal US which may be amenable to surveillance. (Sommers D, Winter T, *Radiol Clin North Am* 2014; **52**: 1265-81) Necessary length of follow-up and the need for surgical intervention remain controversial. Our objective was to determine the safety of long-term observation for incidentally discovered small testicular masses (STMs) and factors associated with increased risk of malignancy.

Methods: Patients presenting to a high-volume male infertility clinic were reviewed to identify those who had testitcular tumour markers drawn or had completed more than one scrotal US between 2001 and July 2014. Charts were reviewed to identify patients with incidentally discovered small (10mm or less) hypoechoic masses. Patient demographics, imaging, laboratory evaluation, and treatment were collected with comparisons via Student's t and chi square tests.

Results: There were 120 patients found to have STMs during the study time period with a mean age of 36.7 yrs. Average follow-up was 1.3 yrs. Mean initial maximum mass dimension was 4.14mm (±2.0) with vascular flow noted in 38/90 (42.2%) lesions. Among patients with follow-up over one month, interval mass growth averaged 0.1 mm/yr [32 (33%) patients with growth, 65 (67%) without]. Eighteen patients (15.0%) underwent extirpative surgery and 6 (33.3%) were found to have malignant lesions while the remaining 12 (66.7%) had benign pathologies. All cases of malignant disease were seminomas and demonstrated vascularity on US with size ranging 5.2-8mm. Significant differences were found between the surgery and surveillance groups in initial max lesion size (5.65 vs. 3.92mm, p<.001) and presence of vascularity (81.3% vs. 33.8%, p<.001).

Conclusions: This represents the largest series of men with incidentally discovered STMs. The majority of these testicular masses did not demonstrate significant growth with long-term evaluation. The duration of follow-up required is still not clear but should be at least one year. Unfortunately, a small fraction of these incidental small testis masses were malignancies, all of which were >5mm and had vascularity.

UP-09.01

Cancer patients and relatives benefit from interprofessional collaborative urotelehealth program in rural northeastern Ontario: A work in progress

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Introduction and Objective: Cancer diagnosis usually carries with it a burden especially for individuals who live in remote communities. Found in several locations across Northern Ontario, Ontario Telemedicine Network (OTN) offers instant videoconferencing platform for clinical care. Since 2006, the uptake of this technology has been on the rise. We have encouraged inter-professional collaborative care where the patient, the relatives the primary health care provider or support worker and the specialist (urologist) all meet at the point of care by Telemedicine. By July 2014, we attempted to determine through a questionnaire survey how the patients and their relatives perceived this pattern of care.

Materials and Methods: This study was reviewed and approved by the Ethics and Review Boards of the Kapuskasing and the Kirkland Lake hospitals. Data were collected by paper and pen questionnaire Informed consent was obtained from participants. Diagnosis, Treatment, Number of Telemedicine encounters and outcomes were recorded. Qualitative information regarding computer and internet use among the patients' relatives was also obtained. Quantitative and qualitative data were analysed using the Statistical Analysis Software (SAS) and conceptual matrix respectively.

Results: So far 44 patients have completed the survey- 32 men and 12 women aged between 31 and 92 (average 64) years. Cancer diagnoses were Prostate 19; Bladder 17; kidney 5; Penis 2; and testis 1 Spouses comprised 90% of all accompanying relatives. There were 8 primary health care providers. Patients and relatives were satisfied with the care provided with timely access nearer home; cost saving and minimal travel time especially during the winter.

Conclusion: This preliminary data suggest that the patients and their relatives value Telemedicine assessments because it helps to minimize travel, reduces cost, time off work and provides appropriate care by the " Care" team. Further experience with this pattern of care and its ramifications is required.

UP-09.02

Bladder outlet obstruction after prostate cancer treatment: A population-based analysis

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Introduction and Objective: Bladder outlet obstruction (BOO) after prostate cancer treatment (PCT) includes urethral strictures, bladder neck contractures and stenosis of the prostatic urethra. We have shown that by 10 years post-PCT, BOO occurs in 20-38% of men, varying by PCT type. BOO recurrence is common and the need for retreatment may burden the cancer survivor. We sought to describe the burden of BOO in a population-based cohort by detailing the types and numbers of BOO procedures performed per patient.

Methods: From a SEER-Medicare cohort of men aged ≥66 years diagnosed with non-metastatic prostate cancer (1992-2007), we identified 12,676 men who underwent at least one surgery for BOO after radical prostatectomy (RP), external beam radiation therapy (EBRT), brachytherapy (BT), EBRT+BT, RP+EBRT or cryotherapy. To describe the risk of multiple treatments, we report the incidence rate per person-year and incidence rate ratios of BOO treatment. Cox proportional hazards regression with repeated events analysis was used to adjust for demographic, clinical and cancer characteristics.

Results: Median follow-up was 8.8 years. 45% underwent more than one treatment; mean number of treatments was 2.5 (range 1 to ≥7). Men who received EBRT+BT were most likely to receive seven or more treatments (9.2%), and those receiving RP were least likely (4.5%). Event rates, incidence rate ratio and Cox proportional hazards of BOO for each treatment group are shown in Table 1. Direct vision internal urethrotomy or transurethral incision of bladder neck contracture was the most common type of stricture treatment across all cancer treatment groups (43.0-51.1%). In RP (35.0%) and RP+EBRT (34.7%), dilation was the second most common treatment of BOO. In EBRT (41.2%), BT (37.0%) and BT+EBRT (28.9%), transurethral resection was the second most common surgery treatment.

Conclusion: When BOO occurs after PCT, nearly half of patients undergo multiple treatments. Men with BOO after radiation or cryotherapy undergo treatments that are more invasive and they have a higher retreatment rate than men with BOO after RP. The need for BOO retreatment and the burden it creates for the cancer survivor deserves more investigation.

Table 1. UP-09.02. Rates of bladder outlet obstruction treatment, by cancer-directed treatment group

Treatment group	EBRT	BT	BT+EBRT	RP RP+	EBRT	Cryotherapy
N	3994	1485	1847	4736	369	245
Person years	29787.54	9823.08	13027.06	43789.33	3298.02	1247.37
Treatments						
No	10226	3902	5419	10824	949	511
Rate (ppy)	0.343	0.397	0.416	0.247	0.288	0.410
Incidence Rate Ratio	1.389	1.607	1.683	1.000	1.164	1.657
Unadjusted HR	1.183	1.382	1.48	1	1.14	1.321
95% CI	(1.1 07–1.263)	(1.252–1.525)	(1.359–1.611)		(0.950–1.368)	(1.042–1.674)
Adjusted HR[a]	1.15	1.33	1.424	1	1.148	1.264
95% CI	(1.067–1.245)	(1.198–1.477)	(1.300–1.561)		(0.954–1.382)	(0.998–1.602)
EBRT=external beam radiation therapy; BT=brachytherapy; RP=radical prostatectomy; Ppy=per person year; CI=confidence interval, HR=Hazard Ratio from Cox model [a]model adjusted for age, race, income, education, Charlson score, T-stage, grade, and SEER registry						
Adjusted HR[b]	*1.072*	*1.2*	*1.318*	*1*	*1.084*	*1.144*
95% CI	*(0.99–1.16)*	*(1.08–1.34)*	*(1.2–1.45)*		*(0.96–1.38)*	*(0.85–1.38)*
[b]model adjusted for age, race, income, education, Charlson score, T-stage, grade, SEER registry, year of PCa treatment, and treatment of BOO in the 12 months prior to PCa treatment						