43rd Annual Northern California Urological Resident Seminar

Saturday, April 8, 2017

Top of the Bay
Hilton Garden Inn
Emeryville, CA

Hosted By:
The University of California, Davis
Department of Urology

43rd ANNUAL
NORTHERN CALIFORNIA UROLOGICAL
RESIDENT SEMINAR
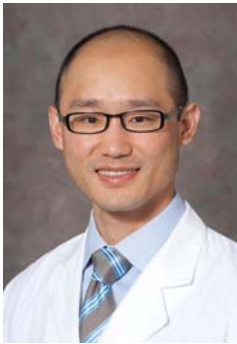
SATURDAY, APRIL 8, 2017

07:30 AM   *Registration/Breakfast*

08:00 AM   *Welcome and Introduction*:
Jennifer Yang, M.D
Residency Program Director & Associate Professor
University of California, Davis

08:05 AM   *Resident Presentations*

10:25 AM   *Break (10 minutes)*

10:35 AM   *Resident Presentations - Clinical Research*

11:55 PM   *Lunch (50 minutes)*

12:40 PM   *Resident Presentations - Clinic Research Cont.*

1:20 PM   **Resident Presentations - Basic Science**

3:00 PM   *Judges Confer*
Break (15 minutes)

3:15 PM   *Award Ceremony*

*Wi-Fi is available please see posted sign

CLINICAL RESEARCH
10 Minute presentation, 5 Minute discussion

JUDGES

Stanley Yap, M.D.
Assistant Professor
University of California, Davis

Jay Shah, M.D.
Associate Professor
Stanford University

Lindsay A. Hampson, M.D.
Assistant Professor
University of *California, San Francisco*

Judges will be given an evaluation form to fill out for each resident presentation. Presentations will be judged on a scale of 1-10 (1 being worst and 10 being best) on three different categories: Presentation Quality, Questions and Answers, and Content Significance. Winners will be announced at the end of the competition.

Clinical Research (10 Minute Presentation, 5 Minute Discussion)

8:05 AM **Reducing Preoperative Stress and Anxiety: Preoperative Guided Imagery in Patients Undergoing Major Urologic Oncologic Surgery**

Jonathan Brajtbord, M.D.
University of California, San Francisco

8:25 AM **The Nodes of Scylla and Charybdis: Balancing the Risks of Thrombosis and Infection After Inguinal Lymphadenectomy**

Robert Lurvey, M.D.
University of California, Davis

8:45 AM **Unplanned Emergency Department Visits and Hospital Admissions Following Ureteroscopy: Do Ureteral Stents Make a Difference?**

Harsha R. Mittakanti, M.D.
Stanford

9:05 AM **Long Term Follow Up of Female Stress Incontinence and Pelvic Organ Prolapse Procedures in Academic Centers within the United States**

Alex Cantrell, M.D.
University of California, Davis

9:25 AM **Natural History of Men on Active Surveillance with Low-Risk Prostate Cancer at a Safety-Net Hospital**

Carissa Chu, M.D.
University of California, San Francisco

9:45 AM **Racial Disparities in Hospital Admissions in the First 30 Days After Urethral Sling Procedures in California**

Ericka M. Sohlberg, M.D.
Stanford

10:05 AM **VesEcho Training Model: Suprapubic Catheterization Under Ultrasound Guidance**

Roland Palvolgyi, M.D.
University of California, Davis

10:25 -10:35 AM	**Break (10 minutes)**
10:35 AM	**Effects of initial Gleason Grade on Outcomes during Active Surveillance for Prostate Cancer** Selma Masic, M.D. *University of California, San Francisco*
10:55 AM	**The Cost of a Catheter: An Environmental Perspective on Single Use Clean Intermittent Catheterization** Andrew Sun, M.D. *Stanford*
11:15 AM	**Implementation of Enhanced Recovery after Surgery Protocol in Radical Cystectomy Patients** Lindsay Yuh, M.D. *University of California, Davis*
11:35 AM	**Care Pathway Variation and Surgical Cost Measurement for Percutaneous Nephrolithotomy with Time-Driven Activity-Based Costing** Ian Metzler, M.D. *University of California, San Francisco*
11:55 -12:40 PM	**Lunch (50 Minutes)**
12:40 PM	**The Fate of the Revised Artificial Urinary Sphincter** Greg Amend, M.D. *University of California, Davis*
1:00 PM	**Interaction between Histologic Subtype and Ethnicity on Bladder Cancer Outcome** Samuel Washington, M.D. *University of California, San Francisco*

Basic Science
10 Minute presentation, 5 Minute discussion

JUDGES

Jennifer Rothschild, M.D. M.P.H.
Assistant Professor
University of California, Davis

Craig Comiter, M.D.
Professor
Stanford University

Sima P. Porten, M.D., M.P.H.
Assistant Professor
University of California,
San Francisco

Judges will be given an evaluation form to fill out for each resident presentation. Presentations will be judged on a scale of 1-10 (1 being worst and 10 being best) on three different categories: Presentation Quality, Questions and Answers, and Content Significance. Winners will be announced at the end of the competition.

Basic Science (10 Minute Presentation, 5 Minute Discussion)

1:20 PM   **Automated and Dynamic Classification of Bladder Cancer Using Deep Learning on Real-Time Confocal Laser Endomicroscopy Images**

Timothy C. Chang, M.D.
Stanford

1:40 PM   **Frequency of DNA Repair Gene Mutations in Localized and Metastatic Prostate Cancer**

Allison Glass, M.D.
University of California, Davis

2:00 PM   **IQGAP1 Scoffold-Kinase Interaction Blockade in Renal Cell Carcinoma: A Novel Biomarker and Therapeutic Strategy**

Rustin Massoudi, M.D.
Stanford

2:20 PM   **Perineal Pressure Changes with Varying Oscillation While Cycling**

Adam J. Gadzinski, M.D., M.S.
University of California, San Francisco

2:40 PM   **Stanford Biodesign: A Clinician's Guide to Innovation**

Craig Stauffer, M.D.
Stanford

3:15 PM   **Awards Ceremony / Closing Remarks**

Stanford MEDICINE | Department of Urology

Abstracts

UCSF
University of California
San Francisco

Reducing Preoperative Stress and Anxiety: Preoperative Guided Imagery in Patients Undergoing Major Urologic Oncologic Surgery

Clinical Research

Jonathan Brajtbord, M.D. (UCSF)

Introduction and Objectives:
The diagnosis of cancer can be a stressful event in a patient's life and often gets overlooked in attempt to cope with the broad ramifications of this diagnosis. Research has shown that stress and depression are associated with worse survival in cancer patients. A paucity of data exists regarding the effects of guided imagery in stress reduction for major oncologic surgery. In conducting a randomized controlled trial, our goal is to examine the effect of a preoperative daily visually guided meditation practice in patients' anxiety and stress undergoing major urologic oncology surgery.

Materials and Methods:
Patients undergoing radical cystectomy, radical or partial nephrectomy, or radical prostatectomy at the UCSF Medical Center's Helen Diller Family Comprehensive Cancer Center were eligible to participate in this is prospective randomized controlled trial. Eligible patients were randomized to receive a 23-minute audio guided visualization mp3 file. Participants then answered a series of electronic validated questionnaires and surveys leading up to their surgery. Participants randomized to the study arm received a daily text message alert from CareMessage™ as well as self-reported their compliance with listening to the daily audio file.

Results:
We have enrolled 48 patients. Among those already enrolled, 92% are Caucasian, 6% Asian, 2% African-American. 60% of patients have an income of greater than >100K. 36% of patients have had prior experience with meditation. There were no differences in baseline anxiety scores between the two groups. After listening to the guided imagery for two weeks prior to surgery, 63% of participants in the guided imagery group responded with "never" or "almost never" when asked how often they felt nervous or stressed. 100% of patients in the control group responded with "sometimes" or "fairly often" to the same question.

Conclusion:
The preliminary results of our ongoing study indicate that guided imagery audio file is well received with patients and is working to reduce stress and anxiety leading up to major urologic oncologic surgery.

The Nodes of Scylla and Charybdis: Balancing the Risks of Thrombosis & Infection after Inguinal Lymphadenectomy

Clinical Research

Robert Lurvey, M.D. (UC Davis)

Introduction:
Inguinal lymphadenectomy (ILND) is the standard of care for many malignancies of the groin, perineum and lower extremities. It is a surgery that is also associated with increased risk of both thromboembolic event (TE) and wound complications. However, many of the prophylactic measures for these complications are opposing, such as ambulation versus bedrest or the use of heparin prophylaxis. Using data from the National Surgical Quality Improvement Project (NSQIP) database, we address this by identifying rates of occurrence and risk factors associated with ILND.

Materials and Methods:
Using CPT codes, we queried the NSQIP database for the years 2003 to 2014 for any patient undergoing superficial or deep inguinal ILND for malignancy. The effect of covariates on the occurrences of complications or readmission were analyzed using logistic regression. Times to occurrences of these events were analyzed using negative binomial regression.

Results:
A total of 1,413 patients were analyzed, of which 539 underwent deep inguinal node dissection. The overall readmission rate was 7.4%, and 18.2% for urologists, though on multivariable analysis type of surgeon was not a significant predictor. Overall rate of wound infection was 13.9%, compared to a 1.1% rate of TE. Diabetic patients (odds ratio [OR] = 2.26, P = 0.003), obese patients (OR = 2.15, P = 0.014) and patients undergoing deep inguinal node dissection (OR = 1.94, P = 0.005) had significantly higher odds of developing a wound infection. Higher serum creatinine was associated with a statistically significant but only marginally longer time to any infection (rate ratio = 1.55; P = 0.04). Patients with preoperative serum albumin of 4 or higher had a significantly longer time to superficial surgical site infection (rate ratio = 1.32; P = 0.018). Obese patients had significantly higher odds of readmission than normal weight patients (OR = 2.59; P = 0.03). We found no significant difference between peri-operative events and surgeon specialty.

Conclusion:
Though arguably a more morbid complication, TEs are very uncommon in the first 30 days following ILND, while rates of wound complication are high. With a better understanding of factors associated with each of these complications, we can better stratify patients to most effectively reduce risks and improve peri-operative outcomes following ILND.

Unplanned Emergency Department Visits and Hospital Admissions Following Ureteroscopy: Do Ureteral Stents Make a Difference?

Clinical Research

Harsha R. Mittakanti, M.D. (Stanford)

Introduction and Objective:
The comparative effectiveness of ureteral stents placed during ureteroscopy for urinary stone disease is widely debated. We sought to evaluate unplanned medical visits within the early post-operative period after ureteroscopy in patients with and without ureteral stent placement.

Materials and Methods:
We identified all ureteroscopic procedures for urinary stone disease in the California Office of Statewide Health Planning and Development (OSHPD) database from 2010-2012. The primary outcome was any emergency department visit or inpatient hospital admission in the first 7 days following ureteroscopy. Patients were sub-categorized by type of ureteroscopy (i.e. laser lithotripsy, basket retrieval, diagnostic) and analyzed for significant differences between stented and unstented patients. Multivariable logistic regression was performed to determine if ureteral stent placement was independently associated with unplanned visits.

Results:
Our analytic cohort included 17,129 patients undergoing 18,860 ureteroscopy procedures. A ureteral stent was placed in 86.2% of patients undergoing laser lithotripsy, 70.5% of patients receiving basket retrieval, and 54.0% of patients undergoing diagnostic ureteroscopy. In the 7 days following ureteroscopy, 6.6% of patients were seen in the emergency department and 2.2% of patients were admitted. In a fully adjusted model, the utilization of a ureteral stent was not associated with emergency department visits or inpatient admissions.

Conclusions:
Ureteral stent placement during ureteroscopy does not increase the odds of emergency department visits and inpatient admissions in the early post-operative period.

Long Term Follow up of Female Stress Urinary Incontinence and Pelvic organ Prolapse Procedures in Academic Centers within the United States

Clinical Research

Alex Cantrell, M.D. (UC Davis)

Introduction and Objective:
There is significant overlap in pathology when considering stress urinary incontinence and pelvic organ prolapse. Often times, repair of one can lead to worsening of another, and vice versa. There is also a significant failure rate even to well established surgical repairs of these conditions. The purpose of this study was to report the rates of repeat SUI or POP procedures in patients who had initially undergone a sling procedure for stress incontinence, and to identify risk factors associated with increased rates of repair.

Materials and Methods:
A hospital consortium database was used to identify women treated for stress urinary incontinence with a sling between 2009 and 2012, who were then followed to the end of 2014 to identify secondary operative procedures. Patient variables were analyzed.

Results:
Of the 24,671 patients identified in this cohort, 48% had concomitant prolapse repair during initial sling SUI procedure. Close to 18% had concurrent hysterectomy and 9% of patients received vaginal prolapse mesh. Concurrent hysterectomy showed a protective effect (HR 0.78) against having a repeat SUI procedure, while prolapse mesh use showed increased risk (HR 1.48). The concomitant repair of SUI with any prolapse procedure resulted in a statistically significant higher risk of requiring additional prolapse repair within the follow up period. Prolapse mesh use also had a statistically significant higher rate of postoperative fistula occurrence (HR 2.6) compared to those without mesh.

Conclusions:
This data most strikingly portrays the increased risk of developing recurrent prolapse leading to additional surgery when concomitant prolapse repair is completed during the initial procedure. There is also increased risk of repeat SUI repair with certain types of prolapse repair. However, the overall risk of requiring additional surgery during follow up period (6-9%) is below currently quoted estimation of recurrence.

Natural History of Men on Active Surveillance with Low-Risk Prostate Cancer at a Safety-Net Hospital

Clinical Research

Carissa Chu, M.D. (UCSF)

Introduction and Objectives:
Men with low-risk prostate cancer on active surveillance (AS) must have adequate follow up and access to care. Our objective was to characterize the demographic and outcomes of men on AS at a safety-net hospital and to assess lost to follow-up (LTFU).

Materials and Methods:
From January 2004 to November 2014, 104 men at Zuckerberg San Francisco General (ZSFG) with low-risk prostate cancer were followed with AS (PSA/DRE every 3-6 months and repeat prostate biopsy every 1-2 years). LTFU was defined as failure to contact patients with three phone calls or any urology visit recorded within 18 months from a prior visit or biopsy.

Results:
Among the 104 men on AS at ZSFG, the median age at diagnosis was 61.5 years. The median follow-up time was 29 months, at which point 17.3% men were LTFU and 46% remained on surveillance. Men underwent a median of 7 serum PSA measurements and an average of 2 prostate biopsies. 20.6% men had definitive treatment; median time to treatment was 26 months. Radiation therapy was more common than surgery (12.5% vs 7.7%). There was one prostate cancer-related death and three non-cancer deaths.

Conclusions:
AS is challenging among a vulnerable population receiving care in a safety-net hospital, as rates of LTFU were high. Our findings suggest the need for an AS program to improve adherence and follow-up among vulnerable and underserved populations.

Racial Disparities in Hospital Admissions in the First 30 Days After Urethral Sling Procedures in California

Clinical Research

Ericka M Sohlberg, MD (Stanford)

Introduction and Objectives:
To evaluate the association of socioeconomic factors with the risk of adverse events in the first 30 days following urethral sling placement.

Materials and Methods:
We accessed non-public data from the Office of Statewide Health Planning and Development in California from 2005-2011. All female patients who underwent an ambulatory urethral sling procedure (CPT 57288) without concomitant surgery were included. The primary outcome of unplanned hospital visit was defined as any subsequent emergency department visit, inpatient admission, or sling revision operation within 30 days of the original surgery. Patient demographics including race and payer status, as well as hospital sling volume were evaluated.

Results:
28,635 women were identified who underwent outpatient urethral sling placement. Within 30 days, 1,628 women (5.7%) had at least one unplanned hospital visit. In the adjusted multivariate model, Black race (compared to White race) and having Medi-Cal/Medicaid insurance (compared to Medicare) were both independently associated with an increased odds of having an unplanned hospital visit (OR=1.85, $p<0.01$ and OR 1.64, $p<0.01$, respectively). Having private insurance (compared to Medicare) was associated with decreased odds of an adverse event (OR 0.65, $p<0.01$).

Conclusions:
Although the overall 30-day unplanned visit rate following urethral sling placement is low, we observed significant disparities in event rates in certain groups. Being of Black race and having Medicaid insurance status were both independently associated with an increased rate of adverse events. Our findings highlight the fact that certain populations are more likely to present with early adverse events.

VesEcho Training Model: Suprapubic Catheterization Under Ultrasound Guidance

Clinical Research

Roland Palvolgyi, M.D. (UC Davis)

Introduction and Objectives:
Suprapubic catheterization (SPC) is a fundamental skill for urology residents and trainees. Ultrasound guidance for this procedure is effective for minimizing complications, and the British Association of Urological Surgeons guideline recommends use of ultrasound for SPC whenever possible. We developed a novel, cost-effective, and sonographically accurate training model for SPC and incorporated it into our resident training curriculum.

Materials and Methods:
The model consists of 4 components: the bladder (water balloon), a pelvic bone replica, and rectus fascia (non-rebreather masks), all housed within an ultrasound compatible gelatin mold. The model was tested during a resident training course to facilitate instruction of SPC. Pre- and post- training surveys were administered to 13 participating urology residents, which assessed the model's anatomic and sonographic realism as well as the utility of the curriculum towards their education.

Results:
The simulator model received a mean score of 4.2/5 (SD 0.6, range 3-5) for anatomical realism and 4.4/5 for sonographic realism (SD 0.5, range 4-5). The value of the simulator as training tool was rated 4.7 and the overall value of the training course was rated 5/5. Regarding change in overall comfort with the procedure, mean total scores (out of 25) significantly increased for all residents after the training course (14.6 to 19.7, 5.1 point increase, $p < 0.001$).

Conclusions:
Our novel simulation model and didactic curriculum received positive evaluations from urology residents and increased their comfort with ultrasound-guided SPC. It is a sustainable teaching tool and can easily be incorporated into any Urology training curriculum.

Effects of Initial Gleason Grade on Outcomes During Active Surveillance for Prostate Cancer

Clinical Research

Selma Masic, M.D. (UCSF)

Introduction and Objectives:
Whether men with GS 3+4 disease are appropriate candidates for active surveillance (AS) remains a matter of debate. We evaluated the effects of the initial Gleason grade on biopsy progression, treatment and outcomes after radical prostatectomy (RP).

Methods:
We prospectively followed men on AS between 1990-2016 and included those diagnosed with Gleason 3+3 or 3+4. Life tables were used to estimate progression-free, treatment-free, and PSA recurrence-free survival after delayed RP. Multivariate Cox proportional hazards regression was used to determine risk factors for progression, treatment and recurrence after RP. Multivariate logistic regression was used to determine risk factors for adverse pathology at RP. Models were adjusted for age, race, PSA density (PSAD), total number of biopsies, and percentage of cores positive at diagnosis.

Results:
 A total of 1,171 men met inclusion criteria with Gleason 3+3 or 3+4 on initial biopsy and ≥1 follow-up biopsy. A total of 1,065 (91%) had Gleason 3+3 and 106 (9%) 3+4. Patients with Gleason 3+4 had lower progression-free (20% vs 40%, $p<0.01$) and treatment-free survival (52% vs 64%, $p<0.01$) at 5 years. There was no significant difference in recurrence-free survival at 3 years for Gleason 3+4 compared to 3+3 (80% vs 90%, $p=0.23$), or in adverse pathology (OR 1.04 95% CI 0.5-2.3).

Conclusion:
While Gleason 3+4 at initial biopsy was a risk factor for progression and treatment on AS, it was not associated with adverse pathology or higher rates of recurrence after delayed RP. These findings suggest that select patients with Gleason 3+4 may be suitable candidates for AS. Longer-term follow-up is ongoing.

The Cost of a Catheter: An Environmental Perspective on Single Use Clean Intermittent Catheterization

Clinical Research

Andrew Sun, MD (Stanford)

Objective: Clean intermittent catheterization (CIC) is considered the gold standard in bladder management for many persons with neurogenic bladder dysfunction. In the past, the majority of insurance providers had covered four catheters per month for this purpose. The expectation was that catheters would be cleaned and reused, with one catheter used per week. However, in 2008, Medicare policy was changed to reimburse for up to 200 catheters per month, thus allowing single use CIC. The basis for the policy change was a presumed increased risk of urinary tract infection with catheter reuse and an expectation of reduced morbidity secondary to single catheter usage. To date however, prior trials fail to show a difference in urinary tract infection rates between single-use and multiple-use CIC. Given the lack of a proven clinical benefit, we assess the potential scope of waste generated by the single-use CIC policy.

Methods: We estimated the prevalence of CIC use in the United States in the neurogenic bladder population, consisting of persons with multiple sclerosis, spina bifida, and spinal cord injury. The amount of waste generated by single use catheters was obtained by weighing representative samples. We further performed a literature review of the primary materials used in catheter construction to determine their degradation properties.

Results: By our estimates, at least 313,607 persons in the United States perform CIC for neurogenic bladder management. When assuming an average five cathing events per day, the amount of waste generated with single use CIC is estimated to be anywhere from 27,660 - 245,440 pounds per day, depending on model of catheter used. Of the primary catheter materials, only latex (which is infrequently used) was found to be somewhat biodegradable (over an 80 year time period). Both silicone and poly-vinyl chloride (which are more commonly used) are unlikely to degrade significantly after disposal.

Conclusions: Single use CIC may generate up to 90 million pounds of waste annually, equivalent to more than 27,000 cars, 340 passenger jets, or 4 U.S. naval destroyers. Given the unproven clinical benefit of the single use policy versus reusable catheters, the environmental impact should be considered. Further study is need to better define the association between CIC and urinary tract infection in order to make informed recommendations and policy.

Implementation of Enhanced Recovery after Surgery Protocol in Radical Cystectomy Patients

Clinical Research

Lindsay Yuh, M.D. (UC Davis)

Introduction:
Using Enhanced Recovery After Surgery (ERAS) principles for cystectomy patients have shown to result in faster return of bowel function and decreased length of hospital stays (LOS). Our aim was to implement an ERAS protocol for cystectomy patients at UC Davis and to evaluate patient outcomes.

Methods:
 An ERAS protocol, which emphasized no bowel prep, use of Entereg and multimodal pain control, was developed. The protocol was implemented on all eligible patients undergoing radical cystectomy from January 1, 2016 forward. Time to bowel function, LOS, complications, and readmission rates were tracked. Analyses were conducted with test group having received majority of the ERAS protocol and separately with those receiving Entereg only.

Results:
 25 patients underwent the protocol and 25 patients in 2015 were used as a control group undergoing traditional postop care before starting the protocol. After adjusting for baseline characteristics, the time to tolerating diet (P = 0.001) and LOS (p=0.018) were significantly shorter in the ERAS. There was a 2.5 shorter LOS in the ERAS group (8.6 vs 6 days). When comparing patients who received Entereg and those that did not, those with Entereg had significantly decreased time to bowel function and LOS (8.2 vs 5.9). There was no difference in complication or readmission rates.

Conclusion:
We demonstrate success in implementing our ERAS protocol and show improvement in time to bowel function and LOS. Effects can be attributed mostly to the use of Entereg. It's role postop morbidity is yet to be determined.

Care Pathway Variation and Surgical Cost Measurement for Percutaneous Nephrolithotomy with Time-Driven Activity-Based Costing

Clinical Research

Ian Metzler, M.D. (UCSF)

Introduction:
Time-driven activity-based costing (TDABC) provides a methodology to better understand true costs of providing a health care service and the variations in cost based on variance in timing. We applied TDABC analysis to a percutaneous nephrolithotomy (PCNL) care pathway.
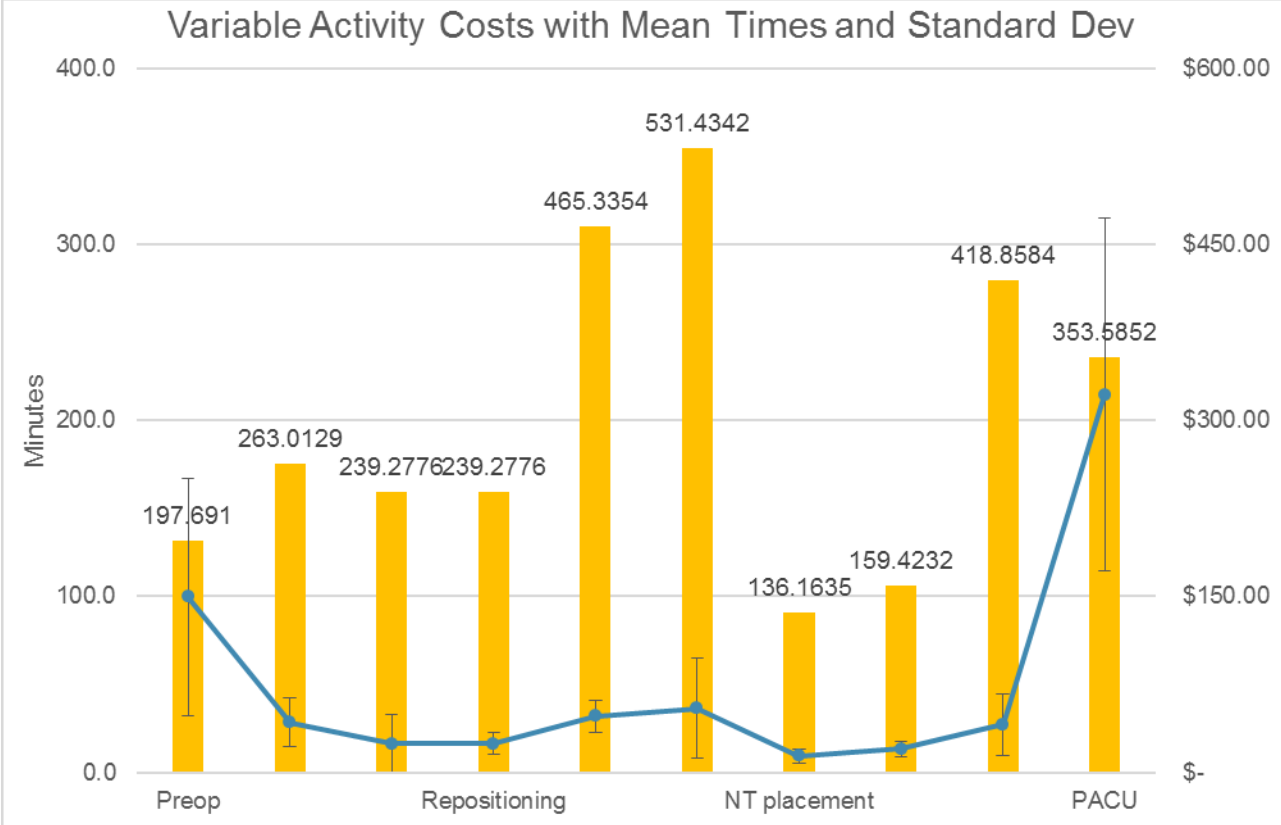
Methods:
The care pathway for PCNL was defined as the time from patient arrival to the preoperative area to discharge from post anesthesia care unit (PACU) to the hospital floor. Process maps were created with perioperative stakeholders to define the activities involved. Stop-watch timing was performed for eleven PCNL cases. The cost rate for attending urologists was calculated using publicly available salaries and estimated capacity, additional cost rates were estimated using a ratio of the averaged salaries for each staff position.

Results:
The activities demonstrating the greatest time variance were PACU recovery, preoperative holding, and stone clearance (214±100.3, 99±67.2 and 36±28.2 minutes respectively). The activities with the least variation were anesthesia extubation, nephrostomy tube placement and patient repositioning (13±3.9, 9±4.3, 16±6.3 minutes respectively). Preoperative care accounted for $470 (7%), intraoperative care accounted for $4351 (84%) and post-operative care accounted for $353 (9%) of the total, 37% of cost was attributable to disposables.

Conclusions:
Although utilizing the operative room is the most cost intensive activity for PCNL, variation exists during different phases of care. The TDABC methodology allows for estimation of true costs for PCNL and modeling of care pathway variation in order to understand health care costs and target areas for increased care value.

Variable Activity Costs with Mean Times and Standard Dev

The Fate of the Revised Artificial Urinary Sphincter

Clinical Research

Gregory Amend, M.D. (UC Davis)

Introduction and Objectives:
The clinical course of artificial urinary sphincter (AUS) surgery has been well studied. AUS revision rates up to 30% are reported; however, little is known about the fate of the revised sphincter. We aim to evaluate the course of the revised AUS, identify risk factors, and highlight the types and timing of complications to help guide discussion.

Methods:
A retrospective chart review was performed on male patients over age 18, who underwent replacement or revision of an AUS at UC Davis Medical Center by two fellowship-trained reconstructive surgeons from 2003 thru 2015. Data on the the initial AUS was obtained. The protocol underwent local IRB approval.
Incontinence diagnosis, history of obesity, smoking, radiation, transurethral surgeries, inflatable penile prosthesis (IPP), major bladder surgery (augmentation or neobladder), and immunosuppression were obtained. Complications associated with the initial and subsequent AUS included mechanical malfunction, incontinence, urethral atrophy, infection, and erosion. Timing and type of revision (minor or major revision, complete exchange or explant) were reviewed. Current state of continence was obtained. Statistical analysis with logistic regression modeling was performed.

Results:
70 patients met inclusion criteria, undergoing a total of 121 AUS revision surgeries. Median follow up years was 9. Average age at initial AUS was 64 and 84% of patient had post-prostatectomy incontinence. Average time to first complication was 6.9 years. Neither obesity, smoking, neurogenic bladder, transurethral surgery, immunosuppression, nor radiation were risk factors for revision. The most common complication was mechanical, 41% of cases, followed by incontinence primarily due to urethral atrophy, 13%. History of obesity had highest risk of mechanical malfunction (OR 3.87). When an IPP was present, revision was more likely to involve sphincter component alone. At completion, 76% of patients retain their AUS; 64% remain continent. Patients with history of prior bladder surgery had the highest revision rates, and shortest time to initial revision, 4.8 vs. 7.4 years. Mechanical malfunction was the primary causative factor, however urethral atrophy rates were high, 14.3% vs. 5.6%. 3/3 patients with history of TURP were without an AUS at follow-up end.

Conclusions:
Patients with history of major bladder surgery have higher revision rates, primarily due to mechanical malfunction. Obesity may also be a risk factor for mechanical malfunction. Patients undergoing revisions may be at higher risk for urethral atrophy which also commonly prompted the initial revision.

Interaction between Histologic Subtype and Ethnicity on Bladder Cancer Outcome

Clinical Research

Samuel Washington, M.D. (UCSF)

Introduction and Objective:
Bladder cancer is a major contributor to cancer-related morbidity and mortality with higher incidence among minorities. We aim to evaluate the relationship between race and non-urothelial carcinoma (UC) variant histology on bladder cancer outcomes using the National Cancer Database.

Materials and Methods:
We compiled data on patients with bladder cancer and treated with radical cystectomy from 2004 to 2013. Univariate analyses identified differences between UC and variant histology. Multivariable Cox regression was used for analysis of overall survival, with hazard ratios (HR) and 95% confidence intervals (CI).
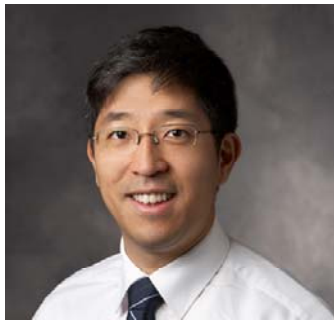
Results:
Of the 362,091 patients included, black patients comprised 5.1% with a higher proportion of women (35.6% vs 24.7%) compared to white patients ($p < 0.05$). Black patients had higher rates of variant histology: squamous cell carcinoma (2.9% vs 1.2%, $p < 0.05$), undifferentiated carcinoma (2.7 vs 1.4%, $p < 0.05$) and adenocarcinoma (1.5 vs 0.5%, $p < 0.05$). In adjusted models squamous cell carcinoma (HR 1.3, 95% CI 1.2-1.4, $p < 0.05$), small cell carcinoma (HR 1.5, 95% CI 1.3-1.7, $p < 0.05$) and black ethnicity (HR 1.2, 95% CI 1.1-1.2) independently predicted increased mortality while chemotherapy was associated with decreased risk (HR 0.8, 95% CI 0.7-0.8, $p < 0.05$).

Conclusion:
Non-urothelial histology was more prevalent in black patients and associated with worse overall survival in patients with bladder cancer treated with radical cystectomy. In addition, black ethnicity was also a predictor of worse survival, independent of histology, in patients treated with cystectomy. Further investigation is needed to explore the interplay between race and variant histology on survival in post-cystectomy patients.

Automated and Dynamic Classification of Bladder Cancer Using Deep Learning on Real-Time Confocal Laser Endomicroscopy Images

Basic Science

Timothy C. Chang, M.D. (Stanford)

Introduction and Objectives: Advancements in artificial intelligence now enable machines to surpass human capability in performing tasks such as classifying images. These innovations can be applied to medical imaging to create next generation tools that augment current clinical practice. Confocal laser endomicroscopy (CLE) is an approved intraoperative optical imaging system that provides real-timhigh resolutione imaging similar, high resolution imaging of tissue microarchitecture and cellular features similar to histology in real-time but requires interpretation of the images by the clinician. OTo decrease the burden on urologists for interpretation, our aim was to create an automated system utilizing deep learning that provides real-time assistance in the diagnosis of CLE images.

Materials and Methods: A deep learning algorithm was optimized for image classification and trained using a bladder CLE dataset collected with IRB approval from 81 subjects with IRB approval undergoing cystoscopy/TURBT. The diagnoses of 458 CLE videos were co-registered with clinical pathology reports to establish the ground truth. CLE videos were captured at 8 frames per second using a 2.6 mm diameter CLE probe through a rigid cystoscope. The algorithm received only the 170,712 CLE images that were individually captured from the videos and its corresponding diagnoses as its only inputs.
The algorithm analyzed a total of 170,712 images that were individually captured from the CLE videos. The dataset was randomly partitioned to 80% training, 10% validation, and 10% testing, resulting in 45 CLE video clips in the test set (consisting of 31% malignant and 69% benign).

Results: Overall accuracy in the prediction of malignant versus benign was 87% (sensitivity 79% and specificity 90%). The algorithm analyzed a total of 170,712 images that were individually captured from the CLE videos. A diagnosis for every individual frame was obtained which was then pooled together to obtain a final diagnosis for each respective video clip. The algorithm was capable of providing frame-by-frame diagnoses

Conclusion: We developed an automated system for real-time, dynamic diagnosis of CLE images. Our deep learning machine achieved high accuracy, sensitivity and specificity in detecting bladder cancer. Every frame is classified in real-time, allowing for live feedback of the streaming CLE images.
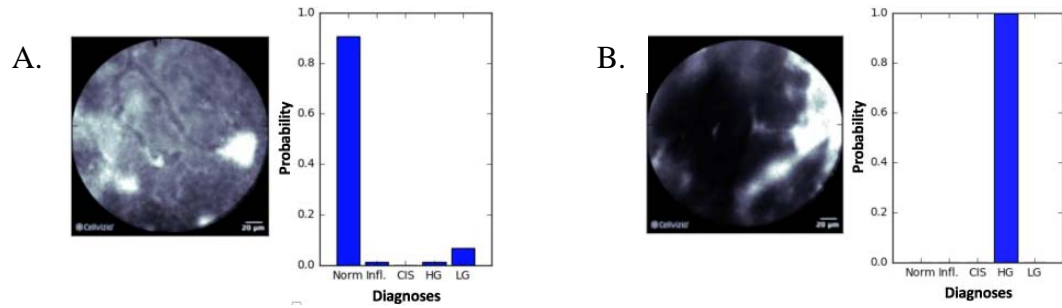
Figure 1: *CLE images with real-time, automated diagnoses*. Screen captures of CLE videos with accompanying histograms providing frame-by-frame prediction of diagnoses. (A) CLE of benign tissue with 90% prediction that it is not a malignancy for that frame. (B) CLE of bladder cancer with 100% prediction of high grade cancer for that frame. Norm = normal tissue, infl = inflammation, CIS = carcinoma-in-situ, HG =

Frequency of DNA Repair Gene Mutations in Localized and Metastatic Prostate Cancer

Basic Science

Allison Glass, M.D. (UC Davis)

Introduction and Objectives:
DNA repair gene mutations are important molecular alterations in prostate cancer pathogenesis. Germline mutations in DNA repair genes, particularly BRCA2, were recently recognized as associated with metastatic prostate cancer. Prostate tumors with DNA repair defects may also be particularly sensitive to platinum based chemotherapy and PARP inhibitor therapy. We sought to characterize alterations in DNA repair pathway genes in both primary and metastatic prostate tumors.

Materials and methods:
We studied the distribution of DNA repair gene mutations in 936 prostate cancers harvested from localized and metastatic tumors. Tumor DNA underwent hybrid capture for all coding exons of 395 cancer-related genes plus select introns from 19 or 31 genes frequently rearranged in cancer. Captured libraries were sequenced to a median exon coverage depth of >500x using Illumina sequencing and were analyzed for base substitutions/insertions, copy number alterations and rearrangements. We utilized two described lists of genes involved in DNA repair : our own in-house list of 74 (UCD) and a list of 20 DNA repair genes associated with cancer predisposition syndromes utilized in a recent publication by Pritchard et al. Nine genes were in common between the two lists yielding a total of 85 unique DNA repair genes. We further stratified the frequency of mutations by tissue site (prostate versus metastases). Only tissues represented by at least 10 samples in the set were included (868). Frequencies of DNA repair defects were compared across metastatic sites by Pearson's Chi-squared test.

Results
We identified 228/936 unique samples with at least one likely functional mutation in a DNA repair gene (24.4%). Mutations were identified in 20.1% of prostate tumors (13% UCD, 18.4% Pritchard et al.) and in 18.8% of bone metastases. The highest rates of DNA repair mutations were found in visceral metastases including brain, pelvis and liver, which were significantly higher than either prostate tissue or bone sites ($p=<0.01$). The most commonly (â‰¥1% of samples) mutated genes in the DNA repair pathways are: BRCA2 (11.43%), ATM (5.77%), MSH6 (2.46%), MSH2 (2.14%), ATR (1.60%), MLH1 (1.28%), and BRCA1 (1.18%).

Conclusion:
DNA repair gene mutations are more common in metastatic than localized prostate tumors. Visceral metastases appear enriched for
these mutations compared with localized tumors or bone and lymph node metastases. Genomic profiling may identify prostate cancers potentially sensitive to platinum-based chemotherapy or PARP inhibition.

IQGAP1 Scaffold-Kinase Interaction Blockade in Renal Cell Carcinoma: A Novel Biomarker and Therapeutic Strategy

Basic Science

Rustin Massoudi, M.D. (Stanford)

Introduction and Objective:
IQ motif-containing GTPase-activating-like protein 1 (IQGAP1) is a ubiquitously expressed protein that scaffolds the Ras/MAP kinase pathway. Blocking the binding of ERK to IQGAP1 may disrupt neoplastic signaling and offer a novel therapeutic approach in renal cell carcinoma (RCC). We sought to characterize the effect of IQGAP1-ERK inhibition in RCC using multiple complementary approaches.

Methods:
First, we evaluated IQGAP1 expression in a tissue microarray of normal human renal parenchyma (N=10) and RCC (N=297). Staining was correlated with tumor factors (histology, grade, size). We fit proportional hazards models to determine the effect of IQGAP1 expression with progression-free and overall survival. Next, we characterized IQGAP1 expression in multiple human-derived RCC cell lines. We used a small peptide mimic of the ERK binding "WW" domain of IQGAP1 to inhibit IQGAP1-ERK binding. We then studied the effect of WW peptide and a MEK inhibitor (trametinib) on RCC cell line viability using an in vitro model.

Results:
IQGAP1 expression was identified in 96% of RCC tumors and demonstrated distinct staining patterns by histology. Cytoplasmic staining was strongest among papillary and chromophobe RCC. Cell membrane staining was notable in normal proximal renal tubules. WW peptide was associated with significantly more RCC cell death (mean 95%) when compared with scrambled protein (41%) and the MEK inhibitor trametinib (40%).

Conclusions:
IQGAP1 scaffold-kinase inhibition holds promise as a novel therapeutic agent in advanced RCC.

Perineal Pressure Changes with Varying Oscillation While Cycling

Basic Science
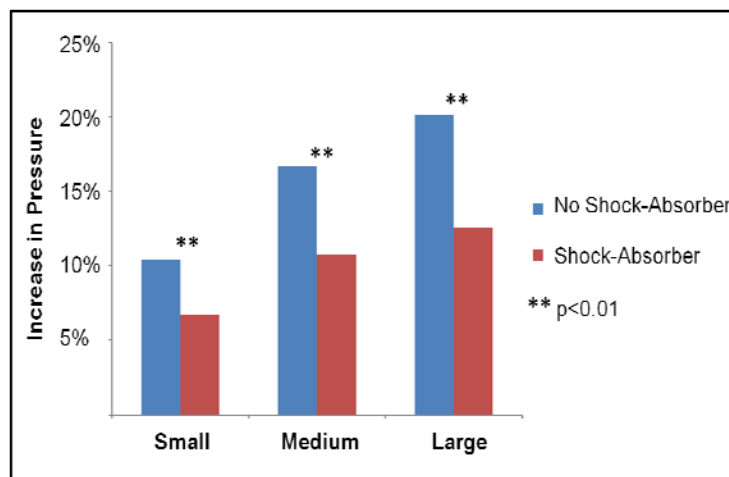
Adam J. Gadzinski, M.D., M.S. (UCSF)

Introduction and Objectives: Up to 30% of cyclists experience perineal/penile paresthesias and short-term erectile dysfunction. The extent of perineal microtrauma from cycling remains unclear. We aim to evaluate the changes in perineal pressure with increasing levels of bicycle oscillation to simulate real world conditions.

Methods: We enrolled healthy subjects ages 18-50 without genitourinary disease or symptoms. We measured perineal pressure while subjects rode a stationary bicycle using a Tekscan pressure sensor secured to the bicycle saddle. We assessed changes in perineal pressure from small, medium and large oscillations defined as drop from 1, 2, and 3cm, respectively. We took measurements in the stationary position and while subjects pedaled. We repeated measurements after adding a seat-post shock-absorber. We summed the total force applied to the perineum at baseline and during oscillation. We compared pressure changes following addition of the shock-absorber.

Results: We enrolled 30 men and 10 women. In the stationary position, small oscillations increased perineal pressure 10% over baseline; medium and large oscillations created 17% and 20% increases, respectively. The shock-absorber significantly lowered the perineal pressure experienced by participants across all oscillations (Figure). In the riding position, pressures decreased with the shock-absorber, but only statistically significant for small oscillations (21% to 17%, $p < 0.05$).

Conclusion: There are notable increases in perineal pressure with oscillations while cycling. The addition of a shock-absorber decreases the force on the perineum with oscillation.

Figure

Stanford Biodesign: A Clinician's Guide to Innovation

Basic Science

Craig Stauffer, M.D. (Stanford)

Introduction:
If you look at the history of medicine, the pace of our understanding of human physiology has rapidly accelerated over the past several decades. Nowhere is this more evident than in clinical medicine where significant advances to patient care seem to come to market almost daily; we have gone from bloodletting to genome sequencing at a blistering speed. Urologists have been at the forefront of innovation and early adoption, from the folklore of urologists "smithing" their own cytoscopes to the popularization of the robotic operating platforms. But there is still so much to be done, particularly as innovation has expanded to workflow improvement.

Methods:
I spent my research year with the Stanford Biodesign Fellowship, an ecosystem set on Stanford's campus with the mission to provide individuals with the knowledge, skills, mentoring, and networking required to deliver meaningful and valuable innovations to patients everywhere.

Results:
Our team focused on the management of underactive bladder and, using desing thinking, worked to improve quality of life in women with underactive bladder.

Conclusions:
We believe our solution offers women with underactive bladder a method of reliable bladder management which increases comfort while achieving comparable results to standard of care.