Obstetrics, Gynecology & Women’s Health Institute

8TH ANNUAL

Research Day

May 10, 2023
Bunts Auditorium
or via Webex
8TH ANNUAL

Obstetrics, Gynecology & Women’s Health Institute

RESEARCH DAY

May 10, 2023
Key Note Address & Lecture
Sawsan As-Sanie, MD, MPH
Professor in Obstetrics & Gynecology
Co-Chief, Gynecology, Director, Minimally Invasive Gynecologic Surgery
Director, Endometriosis & Chronic Pelvic Pain Consultative Clinic
University of Michigan

Judges (Oral Presentations)
Sawsan As-Sanie, MD, MPH
Ashley Brant, DO
Jennifer Eaton, DO
Stacey Ehrenberg, MD
Erin Higgins, MD
Shannon Wallace, MD

Judges (Poster Presentations)
Mariam AlHilli, MD
Jonathan Emery, MD
Monique Katsuki, MD
Adina Kern-Goldberger, MD, MPH
Miguel Luna-Russo, MD
Agenda

7:00 am  Presenter & Judges Registration

7:15 am–7:20 am  Welcome
Tristi Muir, MD
Chair, Enterprise Women's Health Institute

7:20 am–7:25 am  Introduction & Welcome
Ruth Farrell, MD, MA
Vice Chair, Research, Enterprise Women’s Health Institute

7:30 am–8:20 am  Key Note Address
*The Social Injustice of Menstrual Pain: Erasing the Stigma and Being Part of the Solution*
Sawsan (Suzie) As-Sanie, MD MPH
Robert K Ferguson and Virginia A Ferguson Professor in Obstetrics and Gynecology
Co-Chief of Gynecology
Director, Minimally Invasive Gynecologic Surgery
Director, Endometriosis and Chronic Pelvic Pain Program
University of Michigan

8:20 am–8:30 am  Q&A

8:30 am–8:40 am  Break

8:40–10:10 am  PGY3 Resident Oral Presentations

8:40 am  *Fetal Echocardiography Outcomes in Mothers at Increased Risk of Fetal Congenital Heart Disease*
Lauren Buckley, MD

8:50 am  Discussant: Annika Sinha, MD & Q&A

8:55 am  *Necrotizing Soft Tissue Infections in Obstetric and Gynecologic Patients*
Catherine (Katie) Klammer, MD

9:05 am  Discussant: Imani Chatman, MD & Q&A

9:10 am  *Incidence of and Risk Factors for Venous Thromboembolism in Recurrent Ovarian Cancer*
Erika Lampert, MD
9:20 am Discussant: Julia Chalif, MD & Q&A

Madeline Lederer, MD

9:35 am Discussant: Catherine Keller, MD & Q&A

9:40 am *Prevalence of Polycystic Ovarian Syndrome in Young and Adolescent Transmasculine Patients Presenting for Gender Affirmation Care*  
Sabrina Rangi, MD

9:50 am Discussant: Kaia Schwartz, MD & Q&A

9:55 am *Comparing Foley Balloon and Hygroscopic Dilators as Cervical Preparation Prior to Dilation and Evacuation*  
Johnathan Zhao, MD

10:05 am Discussant: Rachel Shin, MD & Q&A

10:10 am *Refreshment Break & PGY2 Resident Poster Presentations*

10:45 am– 12:15 pm Graduating Fellows Oral Presentation

10:45 am *Evolutionary Experimentation Highlights Collateral Sensitivity and Associated Gene-Expression Changes in Endometrial Cancer Cell Lines*  
Sabrina Bedell, MD  
Fellow, Gynecologic Oncology

10:55 am Q&A

11:00 am *Activating the Immune System is Essential for the Efficacy of Heated Intraperitoneal Cisplatin in a Murine Model of Advanced Epithelial Ovarian Cancer*  
Danielle Chau, MD  
Fellow, Gynecologic Oncology

11:10 am Q&A

11:15 am *Evaluating the Impact of Video-Based Surgical Coaching on Obstetrics and Gynecology Residents’ Laparoscopic Suturing Skills*  
Angelina Carey-Love, MD  
Clinical Fellow, Minimally Invasive Gynecologic Surgery
11:25 am Q&A

11:30 am **Hysterectomy in BRCA Carriers: What are the Differences Between Patients Who Have Hysterectomy at the Time of Risk Reducing BSO and Those That Opt for RRSO Without Hysterectomy?**
Alexa Fiffick, DO
Clinical Fellow, Specialized Women’s Health

11:40 am Q&A

11:45 am **The Presence of Cell Extrusion or Exclusion during Embryonic Compaction is Associated with Lower Rates of Blastocyst Formation and Poorer Morphologic Grade**
Christine Hur, MD
Fellow, Reproductive Endocrinology & Infertility

11:55 am Q&A

12:00 pm **Postoperative Functional Outcomes in Patients Undergoing Combined Robotic Ventral Rectopexy and Sacrocolpopexy**
James Ross, MD
Fellow, Female Pelvic Medicine and Reconstructive Surgery

12:10 pm Q&A

12:15–1:00 pm Lunch Break & View Posters

**1:00 pm Innovations in Ob/Gyn Lecture**

*From Good to Great: The Power of Surgical Coaching in Cultivating a Culture of High Performance and Continuous Improvement*
Cara R. King, DO, MS
Section Head, Minimally Invasive Gynecologic Surgery & Medical Gynecology; Program Director, MIGS Fellowship, Cleveland Clinic

1:50 pm Q&A

2:00 pm **Announcement of Award Winners & Closing Remarks**
Ruth Farrell, MD, MA

2:20 pm **Group picture of all presenters, award winners, speakers & Institute Leadership**
2:30–5:00 pm  Faculty Development/Breakout Sessions

**TT1-100**  
*Statistical Support for Your Research Project: What is Included and How to Work With Your Statistician*
Meng Yao, MS, Biostatistician  
Cleveland Clinic, LRI Quantitative Health Sciences

**TT1-102**  
*You’ve Done Your Interviews and Now What? Approaching Qualitative Analysis*
Ruth Farrell, MD, MA  
Cleveland Clinic, Enterprise Women’s Health Institute
Past Research Day Award Winners

Resident Poster Presentation – 1st Place
2022   Erika Lampert, MD
2021   Rachel Shin, MD, MPH
2020   Carrie Bennett, MD
2019   Jessica Son, MD
2018   Sarah Hershman, MD
2017   Caitlin Carr, MD
2016   Laura Moulton, DO, MS

Resident Oral Presentation – 1st Place
2022   Rachel Shin, MD, MPH
2021   Jonathan Hunt, MD, MBA
2020   Anna Chichura, MD
       Alyssa Herrmann, MD
2019   Emily Holthaus, MD
2018   Caitlin Carr, MD
       Julian Gingold, MD, PhD
2017   Laura Moulton, DO, MS
2016   Jamie Stanhiser, MD
2016   Lisa Caronia Hickman, MD

Fellow Oral Presentation – 1st Place
2022   Michelle Kuznicki, MD, MA
2021   Laura Chambers, DO, MS
2020   Katie Crean-Tate, MD
2019   Elizabeth Conner, MD
2018   Tonya Nikki Thomas, MD
2017   Kathryn Maurer, MD
2016   Linnea Goodman, MD
Victoria L. Handa, MD, MHS attended the University of Pennsylvania School of Medicine and ob/gyn residency at the University of California San Francisco. Her first academic appointment was at Duke University, followed by fellowship in Urogynecology at UC Irvine. After 6 years on the faculty of the University of California Davis, she joined Johns Hopkins in 2001. She is currently professor of Gyn/Ob, the Deputy Director for Gyn/Ob at Johns Hopkins School of Medicine, and the Gyn/Ob department chair at Johns Hopkins Bayview Medical Center. Her clinical practice focuses on pelvic floor disorders, including incontinence and pelvic organ prolapse. At the Johns Hopkins Women's Center for Pelvic Health, she leads an interdisciplinary team in Urogynecology, Urology, Colorectal Surgery, and Physical Therapy. She served as the FPRMS Fellowship Director at Johns Hopkins until 2014. Dr. Handa is the recipient of several teaching awards, including a CREOG National Faculty Award for Excellence and several institutional awards for teaching and mentorship. Dr. Handa's research has been supported by NIH funding for almost 15 years. Her current research focus on the long-term impact of childbirth on the later development of pelvic floor disorders. This research has led to more than a dozen publications, a 2011 Pitkin Prize from ACOG, the 2007 President's Award from the Society for Gynecologic Surgeons, a 2011 award from the American Urogynecologic Society, and the 2015 American Journal of Ob/Gyn Impact Award.
Sawsan As-Sanie, MD, MPH

Professor in Obstetrics & Gynecology
Co-Chief, Gynecology, Director, Minimally Invasive Gynecologic Surgery
Director, Endometriosis & Chronic Pelvic Pain Consultative Clinic
University of Michigan

Dr. As-Sanie is the Ferguson Endowed Professor of Obstetrics and Gynecology, Co-Chief of Gynecology, Director of the Minimally Invasive Gynecologic Surgery Program and Fellowship, and Director of the Endometriosis and Chronic Pelvic Pain Program at the University of Michigan. Dr. As-Sanie is an NIH-funded clinician scientist and is committed to improving the healthcare of women with chronic pelvic pain and endometriosis by pursuing clinical and translational research in the epidemiology, neurobiology, and treatment of endometriosis and other pelvic pain disorders.

She has been involved in several different professional organizations committed to this mission. She is a Past-President of the International Pelvic Pain Society (IPPS), an elected member of the American Gynecological & Obstetrical Society (AGOS), Society for Gynecologic Surgeons (SGS), an Ambassador for the World Endometriosis Society (WES) and is currently Chair of the ASRM Endometriosis Special Interest Group. She is also a member of the Society of Women's Health Research Interdisciplinary Network on Female Pelvic Health and serves on the editorial board of the Journal of Minimally Invasive Gynecology.
Judges (Oral Presentations)

Sawsan As-Sanie, MD, MPH
Professor in Obstetrics & Gynecology
Co-Chief, Gynecology, Director, Minimally Invasive Gynecologic Surgery
Director, Endometriosis & Chronic Pelvic Pain Consultative Clinic
University of Michigan

Ashley Brant, DO
Assistant Professor
Cleveland Clinic
Enterprise Women’s Health Institute Obstetrics and Gynecology
Faculty, Obstetrics and Gynecology

Jennifer Eaton, DO
Staff Physician
Cleveland Clinic
Enterprise Women’s Health Institute Obstetrics and Gynecology
Medical Director, Obstetrics and Gynecology

Stacey Ehrenberg, MD
Staff Physician
Cleveland Clinic
Enterprise Women’s Health Institute Subspecialty Care for Women’s Health
Faculty, Maternal Fetal Medicine

Erin Higgins, MD
Assistant Professor
Cleveland Clinic
Enterprise Women’s Health Institute Obstetrics and Gynecology
Faculty, Obstetrics and Gynecology

Shannon Wallace, MD
Assistant Professor
Cleveland Clinic
Enterprise Women’s Health Institute Subspecialty Care for Women’s Health
Faculty, Urogynecology
Judges (Poster Presentation)

Mariam AlHilli, MD
Associate Professor
Cleveland Clinic
Enterprise Women’s Health Institute
Subspecialty Care for Women’s Health
Faculty, Gynecologic Oncology

Jonathan Emery, MD
Assistant Professor
Cleveland Clinic
Enterprise Women’s Health Institute
Obstetrics and Gynecology
Vice Chair, Obstetrics and Gynecology

Monique Katsuki, MD
Associate Staff
Cleveland Clinic
Enterprise Women’s Health Institute
Obstetrics and Gynecology
Faculty, Obstetrics and Gynecology

Adina Kern-Goldberger, MD, MPH
Staff Physician
Cleveland Clinic
Enterprise Women’s Health Institute
Subspecialty Care for Women’s Health
Faculty, Maternal Fetal Medicine

Miguel Luna-Russo, MD
Associate Staff
Cleveland Clinic
Enterprise Women’s Health Institute
Subspecialty Care for Women’s Health
Faculty, Minimally Invasive Gynecologic Surgery
Objective: Guidelines recommend pregnant people with congenital heart disease (CHD) undergo fetal echocardiography as the incidence of offspring with CHD is estimated to be 3.5%. Evidence to support increased detection of echocardiogram is limited. Our study has two objectives: 1. Examine the rate of neonatal CHD in offspring of mothers with CHD in a contemporary cohort. 2. Evaluate the diagnostic accuracy of fetal echocardiogram in addition to level II anatomy ultrasound in pregnant patients with CHD.

Methods: This is an observational retrospective study of patients with CHD referred to a cardiac obstetric clinic in a large hospital system from 1/1/2013-1/1/2022. Maternal-Fetal Medicine interpreted all level II anatomy ultrasounds and pediatric cardiology interpreted all fetal echocardiograms. Sensitivity and specificity were calculated compared to neonatal diagnosis of CHD. Anatomy ultrasound results were compared to fetal echo results via McNamer’s test. Rate of neonatal CHD was calculated as a percentage of the total number of infants born to pregnancies meeting inclusion criteria diagnosed with CHD. Fetal echo and anatomy ultrasound findings were compared to the gold standard of neonatal echocardiogram. Sensitivity and specificity were calculated.

Results: The below results include data that has been analyzed to date. Final data and conclusions will be presented at Research Day. A total of 158 pregnancies met inclusion criteria (45 excluded due to missing information). The rate of neonatal CHD diagnosed was 12.7% (20/158). Demographics were similar between the affected and unaffected pregnancies although affected pregnancies were significantly more likely to be affected by genetic condition (30% vs 5.8%, p=0.003). There was no significant disagreement between abnormal findings on level II anatomy and fetal echocardiogram (p=0.26). However, sensitivity of fetal echocardiogram for neonatal CHD was 50% and sensitivity of anatomy ultrasound was 35%. The specificity of both fetal echo and level II anatomy was 89.1%.

Conclusions: The rate of CHD in offspring of mothers with CHD may be higher than previously reported. Both level II anatomy ultrasound and fetal echo have a high specificity for fetal CHD. Fetal echocardiography interpretation by pediatric...
Objective: Necrotizing soft tissue infections are rapidly progressive bacterial infections that manifest in diffuse subcutaneous necrosis. While uncommon, mortality rates remain high (13-50%) even with medical and surgical intervention (Roberts and Hester, 1972; Roberts, 1987; Nolan et al., 1993; Stephenson et al., 1992). Although several case reports and small studies regarding necrotizing soft tissue infections of the gynecologic tract have been published (Roberts and Hester 1987), there is not yet robust enough of a population to draw meaningful statistical conclusions.

Methods: By conducting a retrospective chart review of patients admitted to the Cleveland Clinic for necrotizing soft tissue infections of the gynecologic tract over the past 12 years, we describe patient and perioperative risk factors associated with length of admission, number of debridements, and mortality for gynecologic patients with necrotizing soft tissue infections.

Results: An EMR inquiry of female patients with the ICD 10 codes for necrotizing soft tissue infection (M72.6), Necrotizing Fasciitis (M72.6), and Fournier’s Gangrene (N49.3) was performed and yielded 79 charts. These charts were reviewed and 38 cases of necrotizing soft tissue infection of the gynecologic tract were identified. A preliminary complete review of 15 charts revealed an average age of 57 years old with a BMI of 40. Our patients’ average ASA class was 2.6 with Charlston Comorbidity score of 2.9. The average pre-operative maximum temperature was 100.0 with WBC of 19 and lactate of 2.6. Average time to receiving antibiotics from presentation was 216.5 minutes.
Conclusions: Final complete review of all 38 cases will provide clinical information regarding optimal management strategies for necrotizing soft tissue infections of the gynecologic tract.

Funding source: None

Faculty Mentor: Roberto Vargas, MD
Discussant: Imani Chatman, MD

Incidence of and Risk Factors for Venous Thromboembolism in Recurrent Ovarian Cancer – IRB 22-085

Objective: To report the incidence and impact of venous thromboembolism (VTE) in patients with recurrent ovarian cancer (OvCa) as well as evaluate predictors of VTE to identify patients who may benefit from thromboprophylaxis.

Methods: This was a retrospective single-institution cohort study in women with recurrent epithelial OvCa treated between 2008-2021. Patients with a diagnosis of VTE prior to recurrence and those previously on anticoagulation were excluded. Univariate and multivariable analyses were performed.

Results: Among 449 patients with recurrent OvCa, 345 patients met inclusion criteria of which 77 (22.3%) developed VTE. There were no significant differences in mean age (62.3 vs 63.3 years, p=0.48), race (p=0.90), histology (p=0.11), stage (p=0.64), smoking (p=0.54), mean BMI (28.4 vs 26.8 kg/m², p=0.056), or platinum-sensitivity (86% vs 76%, p=0.16) between those with or without VTE, respectively. Among patients with VTE, 53.3% had deep vein thrombosis, 40% had pulmonary embolism, and 6.7% developed both. 56 (72.7%) patients were actively receiving chemotherapy at time of VTE diagnosis, of which 44 (78.6%) were on ≥3rd line of chemotherapy. 37 (48%) patients were admitted to the hospital upon diagnosis, 9 (11.7%) had a bleeding complication while on anticoagulation, and one (1.3%) mortality occurred secondary to VTE. Patients with VTE received a higher total number of lines of chemotherapy compared to those without (median 5 vs 4 lines, p=0.012) and a higher median number of treatment lines was associated with increased VTE risk in a multivariate model (OR 1.14, CI 1.02-1.28, p=0.026). Khorana score was not predictive of VTE (p=0.24). There was no significant difference in overall survival (OS; median 62.9 vs 48.7 months,
p=0.19) between patients with and without VTE, respectively.

**Conclusions**: In this cohort, one in five women with recurrent OvCa developed a VTE, and the majority of VTEs occurred during ≥3rd treatment line of chemotherapy. Risk of VTE was higher while receiving chemotherapy and with increasing lines of chemotherapy. While VTE does not appear to impact OS in recurrent OvCa, nearly half of the diagnosed VTEs required hospitalization and more than 10% of patients experienced a bleeding complication on anticoagulation, highlighting the potential impact of VTE on quality of life and healthcare costs.

**Funding source**: None

**Faculty Mentor**: Mariam AlHilli, MD

**Discussant**: Julia Chalif, MD

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**Objective**: Umbilical cord blood collection (UCBC) for stem cell banking is routinely performed during cesarean sections (CS). Few studies have examined the maternal impact UCBC has when collected during CS. The objective of this study is to evaluate whether UCBC at time of primary CS (PCS) is associated with increased maternal blood loss, operative time, and maternal morbidity.

**Methods**: Single-center retrospective cohort study of PCS at Fairview Hospital in 2021. Subjects younger than 18 years, multifetal gestations, emergency delivery, gestational age <34wks, and evidence of infection were excluded. Data was compared between subjects that had UCBC attempted at time of PCS and those that did not. Demographic data includes age, parity, gestational age, body mass index, race, ethnicity, labor status, fetal presentation, presence of hypertension, history of abdominal surgery, nature of CS and indication for CS. The primary outcome of the study was Quantitative Blood Loss (QBL). Secondary outcomes were operative time, administration of hemorrhage medications, and administration of blood transfusion.

**Results**: 802 charts were reviewed, 191 (23.8%) were excluded. Of the included 611 subjects, 151 (24.7%) had UCBC and 460 (75.3%) did not. The UCBC
cohort had a higher average gestational age (39.1 vs 38.7, \( p=0.007 \)), were less likely to have labor status (59.9% vs 72.3%, \( p=0.004 \)), were less likely to be on magnesium sulfate (5.9% vs 12.6%, \( p=0.022 \)), were more likely to be scheduled CS (30.3% vs 18.3%, \( p=0.002 \)). UCBC was associated with increased operative time in PCS (62.4 vs 56.8 min, \( p <0.001 \)) UCBC was also associated with increased rates of post-operative blood transfusion (7.2% vs 3.3%, \( p=0.036 \)). The primary outcome measure, QBL, was slightly higher in the UCBC cohort (1091.5 vs 1007.5 mL, \( p=0.075 \)) although this did not reach statistical significance. When comparing non-labored PCS, difference in QBL was significant (941.8 vs 798 mL, \( p=0.034 \)). There were no associations between UCBC and increased usage of hemorrhage medications.

**Conclusions:** UCBC increases QBL in non-labored PCS. UCBC increases operative time and post-operative blood transfusion in PCS. Patients should be appropriately counseled and selected for UCBC based on hemorrhage risk factors.

**Funding source:** None

**Faculty Mentor:** Maeve Hopkins, MD

**Discussant:** Catherine Keller, MD

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**Objective:** To determine the incidence of PCOS and hyperandrogenism amongst adolescent transmasculine patients presenting to a tertiary care referral center for gender affirming care.

**Methods:** This was a retrospective study of transmasculine patients presenting to Cleveland Clinic for gender affirming hormone therapy (GAHT). PCOS was defined using the NIH 1990 criteria: oligomenorrhea with clinical and/or biochemical hyperandrogenism after exclusion of other androgen excess disorders.

**Results:** The described transgender population had a prevalence of PCOS of 28.8%. The transmasculine patients who met criteria for PCOS had both significantly higher levels of androgens in addition to higher BMIs when compared to
the patients without PCOS. Additionally, the PCOS patients had higher rates of dyslipidemia.

**Conclusions:** The prevalence of PCOS amongst transmasculine patients may be higher compared to the general population. Transmasculine patients with PCOS should be counseled regarding the long-term health implications associated with PCOS and screened appropriately to minimize risks.

**Funding:** None

**Faculty Mentor:** Cecile Ferrando, MD, MPH

**Discussant:** Kaia Schwartz, MD

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**Comparing Foley Balloon and Hygroscopic Dilators as Cervical Preparation Prior to Dilation and Evacuation – IRB 22-1367**

**Objective:** To determine whether the Foley balloon is more effective than Dilapan® hygroscopic dilators as cervical preparation for second-trimester dilation and evacuation (D&E).

**Methods:** Via electronic medical record review, this retrospective cohort study identified patients who received cervical preparation prior to same-day D&E by a single provider at an ambulatory surgery center in Cleveland, OH from January 1, 2022 to June 24, 2022. Inclusion criteria were patient age 18 years or greater, gestational age between 18w0d and 20w6d, and cervical preparation with misoprostol and one form of mechanical dilation (Foley balloon or Dilapan® dilators). Primary outcome was cervical dilation measured in French (Fr) immediately before D&E procedure; dilation was not measured beyond 51 Fr as this width is typically deemed sufficient for D&E. We determined 10 mm (approximately 3.3 Fr) to be a clinically significant difference in pre-D&E cervical dilation between the Foley and Dilapan® groups.

**Results:** Our analysis identified a total 41 patients (21 patients in Foley group, 20 patients in Dilapan® group). No significant demographic differences were identified between groups, and no complications occurred within the total sample. Cervical dilation pre-D&E was significantly greater in the Foley group (mean=50.5) compared to the Dilapan® group (mean=44.1) with p<0.001.
Statistically significant secondary outcomes favored the Foley group and included pain of intervention (Foley 2.4±1.7, Dilapan® 3.8±2.0, p=0.027), pain after D&E (Foley 1.7±1.6, Dilapan® 3.2±1.7, p=0.006), and estimated blood loss (Foley 24.5±9.6 mL, Dilapan® 61.3±20.4 mL, p<0.001). No statistically significant difference was noted in duration between intervention and surgery (Foley 235.0±51.6 min, Dilapan® 253.4±54.9 min, p=0.28) or duration of D&E (Foley 10.2±3.9 min, Dilapan® 9.7±5.0 min, p=0.73).

**Conclusions:** This data support that the Foley balloon is more effective than Dilapan® dilators in cervical dilation prior to D&E with decreased pain, blood loss, and cost without difference in latency or procedure duration.

**Funding:** None

**Faculty Mentor:** Mitchell Reider, MD

**Discussant:** Rachel Shin, MD
Patient Characteristics to Predict Response to Antihypertensive Medications in Severe Hypertension in Pregnancy: A Retrospective Cohort Study

Faculty Mentor: Justin Lappen, MD

Immediate Postpartum Levonorgestrel (Mirena) IUD Insertion: Analysis of Insertion Technique and Expulsion Rates

Faculty Mentor: Ashley Brant, DO

Simulation-Based Training in OB/GYN - Evaluating the Effectiveness of Simulation Based Training in Obstetrics and Gynecology Residents’ Ability to Deliver Bad News

Faculty Mentor: Erin Higgins, MD

Desired Fertility And Its’ Impact On Health Related Quality of Life Post-Operatively in Women With Fibroids

Faculty Mentor: Linda Bradley, MD
Access to Ergonomic Equipment and Instruments among Obstetric and Gynecologic Surgeons
Faculty Mentor: Cara King, DO, MS

Impact of Highly Restrictive Abortion Bans on the Management of Pregnancies with known Trisomy 13/18: A Cost-Effective Analysis
Faculty Mentor: Maeve Hopkins, MD

Implementation and Impact of the Early Pregnancy Assessment Clinic at Cleveland Clinic
Faculty Mentor: Ashley Brant, DO

Kirat Sandhu, MD

Olivia Neumann, MD

Dominic Sandler, MD
Evolutionary Experimentation Highlights Collateral Sensitivity and Associated Gene-Expression Changes in Endometrial Cancer Cell Lines

**Objective:** The purpose of this study was to determine if serial exposure to standard-of-care chemotherapy, carboplatin and paclitaxel, would lead to development of chemoresistance and identify potential novel vulnerabilities (collateral sensitivity) using an endometrial cancer cell line.

**Methods:** The low-grade wild-type TP53 endometrioid endometrial cancer cell line, JHUEM2, was used as the basis for evolutionary experimentation. Five evolutionary/treatment replicates underwent exposure to six “cycles” of carboplatin and paclitaxel, while three (control) replicates underwent serial passages with PBS/DMSO. Chemotherapy dosing was determined using baseline 50% inhibitory concentration (IC50) values. RNA was extracted prior to each new drug exposure and cell aliquots were obtained for collateral sensitivity analyses. Drug and radiation response curves were conducted at baseline and after each cycle of chemotherapy for a total of seven time points. Collateral sensitivity drug panel included carboplatin, paclitaxel, doxorubicin, letrozole, metformin, everolimus, cediranib, olaparib, neratinib, and AMG232. The IC50 of each drug was compared at each time point to determine development of collateral sensitivity or resistance. RNAseq was performed and differential gene expression determined using EdgeR. Over-representation analysis using Reactome pathways was performed.

**Results:** Following six cycles of carboplatin and paclitaxel, resistance to both carboplatin and paclitaxel was demonstrated by an increase in the mean IC50 from 1.008µM to 4.539µM (p <0.001) for carboplatin, and 1.484nM to 3.236nM (p=0.003) for paclitaxel. Collateral sensitivity to cediranib was demonstrated with a significant decrease in the mean IC50 from 1.663µM at baseline to 1.094µM (p=0.02), in contrast with control replicates which did not show a significant shift in IC50 between baseline and post-chemotherapy. The remaining drugs in the panel and radiation therapy did not exhibit collateral resistance or sensitivity. Differential gene expression analysis and subsequent pathway over-representation demonstrated an increase in ribosome s6 kinase (RSK) activation and decrease in p16ink4a signaling.
Conclusions: Development of resistance to carboplatin and paclitaxel highlights potential collateral sensitivity to cediranib in the endometrial cancer cell line, JHUEM2. Therapeutic targeting of ribosome s6 kinase may also provide insight as to the contribution towards chemo-resistance. Conversely, the decrease in p16-in-k4a signaling may provide the rationale behind CDK4/6 inhibitor-driven cell senescence and remains to be therapeutically leveraged.

Funding: None

Faculty Mentor: Roberto Vargas, MD

Evaluating the Impact of Video-Based Surgical Coaching on Obstetrics and Gynecology Residents’ Laparoscopic Suturing Skills – IRB 22-836

Objective: To evaluate the impact of a video-based surgical coaching intervention on technical performance during laparoscopic closure of the vaginal cuff among Obstetrics and Gynecology residents.

Methods: This single center, single-blinded, randomized controlled trial was conducted from August 2022 to June 2023. OB/GYN residents were enrolled and stratified based on year of residency training, and randomized into two groups, a control group and an intervention group. Each participant performed a ten-minute intraoperative vaginal cuff closure at baseline and at the end of the study period. All participants had access to an instructional video outlining laparoscopic suturing techniques and a validated vaginal cuff model in the simulation lab for independent practice during the study period. Additionally, the intervention group received three separate video-based surgical coaching sessions with a Minimally Invasive Gynecologic Surgery (MIGS) attending or fellow who underwent surgical coach training by the Academy for Surgical Coaching. All pre- and post-intervention videos were graded by two MIGS attendings who were blinded to the coaching status and resident year of training, using the Global Operative Assessment of Laparoscopic Skills (GOALS)-Plus tool. The kappa statistic was utilized to assess inter-grader reliability. Self-reported participant experience and perceived confidence performing this technical skill was also measured. GOALS-Plus scores and survey results were compared between groups and statistical analysis was performed using SAS and a p value of <0.05.
Results: Twenty-eight residents were enrolled in the study, half (n=14) in the control group and half (n=14) in the intervention group. Results still pending.

Conclusions: We hypothesize that Obstetrics and Gynecology residents who participate in a surgical coaching intervention (video-based coaching focused on laparoscopic vaginal cuff closure) will demonstrate improved task-specific technical skills compared to residents who do not participate in the intervention. These findings would provide evidence to implement surgical coaching into residency training curricula, with the goal of improving surgical performance and clinical care.

Funding: None

Faculty Mentor: Cara King, DO, MS

Activating the Immune System is Essential for the Efficacy of Heated Intraperitoneal Cisplatin in a Murine Model of Advanced Epithelial Ovarian Cancer

Objective: To investigate whether the clinical benefit of hyperthermic intraperitoneal chemotherapy (HIPEC) in women with advanced epithelial ovarian cancer (EOC) is modulated by the immune system.

Methods: ID8 (luciferase-tagged) tumor bearing mice with or without an intact immune system were injected with cisplatin or vehicle with or without superficial heat (40°C) using an FDA approved hyperthermia unit for 20 minutes. Four treatment groups were evaluated: 1) vehicle without heat (V37) 2) vehicle with 40°C heat (V40) 3) cisplatin without heat (C37) and 4) cisplatin with 40°C heat (C40). Tumor growth was monitored via intraperitoneal D-luciferin. At necropsy timepoints (24 hours and 2 weeks post treatment), tumors were harvested, and immune populations were analyzed by flow cytometry. Statistical tests included analysis of variance, linear regression, and Wilcoxon test.

Results: Heated cisplatin treatment (C40) of immune-competent mice exhibited significant attenuation of tumor growth compared to non-heated cisplatin treatment (C37) (Fig. 1A). By day 14, there was a significant reduction in tumor burden in C40 mice compared to C37 mice, p < 0.05. There was no significant difference between V40 and V37 mice, indicating no benefit derived from heat therapy alone. Furthermore, when this same treatment paradigm was employed in immune compromised mice (Fig. 1B), the additive effect of heat and cisplatin
was lost. Upon endpoint analysis, CD3, CD4, Regulatory, and CD8 T cells were enriched in tumors treated with heat and cisplatin (C40) compared to cisplatin (C37) or heat alone (V40), $p < 0.05$.

**Conclusions:** Our findings reveal a role for the immune system in enhancing efficacy of heated chemotherapy in mouse models, suggesting that the beneficial effect of HIPEC is dependent on a synergistic effect of heat and chemotherapy to produce an augmented immune response. Further investigation is warranted to identify the immune populations that underlie the murine HIPEC phenotype in order to optimize the process by which HIPEC improves clinical outcomes.

**Figure 1:** Hyperthermia plus cisplatin suppresses tumor growth via an immune dependent mechanism. The impact of heated cisplatin on inhibiting tumor growth (A) is lost in the absence of an intact immune system (B). *$p < 0.05$.

**Funding:** Velosano Grant 2021-2023 “Improving Ovarian Cancer Outcomes with Translational Studies of Hyperthermic Intraperitoneal Chemotherapy” PI: Robert Debernardo, Co-I: Danielle Chau.

**Faculty Mentors:** Ofer Reizes, PhD, Robert Debernardo, MD
Objective: We hypothesize that patients (even those followed at an Academic Center) may not be adhering to NCCN guidelines for RRSO at the appropriate age, are not receiving HRT as recommended, and are more likely to return to surgery for hysterectomy later. This hypothesis will be tested via the following Aims: Quantify how many BRCA-positive patients undergo recommended RRSO per NCCN guidelines and at what age, and what proportion have a concurrent hysterectomy. Determine the number of patients who use recommended HRT following RRSO and the duration of such therapy (date of surgery, date of first Rx for HRT, and date of last Rx for HRT unless contraindicated). We will also note age at HRT discontinuation. Determine how many BRCA-positive patients with risk-reducing bilateral salpingo-oophorectomy return to surgery for a total hysterectomy and what pathologic findings are identified (benign, hyperplasia without atypia, hyperplasia with atypia, endometrial carcinoma or other). We will quantify procedures related to bleeding: endometrial biopsy, ultrasound, D&C, and ablation. Determine if (and when) a patient has a Bone Mineral Density test, and what the results were.

Methods: This study will be a retrospective cohort study utilizing an established database of BRCA-positive patients followed at Cleveland Clinic from all departments from 2005-2022.

Results: Data Collection Still Pending

Conclusions: We hypothesize that patients (even those followed at an Academic Center) may not be adhering to NCCN guidelines for RRSO at the appropriate age, are not receiving HRT as recommended, and are more likely to return to surgery for hysterectomy later. If true, this knowledge will help to identify areas that need more attention to ensure patients receive guideline directed care for RRSO and HRT. Also, if true that hysterectomy after RRSO is more likely, it may redirect the conversations physicians and surgeons have when recommending RRSO +/- hysterectomy in BRCA carriers.

Funding source: None

Faculty Mentor: Holly Thacker, MD
The presence of cell extrusion or exclusion during embryonic compaction is associated with lower rates of blastocyst formation and poorer morphologic grade – IRB 5251 and IRB 14-566

Objective: To determine whether visualization of the embryonic compaction process through time-lapse imaging (TL) can assist in predicting likelihood of blastocyst formation, grade or ploidy

Methods: Patients undergoing in vitro fertilization (IVF) with preimplantation genetic testing for aneuploid (PGT-A) between June 2020 to January 2021 were included. Embryo morphokinetics and TL videos were reviewed in detail. Embryo compaction patterns were categorized as follows: 1) full compaction (CP-F), 2) partial with cell extrusion (P-ext), 3) partial with cell exclusion (P-exc) and 4) partial with both cell extrusion and exclusion (P-both). Blastocysts were graded by blast maturity (1-early, 2-full, 3-expanded, 4-hatched), inner cell mass score (1-good, 2-fair, 3-poor/absent) and trophectoderm grade (1-good, 2-fair, 3-poor). The association between CP, morphokinetics parameters, blastocyst formation, grade and ploidy were analyzed. Statistical analysis was performed using Kruskal-Wallis and Chi-Square tests with a p-value of <0.05 considered significant.

Results: A total of 349 embryos from 37 IVF cycles were included. Of the embryos which progressed to morula (n=281), the proportion of compaction patterns were found to be: CP-F 45.6%, P-exc 29.5%, P-ext 12.5% and P-both 12.5%. Embryos exhibiting a CP-F were more likely to proceed to blastocyst compared with those that demonstrated P-exc (95.3% v. 83.1%), P-ext (95.3% v. 82.9%), or P-both (95.3% v 82.9%) patterns. Each of these comparisons were found to be statistically significant. When compared with CP-F, partial compaction patterns exhibited a significant negative association with intercellular mass (ICM) score and trophectoderm (TE) grade. Of the 249 blastocysts formed, 200 were cryopreserved for future use. Further, 181 embryos had PGT-A results. Of those, 85 were diagnosed as euploid and 96 as aneuploid or mosaic. No association between compaction patterns and ploidy was identified in these data. When assessing morphokinetic parameters, it was found that a greater percentage of embryos demonstrating CP-F fell within optimal timing when compared to those with partial compaction patterns.
Conclusions: TL visualization of compaction patterns identified exclusions and extrusions as negative indicators of blastocyst formation. Partial compaction patterns were also associated with poorer ICM and TE grades. Complete compaction patterns were associated with higher proportions of embryos demonstrating optimal morphokinetic parameters.

Funding: N/A

Faculty Mentor: Nina Desai, PhD

Postoperative Functional Outcomes in Patients Undergoing Combined Robotic Ventral Rectopexy and Sacrocolpopexy (POURRS) – IRB 22-003

Objective: To evaluate functional outcomes and overall postoperative satisfaction in women who underwent combined robotic ventral rectopexy and sacrocolpopexy for concomitant pelvic organ prolapse (POP) and rectal prolapse (RP). Secondarily to compare functional outcomes between patients who had intermediate- and long-term follow-up and to describe adverse events associated with surgery.

Methods: This was a retrospective cohort and survey study of women with combined POP and RP who underwent surgical repair via a robotic approach between January 2018 and July 2021. Each patient was contacted to participate in a survey evaluating postoperative functional outcomes using the Pelvic Floor Disability Index 20 (PFDI-20), Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire (PISQ-12), and Patient Global Impression of Improvement Scale (PGI-I). Outcomes were compared between patients who underwent surgery ≤ 24 months and > 24 months before survey completion.

Results: Of the total cohort of 107 patients, mean age and BMI were 63.7 ± 11.5 years and 25.0 ± 5.4 m2/kg respectively. 19% had a prior RP repair and 23% had a prior POP repair. Intraoperatively, a synthetic mesh was used in 100% of sacrocolpopexies and 81% of rectopexies. RP recurrence was reported in 10.4% of patients and objective POP recurrence was found in 7.5% of patients. 67 patients completed the surveys. The median time to survey follow-up was 18 months (8.8-51.8). At the time of survey, the mean PFDI-20 score was 95.7±53.7. The mean PISQ-12 score for all patients was 32.8±7.2 and the median PGI-I score was 2.0 (IQR 1.0-3.0).
Conclusions: In this cohort of patients who underwent a combined robotic ventral rectopexy and sacrocolpopexy, patient-reported postoperative symptom bother was low, sexual function was high, and their overall condition was much improved.

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Faculty Mentor: Cecile Ferrando, MD, MPH
2022

Resident, Fellow and Faculty Publications
Obstetrics and Gynecology


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