10:40am - 11:00am

**14. ATTENUATION OF THE VOLUME-OUTCOME RELATIONSHIP FOR MAJOR CANCER SURGERY IN THE UNITED STATES - IS A PUSH TOWARDS CONTINUED REGIONALIZATION JUSTIFIED?**

*N Wasif MD MPH, D Etzioni MD MS, A Mathur MD MS, E Habermann MPH PhD, Y Chang PhD
Mayo Clinic Arizona
Presenter: Nabil Wasif MD, MPH
Invited Discussant: Waddah Al-Refaie MD, Washington, DC

*2017 WSA Aust Award Finalist*

**Background:** The association of higher surgical volumes with lower post-operative mortality has led to calls for regionalization of complex cancer surgery in the United States. However, given the simultaneous national trend towards improved surgical outcomes and lower postoperative mortality overall, this relationship may have attenuated.

**Methods:** The Nationwide Inpatient Sample (NIS) was used to identify patients with bladder, esophageal, pancreatic, lung, and rectal cancer undergoing surgery from 2003-2011. Hospitals were divided into low (<33rd centile), medium (34th-66th) and high (>67thcentile) volume groups. Annual cancer specific adjusted in-hospital mortality (AIHM) was calculated and the difference in AIHM between low and high volume hospitals (using bootstrapping to generate confidence intervals) plotted over three time periods 2003-2005, 2006-2008 and 2009-2011. Risk adjustment was performed by controlling for and age, sex, race, Elixhauser comorbidity score, insurance, income and surgery type.

**Results:** Our study population consisted of 183,850 patients with bladder (12%), esophageal (4%), pancreatic (8%), lung cancer (43%), and rectal cancer (33%). Regionalization was seen over the time period of the study, reflected by an increase in the proportion of patients undergoing surgery at a high volume hospital for all cancers studied. AIHM following surgery was significantly higher in low volume compared to high volume hospitals in 2003-2005 for all cancer types, with the exception of patients with rectal cancer. The difference in AIHM between low and high volume hospitals narrowed from 2003-2005 to 2009-2011 for pancreatic (4.54% [95% CI 4.51-4.95%] to 1.24% [95% CI 1.01-1.47%]), esophageal (3.81% [95% CI 3.15-4.50%] to 2.61% [95% CI 2.10-3.13%]), bladder (1.23% [95% CI 1.08-1.37%] to 0.74% [95% CI 0.59-0.89%]) and lung cancer patients (1.80% [95% CI 1.67-1.92%] to 1.05% [95% CI 0.96-1.13%], primarily due to a greater improvement in in-hospital mortality for low volume hospitals. For rectal cancer patients the difference in AIHM was low and stable (0.53% [95% CI 0.45-0.61%] to 0.53% [0.46-0.59%]).

**Conclusion:** The difference in AIHM between low and high volume hospitals decreased for 4 out of 5 solid organ cancers requiring major surgery from 2003-2011. This was primarily due to a greater decline in post-operative mortality for low compared to high volume hospitals. Whether these trends will continue or represent a plateau for improvement of peri-operative care has implications for continued regionalization of cancer surgery.
11:00am - 11:20am
15. PRIMARY HYPERPARATHYROIDISM, REDEFINING CURE
AV Rudin MD, TJ McKenzie MD, RA Wermers MD, GB Thompson MD, ML Richards MD
Mayo Clinic
Presenter: Anatoliy Rudin MD
Invited Discussant: Shelby Holt MD, Dallas, TX

**Background:** Primary hyperparathyroidism is the most common cause of hypercalcemia in the outpatient population. The classic diagnosis is established by the presence of hypercalcemia with an inappropriately elevated PTH level, in the absence of other causes of hypercalcemia. Preoperative localization and intraoperative parathyroid hormone assay have modernized the surgical management of this disease. Cure rate for primary hyperparathyroidism has been reported to be 93–100% and has been defined as normocalcemia at 6 months. The follow up to confirm normal calcium postoperatively and at 6 months is resource intensive and costly. The aim of this study was to determine if there is a subset of patients who can be defined as cured earlier than 6 months.

**Methods:** This was a retrospective study of patients who underwent parathyroidectomy between January 2012 and March 2014. Patients with history of MEN syndrome, secondary or tertiary hyperparathyroidism were excluded. Patients with normal preoperative calcium, PTH and those without 6 months follow up were excluded. Patients were divided into two groups, Cured and Not cured. Preoperative sestamibi scan was correlated to intraoperative findings, and labeled as concordant (TP), wrong location (FP) or negative (FN) for each group. Comparison analysis was performed between the two groups, examining age, gland weight, imaging concordance, preoperative PTH, intraoperative PTH, intraoperative cure (decrease of baseline PTH by 50% to normal or near normal PTH level), and 6 months cure rate.

**Results:** A total of 509 patients were screened, 214 met our inclusion criteria, 202 in the cure category and 12 in no cure (94% cure rate). 205 out of 214 (96%) had intraoperative cure. There was no significant difference between age 62 vs 62 (p= 0.48), gland weight 753 mg vs 478mg (p= 0.15) or preoperative PTH 133 pg/ml vs 123 pg/ml ( p=0.33 ). There was a statistically significant difference between final intraoperative PTH 37 vs 55 (p=0.008) and percent PTH decrease 69% vs 43% (p < 0.0001). There was a significant difference between intraoperative cure rate (p < 0.0006), imaging concordance (p=0.0115) and solitary vs multiglandular disease (p=0.0151). Subgroup analysis in patients with concordant imaging, solitary parathyroid adenoma and intraoperative PTH decrease by 50% to normal or near normal correlated with a 6 months cure rate of 97%.

**Conclusion:** Patients with primary hyperparathyroidism who have concordant imaging, single adenoma pathology, and their intra-operative PTH decrease by 50% to normal or near normal (15-65 pg/ml) can be considered cured, and may not need further laboratory follow up.
11:20am - 11:40am
16. PREOPERATIVE CHEMORADIATION INDUCES PRIMARY-TUMOR COMPLETE RESPONSE MORE FREQUENTLY THAN CHEMOTHERAPY ALONE IN GASTRIC CANCER
N Ikoma MD, P Das MD MPH, M Blum MD, JS Estrella MD, HC Chen PhD, X Wang MS, KF Fournier MD, P Mansfield MD, CL Roland MD, J Cormier MD MPH, JA Ajani MD, BD Badgwell MD MS
University of Texas MD Anderson Cancer Center
Presenter: Naruhiko Ikoma MD
Invited Discussant: Margo Shoup MD, Warrenville, IL

Background: After the MAGIC trial showed a survival benefit from perioperative chemotherapy, the use of preoperative chemotherapy significantly increased in the United States over the past 10 years. However, the benefit of preoperative chemoradiation (CXRT) over preoperative chemotherapy alone (“chemotherapy” hereafter) is unknown and is currently under investigation in the TOPGEAR trial. We investigated whether preoperative CXRT improves pathologic complete response rate in the primary tumor (ypT0) compared with preoperative chemotherapy in patients with gastric cancer by analyzing the National Cancer Database (NCDB).

Methods: In total, 168,377 patients with gastric tumors were reported in the NCDB during 2004-2014. Patients with non-metastatic gastric adenocarcinoma who underwent CXRT or chemotherapy followed by gastrectomy were included in this study. Patients who did not have pathologic T category data were excluded. Incidences of ypT0 were compared between the CXRT and chemotherapy groups. Logistic regression models were used to adjust for the effects of other tumor and treatment variables. Since patient characteristics significantly differed between the treatment groups, propensity score matching was used. We applied one-to-one matching based on the nearest neighbor method with a caliper width 0.2 of the standard deviation of the logit of the propensity score. Then, a conditional logistic regression model was used for the matched cohorts to compare incidences of ypT0 between the CXRT and chemotherapy groups.

Results: We identified 8,464 patients with gastric cancer who underwent preoperative CXRT or chemotherapy followed by gastrectomy. The median age was 63 years, 76% were male, and 79% were white. White patients more frequently had tumors in the cardia (78%) and more frequently received CXRT (61%) compared with other race groups (p<0.001). ypT0 was observed in 16.1% (95% confidence interval [CI], 15.0-17.2%) of patients who received CXRT and 6.6% (95% CI, 5.8-7.4%) of patients who received chemotherapy (p<0.001). On multivariable logistic regression, CXRT was associated with a higher ypT0 rate (odds ratio [OR] 2.13, 95% CI 1.78-2.55; p<0.001). Other variables associated with complete response were age, American Joint Committee on Cancer clinical stage, tumor location, and duration of chemotherapy. Race, sex, facility type, radiation therapy type (advanced [intensity-modulated radiation therapy, 3D conformal radiation therapy, or proton therapy] vs. conventional techniques), and radiation dose were not associated with ypT0. Propensity score matching yielded 1,720 pairs and notably improved the similarity of the groups. In the conditional multivariate logistic regression model, CXRT was associated with a higher incidence of ypT0 (OR 2.01, 95% CI 1.64-2.57; p<0.0001).

Conclusion: In this retrospective cohort study of gastric cancer patients from the NCDB, CXRT was associated with a higher incidence of ypT0 compared with chemotherapy.
Background: The rates of mastectomy for breast cancer treatment and immediate breast reconstruction continue to rise, and with increasing scrutiny on health care outcomes and patient satisfaction, there is an impetus for providers to be more deliberate in deciding appropriate patient selection for breast reconstruction. As such, there is increased use of surgical risk calculators, now with an emphasis on longer-term follow-up and outcomes. The Breast Reconstruction Risk Assessment (BRA) Score was developed for prediction of complications after primary prosthetic breast reconstruction, focusing on calculating risk estimations for a variety of complications based on individual patient demographics and perioperative characteristics. Mastectomy skin flap necrosis (MSFN) was not specifically studied in the expansion of the BRA Score XL calculator to predict 1-year outcomes. Previous research has demonstrated necrosis and wound breakdown lead to a number of postoperative challenges. In this study, we evaluate MSFN as a function of patient characteristics to further validate the BRA Score XL.

Methods: We examined our prospective intra-institutional database of prosthetic breast reconstructions from 2004-2015. Patients lost to follow-up before 1 year were excluded. Pertinent patient variables for risk modeling included age, BMI, smoking status, radiation therapy, and various medical comorbidities. Outcomes of interest were 1-year occurrence of MSFN following stage I tissue expander placement. Using logistic regression modeling, risk was calculated based on individual patient factors. Internal validity was assessed using C-statistic for discrimination, Hosmer-Lemeshow (H-L) test for calibration, and Brier score for predictive accuracy.

Results: 903 patients were included; 50% underwent bilateral reconstruction. Median follow-up was 23 months. Average 1-year complication rates were: MSFN (12.4%), seroma (3.0%), infection (6.9%), dehiscence/exposure (7.1%), and explantation (13.2%). Statistically significant higher rates of MSFN were found in older patients, smokers, patients with postoperative infections, hypertension and the use of aspirin. The administration of neoadjuvant or adjuvant chemotherapy and radiation, diabetes and postoperative seroma formation did not have a statistically significant impact on necrosis rates.

Conclusion: Mastectomy skin flap necrosis poses significant challenges to both patients and surgeons, potentially resulting in clinical and psychological comorbidities, delays in adjuvant therapy and increased health care costs. The BRA Score was expanded to estimate complication risk following tissue expander placement up to one year postoperatively. The risk of mastectomy skin flap necrosis as calculated by the BRA Score XL is consistent with previously published studies demonstrating increased risk with specific comorbidities and thus further validates the expansion of the BRA Score XL risk calculator.
Background: Progression of severe TBI is associated with worsening of leukocyte (LEU)-mediated cerebral inflammation but it is unknown if the concomitant presence of a long bone fracture (BF) affects secondary brain injury progression. Enoxaparin (ENX) decreases penumbral LEU mobilization in isolated TBI and improves neurological recovery. We hypothesized that, as compared to isolated TBI: 1) a concomitant BF increases leukocyte mediated brain tissue inflammation and edema and, 2) ENX reverses this process.

Methods: CD1 male mice underwent TBI (controlled cortical impact (CCI): velocity = 6m/sec, depth =1.0mm) or sham craniotomy with or without tibial fracture, and received either ENX (1mg/kg, 3 times/day) or saline for 2 days following injury. Randomization defined 4 groups (Sham, CCI, CCI+BF, CCI+BF+ENX, n=10/each). 48h after CCI, neurological recovery was assessed with the Garcia Neurological Test (GNT, max score: 18 points), penumbral pial intravital microscopy assessed live recruitment of cerebral circulating LEUs and microvascular leakage and hemoglobin was measured in blood. Brain wet/dry ratio (edema) and pericontusional cerebral polymorphonuclear neutrophil (PMN) sequestration (Ly-6G immunohistochemistry- IHC) were evaluated post-mortem. ANOVA with Tukey’s correction determined intergroup significance (p<0.05).

Results: In vivo pial LEU rolling was significantly greater in CCI+BF (45.2±4.8LEUs/100μm/min) than in CCI alone (26.5±3.1, p=0.007), and was significantly suppressed by ENX (23.2±5.5, p=0.003 vs CCI+BF). In vivo LEU adherence was also highest in CCI+BF (71.1+/−2.9%) than CCI alone (42.5+/−2.3, p<0.001). GNT scores were lowest in CCI+BF (15.2±0.2) vs. CCI alone (16.3±0.3, p<0.001). Injured brain hemisphere edema was highest in CCI+BF (83.0+/−1.1%) vs. CCI alone (76.6+/−1.2, p=0.02). Hemoglobin was lowest in the CCI+BF+ENX (10.0+/−0.5g/dl) vs. Sham (12.7+/−0.6, p=0.026) or CCI alone (12.6+/−0.5, p=0.034). Post mortem cerebral IHC demonstrated greatest PMN sequestration in CCI+BF (7.2±1.9/cells) vs. Sham (0.2±0.2/cells, p=0.012) in uninjured cerebral territories.

Conclusion: A concomitant long bone fracture worsens TBI-induced cerebral leukocyte mobilization, microvascular leakage and cerebral edema, and further impairs neurological recovery at 48h. ENX suppresses this progression but may increase bleeding. Further study is necessary to determine what local fracture related agents are responsible for systemic dissemination and worsening of cerebral tissue injury progression and recovery.