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# Resident Section II

## Senior Resident Research Abstracts

With this inaugural Resident Section of the *California Journal of Emergency Medicine*, *CalJEM* embarks on its mission to showcase the academic achievements of both EM residents and medical students interested in Emergency Medicine. Following are six abstracts submitted as part of their 2006 senior resident research projects at the University of California, Irvine. We wish to thank UCI Program Director Dr. Jennifer Oman, Assistant Program Director Dr. Scott Rudkin, and Department Chair Dr. Mark Langdorf for these submissions. We invite program directors from every Emergency Medicine program in the state to submit their senior project abstracts to the journal for possible future publication.

### “Urobilinogen and urine bilirubin as predictors of abdominal injury in adult blunt trauma patients”

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#### ABSTRACT

**Objective** - In this retrospective consecutive cohort study, we attempted to determine the point prevalence of urine bilirubin and urobilinogen in blunt abdominal trauma patients and its utility as a predictor of intraabdominal injury.

**Research Design and Methods** - A total of 986 consecutive trauma patients were screened, of which 698 (71%) were adult blunt trauma patients. 516 (52%) of these patients underwent a urinalysis and CT scan of the abdomen and pelvis or operative exploration of the abdomen and were eligible for inclusion. Urinalysis results were examined for the presence of hemoglobin, urobilinogen and urine bilirubin. CT scan results and operative reports were examined for evidence of liver and spleen laceration, as well as bowel or mesenteric injury. Patient medical records were reviewed for history of preexisting liver or biliary pathology, spleen lacerations, or bowel injuries. Preexisting liver or biliary conditions, such as hepatitis, gallstones, or previous cholecystectomy were not statistically associated with elevation of urine bilirubin ( $p=0.53$ ) and urobilinogen ( $p=0.06$ ).

**Results** -- Urinalysis was positive for urobilinogen in 28 (5.43%) patients and urine bilirubin in 15 (2.91%). 19 (4%) patients were found to have liver lacerations, 28 (5%) to have spleen lacerations, and 15 (3%) to have bowel or mesenteric injury. Eight (29%) patients with urobilinogen ( $p=0.002$ ) and five (33%) patients with urine bilirubin ( $p=0.005$ ) were found to have liver lacerations.

**Conclusions** - Our results indicate that urobilinogen (OR=3.58; 95% conf interval=1.29, 9.02), urine bilirubin (OR=4.32; 95% conf interval=1.11, 14.45), and hemoglobin (OR=3.41; 95% conf interval=1.65, 7.75)

on initial urinalysis after blunt trauma are independent predictors of intraabdominal injury. Initial urinalysis results may be useful in guiding imaging studies and further evaluation of blunt trauma patients. Future research is necessary to clarify the clinical significance of this connection.

### “Positive Cerebrospinal Fluid Cultures in Immunocompetent Emergency Department Patients with Normal Cell Counts and Gram Stains Are all Contaminants”

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#### ABSTRACT

**Study Objectives:** With vaccination advances and herd immunity, the vast majority of initially positive Emergency Department (ED) cerebrospinal fluid (CSF) cultures are subsequently determined to be non-pathogenic contaminants. Clinical follow-up in these patients is costly, time-consuming, and unnecessary if their cultures do not demonstrate a pathogen with potential to cause acute bacterial meningitis. We hypothesized that, in immunocompetent patients with normal gram stain, protein, glucose, and white blood cell (WBC) count, all positive cultures are contaminants and need no further care.

**Methods:** Using standard data forms, we retrospectively reviewed charts of 169 immunocompetent ED patients of any age who had positive CSF cultures from January 1, 2000 to December 31, 2004. Of these, 135 had CSF WBC  $\leq 7$ , normal chemistries, and negative initial gram stains. Our primary outcome measure was the proportion of final culture results that represent true infection (*Streptococcus pneumoniae*, *S. agalactiae*, *Neisseria meningitidis*, *Listeria monocytogenes*, *Escherichia coli*, *Salmonella* species, and *Haemophilus influenzae*) versus contamination (*Staphylococcus epidermidis*,

*Streptococcus bovis*, *Propionibacterium acnes*, *viridans streptococci*, *Enterobacter*, *Flavobacterium*, *Enterococcus*, *Corynebacterium*, and non-anthrax *Bacillus*). In addition, we report the rate of subsequent phone follow-up, repeat ED visits, repeat lumbar punctures, and non-therapeutic antibiotics. Results: Of the 135 positive cultures studied, 134 were contaminants. One remaining culture revealed *S. agalactiae* (Group B Strep) in an adult patient. Repeat lumbar puncture in this patient did not grow any organism. The initial "positive" culture was therefore deemed to be a contaminant. Thus, all 135 positive cultures were contaminants. The most common organisms isolated were coagulase-negative staphylococcus (n=52), *P. acnes* (n=33), *viridans streptococci* (n=14) and *Corynebacterium* (n=8). Unnecessary clinical follow-up activities were as follows: phone calls (49%), repeat ED visits (12%), repeat LPs (10%), and initiation of non-therapeutic antibiotics (3%). Conclusion: In our study, all positive CSF samples in patients with negative lumbar punctures were determined to be contaminants. If validated with a larger sample, follow-up may be unnecessary in patients with positive CSF cultures if their initial lumbar puncture was normal.

### "Optic Nerve Sheath Diameter in Patients Undergoing Head CT in the Emergency Department"

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#### ABSTRACT

**OBJECTIVE:** Previous research has shown a correlation between elevated intracranial pressure (EICP) and an increase in optic nerve sheath diameter (ONSD). Few studies have analyzed the use of bedside ultrasound in measuring the ONSD of patients with suspected EICP. This study seeks to assess the ease of measurement of ONSD in Emergency Department patients, show the distribution of ONSD as measured by bedside ultrasound, and compare the accuracy of this ONSD to non-contrast head CT for the diagnosis of EICP. **METHODS:** Patients undergoing head computed tomography (CT) in an academic emergency department were prospectively identified. Emergency department physicians were trained on measuring ONSD with a 10-minute slide presentation. Informed consent was obtained and the patient's ONSD was measured in both eyes by a physician blinded to the CT results. Measurements were taken on the closed eyelids of supine patients using a 10-MHz linear probe. The ONSD was measured 3mm posterior to the globe. CT scans consistent with EICP were defined as one or more of the following: a midline shift of greater than 3mm, sulci effacement, abnormal cisterns or a collapsed third ventricle. The mean value, standard deviation and range of the ONSD were identified. **RESULTS:** From April 2005 to January 2006, 210 patients undergoing head CT in the emergency department were identified

and enrolled in the study. Mean ONSD of left eyes was 4.74 mm (SD 1.28) with a range from 1.7 to 8.3 mm. Mean ONSD of the right eyes was 4.72 mm (SD 1.17) with a range from 1.8 mm to 8.2 mm. 9 patients (4%) were identified as having changes on head CT consistent with EICP. Mean ONSD of their left and right eyes respectively was 5.42 mm (SD 1.3, range 4.0 to 7.4 mm) and 5.12mm (SD 0.75, range 4.0 to 6.4).

**CONCLUSIONS:** Previous studies indicate that the mean ONSD in normal adult patients is 5.0mm. Our prospective study demonstrates a mean of 4.75 mm in patients without EICP. Further enrollment of patients with signs of EICP on CT scan is required for analysis of ONSD in these patients.

### "Use of Ultrasound to Risk-Stratify Pregnancy Outcome in Emergency Department Patients with First Trimester Vaginal Bleeding"

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#### ABSTRACT

**Objective:** To evaluate how the ultrasound findings in first trimester vaginal bleeding predict the pregnancy outcome in patients who present to a University Emergency Department (ED).

**Design:** Prospective Cohort Study

**Setting:** University Emergency Department

**Patients:** All women over thirteen years of age who presented to the ED complaining of first trimester vaginal bleeding between April 2004 and January 2005 were eligible for the study. Patients who were diagnosed with ectopic pregnancy, molar pregnancy, or were not pregnant were excluded. Also excluded were patients who elected to terminate the pregnancy, did not wish to participate in the study, or were unable to be contacted for follow-up.

**Methods:** All women underwent a standard workup for first trimester vaginal bleeding. This included a serum BHCG and an ultrasound (transabdominal or transvaginal) performed by emergency physicians. The ultrasound results were recorded as no definitive intrauterine pregnancy (NDIUP) where no gestational sac, yolk sac or fetus was visualized either in the uterus or elsewhere, intrauterine pregnancy (IUP) where there was visualization of an intrauterine gestational sac greater than 5 mm with either a fetal pole or yolk sac, live intrauterine pregnancy (LIUP) where an intrauterine pregnancy was identified with fetal heart motion or abnormal intrauterine pregnancy where an intrauterine gestational sac 10 mm or greater with no gestational sac or 16 mm or greater with no fetal pole was identified. The women were then followed up by either telephone contact or medical records to determine the outcome of the pregnancy.

Main Outcome Measure: Live birth

Results: A total of 124 women were enrolled. Of the 70 that met inclusion criteria, 23 (32%) carried to term and delivered live babies. None of the babies carried to term were stillborn. Of the 23 live births, 18 (78%) were noted to have a documented live intrauterine pregnancy at the time of the ED visit. The other findings included intrauterine pregnancy (13%) and no definitive intrauterine pregnancy (8%). None of the abnormal intrauterine pregnancies resulted in a live birth.

Conclusions: In women with first trimester vaginal bleeding the likelihood of carrying the pregnancy to term does appear to be related to the findings on ultrasound. Women with a documented live intrauterine pregnancy have a much greater chance of delivery than women with an abnormal intrauterine pregnancy.

### “Bedside Ultrasound in the Diagnostic Work-up of Acute Appendicitis”

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#### ABSTRACT

Objectives: Acute appendicitis is the most common abdominal surgical emergency. The aim of this project is to evaluate the accuracy of emergency physicians using bedside ultrasound for appendicitis (BUSA).

Methods: All physicians attended a 1-hour didactic lecture on BUSA. Patients undergoing testing for appendicitis were approached for inclusion; this consisted of a 5-minute BUSA. In addition to the BUSA, all patients received at least one: Radiology performed ultrasound (RUS), CT scan, appendectomy, or telephone follow-up. BUSA results were kept confidential from surgeons and radiologists.

Results: A total of 126 patients were analyzed. In 44 cases BUSA was positive. Of these, 37 agreed with the surgical pathology report (true positives), while 7 were found to be negative (false positives). In 82 cases BUSA was negative. Of these, 62 were determined not to have appendicitis (true negatives), and 20 received appendectomies showing appendicitis by pathology (false negatives). Sensitivity for BUSA was 65% [95% CI 52-76], specificity was 90% [95% CI 81-95], positive predictive value was 84% [95% CI 71-92], and negative predictive value was 76% [95% CI 65-84]. The likelihood ratio of a positive BUSA was 6.4 (95% CI 3.1-13.2).

Conclusion: One hour of focused training is not sufficient for the emergency physician to use BUSA as a solitary screening modality.

### “Effect Of A Medical Student Rotation In Emergency Ultrasound On The Number Of Scans Performed By Faculty And Residents

M. Waters, M.D., J. McDonough, M.D., M.P.H., J. C. Fox, M.D., C. Anderson, Ph.D., and W. Weichmann, B.S.

#### ABSTRACT

Study Objective: To determine the effect of the presence of a medical student enrolled in an emergency medicine ultrasound course on the number of patients scanned and total number of scans performed in an academic emergency department.

Methods: We prospectively studied the ultrasound scanning habits of emergency medicine residents and attendings with and without the presence of the medical students.

During the study period, rotating ultrasound medical students were assigned to work shifts on specific days of the week. All days of the week were equally represented, except for Wednesdays, during which residents are in conference most of the day. We collected data on the number of patients scanned, the number of scans performed, as well as whether a resident or faculty member participated in the scan for each day of the week, excluding Wednesdays. The average number of patients scanned and total number of scans performed was calculated using the Mann-Whitney test.

Results: A total of 2066 scans were performed on 1487 patients during the 164-day study period. There were 73 days when the medical students were present and 91 days when they were absent. More patients were scanned when the medical students were present with an average of 11 patients per day (CI 9-13) versus an average of 6 patients per day (CI 5-7) when the students were absent ( $p = <0.0005$ ). In addition, the average total number scans was 14 when the medical students were present (CI 11-19) versus 7 scans per day (CI 6-9) when the students were not present ( $p = <0.0005$ ). When comparing the number of patients scanned with the residents, there was no difference when the medical student was present ( $n=6$ , CI 4-8) versus when they were not ( $n=6$ , CI 4-6). The same was true of the total number of scans with the residents when the students were present versus absent ( $n=6$  and  $n=8$  respectively). A statistical difference did exist in the total number of scans with faculty when the medical students were present ( $n=5$ , CI 4-7) versus when they were not present ( $n=3$ , CI 2-4). However, no significant difference was seen in the number of patients scanned with faculty when the medical students were present ( $n=4$ , CI 3-6) versus when they were not present ( $n=3$ , CI 2-4).

Conclusion: In our study, more patients were scanned, and more scans were done on days when a medical student was present on the ultrasound rotation.