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Cover Art submitted by Scott S. Harris, Drexel University College of Medicine, Class of 2010

Editorial Policy

The *DrexelMed Journal (DMJ)* features the scholarly activities of our graduate medical education trainees. This journal was created to highlight the many interesting and diverse scholarly activities and research ongoing at Drexel University College of Medicine and its participating affiliates including Hahnemann University Hospital, Abington Memorial Hospital, Allegheny General Hospital, and St. Peter's University Hospital. Recognizing that scholarly activity takes many forms, the *Journal* aims to publish all such efforts, and thus welcomes original research, reviews, case reports, and technical reports alike.

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The lead author must be in a current, Drexel-affiliated, graduate medical education program either as a resident or fellow, (i.e. PGY-1, etc.) and must be in good standing with the program. It is the responsibility of the lead author to review the submission(s) with all listed authors prior to the final electronic submission to DMJ. DrexelMed Journal does not assume any responsibility for the addition or omission of authors. It is the responsibility of the lead author to verify all conflicts of interest for every author listed on the paper.

If residents from another institution would like to participate, they should request their designated institution official (DIO) to communicate directly with the Associate Dean of GME at DUCOM: Dr. Mark Woodland (215) 762-3500.

Please refer to the DrexelMed Journal website for further detailed instructions regarding submission guidelines:

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DREXEL UNIVERSITY
COLLEGE OF MEDICINE

EDITORIAL COMMENTS

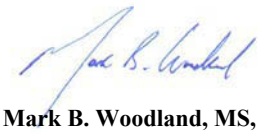
We are happy to present the third issue of the DrexelMed Journal, featuring the scholarly activities of the graduate medical education trainees of Drexel University College of Medicine, Hahnemann University Hospital, Abington Memorial Hospital, Allegheny General Hospital, Monmouth Medical Center, St. Christopher's Hospital for Children, and St. Peter's University Hospital.

This edition of the *Journal* includes almost twice as many submissions as our previous version. We are very proud of the scholarly acitvity of our residents. We have also included the names and projects of this year's resident research fellows and a brief synopsis of other scholarly activity being conducted by residents graduating from our Graduate Medical Education programs.

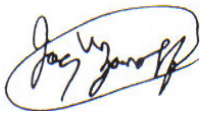
Research abstracts and case presentations in this issue cover an extremely broad array of interesting and educational topics. The original articles relate practical information about the way we care for our patients while hospitalized and provoke a moment of self-reflection about the way we each provide that care. Our review articles this year remind us to keep the serious disease processes on our minds even when dealing with what appears to be a simple problem and also introduce us to some new disease entities. The work our residents are performing is truly impressive.

We hope you take time to peruse and appreciate the diverse richness of this year's edition and encourage you to submit your work for next year's edition!

David Berkson, MDD
Editor-in-Chief
Asst. Professor, Program Director, Family Medicine



Mark B. Woodland, MS, MDD
Program Director, OBGYN
Associate Dean, GME



Jay M. Yanoff, EdD
Chief GME Officer, DIO
Hahnemann University Hospital

DEAN'S RECOGNITION

My congratulations to Dr.'s Berkson, Horrow, Hamilton, Woodland, and Yanoff for the 3rd Edition of the DrexelMed Journal.

Three years ago when Drs. Yanoff and Woodland came to me with this idea, I whole heartily supported the concept of emphasizing the scholarly activities of our residents. I challenged them to expand beyond the halls of our primary GME affiliate and am pleased to see the participation of many of our other affiliates in this edition. As we continue to establish ourselves in the realm of academic medicine, this list will continue to grow through the participation of our other fine affiliate institutions.

Finally, my personal appreciation to the many residents represented in this journal and to those of you in training who have ongoing scholarly activities. At Drexel, academic inquiry through research and innovation is part of basic mission. We hope through out your training programs and your professional careers that you continue your endeavors to move medicine forward.

Richard V. Homan, MD
Senior Vice President, Health Affairs
Dean, College of Medicine
Drexel University College of Medicine

Abstract: Avian Influenza

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OBJECTIVES
To find out the current evidences on the diagnosis and management of bird flu (H5N1) infection in humans from best available evidence base.

METHODS
The best available evidences were referenced for human avian influenza to evaluate the strength of the evidences by means of SORT rating. References include evidence-based guidelines, the Cochrane reviews, POEMS (structured summaries of recent research), clinical decision rules, history and physical exam maneuvers, and diagnostic tests. Up to 50 relevant search results from Medline were also reviewed.

RESULTS/DISCUSSION
The H5N1 virus is contagious in birds and fatal in humans. A history of travel and exposure to poultry in a febrile patient with respiratory illness should prompt testing for avian flu. Reverse Transcription Polymerase Chain Reaction (RT-PCR) on nasal aspirates is used to diagnose the disease. Treatment is with the neuraminidase inhibitor Oseltamivir and supportive management. Strict infection control and involvement of public health as well as animal health sectors help prevent pandemics. SORT ratings for evidence base revealed a C (consensus, disease-oriented evidence, usual practice, expert opinion, or case series) at best for referenced sources. Consistent patient outcomes-based studies on avian influenza are needed for a better understanding of the disease and its prevention.

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Abstract: Bias in Choice of Antenatal Testing by Maternal Indication: Prospective Observational Study

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BACKGROUND
Accurate antenatal assessment of fetal status is paramount to perinatal decision-making. With fertility advancements in delaying reproductive years and medical achievements of pregnancy in patients with significant co-morbidities, accurate ante partum assessment will become more important as Obstetrics moves forward into the future. There are two basic modalities for antenatal surveillance: non-stress test (NST) and biophysical profile (BPP). However, no evidence based protocols have been developed to demonstrate superiority of one test over the other. As it is well known that one is significantly more costly (NST costs approximately $75 and BPP costs approximately $275) it important to investigate provider bias in testing preference based on indication and patient socioeconomic status.

OBJECTIVE
To identify the most common indications for antenatal testing and to determine if choice of testing varies by maternal indication.

METHODS
This is a prospective, observational study of women presenting for antenatal testing. Enrolled subjects had either twice weekly NST or weekly BPP. Data collected included maternal demographic characteristics, indication for testing, type of insurance, and patient income. Type of antenatal testing was evaluated by these factors to determine presence of bias. Two types of analyses were performed. The first assumed NST and BPP were equivalent. The second assumed one test was preferable.

RESULTS
A total of 205 women were enrolled. 94 had NST and 111 had BPP. Refer to the table for an analysis of choice of testing by maternal indication. In a separate analysis, choice of testing did not vary by maternal income or type of insurance.

CONCLUSIONS
In our analysis, choice of antenatal testing was significantly associated with indication for testing. This highlights the potential bias that providers may have when referring patients for antenatal testing.

Table 1. Maternal Indication vs Type of Testing

Maternal Indication	NST, n (%)	BPP, n (%)	Two-sided t-test (p-value)	One-sided t-test (p-value)
Post-dates	12 (75)	4 (25)	0.08	0.04
Twin gestation	2 (25)	6 (75)	0.29	0.14
Decreased fetal movement	13 (93)	1 (7)	0.001	<0.001
Gestational Diabetes	16 (37)	27 (63)	0.09	0.04
Increased blood pressure	8 (31)	18 (69)	0.08	0.04
Advanced Maternal Age	13 (36)	23 (64)	0.13	0.07
Other	30 (48)	32 (52)	ns	ns

Table 2. Maternal demographic characteristics testing type

Variable	NST (n=94)	BPP (n=101)	P-value
Age	30.7	31.9	0.23
Nulliparous	41 (43.6%)	41(40.6%)	0.19
Multiparous	55 (58.5%)	63 (62.4%)	0.31
Work outside home	60 (66%)	75 (75%)	0.52
Home business	9 (10%)	8 (8%)	0.67
Private Insurance	45(48%)	56(55%)	0.72
Medicaid	49(52%)	45(45%)	0.91

Abstract: The "O" Word: Diagnosis and Management of Childhood Obesity in a Family Medicine Practice

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INTRODUCTION
Pediatric obesity remains a growing problem in the US. Data compiled by National Health and Nutrition Examination Survey (NHANES) indicates the overall prevalence among 2-19yo was 13.9% (1999-2000), 15.4% (2001-2002), 17.1% (2003-200) and 15.5%(2005-2006). Undertreated overweight/obesity in childhood is likely to persist into adulthood and caries both physical and psychological consequences. Recent guidelines for the management of pediatric obesity recommend improved diagnosis along with multiple interventions.

OBJECTIVE
To analyze how frequently obesity/overweight children were diagnosed and established guidelines implemented, in a suburban Family Medicine office and to create a plan to improve both diagnosis and intervention.

METHODS
A systematic review of 500 randomly selected patient charts of those between ages 2-18 was undertaken. Indicators from the charts: 1. documentation of height/weight upon each clinical encounter, 2. plotting data on an age/sex-appropriate growth chart, 3. documentation of BMI and plotting on a percentile chart and, 4. submission of the appropriate ICD9 code for BMI, was recorded. Assessment of referral status and dietary recommendations were made for those patients with diagnosed obesity.

RESULTS
Upon completion of the study, practice data will be compared with national norms for offices of similar size. Preliminary review of the available data shows the practice needs to increase diagnosis, early intervention and referral patterns for overweight/obese children.

CONCLUSIONS
Diagnosis of pediatric overweight/obesity is hampered by a number of factors including parental resistance, limited time to discuss health maintenance and anticipatory guidance during acute care visits and cultural variability of perception of the child's weight.

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Abstract: Cholera

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OBJECTIVE
To review available evidence and literature on the pathophysiology and management options on the disease cholera.

DISCUSSION
Cholera is an infectious gastroenteritis caused by the ingestion of the enterotoxin producing bacterium Vibrio cholerae. Cholera toxin, a potent stimulator of adenylate cyclase, causes the intestine to secrete watery fluid rich in sodium, bicarbonate, and potassium, in volumes far exceeding the intestinal absorptive capacity. The most common risk factors were water source contamination, heavy rainfall and flooding, and population dislocation. Cholera has spread from the Indian subcontinent where it is endemic to involve nearly the whole world seven times during the past 185 years. V cholerae serogroup O1, biotype El Tor, has moved from Asia to cause pandemic disease in Africa and South America during the past 35 years. A new serogroup, O139, appeared in south Asia in 1992, has become endemic there, and threatens to start the next pandemic.

CONCLUSIONS
Management of cholera led to the development of rehydration therapy for dehydrating diarrhea in general, including the proper use of intravenous and oral rehydration solutions. Appropriate case management has reduced deaths from diarrheal disease by an estimated 3 million per year compared with 20 years ago. Vaccination was thought to have no role for cholera, but new oral vaccines are showing great promise.

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Abstract: Indications for use of CT in Cases of Mild Head Trauma

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BACKGROUND
Cost savings and patient care improvements may be achieved if guidelines excluded some patients with mild trauma from head CT scans. We performed a retrospective study on 200 ER patients at Hahnemann University Hospital (HUH) to test the sensitivity and specificity of 2 published guidelines (Haydel et.al.[1] and Stein et.al.[2] - Canadian hospital-guidelines) to determine if these are applicable to our patients. Current HUH protocol is to scan all suspected head trauma patients.

METHODS
DUCOM IRB approval was obtained. 200 patient records were reviewed. Patients were between ages 18-89 referred from the ER for CT head scan for any reason within inclusion/exclusion criteria (included previous injuries or developmental defect). Patients had GCS scores of 13-15. Radiographic scans for positive or inconclusive cases were reviewed by an attending radiologist to determine whether scans were positive or negative for acute injuries. Records were reviewed to determine cause of referral, treatment, and outcome.

RESULTS
Analysis showed 22% of ER scans were performed on patients presenting with trauma (falls, assaults or MVA's). For all cases, 19/200 (9.5%) had positive CT findings, whereas only 2/44 (4.5%) trauma cases were positive. Guidelines from Haydel et.al predicted positive CT findings with sensitivity of 0.74 and specificity of 0.27. Canadian Guidelines predicted positive trauma cases with sensitivity of 0.26 and specificity of 0.71.

CONCLUSIONS
Sensitivity and specificity patterns were as expected for each guideline, but neither correlation was 100%. Since it is important to capture all patients who could have intracranial pathology, our results support continued use of "Scan-all" protocol currently the standard of care at HUH.

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Abstract: Development of Quantitative Sensory Testing as a Tool to Assess Vulvar Sensory Processing

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OBJECTIVE
To develop Quantitative Sensory Testing (QST) as a method to identify alterations in vulvar sensory processing in patients with vulvodynia.

METHODS
24 controls and 12 vulvodynia patients are being recruited. A history, physical and cotton swab test of the vaginal vestibule are completed to ensure proper classification of subjects. Sensory detection and pain thresholds to mechanical, thermal and vibratory stimuli are measured at extra-vulvar (left forearm and calf) and vestibular (right/left vestibule adjacent to Bartholin's glands) sites.

RESULTS
Data has been collected on five control and two vulvodynia subjects. Our measurements of right and left vestibular sensory heat detection (46.95 +/- 4.31 and 43.53 +/- 1.30 degrees Celsius respectively) are similar to values previously published[2]. Similarly sensory pain thresholds to thermal stimuli were consistent with published values[1]. Our pain thresholds to pressure were lower than reported values. This is possibly due to variability in instruments utilized to apply mechanical stimuli. Preliminary results indicate regional differences in sensory detection and pain thresholds to pressure (right vestibule mean 0.19g, left vestibule mean 0.28 g in control subjects). Similar trend has been observed with thermal stimuli. Pain thresholds to pressure were lower in vulvodynia subjects.

CONCLUSIONS
The quantitative sensory testing method may be used to assess vestibular and peripheral sensory thresholds. We measured similar temperature threshold findings compared to published values. Further research is required to develop a standardized instrument for measuring vulvar sensory detection and pain thresholds to mechanical stimuli.

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Abstract: Gender Differences in the Prevalence of Coronary Artery Ectasia in South Asians Presenting for Coronary Angiography

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INTRODUCTION
Coronary ectasia is a known manifestation of atherosclerosis. Its role in patient morbidity and mortality has not been fully elucidated. In most recent studies a prevalence of 1.2-4.9% has been shown in various populations. We studied the prevalence of ectasia in a population of South Asians presenting for angiography at the Doctors Hospital Medical Center, Lahore, Pakistan.

METHODS
We included 4962 consecutive patients undergoing angiography in a 2.5 year period. Ectasia was defined as a coronary segment 1.5 times the diameter of the normal adjacent coronary segment. This did not include segments with post-stenotic dilatation.

RESULTS
In this population, 489 patients showed ectatic vessels (10.4% of total). Females had a lower incidence of ectasia (7.23%; $p<0.0001$) compared to males (11.5%), and less likely to present with ectasia (OR=1.681, CI 1.32-2.31, $p<0.0001$). For all women with ectasia, the mean age (54.1 years, n = 91) was higher compared to males (mean age 52.9, n = 398; $p<0.0013$). Furthermore females with isolated ectasia presented at a much older age (50.8, n=45) compared to males (47.8 years, n=95, $p<0.001$). Males with isolated atherosclerosis presented at a younger age (54.7 years, n = 2830) compared to females (56.9, n=910; $p<0.0001$).

CONCLUSIONS
Ectasia was seen in a significantly higher percentage of males (11.5%) than females. Females were less likely to have ectasia, and presented at a younger age than males, even though presentation age for atherosclerosis for females was higher. Further explanation of these differences and the role of preventative therapy should be explored.

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Abstract: Handheld games versus lecture for emergency medicine education: Is one better than the other?

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OBJECTIVES
The study objective was to compare short-term and long-term acquisition of knowledge using a handheld educational game compared to a standard lecture teaching basic emergency medicine concepts.

METHODS
During consecutive months, fifty fourth-year medical students rotating through the emergency department were enrolled in the study. Each was given a pre-test containing toxicology and infectious disease questions. Students were then divided into two groups. One group played an educational game loaded on Personal Data Assistants for 30 minutes, while the other group received a lecture on one of the tested topics. The groups were then switched and received a lecture or played a handheld game with the second topic for another 30-minute period. A post-test was given that included a brief survey. Knowledge retention was assessed by re-testing students between 14 and 21 days after the initial study date.

RESULTS
The average pre-test score was 71.7% +/- 13.2%. The average immediate post-test score for those receiving a lecture was 96.9% +/- 6.4% compared to 98.2% +/- 3.6% for those playing the game. The average score on the retention tests for those receiving a lecture was 91.4% +/- 6.5% compared to 95.2% + /- 7.4% for those playing the game. Medical students reported greater satisfaction with learning via the handheld game versus the lecture.

CONCLUSIONS
Using a handheld game to educate students resulted in a greater immediate acquisition of knowledge and improved retention when compared to lecture when teaching emergency medicine knowledge.

Abstract: A Comparison of Minimally Invasive Hysterectomy and Uterine Artery Embolization: A Preliminary Study Evaluating Outcomes in a Teaching Institution

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OBJECTIVE
Compare outcomes of minimally invasive hysterectomies and uterine artery embolization (UAE).

METHODS
Retrospective study identifying patients who had undergone minimally invasive types of hysterectomy and uterine artery embolization between January 2005 and April 2007. Demographic data, estimated blood loss, length of stay, length of procedure, pre- and post-operative hemoglobin, and post-operative complication data was collected. The setting was an urban tertiary care teaching hospital - Drexel University College of Medicine. Included were women with abnormal uterine bleeding, fibroids and/or menorrhagia who underwent hysterectomy or UAE.

RESULTS
One hundred and eight patients were identified who had undergone a procedure; 85 patients (78%) underwent a method of minimally invasive hysterectomy and 23 patients (21%) underwent UAE. Length of procedure was noted to be significantly different between groups, 180 minutes in the hysterectomy group versus 109 minutes in the UAE group. Pre-operative hemoglobin was noted to be higher in the hysterectomy group at 12.6 versus 10.4 in the UAE group. Postoperative complications included organ injury, vaginal cuff dehiscence, postoperative febrile morbidity, pain requiring readmission, vaginal bleeding and anemia requiring transfusion.

CONCLUSIONS
Both hysterectomies and UAEs can be performed as minimally invasive techniques in order to reduce patient morbidity. Other studies have compared UAE and abdominal hysterectomy but have not evaluated minimally invasive hysterectomies. The information collected in this preliminary study will assist with a prospective study to evaluate these procedures and lend more information to compare two proven minimally invasive procedures.

Disclosures: Carl Dellabadia, DO – disclosures Ethicon, Gynecare, Hologic, Boston Scientific, Microsulis and Wyeth.

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Abstract: Incidence of Preterm Delivery and Preterm Premature Rupture of Membranes (PPROM) in HIV-Infected Pregnant Women at Drexel University College of Medicine

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INTRODUCTION
Some studies suggest an association between HIV infection and preterm delivery[1,2]. In the literature, it is reported that, PPROM complicates 3-4.5% of all pregnancies and is responsible for 30-40% of all preterm births[3]. Understanding the effect that HIV has on preterm delivery is important in guiding the management of HIV infected pregnant women..

OBJECTIVE
To determine the incidence of preterm delivery (PTD) in HIV infected pregnant women at our institution.

STUDY DESIGN
A retrospective review of medical records of 123 HIV-infected pregnant women who attended the HIV Partnership Comprehensive Care Practice and Women's Care Center of DUCOM, between 2002 and 2008.

RESULTS
In this study, twelve pregnancies (9.76%) ended in PTD. Seven (6%) had PPROM, making 58.33% of patients with PTD. The remainder had PTD for any one of the following reasons: preterm labor and delivery, c-section secondary to dilated cardiomyopathy or increased HIV viral load, severe pre-eclampsia with desire for tubal ligation, or failed induction of labor for severe pre-eclampsia. Of the seven pregnancies with PPROM, 5 (71.43%) occurred at 35 weeks, and two (28.57%) at 33 weeks; in cases that occurred at 35 weeks, labor was induced.

CONCLUSIONS
At DUCOM, 6% of HIV-infected women deliver preterm, and a high percentage has PPROM. Generally, pregnancies with PPROM remote from delivery are managed expectantly. The consequences of such management in HIV-infected women are unknown, but could have important implications for vertical transmission. Understanding the incidence of PPROM in this population will help in guiding management.

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Abstract: Obesity and Gynecologic Laparoscopy: Is There an Increased Risk of Complications?

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INTRODUCTION
Obesity currently affects more than 1/3 of American females in this country. Over the last 20 years, it is increasing at a dramatic rate and is reaching epidemic proportions. This becomes important, as obesity can have a tremendous impact on the health care of women. This is particularly important in gynecologic laparoscopic surgery, as obesity can contribute to the technical difficulty of the procedure.

OBJECTIVE
To compare the risk of complication of women undergoing a major gynecologic laparoscopic procedure between a cohort of obese versus non-obese women as defined by Body Mass Index (BMI).

METHODS
A retrospective chart review was performed for patients who underwent a gynecologic laparoscopic procedure at our academic institution between January 1, 2008 and December 31, 2008. A subset of women who had a major gynecologic laparoscopic procedure was identified. These women were divided into 2 cohorts: obese and non-obese by BMI. They were then further stratified into categories based upon BMI classification. The outcomes we were studying included estimated blood loss, length of procedure, length of hospital stay, hospital readmissions, surgical complications, and conversions to laparotomy. Statistical analyses were performed to compare the differences between the groups of women.

RESULTS
Of 111 women studied, 58% were non-obese (defined as BMI < 30) and 42% were obese (BMI $\geq$ 30). There was an overall complication rate of 6.3%. Complications included vaginal cuff dehiscence, bladder injury, incarcerated hernia, admission for evaluation of chest pain, hematoma, difficulty with veress needle placement and ureteral injury. 57.1% of these women were obese. Women with a BMI $\geq$ 30 had a significantly higher rate of conversion to laparotomy (19.1 vs 6.3%, P=.037). There was no statistical significance between the 2 cohorts with estimated blood loss, length of procedure, or length of hospital stay. When the BMI categories were delineated, there was statistical significance in estimated blood loss. As women increased in weight (as defined by BMI), estimated blood loss also increased, P=.017.

CONCLUSIONS
Only a paucity of information exists when it comes to research examining the relationship between obesity and laparoscopic surgery, especially in gynecology. There has been a trend, particularly in our field, to perform traditional procedures with as minimally invasive an approach as possible. In addition, the population of women we serve has become increasingly heavier. Obesity has certainly reached epidemic proportions in this country. The data has lagged behind what our patient population will look like in the future. This study examines our patient population and searches to answer if obesity has a negative impact on patients undergoing major laparoscopic surgery. We conclude that although our sample is small, laparoscopic surgery in gynecology may be the best option for this subset of patients. Our research allows us to better counsel our patients to the increased risk of conversion to laparotomy and potential increase in blood loss in these cases. But, the overall risk of any major complication is very small. Thus, laparoscopic surgery in the obese female is reasonable and can be beneficial, but counseling is important so

that these patients may know the risk, albeit small, that increased weight bestows upon them, even though our surgery takes a minimally invasive approach.

Abstract: Pictorial Review of the Mesenteric Arterial Collateral Circulation Utilizing Angiography

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BACKGROUND
The intestinal tract has an extensive collateral network that either prevents or limits bowel ischemia when central arteries become obstructed. The major mesenteric arterial collateral pathways include the intraceliac branches, the celiac and superior mesenteric arteries (SMA), the superior and inferior mesenteric arteries (IMA), and the inferior mesenteric and iliac arteries. This collateral circulation is important clinically not only in the setting of mesenteric ischemia, but familiarity with the various mesenteric collaterals is very important to the interventionalist when treating gastrointestinal bleeding.

GOAL
The goal of this exhibit is to provide a pictorial review of the major mesenteric collateral pathways encountered on angiography. Multiple anatomic variants will also be illustrated.

DISCUSSION
Typically, the celiac artery supplies the foregut, hepatobiliary system, and spleen. The SMA supplies the midgut (i.e., small intestine and proximal mid colon). The IMA supplies the hindgut (i.e., distal colon and rectum). This exhibit is a pictorial review of the mesenteric collateral pathways, including the gastric arcade (Fig 1), gastroepiploic arcade, Arc of Barkow, Pancreatic arcade, Arc of Buhler (Fig 2), Marginal Artery of Drummond, Arc of Riolan, and the rectal (hemorrhoidal) arcade. Multiple anatomic variants will also be illustrated.

CONCLUSIONS
Familiarity of the mesenteric arterial collateral pathways is essential to the angiographer in the setting of bowel ischemia. The intestinal tract has an extensive collateral network that either prevents or limits bowel ischemia when central arteries become obstructed. Familiarity with the collateral system is also vital to the interventionalist in many circumstances of treating gastrointestinal bleeding.

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Figure 1. Mesenteric collateral pathways

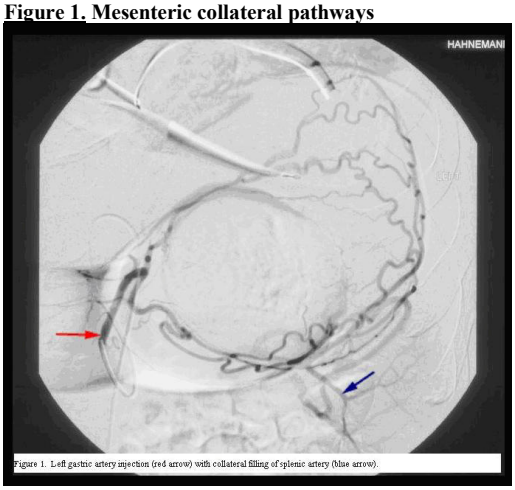
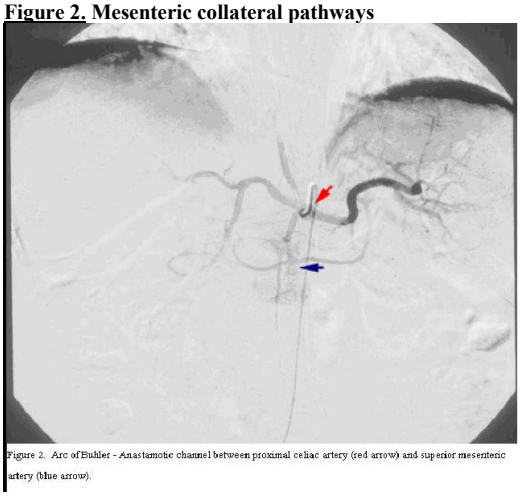


Figure 2. Mesenteric collateral pathways



Abstract: Role of Physicians in Vaccinating COPD Patients

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BACKGROUND
COPD is characterized by an inability to normally move air in and out of the lungs. Patients who have COPD are more prone to respiratory infections which include community acquired pneumonia and viral influenza. One way to prevent infections is through appropriate vaccination for these disease processes. Prevention of pneumonia and Influenza infections in these patients by vaccinations substantially contribute toward decrease in overall morbidity, mortality and medical resource utilization.

METHODS
Charts of patients over the age of 50 with a diagnosis of COPD were reviewed from one family medicine practice. Data recorded includes number of times these individuals have been vaccinated annually against Influenza, and how often patients over the age of 65 have received vaccination against pneumonia.

RESULTS/CONCLUSIONS
Data will be analyzed and vaccination rates of the physicians in this practice will be compared to the general national consensus of opinion. The results will be distributed back to the physicians of the practice for quality assurance.

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Abstract: Single-Port Access Laparoscopic Tubal Occlusion: An Innovative Approach to Minimally Invasive Sterilization Surgery

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BACKGROUND
Our objective is applying Single Port Access (SPA) laparoscopy to gynecologic sterilization. The multi-specialty technique is tested by our gynecology department to perform SPA laparoscopic tubal occlusions and results are compared with the traditional single-arm operative scope approach, which also utilizes a single port of entry.

METHODS
Ten patients underwent SPA laparoscopic bilateral tubal occlusion, performed through a single skin incision at the umbilicus. After placement of initial trocar and laparoscope, the accessory trocar was placed inferior and laterally to the initial trocar through a second fascial incision using the same skin incision.

RESULTS
Postoperative morbidity, length of surgery, and aesthetic outcome were comparable to the traditional single arm operative scope approach.

DISCUSSION
Introduction of minimally invasive surgery has facilitated better visualization and easier dissections within the limited pelvic confines, reduced surgical scarring, shortened recovery times, and decreased postoperative morbidity compared to open gynecologic procedures, e.g. total abdominal hysterectomy versus total laparoscopic[1,2] and laparoscopic assisted vaginal hysterectomies[3]. In general surgery, success was met with SPA gallbladder and foregut procedures[4]. In gynecologic oncology, impressive results were reported with SPA oophorectomy and hysterectomy[5]. We shared a similar experience with its application to tubal occlusion. Compared to the single arm operative scope, SPA increased surgical flexibility and scope of view, improving tracking of instruments and enhancing safety and ease of surgery. It is an excellent laparoscopic training method. The reusable instruments involved also make it cost-effective and eco-friendly. We should continue to explore and expand the applications of SPA gynecologic surgery.

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Figure 1. Single Port Access Scope of View 1

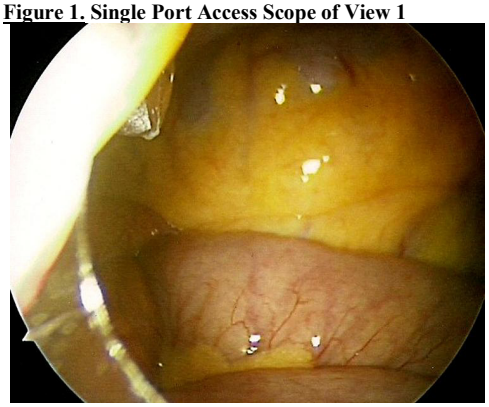
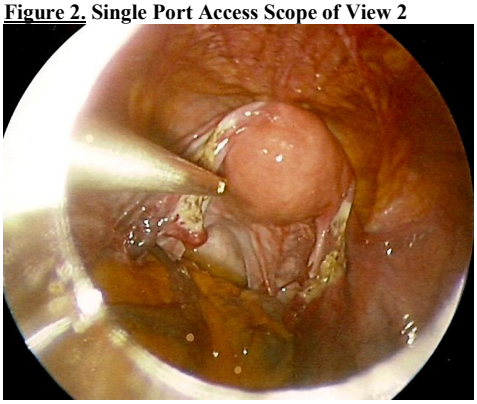


Figure 2. Single Port Access Scope of View 2



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Abstract: Vaginal Diazepam Suppository Use in the Treatment of High Tone Pelvic Floor Dysfunction: A Case Series

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INTRODUCTION
High tone pelvic floor dysfunction (HTPFD) is characterized by hypertonus of the levator ani complex with pain upon attempted squeeze or palpation of the pelvic floor musculature, and is frequently comorbid with hypersensitivity disorders of the bladder, bowel, and vulva, as well as sexual dysfunction. Currently accepted therapies for HTPFD include oral benzodiazepines, known for their antispasmodic activity for muscular hypertonus, in

addition to pelvic floor manual physical therapy and intramuscular anti-inflammatory injections.

OBJECTIVE
To provide preliminary information about the therapeutic effect of diazepam vaginal suppositories.

METHODS
Patients were assessed at their intake visit and subsequent follow-up visits for treatment of their HTPFD with pelvic muscle palpation on vaginal examination and perineometry. In addition, subjects completed Visual Analog Scales for global and sexual pain at each visit to track progress for this marker of functioning during treatment.

RESULTS
4 subjects were enrolled and had intervals between their initial and last documented visit before abstraction of 2-6 months. During this time period, pain and hypertonus with palpation of the levator ani muscles was decreased for each patient to 0; VAS improvement was noted to be (on a scale of 1-10) 2, 6, 7, and 8, respectively; and perineometry values at rest and after squeezing were decreased in 3 of 4 patients.

DISCUSSION
Vaginal diazepam suppositories appear to have a therapeutic effect on HTPFD in this small number of cases. Selection bias is a concern, but a planned prospective crossover study for diazepam versus placebo should confirm the above observations.

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Case Report: 35 year old male with Stage IV Lung Cancer presenting as an Upper Respiratory Tract Infection

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INTRODUCTION

The leading cause of cancer death in the United States is lung cancer[1]. Although uncommon, lung cancer has been widely reported to occur in patients younger than 40 years of age.[2] Typically, young patients with lung cancer more often have adenocarcinoma and smoking is an important risk factor for this subset of young patients. In addition, young patients tend to present with advanced disease at diagnosis, resulting in an extremely poor survival.[3]

CASE REPORT

A 35-year-old young male smoker with a past medical history of seizures presented with several week history of cough, nasal congestion and upper respiratory tract infection. The Primary Care physician ordered CT scans which showed a 3.7 x 3.5 cm central right lung mass, right pleural effusion, mediastinal, axillary, retroperitoneal and portahepatis lymphadenopathy, and a sclerotic L2 lesion concerning for metastasis. MRI of the brain and testicular ultrasound were normal. Pathologic findings from the right lung mass, right pleural fluid (Figure 1) and right axillary lymph nodes were all positive for malignancy. A diagnosis of primary lung adenocarcinoma with metastasis (Stage IV) was rendered.

DISCUSSION

The example of this 35 year old male with lung adenocarcinoma having a history of non-resolving upper respiratory infection presenting as Stage IV lung cancer highlights the importance of considering carcinoma in the differential diagnosis among symptomatic smokers, regardless of age. K-ras mutation is significantly associated with smoking history.[4] K-ras mutation analysis is recommended for this patient with advanced disease to determine eligibility for therapies targeting epidermal growth factor receptor (EGFR).[5]

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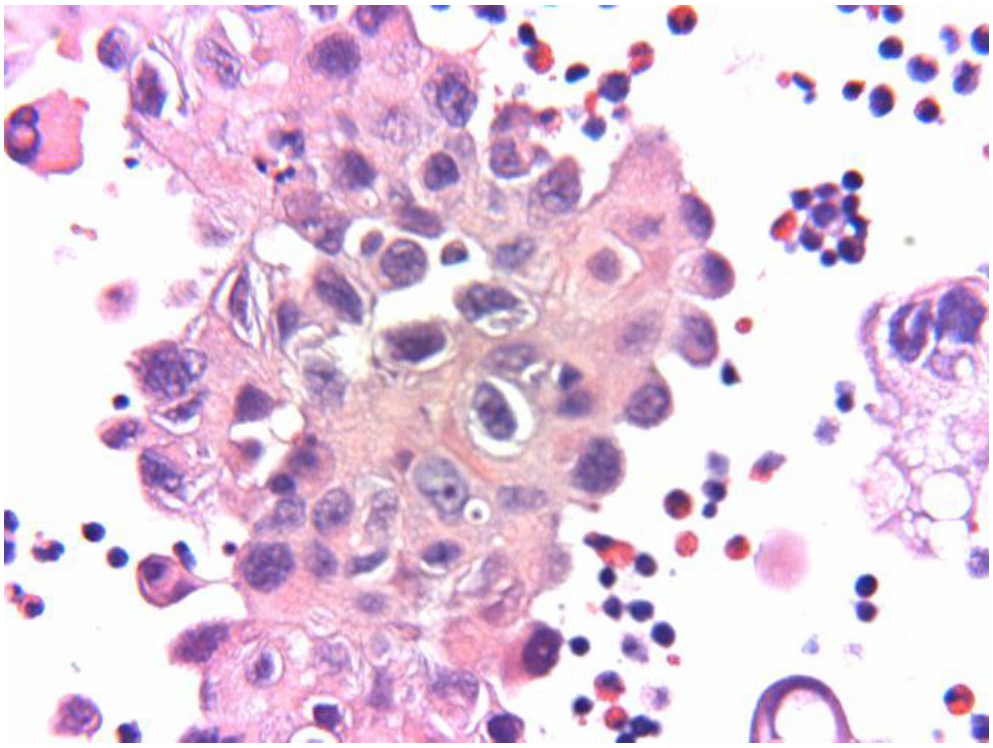
Figure 1. **Pathology from Right Pleural Fluid**



Case Report: Adult Onset Acute Rheumatic Fever – Forgotten But Not Gone

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INTRODUCTION

Acute rheumatic fever (ARF) is a childhood disease now rare in the continental united states. Attacks in adult life are usually recurrences of childhood rheumatic fever. First attacks in adults were rare even when the disease was common.

CASE REPORT

We report a case of a 46-year-old female admitted with complaints of disabling joint pains in her wrists and ankles and low-grade fevers of one-week duration. Patient reported a history of sore throat 2 weeks prior treated with a 5-day course of Z-pak. Physical examination revealed a lacy erythematous serpiginous rash with central clearing on the chest (Figure); the rash was well demarcated with irregular borders. Ankles and wrists were tender with pain on passive flexion; no swelling, warmth or effusions were noted in the affected joints. Laboratory tests revealed an ESR of 602, CRP of 106 and ASO titer was elevated at 800 IU. The patient fulfilled the Revised Jones criteria for the diagnosis of ARF. She was prescribed indomethacin for joint pains and a two-year course of sulfadiazine for secondary prophylaxis of ARF. During a 3-month follow-up visit she was doing well with minimal joint pains and significant improvement in her quality of life.

DISCUSSION

A literature review revealed only five reported cases of adult onset ARF in United States in the past five decades. Also of interest is the fact that she developed ARF despite adequate treatment for streptococcal sore throat. Increased awareness on part of the physician is necessary to ensure prompt and accurate diagnosis of this condition.

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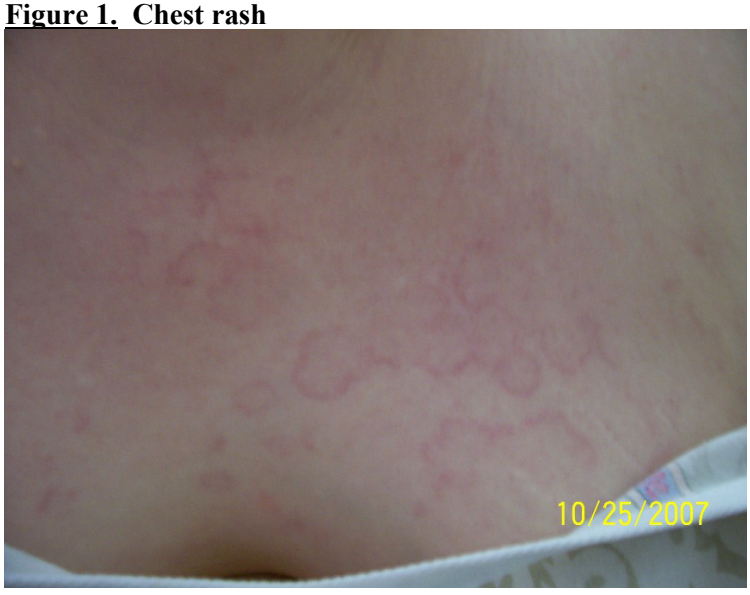
Figure 1. Chest rash



Case Report: Anesthetic implications of 11q terminal deletion disorder

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INTRODUCTION

The 11q terminal deletion (Jacobsen syndrome) is a rare autosomal dominant disorder. Approximately 100 cases have been reported in the literature. There is only one paper on Jacobsen syndrome in anesthesia literature.[1]

CASE REPORT

A 26 year old man with 11q deletion presented for nasolacrimal ducts and orbital lacerations repair secondary to human bite. He had limited mouth opening and Mallampati IV airway. Standard ASA monitors preceded inhalational induction with 8% sevoflurane in 100% O_2. After sufficient depth of anesthesia, direct laryngoscopy with Macintosh 3 was performed. Arytenoids and the posterior vocal cords were visible. 6.0 styletted cuffed ETT was passed into the trachea. Anesthesia was maintained with O_2, N_2O, sevoflurane (1.5%), rocuronium (0.3mg/kg), fentanyl (1µg/kg) and volume controlled ventilation via a closed circuit. SpO_2 was above 99% on FiO_2 0.5 and $etCO_2$ 30-35 mmHg, HR was 75-85, MABP 80mmHg and body temperature 37^0C. TOF ratio remained above 90%. At the end of the surgery, after reversal of neuromuscular blockade with neostigmine (40µg/kg)/glycopyrollate (4µg/kg), the patient resumed spontaneous ventilation. Sevoflurane and N_2O were discontinued and the patient was awake with stable vitals. After smooth extubation, patient was transferred to PACU with nasal O_2 in a head up position.

DISCUSSION

The incidence of Jacobsen syndrome is 1 per 100,000 with no clear phenotype-karyotype correlation.[2] Interaction of anesthetic agents is unknown. Careful evaluation of cardiac status seems warranted. Proactive platelet transfusions and DDAVP minimize bleeding risks.[2] Ocular abnormalities, adrenal insufficiency and hypothyroidism are other areas of concern.[3]

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Case Report: Camphor intoxication leading to seizures and apnea in a 3 year-old.

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INTRODUCTION

Camphor is a common over-the-counter medication found in inhalational "cold" medications and topical anesthetic rubs. While camphor is often believed to be safe, it can actually cause significant morbidity and mortality at low doses.

CASE REPORT

A 3-year-old female presented with new seizure activity. Prior to occurrence, the child was playing with Lander Cold Rub, containing 4.7% camphor, 1.2% eucalyptus oil, and 1% menthol. Within 5 minutes, the child exhibited focal seizure activity, followed by apnea. Cold rub was noted peri-orally. Resuscitation attempts at the scene were successful before hospital arrival. The patient had two episodes of emesis, followed by recurrence of seizure activity responding to lorazepam. Vital signs were appropriate for age. Head CT was within normal limits. Venous blood gas analysis showed a pH of 7.15, with a pCO2 of 56 mm Hg. A bicarbonate level of 18 mEq/L and an anion gap of 15 mEq/L were also noted. The patient subsequently had an uneventful hospital course and was discharged the following day with no residual neurologic effects.

DISCUSSION

The lipophilic cyclic terpene structure of camphor allows for rapid movement across mucous membranes. Toxicity frequently develops within 5-90 minutes of ingestion.[1] The mechanism of camphor toxicity remains unclear. While ingestions of less than 30 mg/kg can be safely monitored out-of-hospital, larger ingestions should be evaluated in the emergency department.[2] This patient ingested 177 mg/kg of camphor, a potentially fatal dose. Camphor in small amounts can cause significant toxicity, leading to seizures and apnea.

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Case Report: Campylobacter Bacteremia in an HIV Positive Renal Transplant Patient

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CASE REPORT

We describe a case of campylobacter bacteremia in a young post-renal transplant African-American patient who presented with fevers and gastrointestinal symptoms. A 34-year-old African American male presented with high-grade fevers (102°F), abdominal pain, nausea, vomiting, severe fatigue, and multiple joint pains. His past medical history included renal transplantation 11 months prior, HIV, hypertension, and anemia. His medications included cyclosporine, mycophenolate, prednisone, HAART, as well as anti-hypertensive medications. On evaluation he was febrile, hypotensive, with diffuse abdominal tenderness, multiple bilateral joint tenderness, and lower extremity edema. His laboratory studies were significant for a creatinine of 5.7(baseline creatinine after transplantation was 2.5), a white blood cell count of 4.9, cyclosporine level of 689, and CD4 count of 45. A right upper quadrant ultrasound revealed cholecystitis. Blood cultures remained persistently positive for one week for campylobacter (speciation not done) which was sensitive to ciprofloxacin. Stool cultures were negative. The patient was treated with a two week course of levofloxacin. His symptoms resolved within 1 week of treatment and subsequent blood cultures were negative.

DISCUSSION

Campylobacter bacteremia in HIV-infected patients can be a cause of severe debilitating febrile illness sometimes requiring multiple and prolonged courses of antibiotic therapy. Severe cases are associated with low CD4 cell counts. Campylobacter bacteremia is rare infection occurring in HIV positive renal transplant patients. It is very important to be aware of such rare infections.

Case Report: External Beam Radiation as Definitive Treatment for Locally Advanced Penile Carcinoma

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INTRODUCTION

Squamous cell carcinoma of the penis is a rare disease. Surgery is the mainstay of treatment; however, radiation therapy (RT) has also been used successfully for early penile carcinomas. Advanced lesions have historically been treated with aggressive surgery, involving partial or total penile amputation. Although, external beam radiation therapy (EBRT) or brachytherapy has been used as primary treatment for early penile cancers, it is rarely used for T2 or greater lesions. A large, retrospective case series of patients treated with EBRT showed local control rates of 65 percent and five-year cancer-specific survival of 86 percent. Other studies have shown no difference in 10-year OS in patients treated with surgery versus RT alone.

CASE REPORT

We report a case of a 63 year-old male with stage III penile carcinoma treated with chemoradiation. The patient tolerated radiation with only Grade I skin toxicity. At the completion of his treatment, the mass within the penis had significantly reduced in size with significant healing of the areas of ulceration. At his follow-up appointment 6 months post-treatment, his penis was well healed with no palpable mass or groin lymphadenopathy and his PET scan was negative.

DISCUSSION

The psychosexual and functional morbidity that can result from surgery is significant and can greatly impact a patient's quality-of-life. Further studies are necessary to explore RT as an alternative, organ-sparing approach to surgery. If RT combined with salvage surgery does not compromise survival in locally advanced penile cancers, most patients would likely choose this approach.

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Case Report: Influenza A results in ST-Segment Elevation Myocardial Infarction

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INTRODUCTION

Major risk factors for CAD include age, family history, smoking, etc. Risk stratification models, though, can cause one to dismiss potentially fatal diagnoses even when the patient has pertinent diagnostic and physical exam findings. A rare complication of infection reminds one that patients do not always read the textbooks.

CASE REPORT

A 17-year-old Caucasian male with no significant PMH presented to the ER complaining of one week history of low-grade temperatures, myalgias, chills, and sore throat. One day prior to admission he developed sudden mid-sternal chest pain with radiation to the LUE.

Vital signs were notable for a temperature of 98.8°F, heart rate of 110, blood pressure of 110/70, respiratory rate of 18, and oxygen saturation of 98% on RA. The physical exam was unremarkable.
Initial electrocardiogram indicated ST elevations in the inferior-lateral leads. His labs were significant for an elevated troponin of 13, CPK of 513, and CK-MB fraction of 41.

The presumptive diagnosis was a STEMI, and cardiac catheterization revealed normal coronaries with a normal EF. He was managed medically with aspirin, beta-blocker, nitroglycerin, and an ace-inhibitor. The potential causes included CHF or acute myocarditis stemming from coxsackievirus, HIV, influenza, legionella, mycoplasma, or lyme. Nasopharyngeal swabs returned positive for influenza A and the patient was eventually discharged on oseltamivir.

DISCUSSION

The importance of maintaining a high index of suspicion for potentially fatal events when developing a differential diagnosis is evident. Influenza, which is typically characterized by fever, myalgias, cough, and sore throat presented with the complication of an acute myocardial infarction.

Case Report: Musculoskeletal Amyloidoma: A Case Report and Review of the Literature

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INTRODUCTION

Amyloidoma is a benign tumor consisting of localized deposition of amyloid tissue in the absence of systemic amyloidosis. Reported cases of amyloidoma have involved the gastrointestinal system, lymphatics, cerebral cortex and musculoskeletal system. Ninety-eight cases of amyloidoma have been reported in the literature. Of these cases, 24 have involved the musculoskeletal system. All cases reported have been treated exclusively with surgical resection. There are no reported cases of musculoskeletal amyloidoma treated with chemotherapy or radiotherapy.

CASE REPORT

We report a case of recurrent musculoskeletal amyloidoma refractory to multiple attempts at surgical resection. The patient is a 68 year-old male who noted an enlarging supraclavicular mass. Fine needle biopsy revealed amyloid tissue which stained positive to Congo Red. Work-up for systemic amyloidosis failed to demonstrate clonal proliferation or bone marrow involvement. Multiple surgical attempts have resulted in recurrence.

DISCUSSION

In guiding our treatment options, we report our findings of a literature review. No cases of amyloidoma have been treated with radiotherapy. However, radiation is used successfully in the adjuvant setting after surgery for other benign tumors such as keloid with excellent results.

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Case Report: Perioperative Electrocardiographic Acute Pseudoinfarction pattern in the setting of Diabetic Ketoacidosis and Severe Hyperkalemia

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INTRODUCTION

Correct identification of ST segment elevation myocardial infarction (STEMI) is critical.[1]

CASE REPORT

A 47 y/o Caucasian male was taken to the OR for removal of a tibial external fixator. Past medical history was significant for diabetes mellitus and hypertension. Preoperative popliteal and femoral nerve blocks provided analgesia. General anesthesia was induced with propofol, fentanyl and rocuronium. Desflurane in oxygen and air provided maintenance. Intraoperatively the patient became tachycardic and hypotensive. Electrocardiogram showed sinus tachycardia, marked ST elevation, and tall, broad T waves in lead II and V_5. P waves were unchanged and Q waves were absent. ABG showed pH 7.28, Na^+ 125 meq/l, K^+ 8.2 meq/l and glucose 736 mg%. The patient received $NaHCO_3$, $CaCl_2$, saline and insulin. EKG revealed sinus tachycardia with complete resolution of the ST elevation. Troponin was normal.

DISCUSSION

It is debatable whether the ST elevation is a primary repolarization abnormality or an artifact caused by merging of the terminal R' portion of the QRS with the T wave.[2] It is possible that the more severe hyperkalemia or the presence of acidosis as found in this case causes the epicardial myocardial tissue to become relatively more sensitive to these metabolic derangements leading to ST segment elevation.[2] Although an ischemic basis for the electrocardiographic changes cannot be absolutely excluded, the rapid normalization on resolution of hyperkalemia and a normal troponin in our patient make ischemia extremely unlikely.[3]

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Case Report: Pilot Error: An Endotracheal Cuff Leak

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CASE REPORT

79-year-old female presented to ED following an MVA. Due to falling GCS, hypotension, and respiratory failure, endotracheal tube placement occurred with bilateral thoracotomy tubes. The patient proceeded to the operating room for exploratory laparotomy following positive DPL.

She remained unstable preventing the use of volatile agents; instead scopolamine and rocuronium were used for surgical anesthesia and immobility. Exploratory laparotomy revealed hemoperitoneum secondary to pelvic venous bleeding. After pelvic packing while rolling the patient, more than 1000 milliliters of blood appeared in the left chest tube necessitating emergent left thoracotomy.

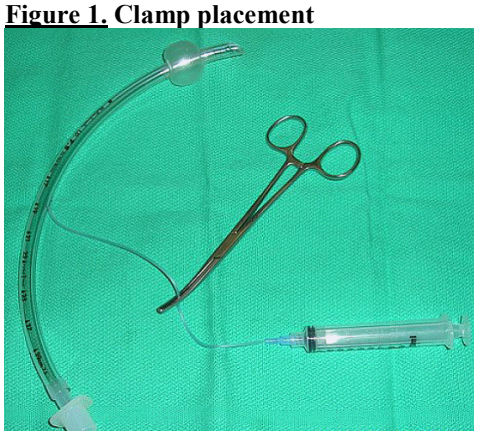
After placement in a right lateral decubitus position, team decided to utilize a right main-stem intubation for lung isolation. While attempting to remove the endotracheal tube restraint, pilot balloon was inadvertently severed. With the loss of air in the cuff, ventilation failed. Cannulation of the inflation tubing utilizing a 22-gauge intravenous catheter ensued. Placement of clamp prevented further loss of cuff pressure (Figure 1).

DISCUSSION

Endotracheal tube failure occurs for a myriad of reasons with up to 4% of accounts describing critical incidents.[1] Hardow et al suggest if an endotracheal cuff leak appears insignificant or does not compromise ventilation, replacement of the endotracheal tube need not occur.[2]

Certain procedures suggested for restoring cuff pressure include using a solution of saline and lidocaine gel around the cuff to prevent further leaks.[3] Another possible method uses a hypodermic needle to re-create a pilot balloon although at the risk of inadvertent needle stick.[4] An interesting series even reported using a stopcock to recreate a one-way valve in the event of pilot balloon valve failure.[5]

Figure 1. Clamp placement



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Case Report: Primary Mediastinal Chondrosarcoma

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INTRODUCTION

Mediastinal chondrosarcoma is a very rare cause of primary anterior mediastinal tumors, which are usually thymomas, lymphomas, teratomas or thyroid masses.

CASE REPORT

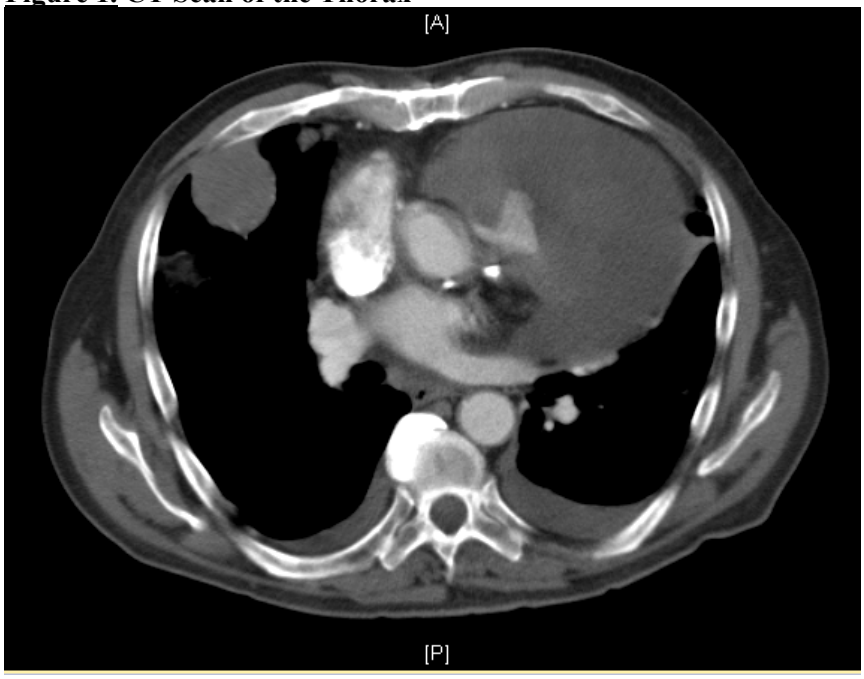
We present a 70 year old male with PMH of CAD s/p CABG, DM and HTN who presented with progressive shortness of breath that was worse on exertion over a period of a few weeks and an unintentional 10 pound weight loss in one month. Chest X-ray in the ER revealed a large mediastinal mass with pulmonary nodules in the right lung, bilateral pleural effusions and a globular heart. CT Thorax showed a mass in the anterior mediastinum, two pulmonary nodules in the right lung and pericardial effusion (Figure 1).

Given the likelihood of cardiac tamponade an echocardiogram was done which showed a large mediastinal mass compressing the right ventricle and causing outflow tract obstruction with a normal EF and a small pericardial effusion. A CT guided mediastinal biopsy was performed subsequently which showed histology of a high grade sarcoma, most likely a chondrosarcoma. His extensive work up for a primary tumor and for extra-pulmonary metastases was negative. Hence the diagnosis of primary anterior mediastinal chondrosarcoma was made and given the extent of the disease with a poor prognosis, the patient was referred to Radiation Oncology for further palliative management.

DISCUSSION

This case of a primary mediastinal chondrosarcoma is one of the few such cases we have come across in the literature reported so far. It highlights the importance of a broad differential whenever a mediastinal mass is evaluated.

Figure 1. CT Scan of the Thorax



Case Report: Takotsubo cardiomyopathy secondary to status epilepticus

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CASE REPORT

A 48-year-old woman with a known seizure disorder was admitted with status epilepticus and hypotension. A 12-lead electrocardiogram showed ST-segment elevations in the anterior and inferior leads (Fig 1A). Cardiac enzyme levels were mildly elevated. Cardiac catheterization revealed normal coronary arteries (Fig 1B). A two-dimensional echocardiogram (2D echo, Fig 2A) showed akinesis of the left ventricular apex, mid-distal septum, lateral, anterior, and inferior walls, akinesis of right ventricular apex and distal free wall with a "hinge point". The basal segments of both ventricles had normal wall motion. Overall, the left ventricular ejection fraction was 30% to 35%. 19 days after, a follow-up 2D echo (Fig 2B) showed normal left and right ventricular chamber size and thickness, with no focal wall motion abnormalities. Left ventricular ejection fraction was estimated at 60%.

DISCUSSION

Takotsubo cardiomyopathy describes an acute cardiac syndrome provoked by physical or emotional stress. It is characterized by transient, reversible wall motion abnormalities and transient ST-segment elevations in the absence of obstructive coronary artery disease.[1-7] The most likely etiology is the increased release of catecholamines coupled with sympathetic overdrive triggered by increased physical and emotional stress. Takotsubo cardiomyopathy associated with epileptic seizures has been reported rarely.[6, 10-12] Autopsies of patients whose mortality was secondary to status epilepticus demonstrated cardiac contraction bands, implicating excessive catecholamine release as the likely mechanism for the myocardial injury.[8-9] Patients presenting with symptoms of acute coronary syndrome and concurrent status epilepticus should be evaluated for Takotsubo cardiomyopathy and managed accordingly.

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Figure 1A. EKG demonstrating ST elevations

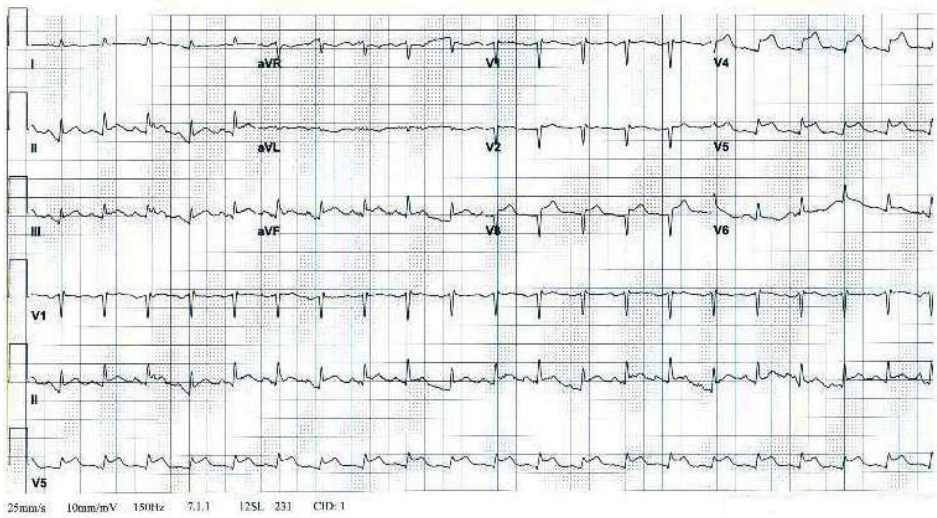


Figure 1B. Cardiac cath demonstrating normal coronary arteries

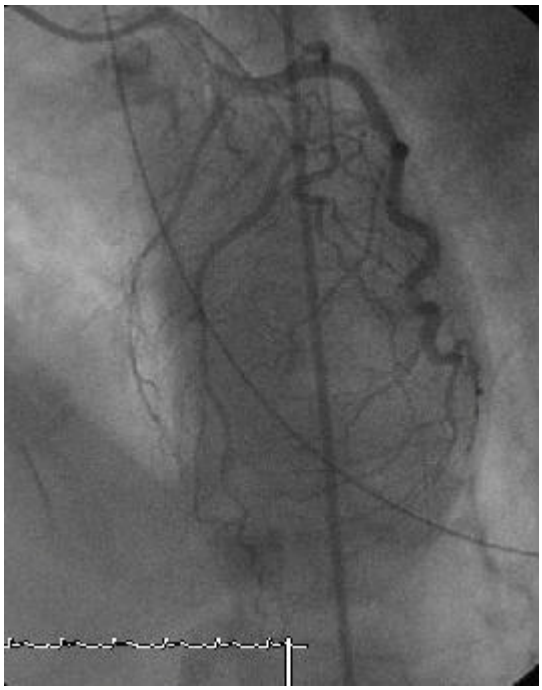


Figure 2A. **Echo in end-systole showing RV hinge point (green arrow)**

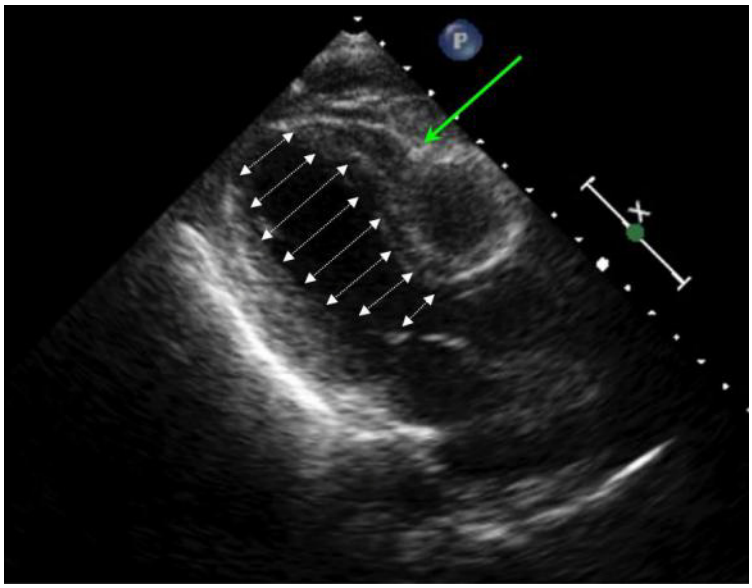
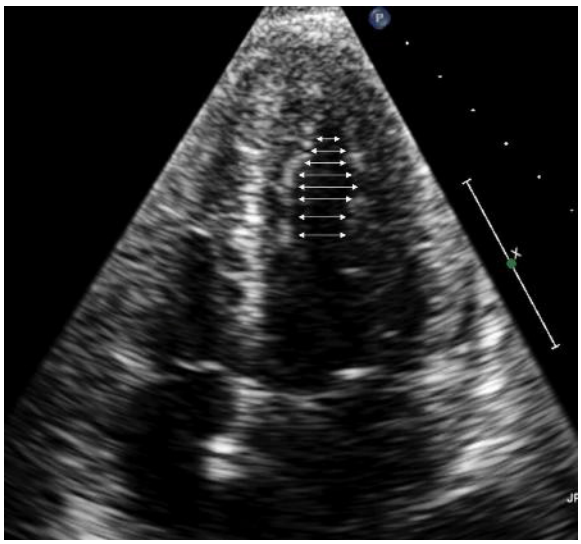


Figure 2B. **Echo demonstrating normal biventricular size and thickness**



Case Report: Unusual case of bilateral brachial plexus injury related to ramping

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INTRODUCTION

In head-elevated laryngoscopy position (HELP), a ramp under the upper torso of an obese patient elevates the upper body and improves the laryngoscopist's view.[1]

CASE REPORT

A 51 y/o man underwent bariatric surgery for morbid obesity. Folded blankets underneath his upper torso, neck, and head achieved a ramped position. Rapid sequence induction and intubation proved uneventful. His head remained in a neutral position with arms abducted 60°. Maintenance and extubation was uneventful. Postoperatively, he had weakness, tingling and numbness in the right arm and left hand. Examination revealed normal bulk and tone, right arm strength 5/5 deltoid, 4/5 biceps, triceps, wrist flexors and extensors, and left arm strength 5/5 deltoid, biceps, and triceps, 4/5 wrist flexors and extensors, and bilateral decreased sensations in the first three fingers. DTRs were depressed bilaterally in the brachioradialis. Sensory and motor function returned to normal gradually.

DISCUSSION

Diminished DTRs ruled out an upper motor neuron lesion. Motor weakness and sensory loss without radicular pain made nerve root lesion unlikely.[2] Injury to a single peripheral nerve could not have caused the extent of involved muscle. Sparing of the suprascapular nerve indicated an injury distal to the trunks of the brachial plexus,[3] most likely to the cords. The most likely cause was thought to be insufficient padding of arm boards. Prevention of brachial plexus stretch occurs with use of arm boards padded up to the level of the ramp, elevating arms and shoulder girdles in neutral position.[4] Arm abduction should be limited to 90 degrees with forearms in either supination or neutral position.[5]

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Original Article: Quality of sleep in hospitalized children

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ABSTRACT

Objectives: To determine sleep quality in hospitalized children compared to home, and if diphenhydramine is beneficial in improving sleep quality.

Methods: We conducted a prospective study of 20 children hospitalized at the Children's Hospital at Monmouth Medical Center. A previously validated questionnaire based on clinical-historical data and on sleep habits was used to create sleep quality scores. The questionnaire was completed by the parent/guardian after the first night in the hospital. Parents were offered the opportunity to provide their children with a single dose of diphenhydramine in the evening to facilitate sleep.

Results: Six children (30%) received diphenhydramine. Sleep scores for subjective sleep quality, sleep duration and habitual sleep efficacy demonstrated a significant statistical differences indicating that quality of sleep in the hospital was poorer than at home ($p<0.05$). Scores for sleep latency, sleep disturbance and a global sleep quality score did not illustrate significant differences but demonstrated a trend toward worse quality of sleep in the hospital. There was no statistical improvement in sleep quality among the patients who received diphenhydramine.

Conclusion: Children have poorer quality of sleep in the hospital compared to quality of sleep at home; however diphenhydramine administered before bed time in the hospital did not show significant improvement of the sleep quality.

INTRODUCTION

Sleep is described as a state of unconsciousness during which the cerebrum rests and from which the person can be aroused by external stimuli. Poor sleep quality may result in tiredness, loss of concentration, weariness, a low threshold for pain, anxiety, nervousness, irrational thought, hallucination, and loss of appetite. It also has been shown to cause tension and delays in healing of wounds.[1,2,3]

Hospitalized patients often complain of sleep disturbance caused by a variety of exogenous factors such as ward environment noise, bright lighting, repetitive staff intervention, and internal causes such as physiological needs, physiological discomfort, and affective responses.[4-9] In adult studies, insomnia is a subjective complaint of dissatisfaction with quantity, quality or timing of sleep. It has been reported that 65% of adult patients sleep poorly in the hospital, although this is probably an underestimate as there is evidence that many adults do not report their sleep problems to a health care professional. Insomnia in the hospitalized patient leads to increased fatigue, irritability and aggressiveness.[10,11]

Children require more sleep than adults. Sleep deprivation in young children also results in difficulties in both ego control and in adaptation to stressful situations such as hospitalization. Hagemann reported that hospitalized children had decrease sleep duration, delay in sleep onset, and early sleep termination.[12,13,14] Isola et al, conducted a study of adult patients' sleep in a medical or surgical ward and found that the most common method used by the patient to improve their sleep was to choose a good sleeping position. Other methods were reading, watching television, having a snack, taking a warm shower or praying. These methods are unlikely applicable to hospitalized children. Delaney described a bed time program to help the children get undisturbed sleep.[15,16]

New admissions to the hospital regularly occur at night time. These environmental changes, namely noises, bright light and conversations,

cause sleep interruptions. Kudo et al investigated the use of diphenhydramine hydrochloride for the treatment of insomnia in psychiatric patients and the investigators found that the hypnotic effect of such medication minimized insomnia especially in the patients who never had any previous treatment.[17] Paul et al studied the effect of dextromethorphan, diphenhydramine and placebo on cough and sleep quality in children with an upper respiratory tract infection.[18] The study showed that the medications did not result in improved quality of sleep. However the study outcome was based on only one dose of medications versus placebo when the cough symptom had not subsided. Furthermore the study was performed in the home environment where sleep quality is considerably different from hospital milieu. A recent study by Meltzer et al indicated that approximately 3-6% of the hospitalized children were treated pharmacologically with the variety classes of non Food and Drug Administration approved sleep medications for children. One third of the children in their study received antihistamines. However the quality of sleep after medications given was not reported.[19] The objectives of our study are to determine sleep quality in the hospital compared to home, and if diphenhydramine is beneficial in improving sleep quality. We hypothesize that the hospitalized children have decreased sleep quality compared to sleep quality in the home environment. We also speculate that diphenhydramine can safely improve sleep quality in hospitalized children.

METHODS

This was a prospective study conducted in a 20-bed pediatric ward at the Children's Hospital at Monmouth Medical Center, Long Branch NJ. The study received ethics and research committee approvals prior to initiation.

Patients. All patients over 12 months of age admitted to the pediatric ward were eligible for the study. We excluded patients who had neurological compromise (e.g. seizure, altered mental status), respiratory compromise (e.g. asthma, respiratory distress), patients who received previous diphenhydramine or other sedative medications (e.g. diazepam, ativan, morphine), and patients who were not accompanied by parents/guardians. The consents were obtained from the legal guardians and the child's assent statements were obtained from the children over 7 years of age.

Data collection and measurement of sleep quality. Demographic data on each patient was collected including age, gender, ethnicity, diagnosis on admission, and length of stay. All patients were offered a dose of diphenhydramine by mouth before bed time on the first night in the hospital. Dosing was predetermined as 1 mg/kg with the maximal dose based on age as follows: 1-2 years, 5mg/dose; >2-5 years, 7.5mg/dose ; >5-11 years, 15mg/dose; >11 years, 30mg/dose. The patients whose caretakers declined diphenhydramine continued to be enrolled in the study. In order to explore sleep quality we used a previously validated questionnaire based on clinical-historical data and on sleep habits.[20] The questionnaire was completed by the parent/guardian right after the first night in the hospital.

Sleep questionnaire (Figure 1) was made up of 12 items. The items are combined to form 5 "component" scores. The 5 component scores are then added to yield one "global" score. The higher scores indicate worse sleep quality.

Component 1 (question # 12) indicates subjective sleep quality. Scores were assigned as follows: very good = 0, fairly good = 1, fairly bad = 2 and very bad = 3.

Component 2 (question# 2) indicates sleep latency. Scores were assigned as follows: <15min = 0, 15-30min =1, 31-60 min= 2 and >60= 3.

Component 3 (question# 4) indicates sleep duration. Scores were assigned as follows: >7 hr= 0, 6-7 hr=1, 5-6 hr=2 and <5 hr=3.

Component 4 indicates habitual sleep efficacy. This is calculated as follows: number of hour sleep (quesion#4) divided by the number of hours spent in bed (question#3 minus question#1) x100. The scores were assigned as

follows: >85% =0, 75-84% =1, 65-74% =2 and <65% = 3.

Component 5 indicates sleep disturbance. Scores were assigned as follows: NO=0 and YES=1. The score for sleep disturbance was the sum of scores from question #5 to #11.

Global sleep quality score was calculated as the sum of the five component scores of each individual patient.

Statistical analysis. Descriptive statistics were applied to calculate the mean with standard error. For comparison between groups we used Student t-test and Mann-Whitney test with $\alpha = 0.05$. The commercially available software SigmaStat (data analysis software system) version 2.03 was used for all statistical tests.

RESULTS

Twenty children were enrolled in the study. Six out of twenty children (30%) received diphenhydramine before bed time on the first night in the hospital. The demographic characteristics of the 20 children are shown in Table 1.

Among the 14 children who did not receive diphenhydramine sleep quality was significantly worse ($p<0.5$) in the hospital as compared to a baseline value from one month at home. This difference was only for subjective sleep quality, sleep duration and habitual sleep efficacy. Scores for sleep latency and sleep disturbance did not demonstrate significant differences but there was a trend toward better quality of sleep at home compared to the sleep in the hospital (Figure 2). Similarly, the global sleep quality scores indicated better quality of sleep at home compared to the night in the hospital; however this difference was not significantly significant (1.61 vs. 4.48; p=0.33 - Table 2).

The baseline qualities of sleep in the past month between the children with and without diphenhydramine were compared. We found no significant statistical differences in all component scores and global sleep scores for the baseline quality of sleep between two groups (Table 4 and Figure 3).

There were no significant statistical differences in all component scores and global sleep score when comparing the quality of sleep in the hospital between the children who received and did not receive diphenhydramine (Figure 4). No adverse effects were reported in the children who received diphenhydramine before bed time.

DISCUSSION

Our study represents one of the first studies in pediatrics investigating the sleep quality of hospitalized children. The 5 components and global sleep quality score were identified. We found that subjective sleep quality, sleep duration and habitual sleep efficacy were significantly poorer in the hospital compared to the baseline at home. Sleep latency, sleep disturbance and global sleep quality score demonstrated a trend towards poorer sleep quality in the hospital compared to the baseline at home.

Among the 5 components, duration of sleep was previously investigated by Hagemann.[14] The loss of sleep duration was explained by the delay of onset or early termination of sleep. The investigator found that an early termination of sleep from an internal or external cause of arousal created the deprivation of a significant portion of the usual REM time. Internal causes of arousal included physiologic needs of elimination, hunger or thirst, physiologic discomfort of pain or nausea, and affective responses to anxiety or fear. The external causes of arousal included environmental stimuli (e.g. light, noise, touch) and caretaking measures (e.g. vital signs taken, tests or treatment). It is thought that children who lose REM sleep become cranky, irritable and inconsolable in the hospital. Such changes may lead the health care providers to overestimate the severity of diseases.

Afternoon nap was noted to be the normal pattern of sleep in children up to the age of 5 years. Healy found that afternoon naps helped shorten presleep time at night.[21] During times of illnesses children may not have regular naps. To exclude this variable we looked at the quality of sleep in the subgroup of children 5 years of age and older. The quality of sleep in these 8

children was similar to those of all ages (Table 3), suggesting that inability to nap did not appear to affect sleep quality independently.

All of our children were admitted through the pediatric emergency room where the initial management was begun. Therefore almost all of our children had some initial clinical improvement and the first night sleep in the hospital may have been affected by exhaustion, as well as tiredness from the illness on the prior days (Figure 2). Unfortunately most of our children had very short length of stay (mean 1.5 days). Study of the second or third night in the hospital might have yielded different results.

Six out of the twenty children received diphenhydramine before bed time. Our findings did not demonstrate a significant statistical difference between non-diphenhydramine and diphenhydramine groups. These findings are consistent with previous studies by Paul et al and the TRIAL study by Merenstein et al in which they found no differences in the night awakening and quality of sleep between placebo and diphenhydramine groups.[18,22] One of the six children who received diphenhydramine had used this medication occasionally at home for night time sleep, however this child did not demonstrate improved sleep quality.
Several important limitations of our study should be mentioned. Our study has a small sample size which limited our ability to perform subgroup analysis based on the children's' ages. It is known that at different ages children have different patterns of sleep due to different percentages of various stages of sleep. The younger children have longer total sleep time and longer rapid eye movement sleep stage (REM), children by the age of 5 years have biphasic sleep-wake pattern, and most of children less than 5 years require afternoon naps to help them to fall asleep at night.
Surprisingly 70% of the parents/caretakers who were approached to enroll in the study, although very cooperative, were reluctant to give their child diphenhydramine. The most common denial phrases included "my child is too tired and had a long day, he/she should be fine without the medicine". We suspect that if the study was conducted on the second or third night of hospitalization we would have received more requests for diphenhydramine.

CONCLUSION

In summary, this study explored the quality of sleep in hospitalized children and showed that children in the hospital experienced poorer sleep quality compared to the quality of sleep at home. This study however was not able to demonstrate an improvement in sleep quality with the use of diphenhydramine. Future studies with larger numbers of patients may be able to more accurately determine what interventions could help improve sleep quality in the hospitalized pediatric patient.

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Figure 1: **Sleep questionnaire**

Questions	Past 1 months in general	The night before admission	The night in the hospital
1.What time did the child go to bed?			
2.How long did it take for the child to fall asleep?	Less than15 min 16-30 min 31-60min more than 60min	Less than15 min 16-30 min 31-60min more than 60min	Less than15 min 16-30 min 31-60min more than 60min
3.What time did your child get up in the morning?			
4.How many hours of actual sleep did the child get?			
5.Wake up in the middle of the night ?	Yes No	Yes No	Yes No
6.Can not sleep without little light on or TV on to fall asleep in the bed room	Yes No	Yes No	Yes No
7.Can not sleep without special toy, doll, special blanket or stuffed animal.	Yes No If yes, did the child have this item in the hospital? Yes No	Yes No	Yes No
8. The child experiences vivid dream-like scenes while falling sleep	Yes No	Yes No	Yes No
9.The child wakes up more than 2 times per night	Yes No	Yes No	Yes No
10.The child wakes up screaming in the night without knowing why	Yes No	Yes No	Yes No
11. The child wakes up to drink or eat in the night	Yes No	Yes No	Yes No
12. How would you rate the child's sleep quality over all?	Very good Fairly good Fairly bad Very bad	Very good Fairly good Fairly bad Very bad	Very good Fairly good Fairly bad Very bad

The questionnaire is filled by ☐ **mother** ☐ **father** ☐ **patient** ☐ **other**

The child received BENADRYL ☐ **YES** ☐ **NO**

Table1: Demographic characteristics of the children (n=20)

age (yr)	3.3 (median)	Range 1.5-15
Gender	male	11 (55%)
Diagnosis	acute febrile illness	11
	acute gastroenteritis	2
	right foot cellulitis	1
	preorbital cellulitis	1
	diabetes mellitus 1	2
	coxsackie infection	1
	colitis	1
	small pneumothorax	1
Ethnicity	Caucasian	15 (75%)
	Hispanic	2
	African American	3
Length of stay (day)	1.5 (mean)	Range 1-3

Table 2: Quality of sleep in the non-diphenhydramine group (n=14)

	A		B		
	mean	**SD**	**mean**	**SD**	**P value**
subject sleep quality	0.571	0.646	1.429	0.938	**0.009***
sleep latency	0.714	0.726	1	1.177	0.446
sleep duration	0	0	0.786	0.975	**0.006***
habitual sleep efficacy	0.0714	0.267	0.857	1.027	**0.01***
sleep disturbance	0.26	0.459	0.388	0.49	0.482
global sleep quality score	1.61	0.42	4.484	0.921	0.333

Column A is the past month in average prior to the illness, Column B is a night in the hospital, * $p<0.05$

Table 3: Quality of sleep in non-diphenhydramine and age ≤ 5 years (n=8)

	A		B		
	mean	**SD**	**mean**	**SD**	**P value**
subject sleep quality	0.5	0.535	1.625	0.916	**0.001**
sleep latency	0.75	0.707	1.25	0.412	0.106
sleep duration	0	0	1	1.069	**0.019**
habitual sleep efficacy	0.125	0.354	1	1.069	**0.045**
sleep disturbance	0.292	0.458	0.569	0.747	0.386
global sleep quality score	0.308	0.487	0.769	0.895	0.221

Column A is the past month in average prior to the illness, Column B is a night in the hospital , * $p<0.05$

Table 4: Quality of sleep in past one month

	Non-diphenhydramine group (n=14)		Diphenhydramine group (n=6)		
	past month prior to illness		**past month prior to illness**		**P value**
	mean	SD	mean	SD	
subject sleep quality	0.571	0.646	0.333	0.516	0.667
sleep latency	0.714	0.726	0.67	0.408	1
sleep duration	0	0	0	0	NA
habitual sleep efficacy	0.0714	0.267	0	0	0.667
sleep disturbance	0.26	0.459	0.262	0.445	1
global sleep quality score	1.61	0.42	0.762	0.253	0.333

Table 5: Quality of sleep in hospital between non-diphenhydramine and diphenhydramine groups

	Non-diphenhydramine group (n=14)		diphenhydramine group (n=6)		
	A night in the hospital		**A night in the hospital**		**P value**
	mean	SD	mean	SD	
subject sleep quality	1.429	0.938	1.5	1.049	0.333
sleep latency	1	1.177	2	1.549	1
sleep duration	0.786	0.975	1.167	1.378	0.667
habitual sleep efficacy	0.857	1.027	1.5	1.378	1
sleep disturbance	0.388	0.49	0.31	0.468	1
global sleep quality score	4.484	0.921	6.477	0.429	0.333

Figure 2. Pattern of sleep quality in non-diphenhydramine group children (n=14)

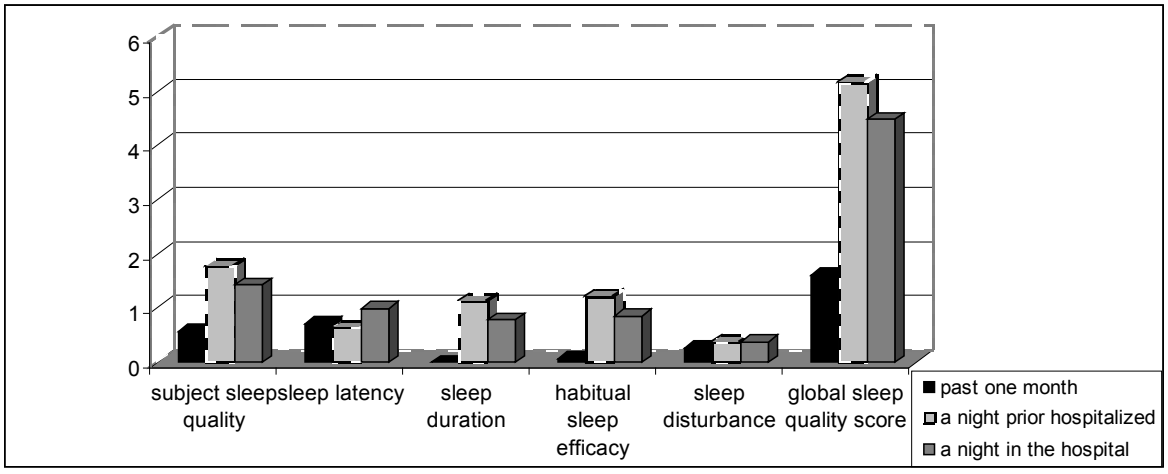


Figure 3. **Quality of sleep in past one month**

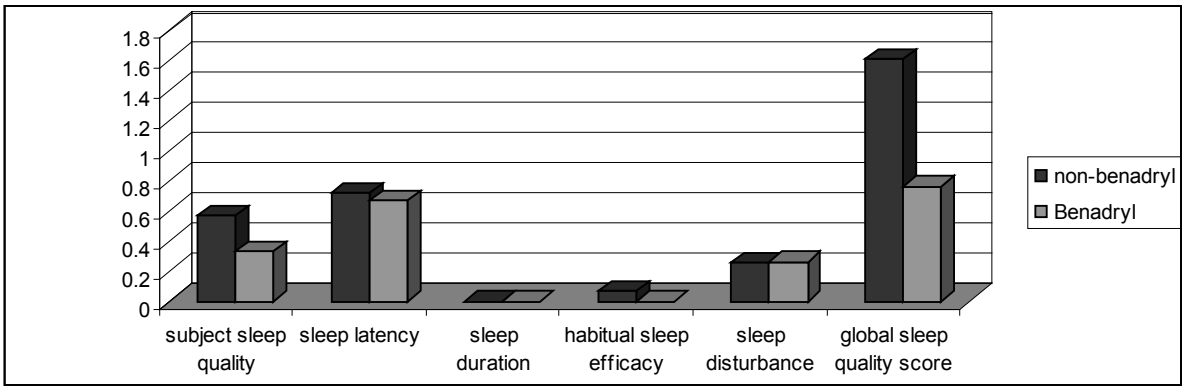
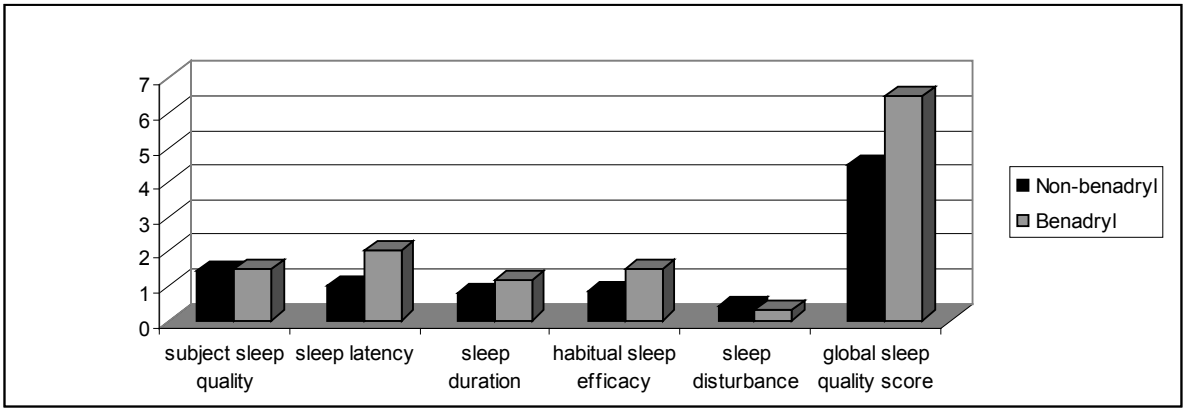


Figure 4. **Quality of sleep in the hospital**



Original Article: Retrospective study of patients admitted with fragility fracture at Abington Memorial Hospital: Evaluation of the diagnostic process and treatment of metabolic bone disease

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ABSTRACT

Objectives: To assess whether patients admitted with fragility type fracture receive the appropriate diagnostic workup for metabolic bone diseases and secondary causes of osteoporosis and determine the adequacy of treatment of osteoporosis at the time of discharge from the hospital. To assess the osteoporosis diagnosis and treatment outcome in patients admitted under the Medicine service and other admitting services.

Methods: This was a retrospective chart review of 200 randomly selected patients admitted to Abington Memorial Hospital between January 2002 and March 2005 with the diagnosis of hip or vertebral fracture.

Results: Out of 200 patients studied, 38% were diagnosed with osteoporosis. A metabolic bone disease workup including TSH, PTH, and vitamin D levels were measured in 32%, 1% and 1% of patients, respectively. At admission, 32% of patients were taking calcium, 28% were taking vitamin D and 12% were taking bisphosphonates. At the time of discharge, 17% of patients were taking calcium, 13% were taking vitamin D and 4% were taking bisphosphonates. A similar trend was noted in the osteoporosis group (n=76). Among patients admitted to the Medicine service (n=50), 28% were discharged on calcium, 22% on vitamin D and 8% on bisphosphonates. In patients admitted to other medical services with a medicine consult (n=117), 13% were discharged on calcium, 9% on vitamin D and 3% on bisphosphonates. Of those patients admitted to other medical services without a Medicine consult (n=33), 12% were discharged on calcium, 12% on vitamin D and 3% on bisphosphonates.

Conclusion: In patients admitted with fragility fractures and risk factors for osteoporosis, only 38% were diagnosed with osteoporosis. An appropriate work-up for osteoporosis/other metabolic bone diseases was only conducted in a small fraction of patients. Only a small number of patients were discharged on appropriate treatment. Although results were not statistically significant, this study revealed that osteoporosis is not addressed adequately during inpatient hospital stays in patients admitted with fragility fractures.

INTRODUCTION

Osteoporosis has been defined as a disease characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk.[1] Osteoporosis is a major public health threat for an estimated 44 million Americans, or 55 percent of the people 50 years of age and older. In the United States, 10 million individuals are estimated to already have the disease and almost 34 million more are estimated to have low bone mass, placing them at increased risk for osteoporosis. Eighty-percent of those affected by osteoporosis are women and twenty-percent are men.[2] Osteoporosis is responsible for more than 1.5 million fractures annually, including over 300,000 hip fractures, approximately 700,000 vertebral fractures, 250,000 wrist fractures, and 300,000 fractures at other sites.

Patients with established osteoporosis are usually asymptomatic. These patients are most likely to come to attention of the medical profession when presenting with fragility fracture.[1] Fragility-type fractures are defined as any fracture of the distal radius, proximal femur, vertebral body or proximal humerus that occurred with minimal trauma (no greater than

the trauma that would be experienced with a fall on a level surface while walking or standing). Fragility fracture may be the first sign of osteoporosis in a patient. A fragility fracture is the strongest indicator of risk of future fracture. Patients who have had a fracture at any site have approximately twice the risk of sustaining a future fracture compared with an individual who has never experienced such an injury as an adult.[3,4] Clinical trials have demonstrated that medical treatment given to patients with fragility fractures can reduce the risk of future such injuries by up to 50%.[5-8]
Despite the evidence in support of appropriate management of patients with osteoporosis after they have sustained a fragility fracture, most are discharged without a bone density test or other assessment as to the cause of the fracture.

Specific Aims and Objectives of the study.

1. To assess whether patients admitted to a community-based teaching hospital with fragility type fracture receive an appropriate diagnostic workup for metabolic bone diseases and secondary causes of osteoporosis.
2. To determine the adequacy of treatment of osteoporosis at the time of discharge from the hospital.
3. To assess the osteoporosis diagnosis and treatment outcome in patients admitted under medicine service and other admitting services.

METHODS

This was a retrospective chart review of randomly selected patients admitted to Abington Memorial Hospital between January 2002 and March 2005 with the diagnosis of hip or vertebral fracture. Patients were included in the study if the index fracture was a fragility type fracture. Patients were excluded if the index fracture was a fracture other than hip or vertebrae, traumatic, or if the patient was younger than 18 years or older than 89 years. Two-hundred patients were randomly selected, using MS Excel software, from a list of the total admissions for fragility type fractures involving hip or vertebrae between January 2002 and March 2005 at Abington Memorial Hospital. A detailed data collection form was used to record all patient information during the chart review. Information collected included demographic information, laboratory data, admitting service and consults, osteoporosis risk factors and admission/discharge medications. To maintain patient confidentiality, all patients were assigned a unique study identification number. All information regarding enrolled subjects was kept in a locked file accessible only to the principal investigator, or, if requested, to the Institutional Review Board and the U.S. Food and Drug Administration. Data collection forms will be shredded 5 years after completion of the study. Descriptive statistics (means and frequencies) and inferential statistics (chi square analyses) were calculated using SPSS version 11.5 for Windows. Statistical analyses were designed to answer the objectives of the study.

RESULTS

The study group consisted of 200 patients. In this group, 86% of the patients were Caucasian and 76% of the patients were female. The mean age for women and men was 81 ± 7.9 years and 76.8 ± 8.9 years, respectively. Forty-one percent of the females and 6% of the men weighed less than 127 pounds.

Admitting Service and Fracture History.
Twenty five percent (50/200) of the patients were admitted to the Medicine service, 66% (131/200) were admitted to the Orthopedics service and the remaining patients were admitted to other services such as Trauma, Cardiology or Pulmonology. Of the 150 patients admitted to non-medicine services, 78% (117/150) had a medicine consult.

Hip fracture was the index fracture in 87.5% (175) patients and 12.5% (25) patients had primary vertebral fracture as the index fracture. Among patients with hip fracture, 78% (137/175) of patients had no prior history of any fracture; 22% had 1 or more fractures in the past. For those patients with a vertebral fracture, 72% (18/25) had no prior history of any fracture; 28% had 1 or more fractures in the past.

Osteoporosis Diagnosis. The diagnosis of osteoporosis was documented in the chart in

38% (76/200) of patients. The diagnosis was made either prior to admission or during the hospital course. For these 76 patients, the documentation of an osteoporosis diagnosis was found in the admission history and physical exam for 24% of patients, in the consultations for 50% of patients, in the nursing database for 58% of patients, and in the discharge summary for 16% of patients.

Of the 200 patients studied, 6% had a history of steroid use, 27% had documented tobacco use and 35% had documented alcohol use. All but one woman (150/151) in the study were post-menopausal.

Laboratory Investigations. Ninety-nine percent of the patients had calcium, blood urea nitrogen (BUN), and creatinine blood tests. Thyroid stimulating hormone (TSH) was completed for 32% of patients, parathyroid hormone (PTH) and vitamin D levels were completed for 1% of patients and serum protein electrophoresis (SPEP) & urine protein electrophoresis (UPEP) were obtained in 2% of the patients (Figure 1).

Admission and Discharge Medications. Of the 200 patients studied, 32% were taking calcium, 28% were taking vitamin D and 12% were taking bisphosphonates prior to admission. At the time of discharge, 17% of patients were taking calcium, 13% were taking vitamin D and 4% were taking bisphosphonates. For those patients diagnosed with osteoporosis (n=76), 37% were taking calcium, 29% were taking vitamin D and 28% were taking bisphosphonates prior to admission. At the time of discharge, 22% of patients were taking calcium, 17% were taking vitamin D and 9% were taking bisphosphonates (Figures 2a and 2b).

DEXA Scan. Of the 76 patients with a diagnosis of osteoporosis, two had documentation in the chart that they had a DEXA scan done prior to admission. Of the 200 patients studied, 5 (2.5%) were given recommendations about an osteoporosis follow up such as scheduling a DEXA scan as an outpatient or a workup to be done as outpatient.

Living Situation. Each patient's living situation was also determined. Of the 200 patients studied, 68.5% (137/200) were living independently at home prior to admission; 10% (14/137) of these patients went back home upon discharge. The remaining 90% were discharged to a nursing home, rehabilitation unit, an assisted living facility or other living arrangements.

Outcome Based on Admitting Service and Medicine Consult. We also categorized patients into three groups based on admitting service: Group A - patients admitted to the medicine service (n=50), Group B - patients admitted to other services who had a medicine consult (n=117) and Group C - patients admitted to other services who did not have a medicine consult (n=33). We analyzed several variables to see if the outcome with regards to osteoporosis differed in these three groups (Table 1).

Diagnosis of osteoporosis was made in 42% of patients in Group A, 41% in Group B and 21% in Group C. Four-percent of patients in Group B were recommended follow-up for osteoporosis care, no patients were recommended follow-up in the other two groups. Patients instructed to take calcium upon discharge included 28% of the patients in Group A, 13% in Group B and 12% in Group C. Patients instructed to take vitamin D upon discharge included 22% of patients in Group A, 9% in Group B and 12% in Group C. In Group A, 8% of patients were discharged on bisphosphonates, and 3% in both Group B and Group C (Table 1).

DISCUSSION

Osteoporosis can now be diagnosed readily, and treatments that increase bone mineral density and decrease fracture risk, even after fragility fracture has occurred, are now available. Clinical guidelines for the management of osteoporosis all recognize that fracture risk is highest among those who have already sustained a fracture, and encourage prompt evaluation and treatment of these individuals. Treatment is especially important and valuable for this high-risk group, since the rate of clinically serious fractures of the hip and spine increases as much as 20-fold after the first fragility fracture.[10]

Despite these guidelines, most patients who experience fragility fractures remain untreated (for osteoporosis) by any of the physicians involved in their care. When a patient is admitted to the hospital, the focus of care is shifted to management of the fracture rather than diagnosing the disease which caused that fracture. There are many factors that determine who will develop osteoporosis. Patients presenting with fragility fracture who have these risk factors should be evaluated for osteoporosis and treated appropriately.

Age is a major risk factor.[2] The older a person is, the greater their risk of osteoporosis. In the present study, the mean age of female patients was 81 ± 7.9 years and male patients was 76.8 ± 8.9, which places them at a great risk of having osteoporosis. Chances of developing osteoporosis are greater for women, which comprised 76% of the current study population.[2] Osteoporosis in men is common and is usually overlooked. In this study, 49 of the 200 study patients were men. Small-boned and thin women (under 127 pounds) are at greater risk of developing osteoporosis, which included 41% of the female study population. Caucasian women are also more likely to develop osteoporosis. In this study group, 86% of the patients were Caucasian. Normal or early menopause (brought about naturally or because of surgery) increases the risk of developing osteoporosis. In this study group, 150 of 151 female patients were post-menopausal. Lifestyles including current cigarette smoking or drinking too much alcohol also increases the chances of developing osteoporosis. In the present study, 27% of the patients had a history of smoking and 35% had a history of alcohol use.

Interestingly, only 38% of our patients had a diagnosis of osteoporosis documented in the chart. The diagnosis was made either prior to admission or during the hospital course. The most common places to find the documentation of osteoporosis were in the nursing database (58%) and consultations (50%). The history and physical exam form and discharge summary contained the documentation in 24% and 16%, respectively.

Patients with fragility fractures should have laboratory investigations done to rule out any metabolic bone disease, if suspected. Vitamin D deficiency is quite common in the community and should be checked in every patient with suspected osteoporosis.[2] Only 1% of patients in our study group had Vitamin D and PTH measured.

Calcium, vitamin D and bisphosphonates are essential to the treatment of osteoporosis.[2] The results of the present study indicate our treatment rate for osteoporosis is poor. In our study group, 32% of patients were taking calcium when admitted and 28% were taking Vitamin D, but only 16.5% and 12.5%, respectively, were discharged on these important supplements. The results were similar in those patients diagnosed with osteoporosis.

When we compared patients admitted to the medicine service (Group A) and patients admitted to other services with medicine consult (Group B) and without medicine consult (Group C), we found the following outcomes. A diagnosis of osteoporosis was made in 42% of the patients in Group A, 41% of the patients in Group B and 21% of the patients in Group C. Osteoporosis follow up recommendations were very poor for all three groups (4% in Group B and 0% in Groups A and C). Group A did a slightly better job in discharging patients on calcium (28%) and vitamin D (22%) compared to the other groups (13% & 9% for Group B and 12% & 12% for Group C respectively). Similarly Group A did a better job discharging patients on bisphosphonates (8%) compared to the other groups (3% for both Group B and C). These results were not statistically significant and overall all three groups did poorly in treating osteoporosis. As shown in Figure 1, all groups did a very poor job ordering laboratory investigations for osteoporosis and ruling out any metabolic bone disease in these patients.

One of the potential reasons for the low rates of investigation and treatment of osteoporosis among patients with fragility fractures admitted to a community hospital is a lack of consensus regarding who is responsible for osteoporosis care. Treatment of osteoporosis should be a

collaborative effort between various specialties. It is a reasonable goal for the orthopedic surgeon to make both the patient and the family physician aware of the possibility of osteoporosis, to recommend calcium and vitamin D supplementation, and to suggest follow-up investigation and management by the primary care physician. An Internal Medicine physician evaluating these patients as a part of their consultation should initiate the workup for osteoporosis including ordering appropriate labs. The admitting service should play a major role in assuring that these patients are discharged on calcium and vitamin D and that adequate follow up has been recommended. If metabolic bone disease other than osteoporosis is suspected then referral to an osteoporosis expert like a rheumatologist or endocrinologist could be considered.[11,12]

There were several limitations to this study. Since this study was a retrospective chart review, poor documentation in some charts could have affected data collection. Patients might have been taking calcium and vitamin D at home prior to admission, but if this was not documented in the chart this information was not collected as part of the study. A few charts were missing discharge or transfer forms as well. The inpatient focus of this study precludes determining whether osteoporosis assessment and treatment was initiated during post-hospitalization follow up care.
Some may argue that in patients presenting with fragility fractures to a hospital, several weeks delay in pursuing osteoporosis diagnosis and management would not be deleterious. It may, in fact, be preferable to focus on pain management, rehabilitation, and the prevention of complications such as thromboembolism, urinary tract infections, delirium, and pressure ulcers during the acute hospital stay. DEXA scans could be ordered post-discharge and bisphosphonate therapy could be initiated when the patient is more reliably upright to safely ingest the medicine. That would be perfectly reasonable. But an inpatient hospital stay provides us with a unique opportunity to educate patients about the disease and initiate the appropriate work up, in addition to treating the fracture. This work-up then can be continued as an outpatient.

Despite these limitations, the results of this study indicate that patients admitted to our hospital with a fragility fracture may not be evaluated and treated properly. Osteoporosis is the most common cause of these fractures in the elderly. Thus we are missing an important window of opportunity to diagnose and treat these patients and prevent future fractures.[12]

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Figure 1: Laboratory Investigations

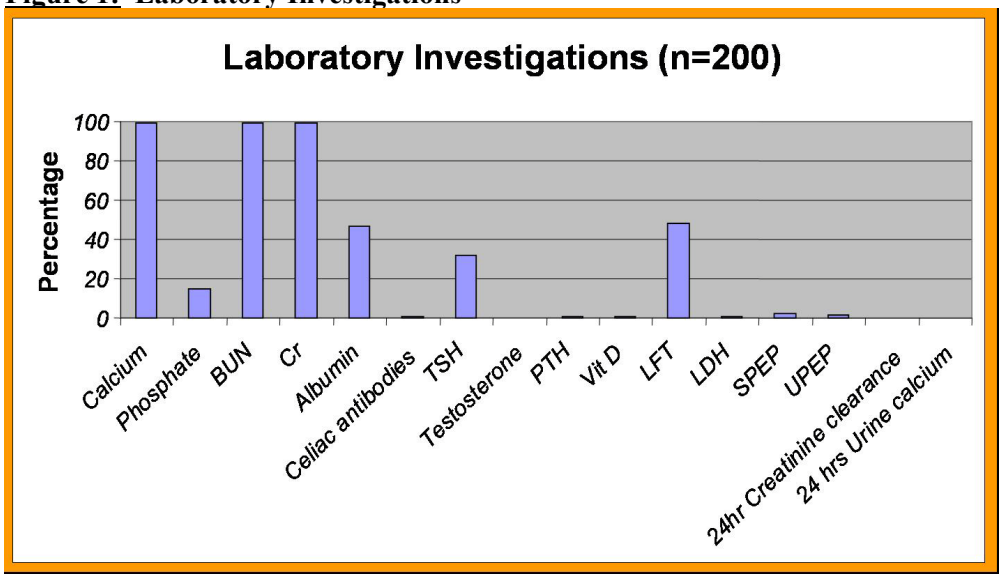

Figure 2a: Treatment in Study Group

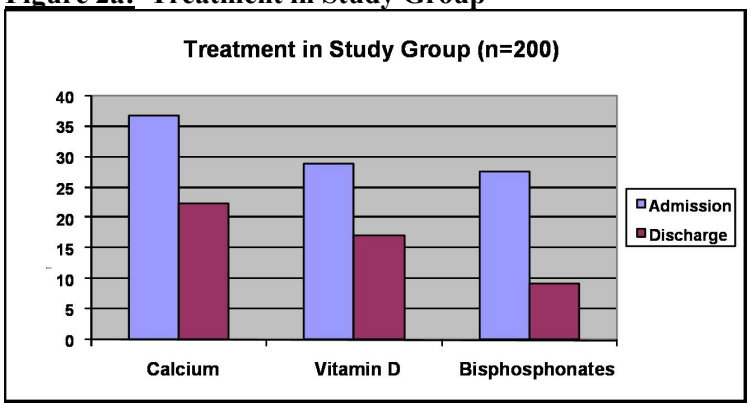

Figure 2b: Treatment in Osteoporosis Group

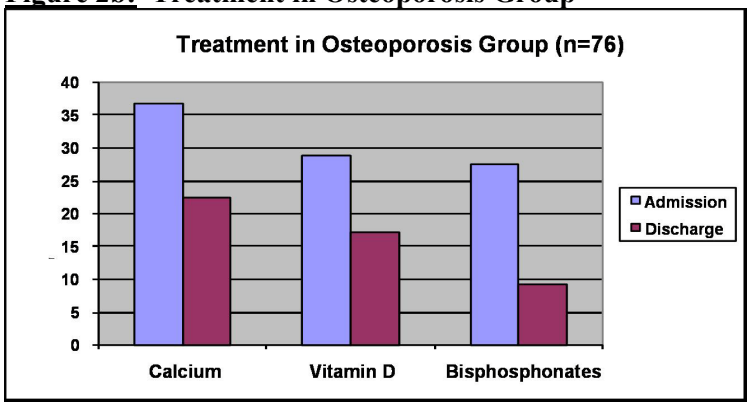

Table 1: Outcome Based on Admitting Service and Medicine Consult

Total Pt = 200	Medicine Service (n=50)	Other Services with Medicine consult (n=117)	Other Services without Medicine consult (n=33)
Osteoporosis Diagnosis	21 (42%)	48 (41.02%)	7 (21.21%)
Osteoporosis follow-up	0 (0%)	5 (4.27%)	0 (0%)
Discharged on Calcium	14 (28%)	15 (12.82%)	4 (12.12%)
Discharged on Vit D	11 (22%)	10 (8.54%)	4 (12.12%)
Discharged on Bisphosphonates	4 (8%)	3 (2.56%)	1 (3.03%)
Workup: TSH	25 (50%)	29 (24.78%)	9 (27.27%)
PTH	1 (2%)	1 (0.85%)	0 (0%)
Vitamin D	0 (0%)	2 (1.70%)	0 (0%)
SPEP	1 (2%)	1 (0.85%)	2 (6.06%)
UPEP	1 (2%)	1 (0.85%)	1 (3.03%)
Celiac Ab	1 (2%)	1 (0.85%)	0 (0%)

Review Article: Community Associated Methicillin Resistant Staphylococcus aureus necrotizing fasciitis in infants

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ABSTRACT
We report on two infants who developed septic shock, necrotizing fasciitis and pneumonitis as a result of community associated methicillin resistant Staphylococcus aureus (CA-MRSA). The disease presented subacutely but progressed rapidly and was quite virulent. The diagnosis was delayed by the lack of classic signs of subcutaneous crepitus and the presence of subcutaneous induration. The emergence of CA-MRSA necessitates more vigilance in the management of cellulitis.

INTRODUCTION
Central to the practice of acute care medicine is the ability to identify patients in whom immediate intervention is needed to prevent long-term morbidity and mortality. This often means that we recognize the emergence of new pathogens and pathological processes. We present here two (2) infants with necrotizing fasciitis and pneumonitis caused by a relatively new microorganism: community associated methicillin resistant Staphylococcus aureus (CA-MRSA).

Case #1
JC, a 9 month old male infant, was admitted with cellulitis and possible sepsis. Five days prior to admission, he developed intermittent fever with a maximum temperature of 103° F. His community pediatrician diagnosed him with otitis media. Amoxicillin and round the clock alternating acetaminophen and ibuprofen were given. His fever resolved, but he remained anorexic, lethargic and irritable. He did not want to be moved and whimpered constantly. On the day of admission, persisting discomfort and firmness of the abdomen were noted. He had no prior history of sick contacts at home, no recurrent prior infections and trauma, and no insect or animal bites, despite having a number of pets - a nonpoisonous snake, a cat and a lizard. Three months prior to admission, a large forehead sebaceous nevus was resected in an ambulatory surgical center.

On examination, the patient was well nourished, lethargic and moaning in pain. There was extensive erythema, edema and induration of the skin on his left side, starting anteriorly on his left chest lateral to the nipple line and extending to the axilla and most of his back, from the subscapular region to the superior iliac crest. There was no evidence of any trauma, fluctuation or crepitus in the skin. Except for a mild tachycardia and a capillary refill time of 2-3 seconds, the rest of his examination was unremarkable. His initial laboratory examination was remarkable for an elevated erythrocyte sedimentation rate 94 mm/h, platelet count 433 k/mm^3, sodium 129 mmol/L, potassium 6.4 mmol/L, BUN 24 mg/dL and creatinine 0.5 mg/dL.

Intravenous ceftriaxone, clindamycin, vancomycin and intravenous fluids were administered. The following day, he developed increasing pain that required intermittent intravenous morphine. A small fluctuant area on his left chest was aspirated and yielded serosanguinous fluid. Methicillin resistant Staphylococcus aureus (MRSA) was recovered from the culture. The isolate was clindamycin sensitive but D-test negative. It was also sensitive to trimethoprim-sulfamethoxazole, vancomycin, linezolid, quinupristin-dalfopristin and gatifloxacin. Later that evening, he developed warm shock with hyperperfused extremities and a low diastolic blood pressure. Intravenous fluid boluses and a dopamine infusion were given to maintain his blood pressure within normal limits.

On the morning of the third day, induration extended laterally across the back to the right

mid-axillary line and new areas of fluctuation were noted. Pain had worsened requiring a continuous fentanyl intravenous infusion. Laboratory studies showed decreased hemoglobin of 7.3 gram/dL and a white blood cell count of 9.8 k/mm^3 with 30% bands; C-reactive protein was 276 mg/L. A diagnosis of necrotizing fasciitis was made.

His creatine kinase was within normal limits, suggesting no involvement of his muscles. He received a blood transfusion, gentamicin and rifampin were added and he was given a 2 gram/kg dose of intravenous immunoglobulin (IVIG, Sandoz). CT scan of the chest, abdomen and pelvis with oral and intravenous contrast revealed a large loculated fluid collection in the superficial soft skin tissue extending from the level of the left axilla inferiorly, laterally and posteriorly to the level of the iliac crest, with no definite air being seen, and patchy atelectasis in the right and left lower lung lobes with a 5 mm nodule in the left upper lobe. Follow up CT scans and radiographs showed the development and gradual resolution of multiple nodules in the left upper lobe suggestive of septic emboli. There was no evidence of lytic or blastic bony lesions. In the operating theatre, gross necrosis of his subcutaneous fascia was confirmed. The necrotic tissue was debrided and the wound was packed. For the next week he underwent daily surgical debridement and irrigation of his wound. All blood cultures remained negative. His tracheal aspirate culture did not grow MRSA. MRSA was recovered from culture of the necrotic subcutaneous fascia obtained after three days of intravenous clindamycin and vancomycin. He gradually improved and was discharged home on the third week post-operatively without the need for skin grafting.

Case # 2

JW, an 11 day old male was admitted as a rule out sepsis with a fever of 101.4° F. The baby was born at 39 weeks of gestational age via a scheduled c-section without any complications. There was no significant prenatal history of maternal infection. Maternal grandmother was involved in the care of the baby and she was also in contact with her cousin's sister who had a MRSA infection. There was no history of direct sick contact, trauma, bug or animal bite.

On examination he was a well nourished, crying but consolable, non-toxic looking male infant. He had a diffuse erythematous maculopapular blanching rash on the lower thoracic and lumbar region of the back extending to the right gluteal region. There was no evidence of any trauma, fluctuation or crepitus of the skin on admission. He also had a small single vesicular pus filled lesion on the inner aspect of left thigh. Except for temperature of 104° F the rest of the physical examination was normal.

His initial laboratory examination was remarkable for elevated white cell count 23.9 k/mm^3, C- reactive protein of 80 mg/l and glucose of 182mg/dL. Blood culture was sent and he was started on IV ampicillin, gentamicin and vancomycin.

The following morning the rash on the back had become more erythematous and was indurated with a small area of fluctuance. A presumptive diagnosis of necrotizing fasciitis was made. An 18 gauge needle was placed in the fluctuant area on the back but no pus aspirated. Needle was removed and rinsed into a blood culture bottle. Blood from the puncture site was collected on the swab and sent to the laboratory. The pus from the vesicle on the thigh was collected and sent for culture and susceptibility. Methicillin resistant Staphylococcus aureus (MRSA) was isolated from the thigh pustule and also from the culture done from the fluctuant area on back. The organism was resistant to erythromycin, sensitive to clindamycin with D-test, and also sensitive to trimethoprim-sulfamethoxazole, vancomycin, tetracycline and rifampin. Intravenous clindamycin was started. However, within the next three hours the baby developed warm shock with heart rates in the 200's and low diastolic pressures requiring multiple fluid boluses prior to being taken to the operating room. In the operating room, gross necrosis of his subcutaneous fascia was noted. This was debrided and the wound packed. Again, culture of the necrotic tissues grew a pure culture of MRSA with identical antibiogram. Immediately post operatively he was given a 2 gram/kg dose

of intravenous immunoglobulin (IVIG, Sandoz). After his antibiogram was obtained, he was continued on IV vancomycin. He underwent daily and then alternate day surgical debridement and irrigation of the wound for next 3 weeks. He gradually improved and was discharged home without any need for skin grafting.

DISCUSSION

These two infants demonstrate that CA-MRSA has the potential to be quite virulent, rapidly turning a pediatric patient with cellulitis to septic shock, necrotizing fasciitis and necrotizing pneumonitis. What is also significant was that these two patients presented quite close to each other in terms of time and loci (within two years of each other). Furthermore, to the best of our knowledge there were no prior similar cases in both of our institutions.

In February 2005, the Centers for Disease Control and Prevention (CDC) defined community associated MRSA (CA-MRSA) infection as follows: identification of MRSA in a patient with signs and symptoms of infection, either in the outpatient setting or within 48 hours after admission to a hospital, with no history of MRSA infection or colonization, no history of admission to a hospital or a nursing home during the previous year, and absence of dialysis, surgery, permanent indwelling catheters or medical devices that pass through the skin to the body. CA-MRSA is emerging globally as an epidemic that is responsible for rapidly progressive, fatal diseases including necrotizing pneumonia, severe sepsis and necrotizing fasciitis. Unlike Hospital Associated-MRSA, CA-MRSA is usually pan-susceptible to non-beta-lactam antimicrobials such as clindamycin, tetracycline, and trimethoprim-sulfamethoxazole.[1] Our patients had a history of a surgical procedure, one at 3 months prior in an outpatient setting and the other at birth, but their MRSA isolates had the classic antibiogram of a CA-MRSA.

Necrotizing fasciitis has received much publicity in the lay press with reports of "flesh-eating bacteria." The disease can spread rapidly and can result in dramatic tissue destruction. Early recognition and aggressive debridement of all necrotic fascia and subcutaneous tissue are major prognostic determinants. Delay in operative debridement has been shown to increase mortality rate.[2,3] Necrotizing fasciitis generally is divided into two types: Type I - caused by mixed anaerobic and facultative bacteria, and type II - the result of group A streptococci with or without concomitant staphylococcal infection.[2] Streptococci are believed to be the most common pathogens.[3] Both patients developed necrotizing fasciitis from a pure culture of CA-MRSA.

Miller et al. reported on 14 cases of CA-MRSA induced necrotizing fasciitis in adults with a median age of 46 years in the Los Angeles area.[4] Our case was similar to the adult cases in the following characteristics: 1) the majorities of their isolates (86%) were monomicrobial MRSA and were sensitive to clindamycin, trimethoprim-sulfamethoxazole, and rifampin, 2) only 40% of their blood cultures grew MRSA, 3) the disease process presented subacutely but progressed rapidly, 4) the diagnosis was not suspected initially but often made surgically, and 5) all of their patients received combined medical and surgical therapy and had a long complicated hospital course.

The urgent need for making a diagnosis of necrotizing fasciitis and performing surgical debridement was evidenced by the persistence of the MRSA in the necrotic fascia and the development of multiple pulmonary nodules (which we presumed were septic emboli) despite 3 days of intravenous clindamycin and vancomycin in Case #1. Distinguishing necrotizing fasciitis from cellulitis with or without local abscess formation can, however, be difficult. Both conditions present with erythema, warmth, tenderness and induration of a localized skin area. In a "typical" type I necrotizing fasciitis, crepitus helps to differentiate. In our patients, crepitus was absent and the skin initially was erythematous and indurated, which is more typical of cellulitis.

In our patients, the clues to the diagnosis of necrotizing fasciitis were extensive, rapidly enlarging area of skin involvement, worsening

pain, development of septic shock, and the subsequent development of hyponatremia, anemia and azotemia. Wong et.al.[5] combined the laboratory values of CRP, drop in hemoglobin, glucose rise, creatinine rise, sodium drop, and WBC rise into a scoring system (the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score) that may provide early identification of patients at risk for developing necrotizing fasciitis. In Case # 1, prior to obtaining a CT scan, we had applied this scoring system, modified for age and obtained a value of 8, which was suggestive of necrotizing fasciitis. However, this scoring system has been validated only in adults.

The use of IVIG in the patient may be considered controversial. There are, however, data to support the idea that the Panton-Valentine Leukocidin cytotoxin (PVL) is responsible at least in part for the increased virulence of CA-MRSA.[6] Naimi TS, et al.[1] in comparing isolates from community versus hospital associated methicillin-resistant Staphylococcus aureus infections noted that in addition to carrying novel methicillin resistance genetic cassettes, many of the CA-MRSA isolates carry the PVL genes. Miller et. al. noted that all the MRSA isolates causing necrotizing fasciitis in the adults in Los Angeles were PVL positive.[4] Given the aggressiveness of our patient's infection, it was likely that the CA-MRSA involved carried the PVL genes, the cytotoxin of which can be neutralized, at least in vitro, by commercial intravenous preparations of immunoglobulin.[7]

CONCLUSION

In summary, CA-MRSA is rapidly becoming a more prevalent pathogen in the pediatric patient with the potential to cause rapid and serious illness such as septic shock, necrotizing fasciitis and pneumonitis. The health care worker treating children with a "simple" cellulitis should be aware of this potential virulent pathogen and consider the development of necrotizing fasciitis in the differential diagnosis of a progressive cellulitis. A high level of vigilance and suspicion in the event of rapid progression and increasing inflammation are warranted, and early referral to a facility with intensive care and surgical support may be vital to prevent septic shock and long term morbidity and mortality.

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Review Article: The Introduction of SAVI as a New Partial Breast Brachytherapy Device

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INTRODUCTION

Breast conservation therapy (BCT) consisting of lumpectomy with adjuvant radiotherapy to the breast has been the standard of care for treatment of early-stage breast cancers for the past two decades. Despite its efficacy, whole breast irradiation is not necessary in all patients and often a more focused radiation to the tumor bed post-surgically, known as partial breast irradiation (PBI) is equivalent for local control and survival. Several brachytherapy devices/modalities have been used in the past, such as the MammoSite, multicatheter interstitial brachytherapy, and the Contura. At our institution, we have begun using the newest device, known as the Strut-Adjusted Volume Implant (SAVI), for accelerated PBI for early breast cancers.

METHODS AND MATERIALS

The SAVI device consists of a central catheter surrounded by 6-10 peripheral catheters (Figure 1) that is afterloaded with an Iridium-192 source. During radiation treatment, the radioactive source has different dwell times in each catheter as designated by the treatment plan. At Hahnemann University Hospital, the device is inserted by the surgeon shortly after the lumpectomy through the original incision. The device is inserted in a collapsed state, and expanded once it has reached the proper depth. A CT scan will then be performed for verification of device location and treatment planning.

DISCUSSION

The radiation dose distribution can be highly contoured, as depicted in Figures 2 and 3, allowing for maximal avoidance of normal tissues adjacent to the lumpectomy cavity such as the skin surface, chest wall, and lung. With the high variability in the breast size and body habitus of the patients we treat, this device has allowed us to treat patients who previously would not have been eligible for breast brachytherapy. Dose distribution to properly treat the lumpectomy cavity, where it has been shown the majority of recurrences occur, while avoiding critical normal structures has been problematic if not impossible in the past for women with tumors near the skin surface or chest wall. In fact, this device has no spacing limitations on its proximity to the skin and chest wall.

This device has proven to be highly advantageous in comparison to previous PBI devices. It is the first single-entry device permitting simultaneous dose modulation at the skin and chest wall while concomitantly providing superior coverage of the tumor region with a slight margin (to account for patient movement and post-surgical changes). Furthermore, being a single-entry device, it is does not require the technical expertise needed for implantation of a multicatheter interstitial brachytherapy device. Yet, due to its interstitial-like catheter placement, device rotation is very minimal, resulting in a more consistent dose throughout the treatment course.

CONCLUSION

In conclusion, the architectural design of the SAVI will allow for treatment of patients with small, large and irregular cavities. Its ease-of-use for the clinician combined with the ability to highly sculpt the dose greatly expands the number of patients who can be treated. It is a significant addition to the options available for accelerated partial breast irradiation.

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Figure 1. **SAVI device at different stages of expansion**

Figure 2. **SAVI 6-1 Applicator in small lumpectomy cavity with simultaneous dose modulation at the skin and chest wall**

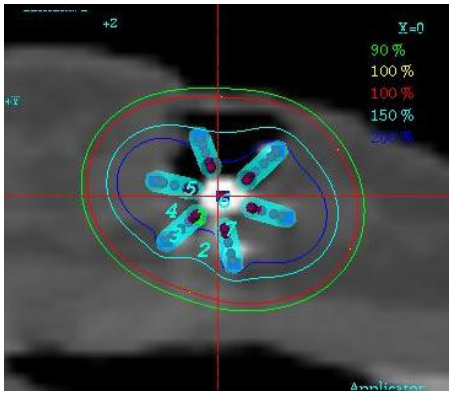
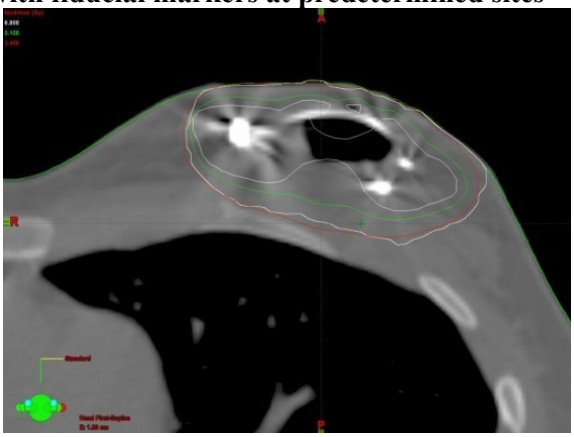


Figure 3. **CT treatment planning image with fiducial markers at predetermined sites**



Review Article: Rhabdomyolysis and Compartment Syndrome Following Massive Diphenhydramine Ingestion

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INTRODUCTION

Diphenhydramine is an over-the-counter (OTC) medication with antihistaminergic, sedative, and hypnotic properties. It is sold in preparations as the sole active ingredient and in preparations with multiple medications. The indications for these various preparations include colds, allergies, and insomnia.

Diphenhydramine is a common medication in both intentional and accidental overdoses. The frequency of intentional overdoses of diphenhydramine is likely due to its use in OTC sleeping pills. Diphenhydramine overdose has been associated with anticholinergic side effects, rhabdomyolysis, renal failure, seizures, and cardiac arrhythmias. Death, though uncommon in diphenhydramine toxicity, can occur as a result of prolonged seizure or cardiac arrhythmia.

We present the case of a patient with massive diphenhydramine ingestion who presented to our facility with rhabdomyolysis and subsequently developed bilateral lower extremity compartment syndrome, and discuss the literature on diphenhydramine toxicity.

CASE STUDY

A 28 year-old female was brought to our Emergency Department by a roommate after a suicide attempt in which the patient took 29 capsules of Unisom Sleepgels Maximum Strength (50 milligrams of diphenhydramine per capsule) and consumed a 750mL bottle of vodka. According to the patient, the ingestion occurred approximately nine hours prior to arrival. When the roommate arrived home from work he noticed that the patient was walking aimlessly through the house and that "she was out of it". On questioning, the patient informed the roommate of the suicide attempt at which point he brought the patient by car to our emergency department.

The patient admitted to the suicide attempt to the physician, stating "I just wanted to go to sleep and never wake up". Past medical history was significant only for depression for which the patient was not taking any medications. The patient denied history of previous suicide attempts. Review of systems was significant for bilateral leg swelling and pain which had started within the last 4 hours. The patient denied any history of leg trauma, recent strenuous physical activity, or recent prolonged inactivity.

Physical exam revealed a young, disheveled female with normal body habitus. Cardiorespiratory, abdominal, and neurological exams were normal. Extremity exam was significant for bilateral leg swelling, tenderness to palpation bilaterally on the anterolateral aspect of the leg, and mottled skin color on the anterior legs bilaterally. Sensation and capillary refill were normal throughout the bilateral lower extremities. Dorsalis pedis and posterior tibialis pulses were normal.

Initial chemistries were within normal limits except a phosphorus of 7.2mg/dL. Initial creatinine was 0.7mg/dL. Blood ethanol level was 42.4mg/dL. Initial creatine kinase was elevated at 106,050 U/L with a normal troponin. Urinalysis was significant for 4+ blood and 5-10 red cells/hpf. Urine drug screening was negative and complete blood cell count, coagulation studies, salicylate level, and acetaminophen level were all within normal limits.

Treatment in the emergency department consisted of a 2-liter bolus of normal saline followed by a normal saline infusion at twice the maintenance rate. The patient was admitted to a general medical floor with surgery and psychiatry consultations.

Seven hours after arrival, the creatine kinase level had increased to 200,197 U/L with no change in the creatinine. Fifteen hours after

arrival the patient complained of increased bilateral leg pain and left thigh pain. Compartment pressures were measured with a Stryker STIC device and found to be elevated in the anterior compartments of the bilateral legs and the anterior compartment of the left thigh. A left thigh fasciotomy and bilateral leg fasciotomies were performed to relieve the compartment syndromes.

The patient's creatine kinase level peaked at 233,900 U/L 21 hours after the patient's arrival. She continued to receive normal saline infusion at twice the maintenance rate while on the general medical floor. The patient's blood urea nitrogen and creatinine levels remained at their baseline values throughout her hospital stay and she was discharged uneventfully five days after admission.

DISCUSSION

Diphenhydramine is used in a number of OTC preparations both as the sole active ingredient and in combination medications for a variety of indications (Table 1). Diphenhydramine is a member of the ethanolamine class of antihistaminergic agents. Members of this class of medications have both antihistaminergic and anticholinergic properties that make them useful in the formulation of OTC cold, allergy, and sleeping aids (Table 2).

Diphenhydramine is a common medication implicated in both accidental and intentional drug overdoses. The frequency of accidental overdose can be ascribed in adults to patient non-compliance with maximum doses printed on OTC medication containers and in children by the ubiquitousness of diphenhydramine in family medicine cabinets. Diphenhydramine is also common in intentional overdoses because patients attempting suicide by medication overdose frequently choose sleeping aids as the medication with which they will attempt suicide. According to the American Association of Poison Control Center's (AAPCC) Toxic Exposure Surveillance System (TESS), there were 28,092 human exposures to diphenhydramine reported to poison centers in the US in 2003. Children less than 6 years of age accounted for 12,089 (43.0%) of all reported diphenhydramine exposures. There were six cases with fatal outcomes in 2003 in which diphenhydramine was apparently the only substance ingested.[1] A review of all fatalities reported to TESS from 1985 through 2002 found 48 deaths in which diphenhydramine was the only drug reported to be ingested.[2]

While it is unclear at what dose diphenhydramine should be considered a toxic exposure, the AAPCC released guidelines in 2005 suggesting that acute exposures in children less than 6 years of age who ingest at least 7.5mg/kg of diphenhydramine and adults who ingest either 7.5mg/kg or 300mg (whichever is less) of diphenhydramine should be referred to an emergency department for evaluation. Also all patients with suicidal intent, intentional abuse, or changes in behavior other than mild drowsiness or mild agitation should be referred to an emergency department. Finally, any patient that is asymptomatic and for whom more than 4 hours have elapsed since the ingestion do not need emergency department evaluation.[2]

Symptoms of diphenhydramine ingestion include anticholinergic effects such as mydriasis, anhydrosis, hyperthermia, decreased GI motility, and altered mental status including somnolence, agitation, hallucinations, and seizures. Dystonia and dysrhythmias are rare complications.[2,3]

Rhabdomyolysis is a rare complication of diphenhydramine overdose that has been previously reported in the literature.[3-7] In some but not all of the cases, confounding causes of rhabdomyolysis such as seizures, hyperthermia, or psychomotor agitation were present creating doubt as to whether diphenhydramine caused the rhabdomyolysis.[3,4,6,7]

It has been suggested that rhabdomyolysis following diphenhydramine ingestion may be due to a direct toxic effect on myocytes.[4,7] There are no studies investigating risk factors for rhabdomyolysis following diphenhydramine overdose. A study by Jo et al investigating rhabdomyolysis after overdose of doxylamine, a related compound, reported that the only reliable predictor for developing rhabdomyolysis was a

large milligram per kilogram (mg/kg) overdose.[8]

Non-traumatic compartment syndrome has been reported following drug or toxin ingestions. It has been hypothesized that in most cases the compartment syndrome occurs secondary to prolonged inactivity after ingestion of a central nervous system (CNS) depressant or from mechanical compression of a compartment from a patient lying for a prolonged period in an awkward position.[9] Neither of these situations occurred with our patient. There are no reported cases of compartment syndrome in the medical literature after isolated diphenhydramine or combination diphenhydramine/ethanol intoxications. There is a single case report in the nephrology literature of a patient who developed compartment syndrome following ingestion of cabromal, phenobarbital, diphenhydramine, and ethanol.[10] Our patient did not have hyperthermia, psychomotor agitation, or CNS depression with mechanical compression of a compartment.

Treatment of rhabdomyolysis following diphenhydramine ingestion should include aggressive hydration and urinary alkalinization to prevent myoglobinuric renal failure. A study by Cho et al reported that lactated Ringer's solution is superior to normal saline for intravenous hydration in this scenario.[11] Treatment of compartment syndrome involves measurement of the compartment pressure using a commercial model tonometer. Elevated compartmental pressures mandate fasciotomy for decompression.

CONCLUSIONS

Diphenhydramine is frequently ingested in both accidental and intentional overdoses. Anticholinergic signs and symptoms such as mydriasis, anhydrosis, hyperthermia, decreased GI motility, and altered mental status are common. Rhabdomyolysis is a rare complication that may be related to high mg/kg overdoses and may be due to direct myocyte toxicity. We report the first case of compartment syndrome secondary to diphenhydramine/ethanol overdose. Clinicians caring for patients after diphenhydramine or dimenhydrinate overdose should evaluate for rhabdomyolysis and compartment syndrome

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Table 1: OTC Preparations Containing Diphenhydramine

OTC Medications with Diphenhydramine as the Sole Active Ingredient:

- AllerMax®, AllerMax® Caplets®
- Benadryl®, Benadryl® Allergy, Benadryl® Allergy Chewables Children' s, Benadryl® Allergy Kapseals®, Benadryl® Allergy Ultratab®, Benadryl® Dye-Free Allergy Children' s, Benadryl® Dye-Free Allergy Liqui-Gels®
- Compoz® Nighttime Sleep Aid, Compoz® Nighttime Sleep Aid Gelcaps®
- Diphen® AF Elixir
- Diphenhist®, Diphenhist® Captabs®
- Diphenhydramine Hydrochloride Caplets®
- Excedrin P.M.® Caplets®, Excedrin P.M.® Geltabs® Excedrin P.M.® Tablets
- Genahist®, Genahist® Elixir
- Goody's® PM Powder
- Hydramine® Cough Syrup, Hydramine® Elixir
- Miles® Nervine Nighttime Sleep-Aid
- Nytol® QuickCaps® Caplets®, Nytol® Quickgels® Maximum Strength
- Simply Sleep® Nighttime Sleep Aid Caplets®
- Sleepinal® Night-time Sleep Aid Softgels®
- Sominex® Caplets®Maximum Strength, Sominex® Nighttime Sleep Aid
- Twilite® Caplets®
- Unisom® SleepGels® Maximum Strength

Combination Medications including Diphenhydramine and other active ingredients

Containing Diphenhydramine and Acetaminophen

- Legatrin PM® Caplets®
- Percogesic® Aspirin-Free Caplets® Extra Strength
- Sominex® Pain Relief Formula
- Tylenol® PM Extra Strength Caplets®, Tylenol® PM Extra Strength Gelcaps®, Tylenol® PM Extra Strength Geltabs®, Tylenol® Severe Allergy Caplets®

Containing Diphenhydramine and Aspirin

- Alka-Seltzer PM® Pain Reliever and Sleep Aid
- Bayer® PM Extra Strength Caplets®

Containing Diphenhydramine and Magnesium Salicylate

- Doan's® P.M. Extra Strength Caplets®

Containing Diphenhydramine and Pseudoephedrine

- Benadryl® Allergy & Cold Fastmelts®, Benadryl® Allergy & Sinus, Benadryl® Allergy & Sinus Fastmelts®

Containing Diphenhydramine, Acetaminophen, and Pseudoephedrine

- Benadryl® Allergy & Cold Caplets®, Benadryl® Allergy & Sinus Headache Caplets® Maximum Strength, Benadryl® Severe Allergy & Sinus Headache Caplets® Maximum Strength
- Sine-Off® Night Time Relief Sinus Cold & Flu Medicine GelCaplets®
- Sudafed® Sinus Nighttime Plus Pain Relief Caplets®
- Tylenol® Allergy Sinus NightTime Maximum Strength Caplets®, Tylenol® Allergy-D Children's, Tylenol® Flu NightTime Maximum Strength Gelcaps®

Table 2: Members of the Ethanolamine Class of Antihistaminergics

- Diphenhydramine
- Carbinoxamine
- Doxylamine
- Clemastine
- Dimenhydrinate

Review Article: Sensory Processing Disorder: Past, Present and Future

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ABSTRACT
Sensory Processing Disorder (SPD), also known as Sensory Integration Dysfunction (SID), has been part of our subculture for almost 40 years. Though it was introduced almost four decades ago, the diagnosis is seldom used. SPD remains elusive to many health professionals, including psychiatrists. Data is lacking regarding neurophysiologic changes in patients with this disorder; furthermore, there are limited standardized testing methods to help make the diagnosis. The American Psychiatric Association is being petitioned to include SPD in the Diagnostic and Statistic Manual, Ed. V (DSM V), scheduled to be released in 2012. With official entry in the manual and recognition as a disorder, the awareness of SPD will increase. This will likely lead to more efforts in developing methods of diagnosis and treatment. This author presents a case of SPD and outlines the diagnostic and treatment dilemmas. Furthermore, the potential implications of including of this disorder in the DSM-V are discussed.

CASE REPORT
A 10-year-old African American male, J.B., presented to an outpatient clinic after being evaluated and treated in another facility. His family had moved from another city and his mother sought to continue treatment for his problem of difficulty concentrating and hyperactive behavior. He was isolating himself both at home and at school. In the last 2 years, his mother stated he had become defiant and oppositional both at home and school leading to disciplinary action at school on multiple occasions.

The mother stated that her pregnancy with the patient was uneventful and full term. There were no birth complications and no history of maternal alcohol, tobacco or drug use. J.B.'s mother also reported that there was no family history of behavioral or mental health problems. The mother stated that the patient began to show signs of being socially withdrawn and having "fussy" behavior shortly after birth. He was often inconsolable with failure of soothing after attempts at playing music or singing to him. Concern was raised after one year of age and evaluation was begun.

Normal developmental milestones included sitting up at six months of age, grasping at objects at five months, standing and taking one or two steps at one year, and fine motor movements that included forming a tower of two cubes at 16 months. Developmental deficits included withdrawn nature with poor social interaction, excessive startle reflex with loud noises, excessive crying in crowded rooms, language delay with first word at 18 months, and no complete sentences until 4 years.

The patient began evaluation for his social withdrawal which included genetic and laboratory studies. Testing included karyotype evaluation, routine laboratory work-up including lead level measurement, and enzymatic deficiency assessment. The results of these tests failed to demonstrate an organic cause for his symptoms.

His speech delay was addressed via speech therapy at age 4 years. Therapy for two years concluded with the ability of J.B. to hold age-appropriate conversations. At age 5 years, psychological educational evaluation revealed normal Intelligence Quotient with delays in reading of one year and math of two years. The patient was then placed in special educational classes to address his reading and math delay.

As the first two years after starting school passed, it was found that the patient continued to demonstrate withdrawal and failure to socialize not only with strangers or peers but even with his mother and other siblings. J.B. also had difficulty with concentrating at home and at

school. He had extreme difficulty with completing his homework and household tasks. He was found to isolate himself, seeking retreat in his bedroom away from his four siblings.

J.B.'s mother had taken him to a neurodevelopmental pediatrician to have him evaluated for a Pervasive Developmental Disorder. He was not found to fit the criteria for this spectrum of disorders. He was then diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). After this diagnosis, he was prescribed stimulant medications and atomoxetine HCl trials, all of which demonstrated limited modification of his behavior. Further questioning revealed that J.B. also had disturbed sleep and a low threshold for arousal. He had a polysomnograph performed which failed to demonstrate any pathology. In attempts to aid his sleeping, diphenhydramine and clonidine were started.

J.B. presented to the office of the author when he was 10 years old and found to be soft, well-spoken, and reserved. He was cooperative throughout the interview. He revealed that he felt most difficulty concentrating in noisy environments, and he found it easier to accomplish tasks at home when he was alone. He also stated that loud noises "hurt him," and that he wanted to retreat to a quiet place when in loud environments. At the time of evaluation, he was taking long-acting methylphenidate 36 mg each morning and short-acting methylphenidate 10 mg each afternoon. He had been taking this medication for one year prior to his visit and was not noted to have much improvement in his behavior. The Vanderbilt ADHD diagnostic parent and teacher rating scales were completed and the results were consistent with ADHD, combined type. A Children's Depression Inventory was completed that failed to demonstrate depression. Baseline laboratory and lead levels were within normal limits.

Though J.B.'s symptoms fit into the category of combined type ADHD, he had failed to respond to appropriate therapy for that disorder. His main complaint was centered on loud sounds and a discomfort and inability to concentrate in that environment. Because of this atypical presentation with failure of conventional therapy, a trial of using earplugs in loud and busy situations was initiated. The earplugs were used selectively at school and at home with the aid of his teachers and family to decrease the loud noises, which J.B. reported interfered with his concentration. After a few weeks of earplug use, J.B. noted a significant change in his ability to focus in loud environments. His family and teachers recognized a change as well. He was subsequently tapered off of his medications, without change in his behavior.

This case is important because it demonstrates a child that underwent a full work-up and had results that were entirely consistent with a diagnosis of ADHD. However, appropriate medical therapy failed to result in an adequate response. This patient's presentation is atypical in that he had specific symptoms of noise-induced inattention and discomfort. His symptoms resolved with the unconventional use of earplugs to decrease the sensory stimulus when no additional benefit was demonstrated with pharmacotherapy.

BACKGROUND AND DEFINITION

It is commonly believed that there are five basic senses: touch, taste, smell, hearing, and vision. These five senses allow one to respond to external stimuli from the environment. Furthermore, there are internal sensory systems which operate without conscious thought. These include interoceptive, tactile, vestibular and proprioceptive senses. Tactile, vestibular and proprioceptive processing are the core of the sensory system which allows motor coordination. The interconnection of stimuli received from the external and internal environments forms the basis of the sensory integration theory. Sensory integration is the fundamental activity that leads to communications between a person and his world.

The term "Sensory Processing Disorder (SPD)" or "Sensory Integration Dysfunction (SID)" was first developed by A. Jean Ayres in 1972 to describe the relationship between brain function and behavior. SPD is a complex disorder in which sensory information is organized and

processed abnormally. The sensory integration theory assumes that the brain is immature at birth and remains immature in those with learning disabilities or SPD/SID.[1] There are three different variants described: under-processing, over-processing, and misinterpretation (processing with interference).

Children with SPD can present with signs and symptoms of a variety of different disorders such as Attention Deficit Hyperactivity Disorder, Fragile X Syndrome, Obsessive Compulsive Disorder, Schizophrenia, Bipolar Disorder, Depression, Anxiety, Autism or other Pervasive Developmental Disorders. These disorders can either be mistaken for SPD, or they can occur with SPD.[2] Table 1 outlines some of the symptoms that children may present with in SPD. It further illustrates the overlap with other disorders and the diagnostic complexity of the disorder.[3]

DIAGNOSIS AND TREATMENT

The primary diagnostic tool for SPD is known as the Sensory Integration and Praxis Test (SIPT) developed by Ayres. It is suitable for children ages 4 to 8 who demonstrate symptoms as described above and do not meet full criteria for other diagnoses. Ayres demonstrated its usefulness in children with learning and developmental delays as well.

Currently, the treatment for this disorder is limited. Utilizing a multidisciplinary approach with coordinated consultant care from specialists based on the main sensory disorder (e.g. ophthalmologists, otolaryngologists, neurologists etc.) is recommended to further delineate the extent of the disorder and devise treatment guidelines. For instance, in the case presented previously, J.B. should be evaluated by an audiologist and otolaryngologist. Family therapy has also been utilized in addition to occupational and physical therapy. Occupational therapists typically initiate therapy using the sensory integration theory as the basis. The central feature of Ayres sensory integration approach is utilization of the brain's ability to organize sensory input for use in functional, meaningful behaviors.[1] The key concept is to provide the child with rich sensory inputs, in a guided and gradual manner, which will eventuate in an effective adaptive response. The level of sensory deficit is used as guideline to tailor the therapy on an individual basis. For instance, for those with over-stimulation problems, systems using low-lighting and gentle touch and rocking mechanisms are employed. For those patients with under-stimulation sensory deficits, the approach is reversed. These methods are introduced gradually into a child's therapy with a goal that allows a child back into a busy classroom or a situation in which he or she was previously unable to handle.

For over 30 years, the primary medium for intervention in sensory integration has been play therapy. While there are not distinct studies using play for SPD, the theories and interventions have been adapted from studies using this medium for treatment of ADHD and developmental coordination disorder.[4] At first glance, the therapy room appears as a giant playroom, with various toys and gym equipment designed to facilitate sensory integration therapy. Therapy sessions are usually weekly or biweekly, lasting up to one hour for each visit.

Several studies have questioned the validity of SPD/SID as a diagnosis. Other studies have questioned the efficacy of the treatment model. In 1991, Cummins reviewed Ayers's analytic studies that provided the foundation of her theories of diagnosis. He discounted the validity of the method proposed by Ayers's, concluding there was a lack of consistency in her studies.[5] In 1993, Kaplan, et al. combined two smaller studies into a larger study with the conclusion that sensory integration therapy efficacy in children with learning deficits is not greater than traditional methods of intervention (tutoring by special education teachers and perceptual motor therapy).[6] Another study by Watling and Dietz in 2007 demonstrated that there were latency effects on the efficacy of sensory integration therapy on children with autism spectrum disorders. The effect was not noticed in the initial period after therapy, but during treatment and later in the home environment behavior modification and engagement were noted. This study emphasized that the therapist should not expect changes immediately; rather subtle

nuances of behavioral changes should be noted during and after intervention.[7]

DISCUSSION

Even though SPD/SID has been part of the literature for over four decades, it is clear that it is still an evasive diagnosis with limited treatment options. Furthermore, treatment efficacy is variable. Many health professionals, including psychiatrists, are skeptical in diagnosing patients with this disorder, partly because of the lack of definitive studies on the subject. Furthermore, the diagnosis of SPD/SID lacks an entry in the current Diagnosis and Statistical Manual, 4th edition (DSM-IV). Petitions have been put forth for entry of the diagnosis in the next edition (DSM-V); yet, further research is necessary to place it in the manual as an official diagnosis. However, funding for research in this area is also limited due to the fact that it has not yet been entered into the DSM, creating a circular dilemma or a "Catch 22" situation. Perhaps entry into the "Criteria Sets and Axes Provided for Further Study" section could grant the diagnosis a provisional status and open the door for further research funding. This could lead to an entry in the DSM-VI as an official diagnosis.

The advantages of placing the diagnosis in the DSM extend beyond the research and funding benefits. Many clinicians who are faced with diagnostic dilemmas may be able to categorize and diagnose previously undiagnosed and untreated patients. Furthermore, with increased recognition and improved diagnostic validity, reimbursement for treatment may improve.

There may also be disadvantages to placing the diagnosis of SPD in the DSM. Currently, the diagnosis is vague and the risk of over-diagnosis by clinicians and subsequent over or mistreatment is a concern. Over-diagnosis may lead to unwarranted healthcare and educational costs. Furthermore, as reimbursement is poor at this time, this may incur unnecessary cost to the patient, as well.

CONCLUSIONS

The diagnosis and treatment of SPD/SID continues to be vague despite its introduction into the literature over four decades ago. Controversies exist regarding the methods of diagnosis and the treatment modality of sensory integration. This controversy has lead to a lack of universal acceptance by healthcare professionals. More research needs to be done in order to devise specific diagnostic criteria and prove the efficacy of treatment options.

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Table 1. **Symptoms of Sensory Integration**

Sensory	Symptom: Over-processing	Symptom: Under-processing	Symptom: Misinterpretation
Visual	Prefers to be in the dark Avoids bright lights	Stares at people and objects	Gets frightened very easily Withdraws when people approach
Auditory	Responds unexpectedly to loud noises Places hands over ears Has difficulty playing and working with background noises	Appears to ignore people when called upon Seems oblivious of active environment	Appears to be frightened in crowded environments (often appears similar to over-processing)
Taste/Smell	Avoids certain tastes or smells	Does not seem to smell strong odors	Routinely smells non-food objects
Touch	Is sensitive to certain materials Avoids going barefoot	Touches people and objects excessively Has decreased awareness of pain and temperature	Misinterprets stimuli as hot when cold, etc.

2008-2009 Resident Research Fellows and their Respective Projects

Monique Ruberu: "Validation of Quantitative Sensory Testing as a Tool to Analyze Pain Thresholds in Patients with Vulvodynia" (abstract on page 7 of this edition)

Andrew Wu: "LCL (Lelkes-Composto-Levy) Grafts ™: Innovative Small Caliber Grafts for Coronary Bypass Operations"

Scholarly Activity of Graduating Residents/Fellows 2009

The following is a small sample of the scholarly activity projects undertaken by the graduating residents and fellows during their time with DUCOM. The projects are listed by department.

Anesthesiology	EMEND Research Study Investigators
	Lidocaine Research Study
Cardiac EP	Effect of Intravenous Lidocaine used to Alleviate Pain with Propofal Injection on Defribrillative Threshold Testing
	Intracardiac echocardiography during transvenous extraction complements transesophageal echocardiography in device –related endocarditis
	Axillary Subpectoral implantation of Pacemaker or Defibrillator in Patients with Limited Venous Access
Dermatology	Antibiotic selection of MRSA, case presentations/review of the literature
	Use of latex-free elastic bandage to demonstrate flap mechanics
	Two case reports highlighting cutaneous adverse reactions to Erlotinib and its potential for a marker of clinical response
Dermatopathology	Bullous Pemphigoid in Treatment of Skin Disease: Comprehensive Treatment Strategies
Emergency Medicine	Simulation lab in comparison to cadaver lab in subclavian line placement
	Splenic Laceration following Routine Colonoscopy
	Improving Patient Safety through Placement of US Guided Central Venous Catheter
	The effects of methadone detoxification on the QT interval of EKGs
	Case series on Clinical Presentation of TTP/HUS
	Unusual ECG Findings in Right-Sided Tension Hemo-pneumothorax
	Radiation Preparadness in Philadelphia Area Hospitals
EM/Pediatrics	Educational Opportunities in a Pediatric Emergency Medicine: Parental Attitude and Perceptions of CPR
	Thromboembolism and DIC in a Hemophiliac with Inhibitors
Sports Medicine	Exercise Induced Anaphylaxis
Internal Medicine	Diabetes Control in Inpatients Clinical assessment of the risk of sudden cardiac death in patients with sickle cell anemia
	Detection of Sepsis Co**n**tinuum by Heatlhcare Providers vs Computer Software

	EKG changes in acute decompensated heart failure
	Effectiveness of Medical Housestaff in providing DVT prophylaxis
	Change in Mental Status and ICU Evaluation
	Mechanical strain and electrochemical signaling in mycocardiocytes."
	Does Renal Function Predict Outcomes in Carotid Artery Stenting?"
	Blood Culture Turn-Around Time: A Quality Improvement Initiative
	Carotid In-stent Restenosis – Predictors and Management Outcomes
	Profiles in Coronary Artery Ectasia Seen in south Asian Women
	Clinical accuracy in diagnosis of small polyps using the conventional colonoscopy
	Disparities Between Caucasians and African Americans in Crohn's Disease
	Investigating the electrophysiologic properties of accessory atrioventricular bypass tracts in relationship to supernormal conduction
	GI Dysmotility in ALS patients.
	Bleeding Risks in Patients Taking People Fish Oil, Aspirin and Clopidogrel
	Cavernous Hemangioma of the Mitral Valve: A Case Report and Review of Literature
	The ePTFE-coated ICD leads are easier to remove than standard ICD leads up to 50 months implant duration
	Ultrasound Vein Mapping for the Creation of AV Fistula
	Renal Insufficiency and Cardiac Device Infections
	Improvement of LV Diastolic Function after Treatment of Renal Artery Stenosis with Stenting
	Incidence of infection in HIV positive renal transplant recipients
	Ovarian Adenocarcinoma Presenting with Intraluminal Colorectal Metastases
	Identifying Mechanisms of action of CD8+T cells in Rheumatoid Arthritis
	The Effects of Demographics, Hospital Course and End of Life Preparedness on Code Status at Time of Death
	Blood Culture Turnaround Time – A Quality Improvement Initiative
	Documenting the type and frequency of medication reconciliation errors
	Obstructive Sleep Apnea and Arrhythmia in Premenopausal and Postmenopausal Women
Cardiology	Safety of Rotational Atherectomy in Patients Undergoing Drug eluting Stent Implantation for Complex Coronary lesions
	Percutaneous Lead extraction in Patients with Intracardiac Vegitations
	Profusion and wall motion abnormnalities in a patient with diabetic ketoacidosis
	Electrocardiographic Patterns of Biventricular Pacing with Variation in Ventricular Timing Interval

	The hemodynamic Effects of Right Atrial Pacing
	Outcome of Renal Artery Stenting in Patients With Unilateral Renal Artery Stenosis, Bilateral Renal Artery Stenosis, and Solitary Functioning Kidney
	Effect of High Dose Statin Therapy on Plaque Composition"
Gastroenterology	Percutaneous Gastrostomy is the Preferred Mode of Central Feeding
	Endoscopic Management of Lateral Duodenal Wall Perforation during ERCP with Application of Endoclips
	Health Maintenance Issues in Cirrhosis A Physician's Guide to identifying and Managing Fecal Incontinence
Hematology and Oncology	Role of PET/CT in Breast Cancer
	Phase II CFP-R and High-dose Cyclophosphamide for Adult Burkett's Lymphoma
Infectious Diseases	Risk factors for failure of metronidazole for initial treatment of *C. difficile*-associated diarrhea
	Microbiological Aspects of Early versus Late Onset Cardiac Device Infection
	Mu-opioid modulation of mucosal immunity to Clostridium difficile infection and vaccination
Interventional Coronary **Cardiology**	Prevalence and Characteristics of Coronary Artery Ectasia in South Asian Women Presenting for Angiography
	Unexplained Spontaneous Left Main Coronary Dissection in a 40 Year Old Female with no major risk factors
Nephrology	Acute Humoral Rejection in HIV Renal Transplantation Patients – One Center Experience
	Role of Renin angiotensin system (RAS) in anemia related to kidney disease
Pulmonary and Critical Care	Pulmonary Hypertension – Molecular biology and mechanisms of disease and biology markers
	Exercise Testing in Cystic Fibrosis
	Localized Thrombolytics in Pulmonary Embolism
Rheumatology	Retrospective evaluation of the diagnostic process and treatment of metabolic bone disease in 366 patients admitted with fragility fracture
Sleep Medicine	Beyond Resident Work Hours: Sleep Health for New Residents
Neurology	Radiographic Findings in Convulsive and Nonconvulsive Status Epilepticus
	Progranulin and Beta-amyloid: A New Mechanism for Alzheimer's Disease
	Prior Endarterectomy is Predictor of the Absence of Carotid Stent Restenosis
	Late Persistence of Hypsarrhythmia in Children
	Markers of Axonal Injury in Multiple Sclerosis
OB/GYN	Screening antenatal ultrasounds in pregnancies complicated by obesity: do repeat ultrasounds improve diagnosis?
Ophthalmology	Visual Function in Surgical and Surgical Subspecialty Residents

OMFS	Aggressive Tumor of the Right Mandible
Orthopaedic Surgery	Non-operative Pelvic Fractures in Professional Cyclists: A Report of 3 Cases
	Correlation of Sagittal Profile and Ambulatory Status in Children with Spinal Cord Injury
	Chronic spinal cord injury in the pediatric population: does magnetic resonance imaging correlate with the International Standards for Neurological Classification of Spinal Cord Injury examination?
	Outcomes in Isolated Glenoid Labral Injuries in Professional Baseball Pitchers
Pathology	Molecular diagnostic techniques and applications
	A Case of Mycosis Fungoides and Anaplastic Large Cell Lymphoma from Two Geriatric Clones
	Histiocytic Erythema Multiforme
Cytopathology	Basaloid squamous cell carcinoma of tonsil presenting with metastatic cystic squamous cell carcinoma and positive HPV 16. A case report and review of the literature
Hematopathology	Role of STAT 3 and Foxp 3 immunohistochemistry in Mycoses Fungoides
Psychiatry	Interference of Pain and Consciousness
	Hyperprolactinemia with Various Antipsychotics.
	The Influence of Occult Depression on CPAP compliance in patients with Obstructive sleep apnea
	Competency issues in refusal to consent to breathalyzer tests in Drunk driving cases
	Diagnostic Difficulties and Cultural Competency in Eating Disorders in Non-Western Populations
	Lithium Induced Sialorrhoea
	Autism needs assessment and linkage to a 3rd world country
Radiation Oncology	Treatment of Paget's Disease of the Breast
Diagnostic Radiology	High Resolution MRI Cranial Nerves
	Successful Treatment of Pulmonary Embolus with Catheter Directed Thrombolytic Therapy in First Trimester patients: 2 Case Reports
	A Unique Presentation of Blunt Liver Trauma
	Interventional Radiology for Gynecologic Interventions
Neuroradiology	Case Review of Wada Testing in Pediatrics
Surgery	Interventional radiology placement of difficult seton for perianal fistula
	Randomized Clinical Study of SilvaSorb® Gel in Comparison to Silvadene® Silver Sulfadiazine Cream in the Management of Partial-Thickness Burns
	Osteoclast-Like Giant Cell Tumor of the Pancreas: Case Report and Review
	Functional characterization of filiamin A interacting protein 1-like, a novel candidate for antivascular cancer