

Proceedings from the 2004 Annual Meeting of the American College of Physicians, Wisconsin Chapter, Part 1

Edited by Kesavan Kutty, MD, FACP, Chapter Governor

INTRODUCTION

The Wisconsin Chapter of the American College of Physicians held its annual meeting in Waukesha, Wis, September 9-11, 2004. Internal Medicine residents from each of Wisconsin's 5 residency programs (Gundersen Lutheran Health System, Marshfield Clinic, The Medical College of Wisconsin, University of Wisconsin Hospital and Clinics, and University of Wisconsin Milwaukee Clinical Campus [Aurora Sinai Medical Center]) presented their research and/or unusual clinical experiences via posters and vignettes. On behalf of the Chapter, it is my pleasure to provide the text versions of their presentations, in an attempt to not only showcase the scholarly work of these physicians-in-training, but also to provide *Wisconsin Medical Journal* readers an overview of the quality of care given by them in the fine residency programs in our state. Finally, although these minimally edited Proceedings are by themselves very educational, being there to listen to them live is, indeed, priceless. On behalf of our Chapter, I invite you to witness this unique experience at our next Chapter meeting, September 7-8, 2006, at the Milwaukee Marriott West, Waukesha, Wis. (*Editor's note: This is the first half of 2004's Proceedings. The second half will be published in our next issue.*)

POSTERS

Abdominal Pain and Leukocytosis: A Most Unusual Presentation

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Case Presentation: A previously healthy 40-year-old African-American woman presented with abdominal pain for 24 hours. Abdominal examination showed splenomegaly, and pelvic examination showed adnexal fullness and tenderness. Her initial complete blood count was consistent with a chronic myeloid leukemia (CML) pattern with a white blood cell count of 264,000. Computer tomography scan of the abdomen and pelvis revealed complex cystic structures in the pelvis consistent with hydrosalpinx versus pyosalpinx. Antibiotic therapy was initiated, but only minimal improve-

ment followed. A total abdominal hysterectomy with bilateral salpingo-oophorectomy was therefore performed. Pathology report revealed extramedullary hematopoiesis of uterus, fallopian tubes, and ovaries.

Discussion: Extramedullary hematopoiesis (EMH) is the production of precursor cells of granulocytic, erythrocytic, or megakaryocytic cell lines outside of the bone marrow cavity, most commonly in the liver and spleen. EMH has also been described in other regions including skin, pleura, and the pelvis. In patients with CML, those who display extensive EMH are commonly in the blast phase. Our patient in the chronic phase of CML displayed extensive infiltration by hematopoietic cells of the pelvic reproductive organs.

Conclusion: This patient's clinical

features represent 2 unusual features, namely, (1) this is the first reported case of EMH in the ovaries and (2) EMH of this extensive degree is extremely rare in a patient with CML who is not in blast crisis.

Accuracy of Nuclear and Echocardiographic Studies Compared to Cardiac Catheterization

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Background: The sensitivity and specificity of noninvasive tests versus angiography in detecting coronary artery disease (CAD) are well reported in the medical literature. Data from the American College of Cardiology-National Cardiac Data Registry (ACC-NCDRTM) allows each institution to perform its own quality assurance assessments, which help compare the accuracy of the stress imaging tests to angiography.

Purpose: To determine the ability of noninvasive stress tests to detect coronary artery disease.

Methods: According to our local ACC-NCDRTM database, 2789 patients underwent stress echocardiography or stress nuclear imaging within 1 month of angiography in the 6 years between October 1997 and September 2003. We compared results of the noninvasive tests to angiography for the detection of CAD, with a positive study being an angiographically demonstrated stenosis of $\geq 70\%$. Echocardiographic

and nuclear stress tests were reported as normal, abnormal, or equivocal for the presence of CAD using standard criteria. Of the 2789 patients evaluated, 217 had equivocal stress tests and were excluded from further analysis. Of the remaining 2572 patients with angiograms, 1732 had nuclear and 840 had echocardiographic studies. We determined the sensitivity, specificity, and positive and negative predictive values for each noninvasive test.

Results:

	Nuclear		
	Adeno- sine	Dobuta- mine	Exer- cise
Sensitivity	94%	91%	91%
Specificity	21%	22%	32%
PPV	68%	66%	62%
NPV	67%	59%	73%

	Echocardiography	
	Dobutamine	Exercise
Sensitivity	79%	89%
Specificity	35%	21%
PPV	71%	54%
NPV	46%	65%

(PPV=Positive predictive value;
NPV=negative predictive value)

Conclusion: While the data suggest nuclear imaging is more sensitive, we found its specificity to be similar to echocardiography at our institution. The sensitivity of both modalities is similar to that reported in the literature. However, the specificity of each test is below what has been previously reported. The results will be used to implement a quality improvement program aimed at increasing the specificity of the noninvasive stress tests.

**Approach to Hypoglycemia:
A Lesson from a Patient
with Insulinoma**

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Case Report: An 82-year-old woman, a retired nurse, presented with recurrent hypoglycemia with disorientation and lightheadedness. She had a 10-year history of multiple episodes of hypoglycemia-induced symptoms that increased in frequency and severity without response to prednisone

and diazoxide. A 72-hour fasting test showed glucose of 42mg/dL, insulin of 32 µU/mL, and C-peptide of 1300 pmol/L in the setting of neuroglycopenic symptoms. Urine testing showed no sulfonyleureas. Plasma cortisol was 16.8 mg/dL, TSH was 1.85 U/mL, and HbA1c was 5.1%. Abdominal computed tomography (CT), non-stimulated angiogram, EGD, ERCP, MRI and Octreoscan were unable to localize the abnormal source of insulin. Intra-operative ultrasound demonstrated a 1.5 cm mass in the tail of the pancreas, which was then surgically excised. The pathology report was consistent with insulinoma.

Discussion: The incidence of insulinoma is 4 per 5 million, the mean age at presentation is 45 years, and it is malignant in 5%-11% of the cases. In 5%-10% of cases it is associated with Type 1 Multiple Endocrine Neoplasia (MEN-1). Clinical symptoms are related to the effects of hypoglycemia on the central nervous system (neuroglycopenic symptoms), including confusion and headache. Symptoms secondary to hypoglycemia-induced sympathetic discharge (vasomotor symptoms) include sweating and palpitations. It can take years before the correct diagnosis is made unless a systematic approach is followed.

In the setting of Whipple's triad (hypoglycemia, neuroglycopenic/vasomotor symptoms, and relief with glucose administration), a C-peptide suppression test is indicated, followed by a 72-hour fasting test if the former is non-diagnostic. If either of these is positive, there is enough justification to proceed with abdominal CT, MRI and/or endoscopic ultrasound. However, if these imaging studies are negative, an intra-operative ultrasound is indicated. Moreover, if this is also negative, termination of the surgery and performance of a post-stimulated calcium angiogram should follow. Surgery with resection of the zone of the pancreas with the highest levels of insulin should then be performed. All patients diagnosed with insulinoma should be evaluated for MEN-1.

**Constrictive Pericarditis
with Normal Thickness
Pericardium**

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Learning objectives: (1) Constrictive pericarditis can occur even when the pericardium is of normal thickness on non-invasive imaging. (2) Although rare, systemic lupus erythematosus (SLE) can be associated with constrictive pericarditis.

Case Report: A 61-year-old white man with SLE was admitted with worsening lower extremity edema for the past several months despite increasing doses of diuretics. On physical examination, he had distended neck veins, bilateral pleural effusions, ascites, and pedal edema. Chest x-ray revealed mild cardiomegaly and bilateral pleural effusions but no pulmonary vascular congestion. Two-dimensional echocardiography showed normal left and right ventricular systolic function. A restrictive mitral Doppler inflow pattern with abnormally increased respiratory variation, normal mitral annular tissue Doppler, and exaggerated respiratory phasic movement of the interventricular septum suggested hemodynamic features compatible with constrictive physiology. A computed tomography scan of the thorax showed normal pericardial thickness. Invasive hemodynamic data included mildly elevated right heart pressures, equalization of end-diastolic pressures in all chambers, and an early diastolic dip and plateau pattern. On surgical exploration, a fibrotic and adherent pericardium was identified, confirming the diagnosis of constrictive pericarditis. A complete pericardiectomy subsequently followed; histology showed dense hyalinized fibrous tissue and multiple foci of chronic inflammation. Three months after surgery, the patient showed significant clinical improvement with almost complete resolution of his symptoms and diuretic requirements.

Discussion: Constrictive pericarditis

should be considered in the differential diagnosis of anyone presenting with anasarca. As illustrated by this case, a normal thickness of the pericardium does not exclude the diagnosis of constrictive pericarditis. Thus, when clinical and echocardiographic features suggest constrictive pericarditis, clinicians should consider pursuing further investigation with invasive left and right heart pressure measurements. Constrictive pericarditis is a very rare presentation of SLE. To our knowledge, this is the first case report of constrictive pericarditis with normal thickness pericardium associated with SLE.

The Chains of Light

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Case Report: An 82-year-old man with a 3-year history of chronic back pain was diagnosed with multiple myeloma after serum and urine protein electrophoresis showed an IgA gammopathy and a bone marrow aspirate demonstrated dense infiltration of atypical plasma cells. His chemotherapy consisted of 8 cycles of prednisone and cyclophosphamide. Prior to treatment, his 24-hour urine gamma protein (UPGMM) was 1966 mg and his urine total protein (UPTP) excretion, 2271 mg. Four months later, the corresponding values were 51 mg and 125 mg respectively. Despite improvement in his overall energy level and appetite, he continued to report increasing back pain that did not improve with physical therapy and nonsteroidal anti-inflammatory medications. Magnetic resonance imaging of his spine performed 8 months after the diagnosis of multiple myeloma revealed degenerative joint disease, an old compression fracture at the level of L1, but showed no signs of cord compression or involvement with multiple myeloma. His back pain continued to increase in severity, requiring hospitalization 1 month later. His hemoglobin was 10.9 g/dL and platelet count, 54 K/ μ L.

The serum creatinine had risen to 6.2 mg/dL from 0.8 mg/dL 1 month earlier. His UPGMM had risen to 1678 mg/24hrs and his UPTP, to 2142 mg/24hrs. Dexamethasone was started for cytoreduction of recurrent myeloma. Renal biopsy showed changes consistent with light chain nephropathy and he was treated with plasmapheresis. A bone marrow biopsy was obtained, which demonstrated nearly complete replacement of the marrow with plasma cells with anaplastic morphology. These findings were consistent with anaplastic myeloma.

Discussion: Multiple myeloma is an abnormal proliferation of plasma cells in the bone marrow that produces serum or urine monoclonal immunoglobulin fragments. Without bone marrow transplantation, conventional therapy has less than a 20% rate of complete remission. Anaplastic myeloma is an aggressive variant that results from the dedifferentiation of myeloma cells. The histological diagnosis of anaplastic myeloma is made by the presence of clustered or diffuse anaplastic cells in the marrow, ranging from mature-appearing plasma cells to immunoblasts. Anaplastic myeloma is associated with a rapid clinical decline and death.

Abnormal Liver Function Tests in an Alcoholic-Cirrhosis? Think Again!

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A 56-year-old man was hospitalized with hypotension and abnormal liver function tests (LFT). He had a significant history of gastroesophageal reflux disease, alcohol use (9 mixed alcoholic drinks daily), episodes of alcohol-induced pancreatitis, and tobacco and illicit drug use. He was on no medications at the time of admission. Family history was negative for gastrointestinal malignancy or liver disease. Physical examination was notable for an alert and oriented patient with tel-

angiectasia and hepatosplenomegaly, but no other stigmata of chronic liver disease was present. The remainder of the examination was normal. Abnormal laboratory values included hemoglobin 10.9 g/dL, white blood cell count 12,400/ μ L, alkaline phosphatase 181 μ /L (50-136), and γ -glutamyl transpeptidase (GGT) 199 μ /L (15-85). Total bilirubin was 2.2 mg/dl, aspartate transaminase (AST) 134 μ /L (10-37) alanine aminotransferase (ALT) 34 μ /L (10-65). His platelet count was 397 K/ μ L and his chest x-ray was normal. Hospital work-up revealed no acute cardiac condition. His hypotension resolved with volume resuscitation. To evaluate the patient's abnormal LFT, a computed tomography scan of the abdomen was obtained. This revealed a diffuse infiltrative process in the liver consistent with alcoholic steatosis versus diffuse metastasis. A liver biopsy showed metastatic carcinoid tumor with evidence of necrosis (chromogranin stain). The tumor was positive for Ki67. An octreotide scan failed to reveal a primary source in the thorax or abdomen. Because of his advanced disease, he was given hospice care; he died within 3 months of hospital discharge.

Metastatic cancer with unknown primary (CUP) is a common clinical entity, accounting for 2% of all cancer diagnosis in the SEER registries between 1973 and 1987. Seventy percent of these cancers are metastatic adenocarcinoma. Neuroendocrine tumors, on the other hand, are uncommon. The classic triad of wheezing, flushing, and diarrhea seen in carcinoid syndrome is an uncommon presentation, and can occur only in the setting of metastatic disease to the liver. These symptoms were absent in our patient. Five-year survival with all stages of metastatic carcinoid is 22%, with median survival being <2 years; our patient died 3 months after diagnosis. Among the poor prognostic signs for metastatic carcinoid, our patient had atypical histology and positive Ki67. Although carcinoids have been traditionally felt to exhibit a restrained biologic behav-

ior, variants with aggressive malignant behavior need to be kept in mind.

Intraductal Papillary and Mucinous Tumor

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Case Presentation: We present a case of acute pancreatitis associated with intraductal papillary mucinous tumor (IPMT) in a 76-year-old woman admitted with a 1-day history of epigastric abdominal pain and anorexia. Physical exam revealed tenderness in the epigastrium, mental status changes of dementia were noted but patient was otherwise normal. Her initial pancreatic amylase was 583 U/L with a lipase of 707 U/L.

Ultrasound of the pancreas demonstrated ductal dilatation to 5-6 mm, undulating in character with beading, filled with low-level echogenic material of variable texture. This raised suspicion for mucinous ductal ectasia. Computed tomography scan revealed a pancreatic duct dilated to 4-5 mm, somewhat beaded in appearance, with the radiologist excluding ductal ectasia. ERCP revealed 5-6 mm dilatation of the main pancreatic duct from the level of the head to the tail of the pancreas with an erratic and ectatic course, multiple side branches and cystic dilatations. The duct of Santorini was normal. Turbid flocculated material was aspirated from the duct and a 3 mm selective pancreatic sphincterotomy done. Cytology of a brushing revealed no tumor cells.

Discussion: IPMT represents a rare mucin-producing tumor of the pancreas. It arises in the pancreatic duct and results in obstruction and progressive ductal dilatation or cyst formation. Long-term obstruction of pancreatic ducts leads to fibrosis and atrophy mimicking chronic pancreatitis. Most patients have no symptoms and it is detected incidentally with imaging studies performed for unrelated indications.

Although rare, IPMT can present with acute pancreatitis. Radiological studies are not always conclusive in diagnosis; ERCP remains the gold standard. Pancreatic duct stenting is often unsuccessful due to stent clogging with thick mucoid secretions. Pancreatic sphincterotomy may give short to intermediate term pain relief as seen in our patient. In nonoperable candidates, treatment options for pain relief are limited.

Metformin Overdose

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Case Presentation: A 56-year-old diabetic woman presented to the emergency department after intentional Metformin ingestion. She had ingested approximately 100 1000mg tablets (100 grams) 40 minutes prior to arrival. The patient reported a history of major depression and recent suicidal ideation. She denied ingestion of alcohol or any other medications that evening. Initial management included charcoal lavage in the emergency department and rapid admission to the medical intensive care unit. Physical exam revealed an alert woman with a depressed affect. Vital signs on admission were stable. She displayed no signs of respiratory distress or hemodynamic instability.

Admission laboratory revealed an arterial blood gas with pH=7.22, pCO₂=25, pO₂=101, and HCO₃=10. The calculated anion gap was 18 and measured lactate level was 8.4. Renal function was within normal limits. Serum alcohol, salicylate, and acetaminophen levels were all undetectable. A serum Metformin level was drawn and sent to an outside lab.

The administration of an IV fluid solution containing 5% dextrose and 2 ampoules of sodium bicarbonate was initiated on admission. Arterial blood gas in 3 hours revealed a pH=7.28, pCO₂=26, pO₂=89, HCO₃=12. A lactate level measured 5 hours after admission was reported as 14.7. Nephrology was consulted secondary

to increasing lactate levels despite attempt at alkalization with IV fluids and oliguria with a rising creatinine. Continuous renal replacement therapies (CRRT) was initiated within 8 hours of arrival to the hospital.

The lactate level quickly normalized on CRRT. The patient was dialyzed for 24 hours. Creatinine level at discharge was 0.7. The serum Metformin level obtained at admission returned with a reported value of 140mcg/mL (therapeutic range 1-2 mcg/mL).

Discussion: There are few cases of Metformin overdose described in the literature. No cases of survival of Metformin overdose with measured serum Metformin levels >139mcg/mL on admission are reported in the current literature. The positive outcome in this case is attributed to early presentation to a medical facility after acute ingestion, and the rapid administration of CRRT for treatment of life-threatening lactic acidosis.

Mononeuritis Multiplex Resulting from Systemic Vasculitis

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A 77-year-old woman with adult-onset of bronchial asthma in her 50s presented with a 6-month history of upper and lower extremity weakness associated with throbbing pain in her leg muscles and paraesthesias in her lower extremities. Neurological examination was consistent with mononeuritis multiplex involving both sensory and motor nerves. Laboratory studies showed profound eosinophilia and sedimentation rate elevation. Electromyography studies revealed axonal degeneration, and nerve and muscle biopsy showed necrotizing vasculitis with extravascular eosinophilic infiltration consistent with Churg-Strauss syndrome (CSS). She was treated with glucocorticoids, and after 1 week of treatment her ESR was normalized and eosinophil count was undetectable. Her neurological

symptoms gradually improved over the next few weeks.

CSS is a rare systemic vasculitis, which involves small blood vessels of the lungs, peripheral nerves, and skin. Its etiology is still unclear. It occurs at a mean age of 50 years without gender difference. CSS is a clinical diagnosis that should be suspected in the setting of adult-onset of asthma and profound eosinophilia. The diagnosis is confirmed during the vasculitic phase with tissue biopsy, which demonstrates necrotizing vasculitis and extravascular eosinophils. Most patients respond to glucocorticoid therapy, but cyclophosphamide can be used for recurrent disease. Before glucocorticoid therapy was available the mortality rate was 50% in 3 months. Since the advent of steroid treatment the survival rate has improved to 62%-75% at 5 years.

Early diagnosis of CSS can prevent morbidity and mortality from this disease. Clinicians must maintain a high index of suspicion for CSS in any patient presenting with late-onset asthma and profound eosinophilia with or without systemic manifestations of vasculitis.

Now That's Atypical Chest Pain

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Case Presentation: A 51-year-old man with a history of diabetes and chronic renal failure presented to the emergency department because of a change in mental status. During the review of systems he stated that he'd had chest pain for 2-3 days that radiated to the left jaw. On physical examination, the patient was febrile and had tachycardia. There were no murmurs and the lungs were clear. Laboratory results revealed an elevated troponin of 17.76 and a white blood cell count of 18,000 with 40% bands. Multiple blood cultures were positive for Methicillin-resistant *Staphylococcus aureus*. A transesophageal echocardiogram showed a large vegetation on the mitral and

aortic valves. On cardiac catheterization it was found that the left anterior descending artery was narrowed compared to a previous catheterization done 1 year previously. The findings were felt to be consistent with a myocardial infarction caused by embolization from the endocarditis. The patient was taken to surgery for aortic and mitral valve replacement.

Discussion: Embolization to the coronary arteries from infective endocarditis was first described in 1856. It is hard to determine the exact number of cases, however, in 1 study approximately 50% of autopsied hearts that were known to have endocarditis had emboli in the coronary arteries. Left coronary artery embolization is predominant and can result in a lethal event. The most common bacteria involved are *Staphylococcus aureus*. It has been suggested that this type of myocardial infarction can be treated by conventional methods. The possible complications, however, should not be taken lightly, and these patients should be monitored closely.

Conclusion: Medical treatment of endocarditis is still the mainstay. It is important to remember that most septic emboli to the coronary arteries are asymptomatic. However, there is a significant risk that embolization could result in a myocardial infarction. In addition, it is important to keep in mind that there can be embolization weeks after medical treatment even if there is no evidence of treatment failure.

A Pneumonia Complicated by Cold

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Case Presentation: A 57-year-old African-American man presented to the emergency department with a complaint of a productive cough, shortness of breath, fever, chills, rigors, generalized body ache, and weakness. On physical examination, he had a temperature of 99.4° Fahrenheit, heart rate of 124, icteric sclera, pale con-

junctiva and buccal mucosa, and splenomegaly. Laboratory data showed a white blood cell count of 15,700, hemoglobin of 4.4 g/dL, hematocrit of 11.9%, and platelet count of 170,000. A chest radiograph was consistent with an atypical pneumonia. Treatment was started with Azithromycin.

Further evaluation of the patient's anemia revealed an lactate dehydrogenase of 1605, haptoglobin <6, cold agglutinin 1:2048, Sedimentation rate >140, absolute reticulocyte count 199, C4 level <10, C3 level 68, and Mycoplasma antibody IgG and IgM levels 0.18 and 0.15 respectively. The patient's findings were consistent with a cold agglutinin autoimmune hemolytic anemia (AIHA) induced by Mycoplasma pneumonia. The anemia was treated with packed red blood cell transfusion. He improved on the third day of admission and was discharged.

Discussion: Cold agglutinin disease is typically characterized by IgM antibodies directed against polysaccharide antigens on the red cell surface. Pathologic cold agglutinins are produced either in response to infection or by paraneoplastic or neoplastic growth of a single immunocyte clone. Cold agglutinins regularly occur in the course of 2 infections, Mycoplasma pneumonia and infectious mononucleosis. Less commonly, cold agglutinins can be associated with other viral diseases. Patients with cold agglutinin AIHA may have symptoms related to both anemia and the agglutination of red blood cells. Cold agglutinin AIHA should be considered in any patient with pneumonia and found to be anemic.

Conclusion: In general, the idiopathic variety of cold agglutinin AIHA is a benign disease with prolonged survival and spontaneous exacerbations and remissions in the course of the disease. Intravenous solutions and previously refrigerated blood products must have their temperature raised before infusion in these patients in addition to treating the precipitating cause such

as infection. These patients may be successfully managed using protective clothing alone.

Pruritus and Primary Hyperparathyroidism

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Case History: A 68-year-old woman presented to the emergency department complaining of a 2-week history of intense pruritus. She had no other complaints, but she did report similar symptoms prior to a partial thyroidectomy for hyperthyroidism 5 years ago. Physical exam was unremarkable and showed no evidence of a skin rash. Chest x-ray revealed a fracture of the left first rib, but the patient had no history of chest wall trauma. Laboratory tests were significant for serum calcium of 12.1 mg/dl, phosphate of 2.1 mg/dl, and a parathyroid hormone (PTH) level of 120 pg/ml. Technetium-99m sestamibi scan revealed 2 small parathyroid adenomas and a subtotal parathyroidectomy was scheduled. While awaiting surgery, a dermatology consult was obtained to evaluate the patient's persistent complaint of pruritus. Her symptoms were attributed to xerosis but not relieved by topical emollients. Following the patient's parathyroid surgery, her pruritus completely resolved.

Discussion: Pruritus is the most common symptom of skin disease. In the absence of primary cutaneous findings, severe and extensive pruritus is often associated with systemic disease. Among patients being evaluated for pruritus, the prevalence of underlying systemic disorders has ranged from 10%-50%. Pruritus has been associated with a variety of metabolic derangements including hyperthyroidism and chronic renal failure. Subtotal parathyroidectomy has resolved the uremic pruritus of some patients with secondary hyperparathyroidism; these findings have encouraged researchers to evaluate derangements in calcium and phosphorous metabolism as pathogenetic risk factors for

uremic pruritus. This case illustrates that pruritus in the context of primary hyperparathyroidism may also be relieved by subtotal parathyroidectomy. To our knowledge, no published case reports have described pruritus in the context of primary hyperparathyroidism or the resolution of non-uremic pruritus by partial parathyroidectomy. Further research is needed to determine if derangements in calcium metabolism could account for non-uremic pruritus.

The Role of Fine-needle Aspiration and Intra-operative Frozen Section in the Management of Thyroid Nodules

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Purpose: Fine-Needle Aspiration (FNA) is well established as the initial step in the evaluation of thyroid nodules. Patients with FNA suspicious for malignancy go on to thyroid surgery, with either a partial thyroidectomy or total thyroidectomy. However, the usefulness of intra-operative frozen section (FS) in deciding on the initial surgical procedure is frequently debated. The purpose of this study is to evaluate the role of FNA and intra-operative FS in the management of thyroid nodules at our institution.

Methods: An 8-year retrospective chart review was conducted on all patients who had undergone FNA for a thyroid nodule with subsequent thyroid surgery and intra-operative frozen section. All patients were included regardless of age, previous thyroid carcinoma, or previous irradiation. The positive predictive value (PPV) of FNA and FS were calculated using the final pathology as the gold standard.

Results: A total of 151 patients (33 men and 118 women) had FNA of a thyroid nodule with subsequent thyroid surgery. FNA was insufficient for analysis in 4 patients. Seventy-seven

patients (51%) were diagnosed with thyroid carcinoma on final pathology. Of the thyroid carcinomas, papillary carcinoma accounted for 86%, Hürthle cell carcinoma for 9%, and follicular cell carcinoma for 5%. The overall PPV for a suspicious FNA was 62%. The overall PPV for a suspicious FS was 82%. The PPV of an FNA and FS suspicious for papillary carcinoma was 79% and 96%, respectively. The PPV of an FNA and FS suspicious for Hürthle cell carcinoma was 39% and 55%, respectively. The PPV of an FNA and FS suspicious for follicular carcinoma was 25% and 57%, respectively. Of the 119 FNA results suspicious for malignancy, 49 (41%) were thought to be benign on FS. Of these, 37 (76%) were correctly diagnosed and 12 were incorrectly diagnosed as benign on FS. A subset of patients went to surgery despite a benign FNA because of progressive growth, compressive symptoms, or patient request. Of the 28 FNA results that were benign, 7 were suspicious on FS. Two of these ultimately were malignant, and 5 were benign.

Conclusion: At our institution, FS had a higher PPV than FNA for malignancy on final pathology, indicating it is a more useful test when deciding between a partial or total thyroidectomy on initial surgery. This was consistently observed with all types of differentiated thyroid carcinoma. If FNA is reported as benign and surgery follows, omitting FS may be reasonable since FS was incorrect in 5 of 7 (71%) cases in which it changed the preliminary diagnosis from benign to suspicious.

Wisconsin Medical Journal

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