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February 22, 2010

Submitted as partial fulfillment of requirement for the Doctor of Nursing Practice Degree

Doctor of Nursing Practice Program

Texas Woman's University

Mr. Grand is a 55 year old insured Caucasian male seen in a family practice clinic. His primary complaint is pain, swelling, and redness in his right great toe. He says he woke up in the night with extremely excruciating pain in his toe, by morning his toe was dark red and warm. He denies a history of recent trauma or similar problems in other joints. He had a similar episode 3 years ago after a long train ride. At that time he was treated with Indomethecin which resolved his problems. He has currently been seen two times for office visits and obtainment of laboratory specimens.

Subjective

Past Medical History

Generally healthy.

Hospitalizations/Surgeries. None.

Major childhood illnesses. Denies rheumatic or scarlet fever, mumps, pertussis, or measles.

Adult illnesses. Hypertension and hyperlipidemia.

Immunizations. Tetanus 5 years ago; Denies having been around anyone with tuberculosis.

Medications. Hydrochlorothiazide 25mg daily and Diltiazem CD 300mg daily.

Allergies. Ace inhibitors.

Family Medical History

He has been married once, for 25 years. He has two grown children in good health. Mother is alive and well. Father died at age 68 from complications of diabetes and hypertension. He has a brother who also has hypertension.

Personal/Social History

He is an accountant for a large corporation. He travels frequently by train or airplane to various offices around the country. He denies smoking, admits to drinking 3-4 beers per night, denies use of street drugs.

Current health habits. Eats at least three meals per day, tries to eat low fat, low cholesterol foods. States he does not exercise regularly, due to his busy schedule. Has labs drawn yearly for cholesterol and checking for diabetes. Former primary care physician passed away about 6 months ago.

Diet and Nutrition. He reports that he likes to eat. One of his favorite foods is chicken livers which he reports to consume several times a week.

Review of Systems

General Constitutional Systems. Currently has chills, denies fatigue, or weight loss.

Skin, Hair, and Nails. Denies skin problems, rash or unusual changes. Denies changes in hair texture or nails. Denies hair loss or thinning of hair on body.

Head and Neck. Denies headaches, dizziness, and has never lost consciousness. Denies unusual changes in lymph nodes.

Eyes. Does not wear corrective lenses. Denies double vision or photophobia.

Ears. Denies hearing difficulties. Denies ringing in ears, discharge, or pain.

Nose. Denies frequent colds, or stuffiness. Denies nose bleeds and discharge.

Throat and Mouth. Denies bleeding gums, infection, gum disease, or soreness of throat or tongue. Last dental visit 12 months ago, brushes and flosses daily.

Endocrine. No changes noticed in thyroid, skin, hair or temperature preferences.

Denies polyuria and polydipsia.

Chest and Lungs. Denies chest pain or palpitations. States history of high blood pressure for past 10 years. Denies history of asthma, shortness of breath, or coughing. Denies spitting up blood. Denies night sweats. Denies varicose veins or bruising. Denies calf pain with exercise or activity.

Gastrointestinal. Denies anorexia, heartburn, indigestion, nausea or vomiting. Denies black or bloody stools, constipation, or diarrhea. Denies jaundice, hepatitis, or ulcers. Denies hemorrhoids. Has not noticed any changes in normal bowel pattern.

Genitourinary. Denies difficulty starting urine stream or changes in strength of stream. Denies dysuria, flank pain, or nocturia. Denies history of kidney stones.

Musculoskeletal. Denies arthralgias or morning stiffness. Previous episode of pain and redness was in same toe. Denies warmth or tenderness in other joints.

Neurologic. Denies stroke, seizures or syncopal episodes. Denies any loss of coordination. Denies paralysis, weakness, numbness, or tingling in extremities.

Objective

Physical Examination

General. Fifty-five year old Caucasian male who appears his stated age; alert, cooperative, pleasant; well-groomed; communicates appropriately; makes eye contact and expresses appropriate concern throughout history.

Temp 100.0 F tympanic
Pulse 94, regular
Respirations 20 even, unlabored
BP 150/100 sitting rt arm;
Wt 208 lbs (94.5 kg); Ht 5'9" (179) cm); BMI 30 overweight; medium frame.

Mental Status. Oriented to person, place and time; short and long term memory

intact; comprehends and follows directions easily; speech clear and appropriate; mood appropriate for setting.

Skin, Hair, and Nails. Has a light tan complexion; warm, no edema, rash or jaundice noted, turgor with instant recoil, no lesions, tophi or scaly areas noted; nails well-groomed, pink, no evidence of trauma or clubbing, capillary refill < 2 sec, no redness or swelling; hair well-groomed light brown; evenly distributed in male pattern.

Head. Midline, erect; skull pink, normocephalic; no lesions, tenderness, or swelling; facial features symmetric; no tenderness over sinuses; no swelling, or drooping; temporal arteries soft, nontender, no bruits.

Eyes. Brows, lids, and lashes evenly distributed; no edema, redness, puffiness, or sagging around orbits; eyelids turned outward; no tremors, ptosis, or nodules; conjunctiva pink; sclera clear, no erythema, or drainage; cornea moist, clear, corneal reflex intact; irides uniformly brown; PERRL; extraocular movements intact; no nystagmus.

Ears. Auricles in proper alignment; colored evenly; no lesions, nodules, or drainage noted; ear canal free of cerumen; tympanic membranes gray, intact, with light reflex visualized bilaterally; bony landmarks visualized; conversation hearing appropriate.

Nose and Sinuses: Nose midline; no deviations; no flaring of nares; no tenderness, masses, or drainage noted; nares patent bilaterally; mucosa pink, moist; no polyps, redness, or swelling visualized; septum midline; no sinus tenderness with palpation or percussion.

Throat and Mouth. Lips pink; vertical and horizontal symmetry at rest and with movement; no dryness, cracks, cheilosis, lesions, or swelling noted; buccal mucosa pink,

smooth, and moist; no lesions or swelling; uvula midline with elevation of soft palate; gag reflex present; pharynx with no erythema or swelling; tonsils present.

Neck. Trachea midline; no tracheal tug, redness, or swelling; no masses; no jugular venous distension; no prominence of carotids; no bruits or thrills; thyroid palpable, firm, smooth, not enlarged; no palpable lymph nodes; full range of motion; no weakness.

Chest and Lungs. AP diameter < lateral diameter with 1:2 ratio; no kyphosis; thoracic expansion even; unlabored respirations without use of accessory muscles; vesicular breath sounds throughout without adventitious sounds; no cough noted.

Heart and Blood Vessels. No visible pulsations over precordium; PMI palpable at 5th intercostal space midclavicular line; no heaves, lifts, or thrills; S1S2, no extra sounds or murmurs; arterial pulses of moderate intensity equal bilaterally, no bruits or thrills; no JVD.

Abdomen. Soft, round, and symmetric; no venous network visible; no visible pulsations or peristalsis; bowel sounds present in all four quadrants; no bruits over aorta, renal, iliac, or femoral arteries; percussion tones tympanic over abdomen, loudest over epigastrium, dullness over liver; liver not palpable; no splenomegaly; no masses felt, no guarding present, no rebound tenderness; no tenderness at costovertebral angle.

Lymphatic. No palpable lymph nodes.

Genital/Rectal. Deferred.

Musculoskeletal. All joints show normal ROM without deformity or signs of inflammation. Except right first metatarsophalangeal joint has local tenderness, warmth, erythema, swelling and limited range of motion. Swelling also noted onto the dorsal

aspect of the foot. Light touch to right great toe causes extreme pain. Posture erect, no scoliosis noted; limp lengths equal bilaterally.

Neurologic. Coordinated movements; deep tendon reflex 2+ bilaterally in all extremities; gets up and down from exam table with ease.

Diagnostics: (Testing performed by Quest Diagnostics)

Test Name	Result	Reference Range	H/L
WBC	13.8	4 – 11 x 10 ⁹ /L	H
Hemoglobin	15.9	13.2 – 17.1 g/dL	
Hematocrit	47.2	38.5 – 50.0 %	
MCV	90	80 – 100 fL	
ESR	30	3 – 15 mm/hr	H
Platelets	180	150 – 450 X 10 ⁹ /L	
Neutrophils	71	40 – 60 %	H
Monocytes	2	0 – 10%	
Lymphocytes	21	20 – 50 %	
Glucose	90	65 – 99 mg/dL	
BUN	7.4	7 – 25 mg/dL	
Creatinine	0.65	0.60 – 1.10 mg/dL	
Uric acid	10.1	3.4 – 7.0 mg/dL	H
AST	59	10 – 35 U/L	H
ALT	77	10 – 40 U/L	H
GGT	56	10 – 55 U/L	H
Total cholesterol	205	125 – 200 mg/dL	
Triglycerides	94	<150 mg/dL	
LDL	139	<130 mg/dL	
HDL	47	>= 40 mg/dL	
Urine pH	6.0		
Protein	None		
Glucose	None		
Blood	None		

A joint fluid aspiration was done and an x-ray of the foot was obtained. Using aseptic technique the affected joint was aspirated. The synovial fluid was sent for cell count, gram staining, culture, and polarized microscopic examination for crystals.

X-ray of the right foot showed soft tissue swelling around the first metatarsophalangeal joint but no erosion. Fresh preparation of synovial fluid showed

needle and rod shaped strongly negative birefringent crystals under compensated polarized light microscopy (400X). The rest of the synovial fluid examination was suggestive of inflammation (WBC – 20,000/ μ L with 92% neutrophil). Culture reports were negative.

Synovial analysis is essential to identify monosodium urate (MSU) or calcium pyrophosphate (CPP) crystals to differentiate gout from pseudogout. Diagnostic arthrocentesis is indicated for every patient in whom a diagnosis has never been proven by joint aspiration and for those in whom a possibility of septic arthritis exists. Joint fluid should be sent for fluid analysis, including cell count and differential; gram stain, culture and sensitivity; and microscopic analysis for crystals. If crystals are seen, their shape and appearance under polarized light can aid in diagnosis (Richette & Bardin, 2010).

In gout, crystals of MSU appear as needle-shaped intracellular and extracellular crystals. When examined with a polarizing filter, they are yellow when aligned parallel to the compensator, but they turn blue when aligned across the direction of polarization (i.e. they exhibit negative birefringence). In pseudogout, CPP crystals appear shorter and often rhomboidal. Under a polarizing filter, CPP crystals do not change color depending upon their alignment relative to the direction of the compensator (Eggebeen, 2007).

Radiographic lesions of chronic gout may appear as punched-out (rat-bite) sclerotic regions on the joint surfaces, with overhanging margins. New onset gout usually has no radiographic findings. Patients with pseudogout usually have degenerative joint changes and may have calcifications in the soft tissues, tendons, or bursae (Eggebeen, 2007).

Assessment

Presenting problem

Foot pain(719.47)/Effusion of foot joint(719.07)

Differential diagnosis

Pseudogout – Inflammation is caused by calcium pyrophosphate dihydrate (CPPD) crystals and is sometimes referred to as calcium pyrophosphate crystal deposition disease. Most commonly involved joints include the knee, wrist, or first metatarsophalangeal. Synovial fluid WBC count ranges from 2,000 to 50,000 per mm³, culture is negative. Diagnosis is based on synovial analysis and evidence of chondrocalcinosis on X-ray. It affects 10-15% of adults over age 65 (Eggebeen, 2007).

Septic arthritis – Symptoms include fever, arthritis, and extreme tenderness of a joint. X-rays typically show swelling and effusion. Synovial fluid shows >50,000 per mm³ WBC's and no crystals. The knee is the most commonly involved joint. Cultures are necessary to rule it out and prompt treatment is necessary to avoid joint destruction (Eggebeen, 2007).

Infective cellulitis – Symptoms include pain, swelling, and erythema of an extremity. X-ray often shows soft-tissue swelling but no joint changes. Cellulitis is often caused by Staphylococcus or Streptococcus (Wilson, 2010).

Medical diagnosis

Gout. (274.0)

Acute gout is characterized by the sudden onset of pain, erythema, limited range of motion and swelling of the involved joint. Peak incidence occurs between 30 and 50 years of age. Approximately 90% of first attacks are monoarticular. The onset of gout

before age 30 in men or before menopause in women is atypical and raises concern about an associated inherited enzyme defect or renal disease (Kumar, Abbas, Fausto, & Aster, 2010).

In almost all first attacks a single distal joint is affected. The first metatarsophalangeal joint is affected in over 50% of cases; other common sites include ankle, midfoot, knee, small joints of hands, wrist, and elbow. During the attack, the joint shows signs of marked synovitis but also periarticular swelling and erythema. The attack may be accompanied by fever, malaise, and even confusion, especially if a large joint such as the knee is involved (Montgomery, 2008).

Uric acid is the final metabolite of endogenous and dietary purine nucleotide metabolism. It is the product of xanthine oxidase catalyzed conversion of xanthine and hypoxanthine. It is a weak acid with relatively little water solubility. Gout is the common end point of a group of disorders that produce hyperuricemia. Gout develops as a result of the buildup of uric acid in the body either by decreased excretion or by increased production. When the concentration of urate exceeds its solubility, crystals precipitate. The crystals lead to activation of classical and alternative pathways of complement, influx of neutrophil into the joint, and release of numerous inflammatory cytokines (Montgomery, 2008).

The American College of Rheumatology's preliminary criteria for the diagnosis of gout includes (Eggebeen, 2007):

Gout may be diagnosed if one of the following criteria is present:

Monosodium urate crystals in synovial fluid

Tophi confirmed with crystal examination

At least six of the following findings:

- 1. Asymmetric swelling within a joint on a radiograph*
- 2. Maximal inflammation within 24 hours*
- 3. An episode of monoarticular arthritis*
- 4. Joint erythema*
- 5. Swollen or painful first MTP joint*
- 6. Monoarthritis attack*
- 7. Unilateral inflammation of a tarsal joint*
- 8. Possible tophi*
- 9. Hyperuricemia*
- 10. More than one acute arthritis attack*
- 11. Subcortical cysts with erosions on a radiograph*
- 12. Joint inflammation with negative culture*

Gout and pseudogout are the two most common crystal-induced arthropathies. They are debilitating illnesses in which pain and joint inflammation are caused by the formation of crystals within the joint space. In gout, inflammation is caused by monosodium urate monohydrate (MSUM) crystals. Primary gout accounts for 90% of cases of which most 85-90% of cases are a result of an unknown enzyme defect which results in an overproduction of uric acid with normal excretion (majority) or increased excretion (minority), or an under excretion of uric acid with normal production. There are known enzyme defects such as partial hypoxanthine guanine phosphoribosyl transferase deficiency which causes an overproduction of uric acid. Primary gout follows a multifactorial inheritance and runs in the family. Secondary gout which makes up 10%

of cases can have multiple causes. Leukemia can be associated with an increased nucleic acid turnover which results in an overproduction of uric acid with increased urinary excretion. Chronic renal disease can lead to a reduced excretion of uric acid with normal production. An inborn error of metabolism, such as in Lesch-Nyhan syndrome, complete hypoxanthine guanine phosphoribosyl transferase deficiency leads to overproduction of uric acid with increased urinary excretion (Kumar, Abbas, Fausto, & Aster, 2010).

Plan

Evidence-based/best practice basis for plan of care

The three general goals of therapy in the management of gout recommended by British Society of Rheumatology are (Jordan et al., 2007):

1. Management of the acute painful attack
2. Recommendations to change diet, lifestyle modifications and implementation non-pharmacological modalities.
3. Management of recurrent or chronic gout

Drugs used in the management of acute gout. NSAIDS such as Indomethacin, Naproxen, Ibuprofen are considered first line therapy. These act primarily by inhibiting the cyclooxygenase enzyme. They are contraindicated in patients with peptic ulcer disease or systemic anticoagulation. Side effects include gastropathy, nephropathy, liver dysfunction, central nervous system dysfunction; may cause fluid overload in patients with congestive heart failure. The most important determinant of therapeutic success is not which NSAID is chosen, but rather how soon NSAID therapy is initiated (Teng, Nair, & Saag, 2006).

Colchine is recommended when NSAIDS are contraindicated. Colchine interferes with neutrophil phagocytosis. A particular disadvantage is its narrow therapeutic to toxic ratio. It can cause particular adverse effects on the gastrointestinal system including diarrhea, nausea, and vomiting (Teng, Nair, & Saag, 2006).

Corticosteroids particularly oral prednisolone, intramuscular triamcinolone, and intraarticular triamcinolone are possible treatment options. Anti-inflammatory action of corticosteroids involves lowering and inhibition of peripheral lymphocytes and macrophage and inhibition of phospholipase A₂. Side effects of steroid use include fluid retention, impaired wound healing, may require repeated injections, and risk of soft tissue atrophy (Teng, Nair, & Saag, 2006).

Allopurinol reduces production of uric acid by producing competitive inhibition of enzyme xanthine oxidase. It is primarily used in the treatment of chronic gout, gout complicated by renal disease or renal calculi. It is a treatment of choice for patients who overproduce uric acid. Peak effect in reduction of urate synthesis occurs at two weeks. Side effects include rash, gastrointestinal symptoms, headache, urticaria, and interstitial nephritis; rare, potentially fatal hypersensitivity syndrome may occur (Teng, Nair, & Saag, 2006).

Rx (pharmacological and non-pharmacological).

1. Indomethecin 50mg three times a day.
2. Keep a supply of NSAIDS and take it as soon as first symptoms appear.
3. Reduce weight.
4. Reduce alcohol consumption.
5. Avoid daily intake of organ meat, especially liver.

6. Drink plenty of water preferably 10-12 glasses per day.
7. Regular follow-up at 3 month intervals
8. Report if acute attacks are frequent, not responding to NSAIDS, or if systemic features develop.

Guidelines for the management of gout include recommendations for diet, lifestyle modification and nonpharmacologic as well as pharmacologic therapy. Dietary restrictions include avoiding high purine foods and red meats. Foods that are discouraged include organ meats, shellfish, and yeast extracts. Drinking water to ensure hydration is encouraged and limiting or avoiding alcohol is recommended. Obtaining an 'ideal' body weight is recommended, however crash diets should be avoided as well as high protein diets. Pharmacological treatments include NSAIDS, Colchicine, Allopurinol, and corticosteroids, therapy may need to be modified in the presence of other health problems, particularly contraindications to NSAID therapy (Jordan et al., 2007).

Psychosocial Care Issues (patient/family)

Discuss with family members the lifestyle modifications that will aid in preventing future reoccurrence of gout. Mr. Grand's wife is the primary purchaser and preparer of meals. Discuss with both the importance of increasing activity and weight loss on prevention of gout and other chronic health issues.

Continuity of Care Addendum

Follow-up

Mr. Grand is asked to follow-up in 3 months. At this visit routine lab work will be done. He is advised to follow-up if he has an attack before his next visit.

Family and Patient Education

A handout from the American Academy of Family Physicians was given to the patient. The patient and his wife were told that patients with gout can reduce their serum urate levels by altering their diet. In particular these patients should avoid purine-rich foods (such as beer, some fish, and spinach), and reduce their total calorie and cholesterol intake. Remaining sufficiently hydrated is also important.

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