The following article is the first of a detailed two-part case study on this procedure. This article covers the preoperative portion of the article; the June issue will cover the intraoperative and postoperative portions of the article.

OVARIAN CYSTECTOMY AND BILATERAL TUBAL LIGATION

A CASE STUDY/PART I

VALERIE ROCHE, CST

Case study biographical information

This patient is a Caucasian woman, born October 15, 1960, who is divorced and lives in New York. Her religious affiliation is Catholic. She smoked two to three packs of cigarettes per week for 20 years and quit smoking in 1995. She drinks alcohol socially—approximately one drink daily and two to three drinks daily on weekends. The patient has three children, two of whom are living at home. She has a high school education and works in an office environment.

Physical condition upon admission

Medical history

The patient has mitral valve prolapse and needs prophylactic antibiotics. This is a condition in which the leaf-like part of the mitral valve drops down during contraction of the heart, allowing leakage or regurgitation of small amounts of blood into the atrium.[1] She should take antibiotics before dental and surgical procedures because of the risk that bacteria introduced during the procedure might infect the heart valve.[2]

She also takes medication for an anxiety disorder. Anxiety is a normal response to stress. However, when anxiety occurs at inappropriate times or is so intense and long-lasting that it interferes with a person's normal activities, it is considered a disorder.[2]

The patient experiences shortness of breath upon exertion and says her other asthma triggers include the weather and an allergy to cats. Asthma is a condition in which the airways are narrowed because hyper-reactivity to certain stimuli produces inflammation; the airway narrowing is reversible.[2]

The patient also states that she has an ulcer. A peptic ulcer is a well-defined round or oval sore where the lining of the stomach or duodenum has been eaten away by stomach acid and digestive juices.[2]

Surgical history

In 1966, the patient had an appendectomy, which is the surgical removal of the vermiform appendix. Appendectomy is performed for acute appendicitis that is usually caused by obstruction of the appendiceal lumen. It manifests as inflammation.[3]

In 1983, she had a cholecystectomy which is the excision of the gallbladder. Cholecystectomy is primarily performed for acute cholecystitis that commonly results from obstruction of the cystic duct by trapped gallstones.[3]

The patient has had multiple breast cyst biopsies and aspirations. Cysts are fluid-filled sacs that can be easily felt. Aspiration is the draining of the fluid with a thin needle to relieve pain caused by the cyst.[2]

The chart also indicates that she had a right knee arthroscopy. There is no date for this procedure. Arthroscopy of the knee is performed for diagnostic purposes, for removal of loose bodies that can cause the knee joint to lock in place, for shaving the patella and torn meniscus, or for meniscectomy.[3]

Allergies

The patient has several allergies. She says that if she takes codeine, she gets hallucinations. Codeine is an opiate analgesic and an antitussive that depresses pain impulse transmission.[4] She is allergic to penicillin, a broad-spectrum anti-infective which interferes with bacterial cell wall replication; it gives her hives. Ceclor® (cefaclor) is an anti-infective, second generation cephalosporin that inhibits bacterial cell wall synthesis.[4] This agent causes her to vomit and itch. Sulfimycin® (an anti-infective) is a combination product composed of 200 mg of erythromycin and 600 mg of sulfisoxazole per 5 ml. Both erythromycin and sulfisoxazole suppress bacterial protein synthesis.[4] Sulfimycin causes her skin to erupt in hives. The patient stated that pain medications cause her dizziness, hallucinations and vomiting.

Current medications

The patient takes the following medications routinely:

1) Xanax® or alprazolam (antianxiety, sedative, hypnotic) depresses the central nervous sys-

tem and is used to treat anxiety.[4] Her oral dose is 1 mg daily.

2) Zantac® or ranitidine (histamine receptor antagonist) inhibits gastric acid secretion and is used to treat gastric ulcers.[4] Her oral dose is 150 mg twice a day.
3) Glucotrol® or glipizide (antidiabetic agent) causes a release of insulin that leads to a drop in blood glucose levels. It is used to stabilize adult-onset diabetes mellitus.[4] Her oral dose is 2.5 mg twice per day.
4) Ambien® or zolpidem (sedative, hypnotic) depresses the central nervous system. It is used to treat insomnia short-term.[4] The patient's oral dose is 10 mg at bedtime.
5) Claritin® or loratadine (antihistamine) provides antihistamine action without sedation. It is used to treat seasonal rhinitis.[4] The patient's oral dose is 10 mg every morning.

The patient's medications indicated treatment for diabetes mellitus and insomnia, which had been omitted from the medical history she had given.

Preoperative diagnosis and contributing findings

The history of the patient's illness included left lower quadrant pain for three months, sharp pain radiating to her hip for two months, and a history of a left ovarian cyst. The cyst was documented in the chart by three separate sonogram reports done in August, October and December of 2002. Sonograms are diagnostic tests that use sound waves to produce an image of an organ or tissue. Ultrasonic echoes are recorded as they strike tissues of different densities.[1] "Because ultrasound can distinguish subtle variations between soft, fluid-filled tissues, it is particularly useful in providing diagnostic images of the abdomen."[5]

The first medical sonograms were produced in the 1950s and in the 1960s came into general medical use. The great advantage over X-ray imaging technologies is that ultrasound does not damage tissues with ionizing radiation, but uses sound waves above the frequency of human hearing—between one and 10 million hertz (Hz).[5] It is warranted as a diagnostic tool for patients afflicted with abdominal pain, as in this case.

The preoperative diagnosis was chronic pelvic pain, left ovarian cyst, and multiparity. Based on the results of the successive sonograms (Table 1) it was obvious that the size of the cyst was increasing.

Preoperative diagnostic studies

Laboratory work is dated 1-28-03, and the values in Table 2 were posted to the patient's chart.

Differential blood count

Lymphocytes: These cells are the primary means of providing the body with immune capability. Less than 1% are present in the circulating blood; they travel back and forth between the circulating blood and the lymph nodes. They constitute 20% to 44% of total white cells in the circulating blood.[1] Normal range is 20%-40%; patient level was 24.9%.

Monocytes: White blood cells that circulate in the bloodstream for 24 hours then move into tissues and become macrophages. They are one of the first lines of defense in the inflammatory process.[1] Normal range is 0-7%; patient level was 7%.

Neutrophils: The most common white blood cell, comprising 50%-70% of the total. They are responsible for much of the body's protection against infection. When killed they release an enzyme that results in the formation of pus.[1] Normal range is 40%-65%; patient level was 63.9%.

Basophils: A type of white blood cell that is essential to the non-specific immune response to inflammation, because it releases histamine and other chemicals that act on blood vessels.[1] Normal range is 0-1%; patient level was 0.5%.

Table 1 Patient's sonogram results

Date	*Result (dimensions of left ovarian cyst)*
8/8/02	69 x 51 x 48 mm
10/21/02	69 x 54 x 47 mm
12/12/02	78 x 67 x 53 mm

Eosinophils: A type of white blood cell that destroys parasitic organisms and plays a major role in allergic reactions. It releases chemical mediators that cause bronchoconstriction in asthma.[1] Normal range is 0-8%; patient level was 3.7%.

Hematology

These are tests of the blood and blood-forming tissues.[1] White blood cell (WBC) count is the number of leukocytes per microliter (µl) of whole blood. Leukocytes average 5,000 to 10,000 per microliter. They are primary effector cells against infection and tissue damage. They destroy organisms and act as scavengers. White blood cell counts are important in detecting infection or immune system dysfunction. The numbers and type of white blood cells are determined by microscopic examination of a thin layer of blood on a glass slide.[1] Normal range is 3,500-10,000/mm^3; patient level was 10,200/mm^3. This slight elevation in white blood cell count is probably due to stress and emotional upset.[6] The patient was very upset prior to surgery.

Red blood cell (RBC) count is the number of erythrocytes per microliter of whole blood. In women, 4.5 million per microliter is an average count. The primary function is to carry oxygen and act as a buffer for the transport of carbon dioxide in the plasma.[1] A red blood cell count provides information critical to physiological functions.[7] A decrease causes hypoxia, an oxygen deficiency.[1] Normal range is 4.5-5.3 million/mm^3; patient level was 4.85 million/mm^3.

Hemoglobin (Hb) is the iron-containing pigment of the red blood cells. A low value for hemoglobin may indicate anemia, which is a deficiency in the quantity or quality of erythrocytes.[7] Normal range is 12-16 g/dl, patient level was 14.4 g/dl.

Hematocrit (Hct) is the volume of erythrocytes packed by centrifugation in a given volume of blood and is expressed as the percentage of total blood volume.[1] Normal range is 35-47%; patient level was 41.9%.

Mean Corpuscular Volume (MCV) is a measurement of the average size or volume of a single red blood cell. This test helps differentiate among the anemias.[7] Normal range is 85-95 FL; patient range was 86.3 FL.

Mean Corpuscular Hemoglobin (MCH) is the hemoglobin content of the average red blood cell expressed in picograms per red blood cell. It is calculated by multiplying the number of grams of hemoglobin per 100 milliliters by ten and dividing by the red blood cell count. This test differentiates among the anemias.[7] A picogram equals one trillionth of a gram.[1] Normal range is 27-32 pg; patient level was 29.7 pg.

Mean Corpuscular Hemoglobin Concentration (MCHC) is a measure of the average percentage of hemoglobin within a single red blood cell. It is the hemoglobin concentration per unit volume of red blood cells. It differentiates among the anemias.[7] Normal range is 31-36 g/dl; patient level was 34.3 g/dl.

Platelet Count (PLT) evaluates, diagnoses and monitors bleeding and coagulation (clotting) disorders.[8] Platelets play an important role in blood coagulation, hemostasis and thrombus formation. They form a plug (clot) that covers an injury.[1] Normal range is 150,000-400,000/mm^3; patient level was 375,000/mm^3.

Red Blood Cell Distribution Width (RDW) tests variations in red blood cell size. It is used to classify and differentiate among the anemias.[4] Normal range is 11.3-13.5%, patient level was 12.0%.

Special hematology

Partial Thromboplastin Time (PTT) measures the intrinsic coagulation time and monitors anti-coagulation therapy.[7] The test screens for deficiencies in clotting factors and detects platelet variations. It is more sensitive than the prothrombin time test.[6] Normal range is 22.0-37.5 seconds; patient level was 22.1 seconds.

Prothrombin Time (PT) is the time it takes for clotting to occur after thromboplastin and calcium are added to decalcified plasma. This test is used to evaluate the effect of the administration of anticoagulant drugs.[1] Normal range is 10.3-14.0 seconds; patient level was 10.7 seconds.

International Normalized Ratio (INR) is a ratio that compares tissue thromboplastin from any source to human brain tissue thromboplastin by dividing the patient's prothrombin time by the mean prothrombin time value of the population. Normal range is 0.7-1.2; patient level was 0.78.

Comprehensive metabolism panel

These tests measure fluid and electrolyte imbalances. Correct balances greatly influence the outcome of surgical intervention.[7]

Glucose is the most important carbohydrate in body metabolism. This test is used to assess the handling of glucose by the body. When blood sugar (glucose) level rises, glucose appears in urine and is a symptom of diabetes. A low level of glucose is called hypoglycemia.[1] Normal range is 70-110 mg/dl; patient level was 169 mg/dl.

The patient takes 2.5 mg of glipizide (Glucotrol®) twice a day to stabilize adult-onset diabetes mellitus (Type II). She had not taken her medication the day of the surgery when these laboratory tests were done. When blood sugar is elevated, there is not enough insulin. Levels higher than 120 mg/dl indicates diabetes.

Blood Urea Nitrogen (BUN) measures the metabolic waste products eliminated by the kidneys. When kidney filtration function is impaired and when dehydration occurs, the BUN is elevated.[8] Normal range is 7-20 mg/dl; patient level was 9 mg/dl.

Sodium is a key regulator in water balance, and is necessary for normal functioning of muscles and nerves, and for normal metabolism.[7] Normal range is 135-147 mEq/l; patient level was 135 mEq/l.

Potassium is essential for electrochemical reactions for cellular functions.[7] It also tests kidney and adrenal gland function.[8] Normal range is 3.8-5.0 mEq/l; patient level was 4.0 mEq/l.

Chloride is essential to electrochemical reactions for acid-base regulation, and for the movement of water between fluid compartments in the body.[7] It also combines with sodium in the blood.[1] Normal range is 100-108 mEq/l; patient level was 101 mEq/l.

Carbon dioxide in a blood profile tests for acid-base imbalance from a variety of possible causes including respiratory failure, kidney disease, diabetic acidosis and diarrhea.[8] Normal range is 24.0-32.0 mEq/l; patient level was 27.0 mEq/l.

Creatinine is a normal constituent of urine.[1] It is a chemical normally found in blood that is excreted in the urine. The filtration function of the kidneys can be assessed by comparing the amount of creatinine in the blood with the amount excreted by the kidneys.[8] An increase may mean kidney failure or dehydration.[8] Normal range is 0.5-1.5 mg/dl; patient level was 0.7 mg/dl.

Calcium is essential to normal muscle physiology and is an intricate part of the blood clotting mechanism.[7] It can indicate problems with the parathyroid and thyroid glands, bone diseases and kidney malfunction.[8] Normal range is 8.5-10.5 mg/dl; patient level was 9.1 mg/dl.

Total proteins reflect metabolic and nutritional status in a wide variety of disorders, and some cancers cause an overproduction of proteins.[8] Normal range is 6.0-8.6 g/dl; patient level was 7.1 g/dl.

Albumin is a simple protein found in the blood as serum albumin that acts as a carrier to maintain blood volume and blood pressure.[1] In some forms of liver and kidney disease and

in malnutrition, albumin is reduced.[8] Normal range is 3.5-5.0 g/dl; patient level was 4.1 g/dl.

Bilirubin is the orange-yellow pigment in bile derived from the hemoglobin of red blood cells that have died.[1] The test helps determine liver function.[1] Normal range is 0.2-1.0 mg/dl; patient level was 0.7 mg/dl.

Alkaline phosphatase (ALP) is used to assess liver condition.[7] It functions in the mineralization process of bone.[1] Normal range is 45-124 U/l; patient level was 50 U/l.

Serum glutamic-oxaloacetic transaminase (SGOT) is an intracellular enzyme involved in amino acid and carbohydrate metabolism. An increased level in the blood indicates necrosis or

disease in the muscles, liver or brain.[1] Normal range is 7-37 U/l; patient level was 16 U/l.

Serum glutamic-pyruvic transaminase (SGPT) is an intracellular enzyme involved in amino acid and carbohydrate metabolism. An increased level of this enzyme in the blood indicates necrosis or disease in the liver, muscles or brain.[1] Normal range is 3-31 U/l; patient level was 17 U/l.

Urine—macroscopic

A routine urinalysis was performed preoperatively (Table 2). Urinalysis indicates kidney and bladder infections and diseases, certain metabolic and systemic diseases, dehydration, and urinary tract bleeding.[8]

Blood

The type and cross-match test establishes the patient's blood group (A, B, AB or O) and Rh type to ensure compatibility of transfused blood between the donor and the recipient.[8] The patient's blood type is A, Rh-positive.

The antibody screening test ensures that blood is safe for transfusion. It identifies antibodies that attack cells of the patient's own body. Presence may indicate collagen vascular disease, thyroid disorders, and adrenal disorders.[8] Normal is negative; the patient was negative.

Pregnancy test

Human chorionic gonadotropin (hCG) determines whether a women is pregnant. The hormone, hCG, is released within six days after conception. Presence of hCG indicates pregnancy.[8] The patient's test was negative.

X-ray studies

Radiographic Report: (Test done prior to surgery.)

A chest X-ray is performed to evaluate the lungs and thorax for the presence of abnormalities; to evaluate the size of the heart; and to screen for lung disease.[8] It rules out unsuspected pulmonary disease that could be communicable or would contraindicate the use of inhalation anesthetics.[7]

Two views were taken: a posteroanterior (ie X-ray passes from back to front of body), and a lateral view (ie X-ray passes through patient's side).The report stated that radiographs of the chest demonstrated the heart and mediastinal structures were within normal limits. Pulmonary vascularity was normal, and the lungs were clear. Bony structures were unremarkable, and no evidence of pulmonary disease existed.

Electrocardiogram (EKG or ECG) (test done prior to surgery)

This test records, in graphic form, the heart's function by detecting the heart's electrical activity (Table 3). It provides information on the rate (eg number of beats per minute) and the rhythm (eg regularity of beats) of the patient's heartbeat. Electrodes (disks) connected to a lead (wire)

Table 2 Patient's Urinalysis

Patient's Urinalysis (macroscopic)	*Normal*	*Patient*
Color	light straw to dark amber	yellow
Clarity	clear	clear
Glucose	negative	negative
Bile	negative to 0.02 mg/dl	negative
Ketones [when the level of ketones in blood exceed the threshold, ketones appear in the urine][1]	negative	negative
Specific Gravity [this measures the concentration of particles and the hydration status of the patient][10]	1.015-1.025	1.015
Blood	negative	negative
pH [this indicates acid-base balance and identifies crystals in the urine, and the predisposition to form renal stones][10]	6.0-7.0	6.0
Protein [normally not present][10]	negative	negative
Urobilinogen: A colorless derivative of bilirubin, formed from the action of intestinal bacteria.[1]	0.2-1.0 eu/dl	0.2 eu/dl
Esterase [an enzyme that catalyzes the hydrolysis of esters].[1]	negative	negative
Patients Urinalysis (microscopic)	*Normal*	*Patient*
Red Blood Cells	none	none
White Blood Cells	none	none
Epithelial Cells [these cells form the outer surface of the body and line the body cavities, tubes and passageways leading to the exterior of the body][1]	none	none
Solid Body Crystals [crystals indicate that renal stone formation is imminent][10]	none	none

detect electrical impulses given off by the body.[9] The test detects heart problems or blockages in the coronary arteries, records heart rate and regularity of heartbeats, and diagnoses heart disorders or heart attacks.[8] A normal heart beat is 50-90 beats per minute. The QRS complex shows markers for potential ventricular arrhythmias and represents atrial depolarization.[10]

Preoperative medications ordered

Due to her mitral valve prolapse, the surgeon ordered amoxicillin to be administered intravenously one hour prior to surgery. Amoxicillin is a broad-spectrum anti-infective that interferes with bacterial cell wall replication, causing it to swell

and burst.[4] While the patient was in the holding area prior to her surgery, the nurse noted that she was allergic to penicillin and did not administer the amoxicillin. Amoxicillin is contraindicated for patients with a hypersensitivity to penicillins.[4] Also, amoxicillin cannot be administered intravenously; it is not available in that form.[4]

This matter delayed the preparation of the patient for surgery. The surgeon ordered 1 g of vancomycin to be given intravenously, and an additional gram was to be administered in the operating room. Vancomycin is also an anti-infective that inhibits bacterial cell wall synthesis.[4] This drug was administered for surgical prophylaxis.

Table 3 Patient report

Normal EKG and normal sinus rhythm.
Ventricular rate was 82 beats per minute.
PR interval of sinus rhythm was 164 ms.
The QRS duration was 90 ms.
QT/QTC was 372/434 ms.
P-R-T axes was 39-9-45.

Operating room check

With the assistance of the staff, the surgical technologist conducted a room review and prepared for the surgical procedure. It entailed the following: a) closing the operating room doors; b) placement of room furniture including back table, Mayo stand, and ring stand; c) operating room table positioned under the operating lights, which were checked for functionality, and lowered and positioned for the procedure; d) bags for laundry and waste positioned and made ready; e) kick buckets checked and placed; f) suction canisters for anesthesia and the operative procedure attached and checked for proper functioning; g) two intravenous poles placed at the head of the bed on either side; h) electrosurgery (ESU) equipment connected and checked for functioning; i) outside sterility indicators checked; and the following items brought onto the field--a major pack, two towel packs, a Mayo tray, a major instrument set, a hysterectomy set, a double basin pack, a gown on the ESU, a preoperative skin prep tray, circulator set-up pack, Bard Foley Tray, 2-0 Polysorb on a V-20 needle, 2-0 Plain Gut on a GS-21 needle, 0 Polysorb on a GS-21 taper needle, and one extra gown; and j) the surgeon's preference card was checked for required equipment, supplies and preferences.

Holding area

The patient arrived late from Ambulatory Admissions to the holding area, at 7:15 am, accompanied by a friend. Her vital signs upon admission were as follows: temperature was 98.5° F; pulse was 92 beats per minute; respiration was 18 breaths per minute; and blood pressure was 144/88 mm/Hg. The patient's preopera-

tive diagnosis was chronic pelvic pain, left ovarian cyst and multiparity.

The surgical technologist reviewed the chart with the assistance of the circulating nurse. They checked for surgical consent, which was signed, as well as for the diagnosis, history and physical, and the laboratory reports. After her arrival, an anesthesiologist visited the patient and told the surgical team that the patient refused to sign the anesthesia consent form.

The nurse and surgical technologist went to her bedside. The patient was sitting in bed and wearing a hospital gown. The surgical team checked her name and identity bracelet. They conducted a preoperative interview and confirmed that the patient had no implants, plates or screws in her body, and no false teeth or hearing aids. They reviewed her allergies, and the patient confirmed each allergy and her adverse reaction. Her wristband and chart confirmed her statements.

At this point the intravenous line on her right arm was started with 1,000 ml of Ringer's lactate. The nurse waited for instructions regarding the preoperative antibiotic.

The patient stated that she had not had anything to eat or drink since 8 pm the previous night. She had removed her jewelry before her arrival, and did not need to void. She was, however, clutching a rosary and a piece of paper on which was a written prayer, and insisted that she be allowed to take these items with her into the operating room. She was extremely anxious, stating she would refuse to sign the consent for general anesthesia. She became quite agitated about this issue.

Another anesthesiologist arrived and explained several times that the consent for general anesthesia was for her protection in the event of an emergency during the procedure. The nurse and surgical technologist also spoke with her. Eventually she relented and signed the consent voluntarily.

The patient named and understood the two surgical procedures (ie ovarian cystectomy and bilateral tubal ligation). The order for Vancomycin was issued and signed, and the drug was administered. They bagged her rosary and prayer and let her hold it. They put a cap on her head, assisted her into the wheelchair and headed for the operating room.

About the author

Valerie Roche, CST, is a surgical technologist at North Shore University Hospital at Syosset in Syosset, New York. She has a bachelor's degree from Columbia University and an MBA degree from Cornell University. She had a successful business career in the securities industry prior to returning to Nassau Community College for her AAS degree in surgical technology.

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Editor's note: The surgical technologist (author) explained to the patient that she was doing a report on her case and received permission to visit her and follow her progress.

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1. Due to a ____, this patient should take antibiotics prophylactically before surgery.

a. peptic ulcer b. mitral valve prolapse
c. anxiety disorder d. appendectomy

2. ____ is a combination of erythromycin and sulfisoxazole.

a. Ceclor® b. codeine
c. alprazolam d. Sulfimycin®

3. ____ is a drug which depresses the central nervous system and is used to treat insomnia.

a. Ambien® b. alprazolam
c. Glucotrol® d. loratadine

4. Which result of the Differential Blood Count tests may be related to the patient's asthma?

a. basophils b. eosinophils
c. neutrophils d. monocytes

5. Which of these hematology results are mismatched?

a. platelet count-detects clotting disorders
b. leukocyte count-detects infection or immune dysfunction
c. red blood cell count-detects hypoxia
d. erythrocyte count-detects iron containing pigment

6. Which hematology test evaluates the effect of anticoagulant drugs on the patient?

a. mean corpuscular hemoglobin
b. Partial Thromboplastin Time (PPT)
c. Prothrombin Time (PT)
d. International Normalized Ratio (INR)

7. The Blood Urea Nitrogen (BUN) test measures ____.

a. creatinine output
b. adrenal gland function
c. metabolic waste from kidneys
d. protein production

8. ____ is a protein that acts as a carrier to maintain blood volume and pressure.

a. albumin b. calcium
c. chloride d. creatinine

9. ____ is essential for water balance, muscle and nerve function, and normal metabolism.

a. calcium b. potassium
c. sodium d. zinc

10. Hypoglycemia is a low level of ____.

a. calcium b. carbon dioxide
c. bilirubin d. glucose

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4	❑	❑	❑	❑	9	❑	❑	❑	❑
5	❑	❑	❑	❑	10	❑	❑	❑	❑

Mark one box next to each number. Only one correct or best answer can be selected for each question.