

Perspectives

Recovery Strategies from the OR to Home

In This Issue

Cardiovascular disease (CVD), including stroke, is the leading cause of illness and death in the US. There are an estimated 62 million people with CVD and approximately 946,000 deaths are attributable to this disease annually. With improvements in medical treatments, the number of survivors of cardiac events is increasing: however with the aging US population the incidence of CVD is also on the rise. Coronary artery bypass grafting (CABG) is a well-accepted method of treatment or revascularization. In her article, Dr. Cameron discusses the nursing management for the traditional "on-pump" CABG. To best monitor a patient's progress through the continuum of care, Dr. Cameron outlines critical or clinical pathways that are routinely used as a multidisciplinary tool to facilitate and coordinate care across disciplines.

Lung cancer remains a significant health problem in the US with 173,770 new cases expected to be diagnosed in 2004 and about 160,000 deaths. Lung cancer accounts for 13% of all diagnosed cancers and for 25% of all cancer-related deaths. Treatment strategies for lung cancer include surgery, radiation, and chemotherapy. Since many patients will have some type of surgery during the course of their illness, Ms. Fortenbaugh's article focuses on the surgical treatment and the nursing interventions that can help patients to prepare for surgery and minimize postoperative complications.

Advisory Board

Lois Dixon, MSN, RN

Adjunct Faculty, Trinity College of Nursing, Moline, IL
Pulmonary Staff Nurse, Genesis Medical Center, Davenport, IA

Jan Foster, RN, PhD, MSN, CCRN

Asst. Professor for Adult Acute and Critical Care Nursing
Houston Baptist University, TX

Mikel Gray, PhD, CUNP, CCCN, FAAN

Nurse Practitioner/Specialist, Associate Professor of Nursing,
Clinical Assistant Professor of Urology, University of Virginia,
Department of Urology, Charlottesville, VA

Tracey Hotta, RN, BScN, CPSN

President, American Society of Plastic Surgery Nurses

Victoria-Base Smith, PhD(c), MSN, CRNA, CCRN

Clinical Assistant Professor, Nurse Anesthetist,
University of Cincinnati, OH

Mary Sieggreen, MSN, RN, CS, NP

Nurse Practitioner, Vascular Surgery, Harper Hospital, Detroit, MI

Franklin A. Shaffer, EdD, DSc, RN

Vice-president, Education and Professional Development,
Executive Director, Cross Country University

Surgery for Lung Cancer

by Cathy Fortenbaugh, RN, MSN, AOCN, APNC

Surgery for lung cancer offers the best chance for cure, especially if cancer has not metastasized. In fact, the 5-year survival rate is nearly 50% for patients diagnosed with localized disease. Unfortunately, only 15% of patients have early-stage lung cancer. Survival rates decline significantly if metastasis occurs. The 5-year survival is 16% for patients whose disease has spread regionally and 2.1% for patients who have distant metastasis.¹

Lung cancer is treated with surgery, radiation, and chemotherapy. Treatment options are determined by the type and stage of lung cancer. Because the disease is usually not diagnosed in the early stages, all three treatment modalities are often combined.

Since many patients will have some type of surgery during the course of their illness, this article will focus on the surgical treatment of lung cancer. Nurses who care for patients who are diagnosed with lung cancer can help them to prepare for surgery and minimize postoperative complications, significantly improving their quality of life.

Scope of the problem

Lung cancer remains a significant health problem in the United States and throughout the world. According to the American Cancer Society, 173,770 new cases of lung cancer are expected to be diagnosed in the USA in 2004. This number accounts for 13% of all cancer diagnoses. About 160,440 deaths from lung can-



The 5-year survival rate is nearly 50% for patients diagnosed with localized disease. Unfortunately, only 15% of patients have early-stage lung cancer.

cer are expected in 2004, accounting for 25% of all cancer-related deaths.

More women die from lung cancer than breast cancer. This trend started in 1987.¹ It is possible that women are more susceptible to the effects of smoking than men. The role of estrogen and genetic or metabolic factors in women who smoke is being studied.

Smoking is the most important risk factor in the development of lung cancer in both men and women. Other risks include occupational or environmental exposure to arsenic, some organic chemicals, radon, asbestos, radiation (medical and environmental), air pollution, and second-hand smoke.¹

Continued on page 4

Coronary Artery Bypass Graft (CABG) Surgery: Recovery Across the Continuum

by Kim Cameron Fagan, RN, MSN, DSN

Diseases of the heart remain the primary cause of mortality and morbidity among Americans. In 2001, cardiovascular disease (CVD) caused 38.5% of all deaths or 1 in every 2.6 deaths in the United States.¹ The estimated prevalence of CVD among American adults is 64,400,000; 25,300,000 of these adults are 65 years or older.

CVD is a major and persistent public health problem for Americans. Continued developments and improvements in medical therapy and invasive procedures will likely increase the number of survivors of cardiac events. The estimated direct and indirect annual cost of CVD is \$368.4 billion.¹ Further, the overall incidence of CVD is expected to rise, given the aging population. The average incidence of a first major cardiovascular event increases from 7 per 1,000 men at ages 35-44 to 68 per 1,000 men at ages 85-94. Women have similar rates of cardiovascular events, but they occur about 10 years later in life.

The person afflicted with CVD is treated with revascularization and/or non-pharmacologic and pharmacologic interventions. Revascularization procedures are performed to relieve anginal pain and improve quality of life. They have been shown to improve survival in certain subgroups.² Coronary artery bypass grafting (CABG) is a well-accepted method of revascularization. In 2001, about 516,000 bypass procedures were performed in the USA.¹

CABG involves bypassing a blockage of one or more coronary arteries. This procedure can be performed with or without the use of a cardiopulmonary bypass (CPB) machine.

The traditional or “on-pump” approach to CABG uses the CPB machine. When it is used, the surgeon performs a median sternotomy, cross-clamps the aorta, and attaches the patient to the pump. The CPB machine oxygenates the patient’s blood, while the heart is motionless, secondary to cardioplegia.³

While the patient is on the CPB pump, the surgeon bypasses the blockage(s) in one or more coronary arteries. Conduits,

The overall incidence of CVD is expected to rise, given the aging population.

typically comprised of grafts from the saphenous vein or mammary artery, are created to transport blood distal to the blocked artery. After the bypass is performed, blood circulating in the CPB machine is gradually warmed, then returned to the patient. The heart is “re-started” by internal defibrillation. Pacing wires are then sutured to the epicardium and mediastinal chest tubes are inserted.

In contrast, the newer “off-pump” CABG involves bypass grafting on a beating heart. A sternal incision is performed, followed by partial cross-clamping of the aorta. A stabilizer allows the surgeon to bypass a specific section of the heart, while the remainder continues to beat and supply blood to the body.⁴

This article will focus on nursing management for patients undergoing traditional “on-pump” CABG. It is important for nurses to be familiar with the CABG procedure in order to understand and assess postoperative complications.

Preoperative considerations

Nursing management for the CABG patient begins preoperatively with patient and family education about the CABG procedure and expected outcomes. Patients can expect to be hospitalized from 5 to 7 days after CABG with 1 to 2 of those days being spent in an intensive care unit (ICU).

Patient education may occur at an outpatient clinic or in hospital prior to surgery. Methods of education include videotapes, written materials, or one-to-one

interview/instruction with a nurse educator and the patient/family. Regardless of delivery method, the nurse should be sensitive to the timing of education and assure that it is culturally sensitive.

The patient and family should be informed about what to expect before, during, and after surgery and hospitalization, including the expected length of hospital stay. The preoperative CABG patient is typically taught how to use an incentive spirometer (IS) and pulmonary toilet after surgery. In addition, the progression of postoperative activity and postoperative restrictions are addressed.

The importance of pain control after surgery is discussed with the patient and family. If possible, pain scales (assessments) should be reviewed with the patient and family. The patient should then choose a pain scale to use during hospitalization. This is an important time to identify CV risk factors and address lifestyle modifications.

Prior to surgery, the surgeon typically writes in order to have the patient’s blood cross-matched and to order blood supplies for use, if necessary, during or after surgery. Other preoperative orders include antibiotics to be given in the operating room, an antiseptic scrub (Chlorhexidine) on the night before surgery, skin preparation, NPO after midnight, and other preoperative medications.

Intraoperative considerations

CPB is used in conjunction with hypothermia, hemodilution, and anticoagulation.⁵ Hypothermia lowers metabolic requirements during surgery but has several side effects, including poor organ blood flow, reduced cerebral blood flow, ventricular dysrhythmias, electrolyte imbalances, increased renin production, impaired mentation, and decreased gastrointestinal motility.

Hemodilution is needed to decrease blood viscosity with the intent of improving capillary blood flow. Anticoagulation is necessary to decrease trauma to cells and decrease the incidence of thromboemboli.

During CABG, electrocardiogram (ECG), pulse oximetry, arterial line, urinary catheter, nasogastric tube, and pulmonary artery catheter are routinely monitored. Once the surgeon completes the grafts, the patient is weaned from the CPB machine and epicardial pacing wires and mediastinal chest tubes are placed. The patient is then transported to the ICU or recovery room.

Postoperative considerations

To better monitor a patient's progress through the continuum of care, critical pathways or clinical pathways are routinely used as a multidisciplinary tool to facilitate and coordinate care across disciplines. These pathways should reflect best practice, standardize patient care, and have identifiable expected outcomes and interventions within a predetermined time line.

On admission to the ICU, the patient's endotracheal tube is connected to a mechanical ventilator. The ECG and hemodynamic pressure lines are transduced to a bedside monitor for continuous assessment. A thorough cardiovascular and pulmonary exam should be performed. Equal chest expansion should be observed and bilateral breath sounds auscultated. Peripheral pulses should be palpable. Continuous pulse oximetry is monitored. The ECG tracing should demonstrate adequate rate and rhythm. Medication drip rates are checked and readjusted on controlled infusion pumps, as needed. Chest tube drainage systems and the nasogastric tube are connected to suction. To minimize the potential of skin breakdown, commercially available nasogastric tube holders can be used.

Hemodynamic measurements (arterial blood pressure, central venous pressure [CVP], pulmonary artery pressures [PAS/PAD], pulmonary capillary wedge pressure [PCW], cardiac output and index [CO/CI], systemic vascular resistance [SVR], and mixed venous oxygenation [SVO₂]) should be obtained and monitored. Laboratory tests are sent, as ordered. A supine chest x-ray is obtained to confirm endotracheal tube and Swan-Ganz catheter placement and to assess for presence of pneumothorax, fluid overload, atelectasis, or pleural effusion. In addition, a 12-lead ECG is obtained and reviewed for ischemic changes and dysrhythmias. Applying a transducer holder directly to the patient's arm will allow closer approximation to the phlebostatic axis and can reduce the likelihood of errors associated with improper leveling. Although each institution may vary in the specific management of CABG patients, their general postoperative care includes:

- **Airway management:** Pulmonary status should be monitored through frequent assessment as well as pulse oximetry monitoring. Pulse oximetry should read 92% or more. Mechanical ventilation weaning protocols are followed, as ordered. Once the

Applying a transducer holder directly to the patient's arm can reduce the likelihood of errors associated with improper leveling.

patient is weaned from the ventilator, the use of incentive spirometry and pulmonary toilet is encouraged.

- **Hemodynamics (Swan-Ganz catheter and saline):** Monitor for decreased cardiac output/ index postoperatively due to cardiac tamponade, myocardial stunning, hypovolemia, and dysrhythmias.
- **Vital signs/Intake and output:** Vital signs are taken every 15 minutes until the patient is stable. Intake and output should be assessed and documented at least every hour. Urinary output is closely monitored, as there is potential for decreased renal perfusion secondary to cross-clamping of the aorta during surgery. The Foley catheter stays in place until the patient is mobilized, unless diuretic therapy is used. The application of a legband foley catheter holder should be applied to help reduce the meatal irritation which contributes to nosocomial urinary tract infections (Figure 1).
- **Chest tubes:** Chest tube drainage is



Figure 1. Foley Catheter Holder (Courtesy of Dale Medical Products)

monitored hourly. Total drainage should not exceed 200 ml/hr. Once the total drainage is less than 100 cc over an 8-hour period, the chest tubes are removed.

- **Nasogastric (NG) tube:** Low, intermittent suction is used to aid in gastric decompression. The NG tube is usually removed after the patient is extubated.
- **Epicardial pacing wires:** Temporary epicardial pacing wires should be securely attached to the patient and cable connector of the pulse generator (pacemaker box). Usually the pulse generator is not turned on (or is placed in demand mode) but is available in case the patient's heart needs to be paced. Understanding of how the pulse generator works is imperative. If the pulse generator is not attached to the pacing wires, the pacing wires require isolation and insulation to avoid potential electrical currents. Pacing wires are removed prior to patient discharge.
- **Electrolytes:** Monitor electrolytes and replace as ordered.
- **Bleeding:** Monitor the patient's lab work (hemoglobin & hematocrit, coagulation labs) and watch for signs of bleeding.
- **Pain:** Assess for and manage pain, as discussed preoperatively and as prescribed.
- **Incisions:** Assess incisions and change dressings, as ordered. Monitor for signs of infection.

Family support after CABG is an important function of the nurse. The family may need information about the CABG procedure, patient's condition, hospital/unit routines (visitation policy), and what to expect.

Once the patient is off vasoactive medications, extubated, and mobilized, he or she is ready to transfer to a step-down unit. All invasive lines (Swan-Ganz, arterial, Foley catheter, NG tube, and chest tubes) are removed prior to transfer. The pacemaker wires typically remain in place until discharge from hospital.

While on the care unit/floor, the patient's activity progresses with the implementation of sternal precautions to protect the incision. Pulmonary toilet and IS are continued. Optimal risk-factor management, using pharmacologic and nonpharmacologic methods after revascularization, is crucial to prevent disease progression.

Cardiac rehabilitation

The Agency for Health Care Policy and Research undertook an exhaustive and critical literature review on cardiac rehabilitation and formulated clinical practice guidelines and recommendations.⁶

Cardiac rehabilitative services should start during hospitalization and continue on an outpatient basis. Cardiac rehabilitation provides multifactorial services over time, including prescribed exercise, medical evaluation, counseling, education, and behavioral interventions to enhance risk factor reduction.

Phase I cardiac rehabilitation should begin immediately after CABG. The focus of this phase of rehabilitation includes the prevention of negative effects of prolonged bedrest, monitoring the patient's physiological response to exercise, and educating the patient and family about risk-factor reduction and recovery.

While in the ICU, patients are turned every two hours until extubated from mechanical ventilation. After extubation, patients are mobilized to a chair. After transfer to the step-down unit, the patient begins to ambulate 3 to 4 times a day. The patient's blood pressure, ECG (telemetry), heart rate, and pulse oximetry are measured before, during, and after activity. Heart rate should not increase more than 20 beats per minute above the resting heart rate. The systolic blood pressure should not increase more than 20 mm Hg or decrease more than 10-15 mmHg after exercise. The heart rhythm is monitored for dysrhythmias during and after exercise.

Outpatient rehabilitation (Phase II), which requires a physician referral, begins about two weeks after discharge. This phase is medically supervised and focuses on exercise therapy, education, meeting the psychosocial needs of patient and family, and support for the adoption of risk-reducing behaviors. In addition to medical staff, nutritionists, social workers, and psychologists work as a team to educate and counsel the patient and family. Exercise therapy occurs 3 times a week over about 3 months. During exercise sessions, the patient has continuous ECG monitoring. Blood pressure, heart rate, and respiratory rate are also assessed. Activity is gradually increased, according to the patient's response.

Phase III cardiac rehabilitation programs are carried out in community settings, such as the YMCA. During this phase, exercise and risk-reducing behav-

iors are encouraged and maintained. Patients take responsibility for monitoring their blood pressure and heart rate in response to exercise.

The efficacy of primary and secondary preventive measures in the reduction of coronary risk is consistently determined. However, lack of initiating and maintaining a medically prescribed regimen remains a problem in risk-factor management. The patient's willingness to change, which affects the decision to initiate, adopt, and maintain cardiac risk-reducing behaviors, is crucial to the process of determining the ideal content and timing for nursing interventions related to cardiac rehabilitation and recovery.

Conclusion

Given the aging population and continued developments and improvements in medical therapy and invasive procedures, we can expect an increasing number of Americans to have CABG. Nurses play a key role in the management of patients who experience this surgical procedure and in the initiation and maintenance of risk-reducing lifestyle changes.

References

1. American Heart Association. Heart disease & stroke statistics: 2004 update. Dallas, TX: American Heart Association, 2004. 1079736729696 HDS Stats 2004 Update REV3-19-04.pdf. Accessed August 1, 2004.
2. Pearson T, Rapaport E, Criquiri M, Furberg C, Fuster V, Hiratzka L, Little W, Ockene I, Williams G. (1994). Optimal risk management in the patient after coronary revascularization: a statement from the American Heart Association for healthcare professionals. *Circulation* 1994,90(6):3125-3133.
3. Hyett JM. Caring for a patient after CABG surgery. *Nursing* 2004,34(7):48-49.
4. Chen-Scarabelli C. Beating-heart coronary artery bypass graft surgery: indications, advantages, and limitations. *Critical Care Nurse* 2002,22(5):44-58.
5. Bojar RM, Warner KG. Manual of perioperative care in cardiac surgery. 3rd ed. Malden, MA: Blackwell Science, 1999.
6. Wenger NK, Froelicher ES, Smith LK, Ades PA, Berra K, Blumenthal JA, Certo CME, Dattilo AM, DeBusk RF, Drozda JP, Letcher BJ, Franklin BA, Gaston H, Greenland P, McBride PE, McGregor CGA, Oldridge NB, Piscatella JC, Rogers RJ. Cardiac rehabilitation. Clinical Practice Guideline No. 17. AHCPR Publication No. 96-0672. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research and the National Heart, Lung, and Blood Institute, 1995.

Kimberly Cameron Fagan, RN, MSN, DSN, is an assistant professor at the Texas Woman's University College of Nursing in Houston, TX, where she teaches courses in high acuity nursing and nursing research. She works as a clinical nurse at the Shock-Trauma ICU at Memorial Hermann Hospital in Houston and has many years of experience in coronary intensive care. She is a member of the American Association of Critical Care Nurses Cardiovascular Surgery Practice Analysis Task Force.

Surgery for Lung Cancer — continued

Signs and symptoms

Signs and symptoms of lung cancer include cough, dyspnea, hoarseness, decreased appetite, hemoptysis, chest pain, superior vena cava syndrome, fatigue, weight loss, and frequent respiratory infections due to obstruction. Patients may also present with many different symptoms, related to metastatic disease which vary depending on which organs or body areas are affected. Some symptoms include headache, seizures, weakness, pain, bone fractures, bleeding or blood clots, jaundice, and symptoms related to the syndrome of inappropriate antidiuretic hormone, such as confusion, lethargy, decreased urine output, and coma. These signs and symptoms usually lead an individual to seek medical attention.²

Diagnosis

Diagnostic workup can include chest x-ray, sputum cytology, bronchoscopy with biopsy, video-assisted thoracoscopy, ultrasound-guided fine-needle aspiration, CT, PET, and MRI. Newer tools, including low-dose helical CT scans and PET scans, can detect lung cancer earlier and when smaller than conventional x-rays. These advances will allow more patients to become surgical candidates. Lung cancer cannot be definitively diagnosed without a cytology or biopsy specimen, which is examined in the pathology department.²

Screening

There are no recommended screening examinations for lung cancer at this time. The National Cancer Institute initiated the National Lung Cancer Screening Trial in 2003. Participants are randomized to receive either spiral CT or chest x-ray lung cancer screening. About 50,000 individuals are expected to participate in this trial.³

Types of lung cancer

There are two basic types of lung cancer: small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC). Treatment varies according to the type of lung cancer, so it is important to differentiate the two. NSCLC is the most amenable to surgery.

NSCLC is comprised of three subgroups, which are named for the type of lung cancer cells found in each group. In the first group, adenocarcinoma is the

most common of all lung cancers, making up almost one-half of total cases. It grows along the outer edges of the lungs and tissue lining the bronchi. It is the most common lung cancer in women. It is associated with a high likelihood of metastasis.

Epidermoid carcinoma is also known as squamous cell carcinoma. It begins in a central location in the lungs, such as the bronchi, and may remain longer in the lungs without spreading than other types of lung cancer. Many patients with epidermoid lung cancer are surgical candidates. This type of lung cancer is easier to resect because of its location. It is associated with a better prognosis.

Large cell lung carcinoma is found in the smaller bronchi. It is more difficult to resect and is associated with a poor prognosis.⁴

SCLC comprises about one-fifth of all lung cancers. It is characterized by rapidly growing cells and early spread to other organs. It usually starts in the bronchi. SCLC is also known as oat cell cancer, because the cells look like oats when viewed under the microscope. Because SCLC is considered a systemic disease on diagnosis, surgery is done less often.⁵

Classification and staging

Accurate classification and staging are extremely important in defining treatment options for patients with lung cancer. This process has an impact on quality of life. Appropriate treatment is either curative or palliative. If a lung cancer is inadequately staged, a patient may undergo unnecessary treatment, including surgery. They may sacrifice precious quality time with family and friends due to difficult side effects. Staging for NSCLC follows the American Joint Commission on Cancer (AJCC) TNM system. T divides lung cancer into 8 numerical stages. It classifies and divides the primary tumor into categories based on size, location, and invasiveness. N divides it into categories representing regional lymph node status. M indicates the presence or absence of distant metastasis.

Surgical resection is standard treatment for stages I and II NSCLC. Controversy exists about the appropriate treatment for stage IIIA patients. Most surgeons consider individuals with stage IIIB and IV to be inappropriate for surgery.

SCLC also follows the TNM Classification System. However, most clinicians use a two-stage system, which is characterized as either limited or extensive. Limited disease means that the tumor is con-

finied to one hemithorax and corresponding regional lymph nodes with either the presence or absence of pleural effusion. This definition encompasses all tumors that can be contained within a single radiation portal. Extensive disease means that the tumor has spread beyond the boundaries of a limited area. The TNM system does help with identifying the rare SCLC patient who presents with a small solitary mass, no lymph node involvement, and no distant metastasis.⁶

Goals of surgery

The three goals of surgery are curative, debulking, and palliative. Curative surgery is done when the cancer is confined to one area. The entire tumor is removed with a cancer-free margin. The surgeon may remove a wedge, lobe, or whole lung. Debulking surgery is done when the entire tumor cannot be excised. As much tumor as possible is removed. The remaining disease is treated with chemotherapy and/or radiation. Palliative surgery is used to remove parts of a tumor that are causing pressure pain or obstruction.²

Prevention of complications

Thoracic surgery has a high risk of complications. Candidates are carefully selected to determine if they are able to withstand surgery. Cardiopulmonary status is carefully evaluated.

Nurses involved in the preoperative care of lung-cancer patients are essential in facilitating a successful recovery. The patient's ability to use incentive spirometer, cough, turn, deep breathe, splint, and perform upper and lower extremity range-of-motion exercises postoperatively should be evaluated preoperatively. These activities should be taught preoperatively with a return postoperative demonstration. Preoperative education focuses on

the specific procedure and what the patient will experience before, during, and after surgery. The use of an abdominal binder postoperatively can help splint the abdomen, will encourage the patient to cough, deep breathe, and give the patient a sense of confidence during initial mobility (Figure 1).

A tour and discussion about the Intensive Care Unit (ICU), monitoring devices, and ventilator can reduce postoperative anxiety, as the patient and family are then prepared for the experience. Patients should expect to spend 24-48 hours in a monitored setting. In addition to the ventilator, patients should be prepared to expect that they might have chest tubes, compression stockings, a Foley catheter, intravenous fluids, and possibly a tube feeding. In many cases, tubes will be held securely in place with a variety of holders, including a Foley catheter holder and nasogastric tube holder that will help prevent the tube from becoming dislodged and minimize skin irritation. The nurse may explain these holders will help prevent tube dislodgement or skin irritation. Families should know where to wait and how information will be communicated. Patients who smoke should be strongly encouraged to quit smoking and be given information about smoking cessation options.²

Ideally the nurse is a part of an interdisciplinary team, which includes the physician, social worker, dietitian, physical therapist, chaplain, and other practitioners who give supportive care.

Pneumonectomy

At one time, pneumonectomy was considered the standard surgical treatment option for lung cancer. Pneumonectomy is removal of the total lung. Now it is only done if the tumor is too large to be excised by lobectomy or if the tumor involves the proximal bronchus or is fixed to the hilum. A pneumonectomy is either a radical or a simple procedure. A radical procedure involves removal of the lung along with stapling or suturing of the bronchus. Surgical mortality is about 6% with this procedure.²

Lobectomy

A lobectomy is done when cancer is confined to a single lobe of the lung. The affected lobe is excised and the bronchial stump is closed. Two chest tubes are placed to drain blood, fluid, and air. The remaining lung tissue expands to fill the space. Because this surgery is less exten-



Figure 1. Abdominal Binder (Courtesy of Dale Medical Products)

Resources
Alliance for Lung Cancer Advocacy, Support and Education (ALCASE) 800-298-2436 (Lung Cancer Hotline) www.alcase.org
American Cancer Society 800-ACS-2345 www.cancer.org
American Lung Association 800-LUNGUSA www.lungusa.org
American Society of Clinical Oncology (ASCO) 888-651-3038 www.peoplelivingwithcancer.org
Cancer Care, Inc. 800-813-HOPE www.cancercares.org
It's time to focus on lung cancer 877-646-LUNG www.lungcancer.org
National Cancer Institute 800-4-CANCER www.nci.nih.gov
Oncology Nursing Society 866-257-4ONS www.ons.org
The Wellness Community 888-793-WELL www.thewellnesscommunity.org
Oncolink Abramson Cancer Center, University of Pennsylvania 215-349-8895 (Editorial offices) www.oncolink.upenn.edu
Quitnet 617-437-1500 www.quitnet.com

sive, the surgical mortality rate is 3%.

When the tumor is confined to the pulmonary artery or bronchus and no metastasis exists, a sleeve resection with bronchoplastic reconstruction can be done. The cancerous lesion is removed and the bronchus is reattached. This procedure conserves lung tissue and improves quality of life.²

Segmentectomy

A segmentectomy is the partial removal of a lobe and corresponding bronchovascular segment. The role of segmentectomy is unclear at this time. This limited resection is used for patients who are not candidates for more extensive types of surgery, such as those with compromised cardiac or respiratory function. This surgery has a low surgical mortality rate but high relapse rate.²

Wedge resection

A wedge resection is done when a patient has small peripheral nodules or when the patient is not a candidate for more extensive surgery. A small area of

disease is removed, but the bronchovascular segment supplying the area is left intact. This surgery is an even more limited than segmentectomy. The mortality rate is low, but the recurrence rate is three times that of lobectomy.²

Video-assisted thoracic surgery

Video-assisted thoracic surgery (VATS) is a newer surgical technique that can be used diagnostically with video-assisted thoracoscopy or therapeutically with video-assisted thoracotomy for early-stage disease. Small thoracotomy incisions are made, and thoracoscopic instruments are inserted through the incisions. The surgeon can then visualize the chest and mediastinum on a monitor.

VATS works best when used for small peripheral nodules. VATS involves one to four small incisions and can be used for excision of lung lesions, biopsy of mediastinal masses, wedge resection of tumors, and other exploratory procedures. Because VATS involves less invasive surgery, it is associated with less postoperative discomfort, less need for postoperative analgesia due to less dissection and spreading of ribs, shorter recovery, and decreased length of stay.⁷

Postoperative nursing care

The patient will go from the recovery room to an ICU after surgery. Meticulous nursing care is required. The patient will most likely receive ventilator support and have a chest tube in the immediate postoperative period. Frequent vital sign measurements, continuous pulse oximetry, and hemodynamic monitoring will be expected.

A transducer holder can assist in assuring accurate measurements. The holder provides a safe and level platform for holding up to three transducers. The stability of the transducer holder will assure that the waveform of vascular pressure and corresponding numerical display of measurement are correct. The platform conforms to the patient's arm. Three leveling tabs are set on the platform. These tabs reduce the time and difficulty of manually leveling and taping individual transducers to the patient's chest or arm, or mounting them on the IV pole. Applying a transducer holder directly to the patient's arm will allow closer approximation to the phlebostatic axis and can reduce the likelihood of errors associated with improper leveling (Figure 2).

Chest tube dressings are normally left

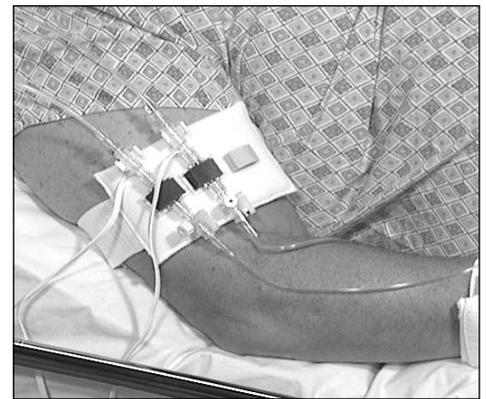


Figure 2. Transducer Holder (Courtesy of Dale Medical Products)

in place and reinforced as needed. Careful recording of drainage as well as intake and output is necessary. The nurse should assess chest tubes for patency at least once a shift.

Pain is one of the most common postoperative complications. Because nerves are involved in surgery, incision pain can be severe. It can last up to 4 years in as many as one-half of patients.

Immediate postoperative pain can be aggravated by the presence of chest tubes. Nurses have a direct impact on the postoperative course of lung-cancer patients through effective pain management. Pain relief must be a priority during this time. If postoperative pain is not well controlled, the patient may experience other complications due to ineffective coughing and immobilization, such as atelectasis, pneumonia, frozen shoulder, deep vein thrombosis, or pulmonary embolus.

Common narcotic analgesic administration methods used in the immediate postoperative period include epidural analgesia, patient-controlled epidural analgesia, intrathoracic analgesia, and patient-controlled analgesia.

Patients may need to take narcotic analgesics for several months after surgery. Patients and families need to be taught how to use the 0-10 pain scale and how to describe the location, characteristics, and aggravating and relieving factors of pain before surgery, so that they are comfortable with "pain language" after surgery. These lessons should be reinforced postoperatively.

If pain is expected to be chronic, a pain diary may be helpful. Along with pain, the side effects of narcotic analgesics, such as nausea or constipation, should be assessed and ideally prevented. As soon as a patient is able to tolerate oral intake, a stimulating laxative can be regularly administered.

Respiratory complications include atelectasis, pneumothorax, bronchospasm, pulmonary embolus, bronchopleural fistula, and adult respiratory distress syndrome. Some of these complications can be life threatening; early nursing respiratory assessment and prompt intervention are essential. Vital signs, pulse oximetry, and arterial blood gases are closely monitored. Color, consistency, and amount of sputum are assessed and recorded. Nurses should reinforce teaching about pulmonary toilet exercises and encourage range-of-motion exercises and early ambulation. Atelectasis is the most common preventable respiratory complication that good nursing care can avoid.² If the clinician has not recommended a binder prior to the onset of ineffective coughing a binder may be requested at this time to encourage an effective cough.

Wound infection at the incision site or chest tube insertion site can complicate postoperative recovery. Incision dressings are changed as per the surgeon's instructions. Usually they are kept in place for three days, then the incision is left open to air. Nurses should inspect incision sites for redness tenderness, drainage, or induration at least once a shift.²

Adequate nutrition needs to be maintained in the perioperative period. Patients who are not impaired nutritionally have a better postoperative mortality rate and a lower reventilation rate than their nutritionally compromised counterparts. Patients may receive enteral feedings in the postoperative period, if they are nutritionally compromised. Preoperative measurements, such as weight and body mass index, may help to predict patients at risk for postoperative complications.⁸

It is not unusual for patients to experience depression or anxiety related to the diagnosis of lung cancer and the experience of undergoing major surgery. Patients may have greater spiritual needs during the perioperative period, as they try to find meaning in their illness. Nurses can provide information and support, encourage patients to express their feelings, and refer them to a social worker, chaplain, or other team member, when appropriate.

Conclusion

The nurse is an important part of the interdisciplinary team and can act as the coordinator of supportive patient care. A surgery-specific clinical pathway or

patient-specific care plan should be developed and used for patients with lung cancer. Proactive care that includes the prevention of complications, accurate assessment, and prompt intervention makes a significant difference in the patient's morbidity, mortality, and quality of life.

References

1. American Cancer Society. Cancer Facts and Figures 2004. Atlanta, GA: American Cancer Society, 2004.
2. Ingle RJ. Lung cancers. In: Yarbrow, Hansen-Frogge M, Goodman M, Groenwald SL. *Cancer Principles and Practice*. 5th ed. Sudbury, MA: Jones and Bartlett, 2000:1310-1316.
3. National Cancer Institute. NIH publications No. 02-5131, August 2002.
4. Ginsberg RJ, Volkres EE, Rosenzweig K. Non-small cell lung cancer. In: Devita VT, Hellman S, Rosenberg SA (eds.). *Cancer Principles and Practice*. 6th ed. Philadelphia, PA: Lippincott Williams and Wilkins, 2001:925-983.
5. Walker S. Updates in small cell lung cancer treatment. *Clinical Journal of Oncology Nursing* 2003;7(5).
6. Greene FL, American Cancer Society, American Joint Committee on Cancer. *AJCC Cancer Staging Manual*. 6th ed. New York, NY: Springer-Verlag, Inc., 2002:173-177.
7. Kucharczuk JC, Kaiser LR. Video-assisted thoracic surgery. *Contemporary Surgery* 2002;58(11):571-574.
8. Jagoe TR, Goodship THJ, Gibson GJ. The influence of nutritional status on complications after operations for lung cancer. *Annals Thoracic Surgery* 2001;71(3):936-943.

Cathy Fortenbaugh, RN, AOCN, APNC, MSN, BSC, is an Oncology Clinical Nurse Specialist for a 42-bed medical/surgical oncology unit at Pennsylvania Hospital, Philadelphia, PA. She is Chair of the Nursing Research Council and a member of the Hospital Research Review Committee, Hospital Ethics Committee, and University of Pennsylvania Health System Nursing Research Committee. Cathy acts as an oncology consultant to hospital staff, peers, and the community.

Perspectives, a quarterly newsletter focusing on postoperative recovery strategies, is distributed free-of-charge to health professionals. *Perspectives* is published by Saxe Healthcare Communications and is funded through an educational grant from Dale Medical Products Inc. The newsletter's objective is to provide nurses and other health professionals with timely and relevant information on postoperative recovery strategies, focusing on the continuum of care from operating room to recovery room, ward, or home.

The opinions expressed in *Perspectives* are those of the authors and not necessarily of the editorial staff, or Dale Medical Products Inc. The publisher, and Dale Medical Corp. disclaim any responsibility or liability for such material.

We welcome opinions and subscription requests from our readers. Please direct your correspondence to:

Saxe Healthcare Communications
P.O. Box 1282, Burlington, VT 05402
Fax: (802) 872-7558
sshapiro@saxecommunications.com

© Copyright: Saxe Communications 1998-2004

Cross Country University is an accredited provider of continuing education in nursing by the American Nurses Credentialing Center's Commission on Accreditation.

After reading this article, the learner should be able to:

1. Identify needed education specific to patients/families of CABG recipients.
2. Identify needed assessment parameters specific to the CABG patient prior, during and post-operatively.
3. Explain the expectation of progression of care for those patients receiving a CABG.
4. Identify risk factors for developing lung cancer.
5. Discuss 5 surgical options for treating lung cancer.
6. Describe medical and nursing measures used to prevent postoperative complications.

To receive continuing education credit, simply do the following:

1. Read the educational offering (both articles).
2. Complete the post-test for the educational offering. Mark an X next to the correct answer. (You may make copies of the answer form.)
3. Complete the learner evaluation.
4. Mail, fax, or send on-line the completed learner evaluation and post-test to the address below.
5. 1.2 contact hours for nurses are awarded. Cross Country University, a Division of Cross Country TravCorps, Inc., is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation. Cross Country University is an approved provider with the Iowa Board Of Nursing, approved provider #328. This course is offered for 1.2 contact hours. Cross Country University is approved by the California Board of Registered Nursing, Provider #CEP 13345, for 1.2 contact hours. Cross Country University is an approved provider by the Florida Board of Nursing, provider #50-3896. This course is offered for 1.2 contact hours.
6. To earn 1.2 contact hours of continuing education, you must achieve a score of 75% or more. If you do not pass the test, you may take it again one time.
7. Your results will be sent within four weeks after the form is received.
8. The administrative fee has been waived through an educational grant from Dale Medical Products, Inc.
9. Answer forms must be postmarked by Dec. 15, 2006, 12:00 midnight.

1. **The most important risk factor for developing lung cancer is:**
 - a. Occupational exposure
 - b. Air pollution
 - c. Genetic factors
 - d. Smoking
2. **Diagnostic workup for lung cancer includes:**
 - a. Low dose helical CT scans and PET scans
 - b. Participation in the NIH lung cancer screening trial
 - c. Ultrasound and upper GI series
 - d. Full genetic analysis
3. **Which type of lung cancer is easiest to resect?**
 - a. Small cell lung cancer
 - b. Large cell lung cancer
 - c. Epidermoid carcinoma
 - d. Adenocarcinoma
4. **What tests are most important in preoperative evaluation?**
 - a. Pulmonary function tests
 - b. Cognitive function
 - c. Classification and staging
 - d. Incentive spirometry
5. **Which surgery involves partial removal of a lobe and corresponding bronchovascular segment?**
 - a. Lobectomy
 - b. Segmentectomy
 - c. Pneumonectomy
 - d. Wedge resection
6. **Which type of surgical treatment for lung cancer is associated with shorter recovery and decreased length of stay?**
 - a. Pneumonectomy
 - b. Lobectomy
 - c. Video assisted thoractomy
 - d. Segmentectomy
7. **How can the adverse effects of wound infection be minimized?**
 - a. Nurses should inspect incision site for redness, tenderness, drainage, or induration at least once a shift
 - b. Nurses should encourage early ambulation
 - c. Nurses should teach patients coughing, turning, deep breathing, spitting, and incentive spirometry preoperatively
 - d. Nurses should medicate for pain around the clock for the first 24-48 hours after surgery
8. **What is the most common preventable respiratory complication that good nursing can impact?**
 - a. Pneumothorax
 - b. Adult respiratory distress syndrome
 - c. Atelectasis
 - d. Bronchospasm
9. **What should be administered along with narcotic analgesics for postoperative lung cancer patients?**
 - a. Bronchodilators
 - b. Stimulating laxatives
 - c. Caffeinated beverages
 - d. Beta blockers
10. **What assessment tools are used postoperatively to detect respiratory complications?**
 - a. Vital signs, pulse and arterial blood gasses
 - b. CBC with differential, electrolytes and vital signs
 - c. Vital signs, pulmonary function tests and EKG
 - d. EEG, SMA 12, vital signs
11. **What of the following physician orders can a nurse anticipate prior to the CABG procedure:**
 - a. Blood typing/unit orders
 - b. Electrolytes
 - c. Pre-operative antibiotics
 - d. All of the above
12. **Which is the best time for the nurse to assess CV risk factors?**
 - a. Pre-operatively
 - b. Intra-operatively
 - c. Post-operatively
 - d. After discharge from hospital
13. **Pre-operative education includes which of the following:**
 - a. Expected length of hospital stay
 - b. Use of Incentive spirometry
 - c. Pain control
 - d. All of the above
14. **Revascularization procedures, such as CABG, in conjunction with pharmacologic interventions have been shown to:**
 - a. Improve quality of life
 - b. Increase anginal pain
 - c. Decrease survival
 - d. Have no effect on quality of life
15. **On-pump CABG procedures differ from off-pump CABG procedures in that:**
 - a. The bypass grafting takes place on a beating heart
 - b. The cardiopulmonary bypass (CPB) machine is used
 - c. Cardioplegia is not used
 - d. Partial cross-clamping of the aorta is indicated
16. **Important assessment parameters for the post operative CABG patient include which of the following:**
 - a. Airway management
 - b. Hemodynamic monitoring
 - c. Bleeding
 - d. All of the above

Participant's Evaluation

What is the highest degree you have earned (circle one) ? 1. Diploma 2. Associate 3. Bachelor's
4. Master's 5. Doctorate

Indicate to what degree you met the objectives for this program: Using 1 = Strongly disagree to 6 = strongly agree rating scale, please circle the number that best reflects the extent of your agreement to each statement.

	Strongly Disagree			Strongly Agree		
	1	2	3	4	5	6
1. Identify at least three topics that are essential to home management of the patient with a tracheostomy tube.						
2. Discuss two wellness issues that the nurse needs to address to assure successful adaptation to the home environment.						
3. Describe how overweight and obesity are defined and measured.						
4. Identify at least two types of altered respiratory function associated with obesity						
5. List three types of prevention strategies to minimize the risk of respiratory failure in the obese patient.						

Name & Credentials _____

Position/Title _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax: _____

email address _____

*License# _____ or SS# _____

*Florida registered nurses must supply your FL RN Lic.#

Mark your answers with an X in the box next to the correct answer

1	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	9	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
2	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	10	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
3	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	11	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
4	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	12	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
5	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	13	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
6	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	14	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
7	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	15	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
8	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	16	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D