CHAPTER 1

Overview

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History of Surgical Oncology

Surgery is the oldest form of cancer treatment for solid tumors, and today, for many cancers it offers the greatest chance for cure. Until recently, surgery was the only treatment that could offer a cure (Rosenberg, 2011). The description of the surgical treatment of cancer can be traced to circa 1600 B.C. in Egypt with documentation of events back to 3000 B.C. (see Figure 1-1). These teachings described tumors that could be cured by surgery, but cautioned to not treat lesions that could be fatal. Hippocrates (460–375 B.C.) used the same caution with his descriptions of the clinical symptoms related to cancer and favored quality of life to surgical intervention. For the next 1,500 years, surgery was reserved for traumatic injuries, as few would elect to undergo painful surgeries in the absence of anesthetics, and most patients died from sepsis (Niederhuber, 2008). A new interest in cancer treatment developed in the 18th century when pathologists described cancer as a local occurrence that spreads to other anatomic sites. A deeper understanding of human physiology occurred with ongoing pathologic discoveries at autopsy (Pollock, Choti, & Morton, 2010).

Early Leaders

Several breakthroughs in the 19th century allowed for the advancement of cancer surgery. In 1809, Ephraim McDowell removed a 22-pound ovarian tumor from a patient who survived for 30 years. This inspired interest in the exploration of elective cancer surgery (Pollock et al., 2010). In the mid-1800s, Louis Pasteur described a germ theory of disease, which became the premise for Joseph Lister's development of antisepsis using carbolic acid and heat to clean surgical instruments. Robert Wood Johnson invented an

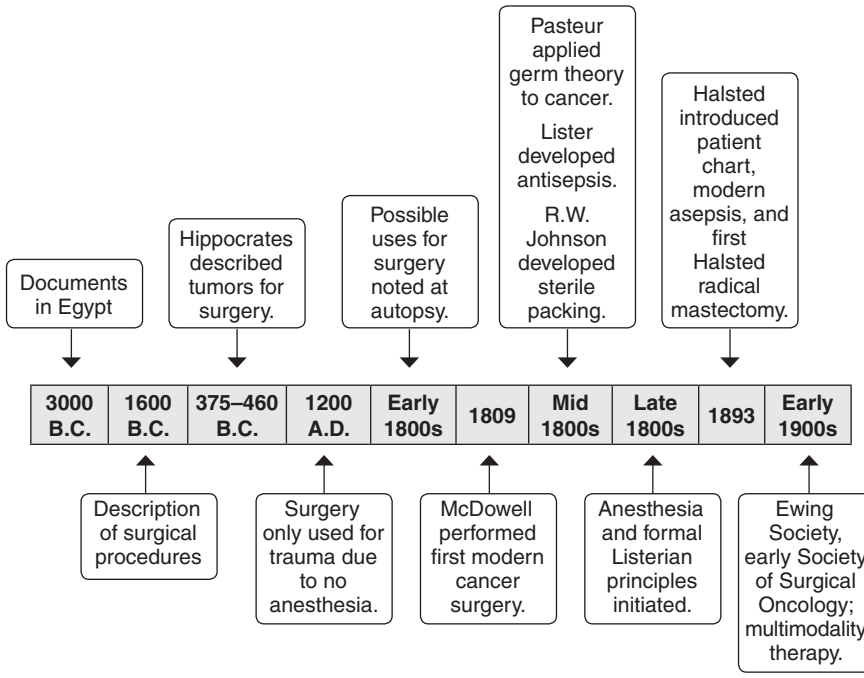

Figure 1-1. Timeline of the History of Surgical Oncology

individualized sterile wound packing, which further controlled wound infection (Pollock et al., 2010). These developments in addition to the use of ether and chloroform as anesthetics would advance the field of surgery (Rutkow, 2012). In the late 1800s, with the utilization of the Listerian principles (disinfection of hands, instruments, and field of operation, as well as scrupulous surgical technique and gentle handling of tissues), infection rates decreased (Rutkow, 2012).

William Halsted, MD

William Stewart Halsted used meticulous tissue handling and aseptic technique and developed the principle of en bloc resection as seen in the radical mastectomy (Rosenberg, 2011). Beyond his talent as a surgeon, Halsted showed great interest in the education for future surgeons. He is credited with the development of the residency system for training surgeons. Surgeons learned both scientific and practical aspects of surgery with the intent to raise the standard of surgical science (Rutkow, 2012). Halsted's collaboration with fellow cancer colleague Sir Wil-

liam Osler marked one of the earliest examples of providing multidisciplinary care.

James Ewing, MD

Dr. James Ewing is credited as the father of the multidisciplinary approach for the treatment of cancer (Society of Surgical Oncology [SSO], n.d.). Ewing was a pioneer in the field of oncology, from his expertise as a pathologist, interest in new treatment modalities, and role in the advancement of radiation therapy. Beyond his clinical skills, Ewing's administrative talents allowed him to recruit and organize medical doctors and surgeons to provide multidisciplinary care for patients with cancer. In 1940, the James Ewing Society began as an alumni association of graduates to showcase his cancer-focused, multimodality medical program at Memorial Hospital in New York (which later became Memorial Sloan-Kettering Cancer Center). Over the years, physicians and scientists from other institutions were eligible to join the group, which became SSO and gained national recognition from the American Medical Association. With a focus on medical education, training, research, and patient care, SSO (n.d.) is committed to the advancement of the science and practice of surgical oncology worldwide.

Surgical Oncology Today

A physician who provides care for surgical oncology patients requires extensive specialized training and education related to the principles of cancer surgery. The surgeon must have a complete understanding of the biology of cancer, the role of systemic chemotherapy, radiation therapy, immunotherapy, clinical trials, cancer prevention, and the care available through the multidisciplinary team. Likewise, the nurse who cares for surgical oncology patients must also be educated to provide appropriate care.

The Oncology Nursing Society (ONS, n.d.) was founded in 1975 to support the specialty profession of oncology nursing. ONS is dedicated to excellence in patient care, education, research, and administration in oncology nursing and aims to set the standard of nursing care for patients with cancer. The Society's mission is to promote excellence in oncology nursing and quality cancer care. Nurses have access to best practice clinical care standards and supporting evidence and research to develop knowledge and practice patterns related to this specialty. The ONS Surgical Oncology Special Interest Group (chartered in 1991) provides nurses working in any aspect of the surgical care continuum with networking and collaborative opportunities.

Principles of Oncology Surgery

Principles of cancer surgery are based on the goal of surgery (e.g., prevention, cure, palliation), the functional importance of the organ or structure, the ability to reconstruct the area, and the patient's condition to undergo the procedure. Other key components include the technical ability of the surgeons and surgical team, the availability of adjuvant therapies, and the biology of the disease (Wagman, 2009).

The terms *operable* and *resectable* are used to describe surgical cases. *Operable* describes the patient's physiologic condition to undergo surgery, and *resectable* is the possibility of the tumor to be surgically removed (Wagman, 2009). Cancer surgery can be performed for several reasons, including prevention, diagnosis, cure, rehabilitation, and palliation (Lester, 2007).

Goals of Surgical Procedures

Prevention

The surgical oncology team must also be proficient in the prevention of certain cancers as designated by risk factors such as personal and family history and possible or true genetic mutations. Some genetic mutations indicate a high risk of cancer development. Similarly, when these risk factors are known, patients are monitored very closely to detect any changes in condition. Some patients may choose to have the organs removed, for example, prophylactic bilateral mastectomies in a woman with risk factors such as a genetic mutation of *BRCA1* or *BRCA2* (Rosenberg, 2011). When the gene mutation for multiple polyposis is identified, the patient may desire to undergo a total colectomy to prevent the development of colon cancer (Rosenberg, 2011). Knowledge of genetic research and a relationship with a genetic counselor is essential for the surgical oncologist, nurse, and patient and family.

Diagnosis

The diagnostic role of surgery is the removal of tissue for histologic examination (Rosenberg, 2011). When a lesion or mass is found, it must be biopsied to determine pathology—benign (nonmalignant) or cancerous (malignant). Additional cellular and genetic features are incorporated to form the final diagnosis. Biopsies can be performed with a fine needle (e.g., fine needle aspiration) or with a retractable core needle device that punctures the tumor and removes small amounts of tissue (Mills, White, Diggs, Forti-

no, & Vetto, 2013). If a larger amount of tissue is required for diagnosis, an incisional biopsy (i.e., an open procedure to remove part of a lesion) or excisional biopsy (i.e., an open procedure to remove the entire lesion, mass, or lymph node) may be done. Another surgical tool is the diagnostic laparoscopy. When the extent of disease is unclear or symptoms do not match pathologic or radiographic evidence, a diagnostic laparotomy may be performed. Through small incisions in the anatomic area of concern, a laparoscope is placed so the surgeon can visualize internal structures and identify any irregularities. An ultrasound probe may also be used to explore area densities. Tissue and fluids can be gathered for pathology, histology, and cytology. These techniques can aid in the diagnosis and staging of disease. Laparoscopic surgery also has the benefit of sparing the patient the large incision and extended healing time associated with open-and-close surgery.

Cure

Surgery for the removal of a primary cancer includes resection of the entire tumor as well as a margin of normal tissues around the mass. This resection may also include adjacent blood vessels and lymphatic tissue or other organs the tumor may abut. Surgery for metastatic disease may be performed if the outcome has a potential for cure. General principles in surgical technique involve an adequate incision to visualize and remove the tumor, with the least potential for scarring and trauma to surrounding tissue.

The malignancy is removed with adjacent vessels and lymphatics and at least 1 cm of uninvolved tissue (known as a *clear margin*) with limited handling. Adequate clear margins are a critical aspect of cancer surgery and are defined as "a complete resection of normal tissue around a primary lesion, complete removal of involved regional lymph nodes, resection of adjacent affected organs, and en bloc resection of biopsy tracts and tumor sinuses" (Niederhuber, 2008, p. 414). Frozen sections during surgery are used to evaluate tissue margins when complete resection is a concern (Niederhuber, 2008). A positive margin with cancer cells at the edges of the pathologic specimen equates to an incomplete or noncurative resection.

Reconstruction and Rehabilitation

Quality of life is an important aspect in surgical oncology care. As specialists perform complex and radical surgeries to eradicate disease, the potential exists for a loss of function or disfigurement. Oncoplastic surgeons have become important members of the multidisciplinary team for their expertise of microsurgery, reconstruction, restoration of function, and repair of defects from radical cancer surgery (Li et al., 2014). A major source of psychological distress in patients with cancer is coping with a diagnosis that has a potential impact on body image (Reed, 2009). The utilization of muscle

flaps, free flaps with bone grafts, skin grafts, and tissue transfers at the time of the initial surgical intervention can alleviate some distress related to cosmetic defects. In addition, the functional impact of surgery is an important consideration in the need for prosthetics and ultimate rehabilitation to improve patients' quality of life.

Palliation

Nearly all cancers can cause distress and symptoms because of tumor progression or lack of response to treatment (Reed, 2009). Palliative surgery is performed with the goal of comfort, not cure. Palliative surgery can involve debulking, decompression, or diversion from the tumor. *Debulking* refers to removal of a bulky tumor or cytoreductive surgery. This surgery may be executed to decrease tumor burden in anticipation of chemotherapy or radiation therapy that would be more effective on the smaller amount of residual disease (Niederhuber, 2008). *Decompression* is performed to decrease pressure on a structure, such as placement of a gastrostomy tube to allow gastric juices to drain when a gastric outlet obstruction exists. A *diversion* may be done if an area is obstructed, such as creating a colostomy for bowel obstruction or placing an esophageal stent for esophageal blockage. Procedures also can assist with decreasing pain or helping with symptom management. The goal of palliative surgery is to decrease suffering and facilitate comfort. Palliative surgery is an important tool to promote quality and dignity. It is vital that the patient, family, and caregivers understand the intent and impact of the surgery.

Types of Surgical Interventions and Procedural Care

Patients with cancer undergo many interventions that require technical skill and care. In the past, these interventions or procedures were performed exclusively by surgeons; however, today, the interventional radiologist and team may complete the procedure and related care. Procedures such as biopsies, vascular access device placement, drain and stent placement, and tumor embolization and ablation are often accomplished within a procedural suite by these specially trained physicians. With radiographic imaging as a guide and appropriate levels of conscious sedation of patients, these professionals can safely, efficiently, and effectively render care.

Minimally Invasive Surgery

Minimally invasive surgery was once unthinkable in surgical oncology because the belief was that a wide incision was necessary to fully visualize and

explore a cancerous growth and adjacent tissue. However, inventive technology now allows a skilled surgeon to fully explore the human anatomy through the use of laparoscopic and robotic devices. Operative tools to enhance laparoscopes and robotic arms are continually evolving to allow smaller access ports and greater dexterity than a surgeon's hand may achieve in direct contact with the patient (Halabi et al., 2013). The potential for smaller incisions and minimal manipulation within the operative field may result in easier recovery, improved outcomes, and rapid return to daily life and meaningful activities.

Open Surgery

Traditionally, surgical oncologists used an open approach to surgical resection. Large, wide incisions were made in the anatomic area of the tumor to visualize the tumor, adjacent tissue, vessels, and lymphatics and minimize manipulation of the cancer upon removal. This approach remains relatively common today, but as technology advances and surgical skills are developed, the need for an open approach will likely diminish. Complications from extensive wound healing can lead to a delay in beginning adjuvant therapy, as well as the patient's return to a meaningful quality of life and activities.

The Surgical Team in the Perioperative Arena

Safe surgical interventions require the dedication of multiple staff across the patient care continuum. When a surgical intervention is indicated, the physician and clinical team must ensure the patient will tolerate the procedure. Once this is established and informed consent obtained, the patient will enter the perioperative arena.

The preoperative area is responsible for final preparations prior to entrance into the operating room (OR). The surgeon and anesthesiologist will often see the patient in the preoperative area, and nursing staff will complete final preparations. The OR team consists of (a) a surgeon, who is in charge of the planned operation and any deviations from the plan, (b) a surgical first assistant or assisting surgeons, who assist with the procedure and perform commands as directed by the surgeon, (c) a scrub nurse or surgical technician, who maintains the sterile field and instruments directly around the patient, (d) a circulating nurse, who readies sterile packages and deploys necessary equipment to the sterile surgical field (via the scrub nurse) and is responsible for documentation and all sponge and instrument counts, and (e) an anesthesiologist or nurse anesthetist, who provides analgesia, sedation, anesthesia, intubation, ventilation, hemodynamic monitoring, and vital sign and medication management.

After completion of the surgery, the patient is moved to the postanesthesia (recovery) room and is intensively monitored by a nurse for effects of extubation and anesthesia. The nurse and anesthesiologist collaborate to ensure the patient has stabilized (i.e., vital signs have returned to baseline and the patient is hemodynamically stable) before the patient moves to the next level of care. The patient will be discharged or moved to the appropriate nursing unit for ongoing care.

The patient may receive care on a unit prepared to take care of surgical patients, a unit prepared to take care of patients with cancer, or a unit prepared to care for patients having specific cancer surgeries. The nurse must be prepared to care for the patient based on the diagnosis and surgical intervention. General postsurgical principles will apply and include monitoring vital signs; providing hydration and nutrition; assessing incisions, tubes, and drains; and assisting with activity and pulmonary toilet. The nurse should also understand the patient's cancer trajectory, which includes the anticipated stage of cancer, other treatments the patient has had or will receive, and the goals of the surgical procedure and planned outcomes, as well as functional and physiologic challenges that the patient may face postoperatively. The nursing plan of care must address and educate the patient, family, and caregivers on important needs related to short- and long-term care.

Morbidity and Mortality

Surgical morbidity and mortality can be quite high following extensive cancer surgery if physiologic and biochemical deficiencies are not corrected (Pollock et al., 2010). Because of the age at diagnosis, debility, and wasting characteristics of the disease, patients with cancer may not be in optimal condition prior to surgery. Care must be taken to improve protein stores and nutrition, fluid volume, and blood and electrolyte levels prior to the surgical procedure. *Operative mortality* is defined as mortality that occurs within 30 days of a surgical procedure (Pollock et al., 2010). A complete physiologic, biochemical, and metastatic evaluation should occur prior to surgery, as well as maximum treatment of any comorbid diagnoses. In patients with cancer, the underlying disease is a major determinant of operative mortality (Rosenberg, 2011). Mortality related to complications from anesthesia is attributed to the presurgical physical status of the patient (Niederhuber, 2008). This risk has decreased substantially with the advent of anesthesia patient classification, standardized practices, and improved supervision in the OR. The risk-benefit ratio, the goals of surgery, and alternative options and outcomes must be well-defined, discussed, and understood by the surgeon and the patient, family, and caregivers to ascertain the choice of intervention.

Outcomes and Quality of Life

Outcome studies generally review data to discern the effectiveness of treatment with the ultimate indicators of death, time to recurrence or disease-free interval, and morbidity measures. More recently, functional status, quality-of-life indicators (e.g., patient-reported outcome assessments), and cost and cost-effectiveness have become increasingly important (Earle & Schrag, 2011). Oncology nursing-sensitive outcome classifications are symptom experience, functional status, safety (e.g., preventable adverse events), psychological distress, and cost/economics (Given et al., 2004). Quality care and outcomes are measured with the oncology patient across the full continuum of care. Examples within the perioperative setting include time-out and surgical infection control procedures used with each patient to ensure quality care. Inpatient nursing staff must be vigilant about prevention of falls and pressure ulcers, and accuracy of medication administration. Outpatient staff must measure appropriateness of testing, timeliness of care provision, time for education, and survivorship care. Nurses who care for patients with cancer must consider both provider and patient/caregiver outcomes and the impact of quality nursing care. As more patients become long-term cancer survivors, the impact of cancer treatment across the life span must take into account the lasting consequences.

Nursing Care of the Surgical Oncology Patient

Care of the patient with cancer in the midst of a surgical intervention requires a blend of oncology and surgical nursing skills. Immediate physical needs may mostly include surgically focused care, yet the patient's psychosocial care needs cannot be forgotten. Although the surgical intervention may physically take place outside of the oncology department, it still requires specific oncology care. Today's patient with cancer may receive neoadjuvant or adjuvant chemotherapy, biotherapy, or radiation therapy, and the impact of these treatments must be understood by all caregivers. Cancer site–specific guidelines are provided by the National Comprehensive Cancer Network and include the medical and supportive plans of care. Other resources for cancer care are provided by the National Cancer Institute, the American Cancer Society, and ONS. From prevention and early detection, through the medical and surgical care trajectory, to rehabilitation, palliation, or survivorship, nurses play a key role in the education, support, and care of the patient with cancer. It is essential that nurses interact with the surgical oncology team as well as the patient, family, and caregiver and are knowledgeable of the impact of current and future care needs.

Conclusions

The nurse with comprehensive relationship skills will be crucial to the ongoing development of nursing practice and the care of the patient with cancer. Collaboration with the expanding multidisciplinary teams is critical to the optimization of oncology care. The past decade has demonstrated advances in surgical technology, from microvascular oncoplastic surgery to minimally invasive and robotic surgical techniques. With these advances comes the increased need to nurture the relationships with the oncology team to ensure best patient outcomes. The oncology nurse must advocate for nursing research to develop evidence-based approaches to patient care inclusive of the surgical arena, optimizing outcomes for the cancer survivor. The oncology nurse must remain current and forward-looking to assist the patient to navigate the complex, multifaceted world of cancer care.

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