Surgical Oncology

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Learning Objectives

After completing this module, attendees should be able to

- **Appreciate the history of surgical oncology**
- **Describe the role of surgery in the multidisciplinary management of cancer, including its role in**
  - **Prevention**
  - **Screening**
  - **Diagnosis**
  - **Treatment**
  - **Rehabilitation**
  - **Follow-up care**
  - **Palliative care**
- **Describe the impact of molecular biology on surgical management of cancer**
- **Discuss the future of surgical oncology**

Role of Surgery in Cancer Care

“Surgery makes its contribution to cancer treatment in concert with other modalities.

Advances in the treatment of cancer will derive from improved orchestration with the other modalities rather than from improved operative technique alone.”

Bernard Fisher, 1977

Surgical Oncologist

"A surgical oncologist is a well-qualified surgeon who has obtained additional training and experience in the multidisciplinary approach to the prevention, diagnosis, treatment, and rehabilitation of cancer patients, and devotes a major portion of his or her professional practice to these activities and cancer research."

Society of Surgical Oncology
Training Program Guidelines, 2004

Ancient History of Surgery for Cancer Treatment

1600 BC First recorded description of the surgical treatment of cancer (in Egypt)

400 BC Hippocrates describes the stages of cancer and advises against surgery for terminal disease; he coins the terms “carcinoma” (crab-leg tumor) and “sarcoma” (fleshy tumor)

200 AD Galen identifies cancer as a systemic disease (primary and metastasis)

Historical Eras of Surgery to Treat Cancer

Before 1850	**Early heroic attempts to resect cancer**
1850-1950	**Development of standard surgical resection techniques**
1950-1960	**Development of extended radical surgical procedures**

Historical Eras of Surgery to Treat Cancer

1960-1980 Exploration of combined-modality treatment

1980-2000 Multimodality therapy improves organ preservation and survival

2000-present Surgical practice incorporates improved understanding of the molecular basis of tumor biology

Landmark Advances in Surgical Oncology

1775 Etiologic basis of cancer
Percival Pott

1809 Elective oophorectomy
Ephraim McDowell

1829 Metastatic process
Joseph Recamier

1846 Ether used as anesthesia
John Collins Warren

1867 Carbolic acid used as antisepsis
Joseph Lister

1873 Laryngectomy
Albert Theodore Billroth

Holland J et al. *Cancer Medicine,* 6th ed. 2003.

Landmark Advances in Surgical Oncology

1878 Resection of rectal tumor
Richard von Volkman

1880 Esophagectomy
Albert Theodore Billroth

1881 Gastrectomy
Albert Theodore Billroth

1890 Radical mastectomy
William Stewart Halstead

1896 {Oophorectomy for breast cancer}
G. T. Beatson

Landmark Advances in Surgical Oncology

1904 Radical prostatectomy
Hugh H. Young

1906 Radical hysterectomy

Ernest Wertheim

1908 Abdominoperineal resection
W. Ernest Miles

1909 Nobel prize for thyroid surgery
Theodore Emil Kocher

1910 Craniotomy
Harvey Cushing

Landmark Advances in Surgical Oncology

1912 **Cordotomy for the treatment of pain**
E. Martin

1913 **Thoracic esophagectomy**
Franz Torek

1927 **Resection of pulmonary metastases**
George Divis

1933 **Pneumonectomy**
Evarts Graham

1935 **Pancreaticoduodenectomy**
Allen O. Whipple

Landmark Advances in Surgical Oncology

1945 **Adrenalectomy for prostate cancer**

Charles B. Huggins

1957 **Isolated limb perfusion**

Oliver Creech

1958 **First multicenter clinical trial**

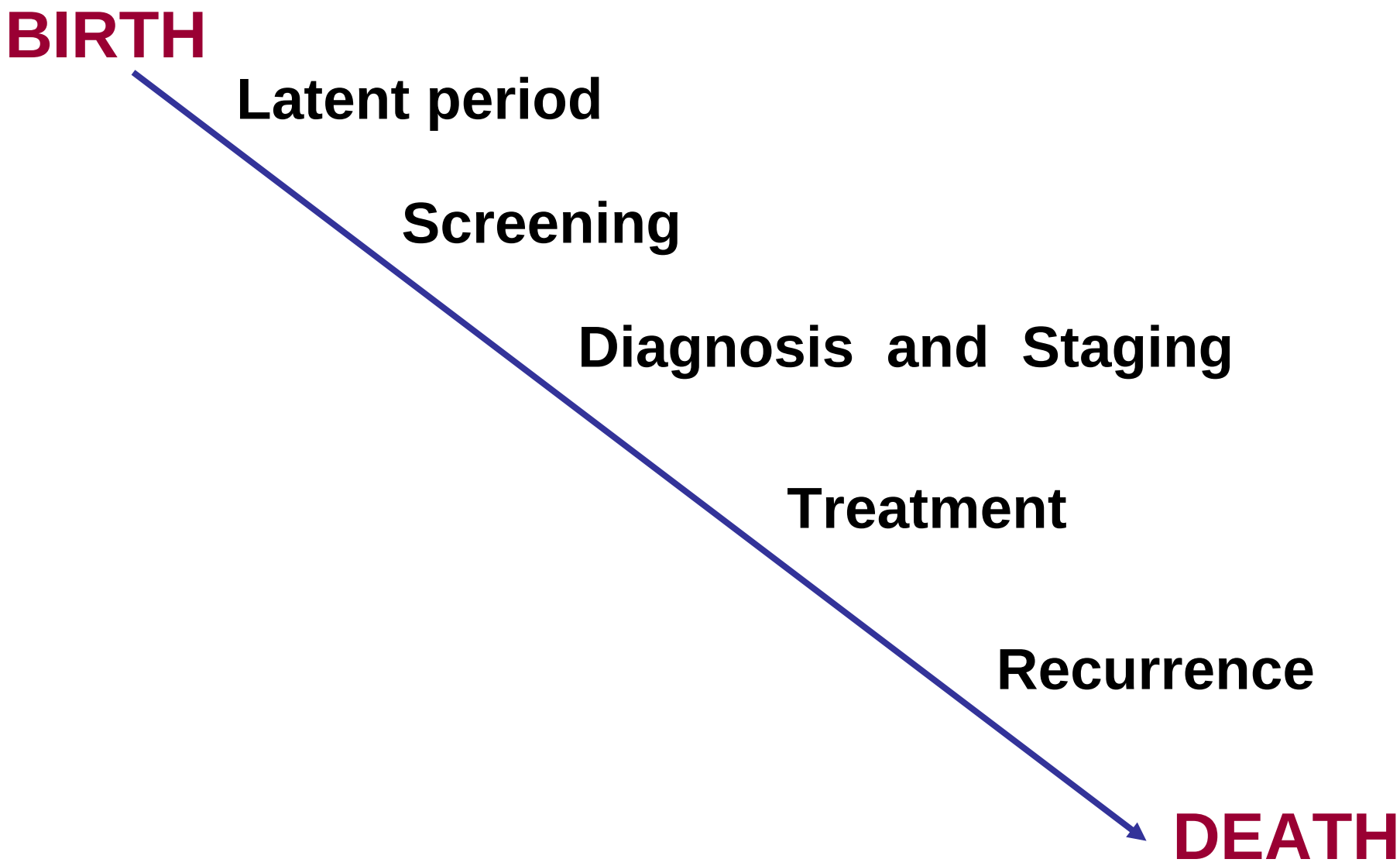
Bernard Fisher

1965 **Hormone therapy for cancer**

Charles Huggins

1971 **Microvascular free-tissue transfer**

Harry Buncke


BIRTH
Latent period
Screening
Diagnosis and Staging
Treatment
Recurrence
DEATH

Surgery for Cancer Prevention

Role of Surgery in Cancer Prevention

- **Pre-cancerous lesions**
  - **Leukoplakia of the tongue**
  - **Thyroid gland in MENS II**
  - **Colon in FAP**
- **Organs at high risk of malignancy even where a pre-cancerous lesion has not been identified**
  - **Breast in cariers of deleterious BRCA mutations**
  - **Colon in HNPCC**

Surgery for Cancer Screening

Role of Surgery in Cancer Screening

- Colonoscopy in colon cancer
- Digital rectal examination in prostate cancer
- Clinical breast examination

Surgery for Diagnosis

Role of Surgery in Diagnosis

- **History**
  - **Ascertain presence of risk factors**
  - **Evidence of metastases**
  - **Presence of co-morbid factors**
  - **Family and social history**
  - **Psychological assessment of patient**

Role of Surgery in Diagnosis

- **History**
  - **Ascertain patient's social and economic resources**
  - **Ascertain patient's expectation from therapy**
  - **Patient's treatment preferences**
  - **Educate patient on diagnosis, treatment and follow-up, and correct mis-information**

Role of Surgery in Diagnosis

- **Investigations**
  - **Knowledge of all available modalities of investigating particular case**
  - **Microscopic diagnosis is compulsory**

Biopsy

Surgeon's responsibilities:

- **Selection of appropriate biopsy method and site**
- **Responsible that the tissue reach the pathologist timely and properly .**
- **Communicate the results to the patient, family, other physicians**
- **Provide initial prognosis and information on follow-up care**

Types of Biopsy Methods

- **Transcutaneous**

- **Image-directed (with fine-needle aspiration or cutting needle)**
  - **Ultrasonography**
  - **Computerized tomography**
  - **Magnetic resonance imaging**

- **Open incisional (A portion of the tumor)**
- **Open excisional (All tumor mass removed)**

Image-Directed Biopsy

Surgeon's Tasks in Performing Biopsy

- **Orient the specimen**
- **Ensure the integrity of the tissue plane**
- **Ensure the adequacy of the tissue sample**
- **Be sure tissue reach the pathologist !**

Appropriate Open Biopsy

- **Scar is parallel to the long axis of the extremity**
- **Tissue planes and compartments are intact**
- **En bloc resection will be easy to accomplish**
- **Biopsy is only the first step**

Surgery for Cancer Staging

Surgery and Staging

- **Classifies patients according to the degree of spread of cancer in order**
  - **Guide selection of primary and adjuvant treatment**
  - **Estimate prognosis**
  - **Assist in evaluating result of treatment**
  - **Facilitate exchange of information**
  - **Contribute to continuing investigation of cancers**

Surgery for Cancer Treatment

Role of Surgery in Cancer Care

- **Surgery**

  Zero-order kinetics—100% of cells at risk are killed with a single treatment

- **Radiotherapy/Chemotherapy**

  First-order kinetics—only a portion of cells at risk are killed during treatment, which is followed by regrowth

Preoperative Assessment and Preparation

- **Surgeon's responsibility to assess the risk-to-benefit ratio and identify and correct underlying, *relevant* health problems .**
  - **Nutritional status**
  - **Co-morbid medical conditions**
    - **Hypertension**
    - **Diabetes**
    - **Congestive heart failure**
    - **Liver or renal insufficiency**
    - **Immunosuppresion**

Types of surgery

- **Local resection**
- **Radical resection with en-bloc resection of lymph nodes**
- **Supra-radical resections**
- **Surgery for metastasis**
- **Surgical management of complications**
- **Vascular access surgery**

Treatment

- **Principles of surgical resection of tumor**
  - **Adequate margin of resection**
  - **Prevention of tumor spillage**
  - **Minimal manipulation**
  - **Reconstruction**

Metastasectomy

This is done when:

- **The primary tumor is controlled or can be controlled**
- **Metastasis is single or where multiple is localized**
- **Evidence that metastasectomy is associated clinical benefits**
- **Tumor doubling time is sufficiently long**
- **No significant co-morbid factor**

Metastasectomy

Complete resection of distant metastases improves five-year overall survival rates

- **40% for colorectal cancer with resection of liver metastases**
- **30% for sarcoma with resection of lung metastases**
- **16% for breast cancer with resection of brain metastases**

Treatment-Related Complications

- **Gastrointestinal and genitourinary strictures**
- **Fistulae**
- **Tissue necrosis of bone (osteonecrosis) or skin**
- **Proctitis and cystitis**
- **Radiation-induced secondary cancer**

Surgery and Rehabilitation

Role of surgery in the rehabilitation of cancer patients

- **Restoration of form**
- **Restoration of function**
- **Care of ostomies**
- **Psychological treatment and support**
- **Maintenance and improvement of quality of life**

Surgery and Palliative care

Goals of Palliative Surgery

- **Relieve symptoms for patients beyond cure when non-surgical measures are not feasible, not effective, or not expedient**
- **Palliation means patient should be better at the completion of the procedure**

"It is axiomatic that one cannot palliatively improve an asymptomatic patient using a scalpel."

R. G. Martin, 1982

Palliative Improvement of Function and quality of life

- **Adequate control of pain**
- **Relief gastrointestinal and biliary obstruction**
- **Stop hemorrhage**
- **Supplement poor nutrition**
- **Airway obstruction**
- **Renal failure**
- **Rectal or urinary incontinence**

Factors that influence outcome of treatment

Factors that influence outcome of treatment

- **Patient related factors**
- **Health care provider related factors**
- **Environment related factors**

Future of Surgical Oncology

Surgical Oncology in the Future

- **Preemptive surgery in populations at genetic risk for the development of cancer**
- **Tissue and function-preserving improvements**
  - **Minimally invasive and robotic surgery**
  - **Implantable monitors**
  - **Treatment sensitizers**
  - **Tissue-engineered, implantable “spare parts”**
- **Refinements in surgical practice will be driven by the underlying molecular basis of tumor biology**