Principles of Surgical Oncology

ศาสตราจารย์ นายแพทย์ ธนพล พิทยานุพงษ์
Surgery is the oldest treatment for cancer and, until recently, was the only treatment that could cure patients with cancer.
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
Roles for Surgery

• Prevention of cancer
• Diagnosis of cancer
• Treatment of cancer
• Rehabilitation
## Surgery that can prevent cancer

<table>
<thead>
<tr>
<th>Underlying Condition</th>
<th>Associated cancer</th>
<th>Prophylactic surgery</th>
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</thead>
<tbody>
<tr>
<td>Cryptorchidism</td>
<td>Testicular cancer</td>
<td>Orchiopexy</td>
</tr>
<tr>
<td>Polyposis coli</td>
<td>Colon</td>
<td>Colectomy</td>
</tr>
<tr>
<td>Familial colon cancer</td>
<td>Colon</td>
<td>Colectomy</td>
</tr>
<tr>
<td>Ulcerative colitis</td>
<td>Colon</td>
<td>Colectomy</td>
</tr>
<tr>
<td>Multiple endocrines</td>
<td>Medullary cancer of the thyroid</td>
<td>Thyroidectomy</td>
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<tr>
<td>Neoplasm (type II and III)</td>
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<tr>
<td>Familial breast cancer</td>
<td>Breast</td>
<td>Mastectomy</td>
</tr>
<tr>
<td>Familial ovarian cancer</td>
<td>Ovary</td>
<td>Oophorectomy</td>
</tr>
</tbody>
</table>
Roles for Surgery

• Prevention of cancer
• **Diagnosis of cancer**
• Treatment of cancer
• Rehabilitation
Surgical detection and biopsy for tissue diagnosis

- Fine Needle Aspiration (FNA) cytology
- Core needle biopsy
- Incisional biopsy
- Excisional biopsy
- Surgical staging
Pitfalls in Biopsy Techniques
Specialized techniques of cancer management

- Laparoscopy
- UGI endoscopy
- Colonoscopy
- Bronchoscopy
- Mediastinoscopy
- Thoracoscopy
- Needle localization and breast biopsy
Roles for Surgery

- Prevention of cancer
- Diagnosis of cancer
- Treatment of cancer
- Rehabilitation
Surgical Treatment of Cancer

- Surgery for primary cancer
- Surgery for residual disease
- Surgery for metastatic disease
- Surgery for oncologic emergencies
- Surgery for palliation
- Surgery for reconstruction and rehabilitation
Principles of surgical resection of tumor

• Adequate margin of resection
• Prevention of tumor spillage
• Minimal manipulation
• Reconstruction
New Concepts in Cancer Management

- Conservative breast surgery
  *(Sentinel node biopsy)*
- Limb salvage surgery in sarcoma
- Major ablative surgery in head & neck cancer
Sentinel node biopsy
99mTc-sulfur colloid = 0.4 mCi
Perioperative management of patient with cancer
Effects of cancer

- Anatomical
  - Tumors
  - Cancer therapy

- Physiological
  - Tumors
  - Cancer therapy
Anatomical effects of tumors

- Airway consideration in patient with advanced head and neck tumors
  - Preoperative CT scan
  - Awake intubation using fiberoptic guidance
  - Beware of post operative airway obstruction
Mediastinal Masses

History of dyspnea, stridor, wheezing, orthopnea

- Patient with possible mediastinal compression should be avoid from general anesthesia (biopsy under local anesthesia)

Mediastinal Masses (cont.)

Patients who require general anesthesia despite tracheobronchial tree compression should undergo the following

1. Awake fiberoptic intubation

2. Spontaneous ventilation throughout the procedure
Mediastinal masses (cont.)

3. Ability to quickly reposition the patient to lateral, prone or sitting position in the event of cardiovascular collapse or airway obstruction

4. Available rigid bronchoscopy to open, a collapsed airway

5. Standby femoro-femoral bypass

Physiologic effects of tumors

Pheochromocytoma

- Preoperative pharmacologic manipulation
- Intraoperative monitoring

Hypertensive crisis
Hypotension
Physiologic effects of tumors

Carcinoid Tumors

5 hydroxytryptamine (serotonin)
- Diarrhea with abdominal cramping
- Respiratory distress
- Bronchospasm
- Hypertension
Carcinoid Tumor (cont.)

Preoperative Preparation

• Adequate hydration

• Cardiac evaluation

(Right – sided heart failure)
Anatomical effects of cancer therapy

Effects of radiation therapy to the head and neck

• Distortion of airway anatomy

• Edema and swelling of tissue
Effects of radiation therapy to the GI Tract

- Stricture
- Obstruction
- Perforation
- Bleeding
- Fistula formation
- Radiation induced – bowel injury
Physiologic effects of cancer therapy

Bleomycin – Pulmonary fibrosis

- Dry non productive cough
- Dyspnea
- Fever
- Tachypnea
Physiologic effects of cancer therapy (cont.)

Cardiac toxicity

- Doxorubicin
- Daunorubicin
- Epirubicin
- Herceptin

\{ ECG change
or Chronic cardiomyopathy \}
Hepatic Toxicity After Chemotherapy

- Steatosis
- Vascular Lesions
  (Centrolobular Necrosis)
- Steatohepatitis
  (CASH: Chemotherapy - Associated Steatohepatitis)
Physiologic effects of cancer therapy (cont.)

Steroid administration

• Received $> 2$ weeks in the past year

Risk of adrenal suppression
Poor Nutritional status

Effects of tumor and therapy

• Eating and Drinking impaired by pain, nausea, stomatitis
• Tumor involving oropharynx or GI tract
• Metabolic aberrations may induce anorexia and weight loss
Poor nutritional status (cont.)

Perioperative nutritional support

• Fewer operative complications
• Shorter length of hospital stay
Oncogeriatric patients

- Two thirds of all solid tumors occur in patients aged 65 years or older and most cancer-related deaths occur within this age group

There is considerable evidence that this steadily expanding population receives substandard treatment when compared with younger age groups.

Surgical Treatment of Cancer

- Surgery for primary cancer
- Surgery for residual disease
- Surgery for metastatic disease
- Surgery for oncologic emergencies
- Surgery for palliation
- Surgery for reconstruction and rehabilitation
Surgical Treatment of Metastatic Disease

- Pulmonary metastases
- Liver metastases
- Bone metastases
- Brain metastases
Criteria for resection of pulmonary metastasis

• The disease at the primary site must be controlled

• No metastases outside of the lungs are demonstrable

• All apparent disease in the chest must be completely resectable

• The risk of the resection must not be excessive
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
Surgical Treatment of Cancer

- Surgery for primary cancer
- Surgery for residual disease
- Surgery for metastatic disease
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- Surgery for palliation
- Surgery for reconstruction and rehabilitation
Surgery for palliation

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
Surgery for reconstruction and rehabilitation

- Restoration of form
- Restoration of function
- Care of ostomies
- Psychological treatment and support
- Maintenance and improvement of quality of life
Treatment-related complications

- Gastrointestinal and genitourinary strictures
- Fistulae
- Tissue necrosis of bone (osteonecrosis) or skin
- Proctitis and cystitis
- Radiation-induced secondary cancer
The surgeon who treats cancer must be familiar with the natural history of diseases and with the principles of multimodality treatment of surgery, radiation therapy, chemotherapy, immunotherapy and other new treatment modalities.
A Surgical Oncologist is a well-qualified surgeon who has obtained additional training and experience in a multidisciplinary approach to cancer patients. They devote a major portion of their professional practice to these activities and cancer research.
Multidisciplinary teams and collaborative environment

• Teams include not only clinicians and nurses but also support staff and basic and applied scientists.

• All aiming toward improved outcomes and higher quality of care and of life.
Training of Surgical Oncologist

- Two years training program on a surgical oncology service
- Training from approved program
- Training at a center with sufficient basic science resources
- Training at an institution that will provide adequate operative experience
- Full-time assignment to radiation and medical 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
Thank You