بسم الله الرحمن الرحيم

# Anesthesia & cancer patients
## ..... Problems orieted

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# The most common toxicities to chemotherapeutic agents

- **Cardiac:**



**Anthracycline agents**

**A cyclophosphamide**

*Previous treatment with anthracyclines may enhance the myocardial depressive effect of anaesthetics even in patients with normal resting cardiac function*

**The preoperative assessment:** 2D - echocardiogram or nuclear medicine studies

**Anthracycline agents can cause dysrhythmias**

**Invasive arterial blood pressure**

**Develop acute intraoperative left ventricular failure refracto to â- adrenergic receptor agonists.**

**Amrinone**



# The most common toxicities to chemothera-peutic agents

- **Pulmonary :**
- 75% to 90% of pulmonary complications are secondary to infection
- Several patterns of pulmonary toxicity produced by bleomycin:
- Dose dependent interstitial pneumonitis progressing to chronic fibrosis
- An acute hypersensitivity pneumonitis with peripheral eosinophilia resembling eosinophilic pneumonia.
- An acute chest pain syndrome.
- A bronchitis obliterans with organising pneumonia.
- Pulmonary veno-occlusive disease.



# The most common toxicities to chemotherapeutic agents

- **Pulmonary :**
- Progressive interstitial pneumonitis and fibrosis is the most common pattern of bleomycin lung injury. Symptoms generally occur between 4 to 10 weeks after bleomycin therapy
- ***Hyperoxia & Bleomycin***
- Debate
- Intraoperative PEEP
- Postoperative rigorous physiotherapy
- Fluid balance is another important factor in predicting pulmonary morbidity in-patients receiving bleomycin.;
- Conservative fluid management is important
- use of colloids is beneficial as compared to crystall





# The most common toxicities to chemotherapeutic agents

- **Renal complications :**
- **Cisplatinum**
- Proper hydration with forced dieresis
- Use of normal saline is particularly beneficial
- The renal toxicity may be accentuated if the patient receives aminoglycosides concomitantly
- **CNS complications:**
- **Vinca alkaloids :Vincristine**
- Regional anesthesia is concerned, one should be aware
- Recently, a diffuse brachial plexopathy after interscalene blockad been reported .



# The most common toxicities to chemothera-peutic agents

- **Hepatic complications :**
- **Cytarabine, cyclophosphamide, mitomycin, etc.**
- **Manifestation**
- **Haematological complications:-**
- **Primary bone marrow disorders (e.g.,leukemia),**
- **Bony metastases (e.g., from breast cancer),**
- **Myelosuppressive chemotherapy.**
- Myelo-suppression caused by all the chemotherapeutic agents is partially or completely reversible within 1 to 6 weeks of termination of therapy.



# The most common toxicities to chemothera-peutic agents

- **Syndrome of inappropriate antidiuretic hormone secretion (SIADH):**
- Metabolic abnormality in patients with cancer like lung, pancreas-adeno-carcinoma, duodenum, thymoma, mesothelioma, leukaemia, hodgkin, reticulum cell sarcoma, is SIADH
- **Steroid administration:**

The patient who has received ≥2 weeks of glucocorticoids within the past year is considered at risk for adrenal suppression

**Tumor lysis syndrome:**

Vigorous intravenous hydration, often with diuretics or renal doses of dopamine to ensure adequate urine output.



# Anaesthetic considerations for patients after chemotherapy

- **The goals:**
- To optimize patient's physical status.
- To assess effects of cancer and cancer therapies (chemotherapy, radiotherapy and surgery) on patient.
- **Thorough history and physical examination**
- **Routine clinical tests**
- **Immuno-suppresion ------aseptic techniques**
- **Patients who had a bleomycin therapy**
- **should not receive high inspired oxygen concentrations**
- **colloid rather than crystalloid replacement.**
- **Ventilator support should be anticipated in the postoperative period.**



# Anaesthetic considerations for patients after chemotherapy

- Congestive heart failure is treated using diuretics, digitalis and oxygen.
- Operating and recovery room monitoring
- Anaesthetic drugs THAT causing liver damage should be avoided.
- Balanced electrolyte solutions started the evening before surgery will aid in maintaining optimal renal flow and glomerular filtration.
- Potentially nephrotoxic drugs should be avoided.
- Negative interactions between methotrexate and non-steroidal anti-inflammatory drugs (NSAIDs) are well known (NSAIDS are known to reduce the excretion of methotrexate)
- Diarrhea is a side effect of many of the anticancer drugs



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# Lung Cancer

- SIGNS AND SYMPTOMS
- --Cough, hemopysis, wheezing, stridor, dyspnea, or pneumonitis.
- --Mediastinal metastasis causes hoarseness (RLN compression), superior vena cava syndrome, dysrrhythmias, CHF from pericardial effusion and tamponade.
- ---Generalised weakness, anorexia and weight loss are common.



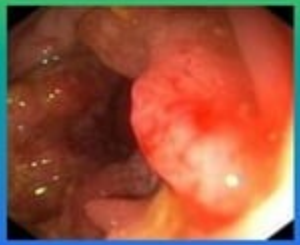


# Management of Anesthesia Lung Cancer

- Evaluate underlying pulmonary and cardiac function when lung resection is planned.
- If mediastinoscopy, monitor for hemorrhage, pneumothorax, VAE, pressure on right subclavian artery and carotid artery.
- Prepare to place a DLT for a thoracotomy in order to isolate the lung, keep ETCO2 35-45, PIP <35 cm H2O.
- Large bore IVS X2, Aline .
- Standard induction: STP or propofol, succs or Roc.
- O2, iso and iv opioids.
- Epidural or intercostal block.
- Extubate in OR, transfer in head up position to PACU or ICU.

# Colorectal Cancer

- GETA with epidural for post op pain if possible.
- If acute abdominal process RSI or awake intubation.
- Maintenance, combined epidural with GA.
- Decision to extubate depends on underlying cardiopulmonary status.
- Anticipate large 3rd space losses, large bore IVS x2, monitor UOP.
- T&C for 4 units PRBC.

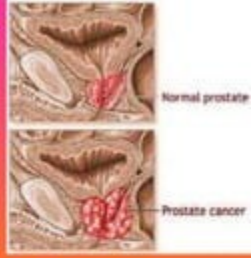


# Colorectal Cancer



- Disease induced anemia. Metastasis to liver, lungs, bones or brain.
- Chronic large bowel obstruction does not increase risk of aspiration during induction, but may interfere with V/O.
- Blood transfusions are associated with decreased survival probably from immunosuppression from transfused blood.

# Prostate Cancer




- TURP
- Regional or GA depends on coexisting disease and patient preference.
- Regional anesthesia may be better in order to evaluate mental status to detect TURP syndrome.
- SAB T9 level is optimal using 0.5% bupivacaine 12mg in dextrose 7.5% solution.
- TURP should not exceed 2hrs due to absorption of irrigation fluid.

# Prostate Cancer

- Standard induction.
- Muscle relaxation is not mandatory but patient movement must be avoided.
- Anticipate BP drop when legs are dropped from lithotomy position.
- Blood loss can be large if venous sinuses are entered, difficult to quantify with irrigation.
- Invasive monitoring depends/patient condition.
- Signs of bladder perforation, such as shoulder pain in awake patient, maybe unnoticed under GA, may see increased HR and BP, sometimes low BP.
- Minimal post op pain.

# Breast Cancer



- Side effects of chemotherapy should be evaluated.
- IV lines should be avoided in ipsilateral arm to avoid exacerbation of lymphedema.
- Bone pain and pathological fractures should be considered when selecting regional anesthesia.
- Preop opioids help with pain management prior to surgery.
- Isosulfan dye used for localization can decrease pulse oximetry transiently.
- Anesthetic drugs, techniques, and monitoring depends on planned surgical procedure and pts current condition.

## Anesthesia for Breast-conserving surgery, mastectomy and reconstruction

- GETA or GA with LMA.
- Regional anesthesia with paravertebral block (PVB) in breast surgery is associated with less PONV, less pain and earlier discharge.
- Standard induction.
- Use of muscle relaxants during axillary dissection should be avoided to allow identification of nerves by nerve stimulator.
- Risk of pneumothorax.
- High incidence of PONV so medicate appropriately.
- Minimize coughing on emergence to decrease post op bleeding.

# Postoperative Considerations

- **Postoperative mechanical ventilation** following invasive or prolonged operations and in patients with preoperative drug-induced pulmonary fibrosis.
- **Drug induced cardiac toxicity patients** are more likely to experience postop cardiac complications.

# Acute and Chronic Pain

- Acute pain is associated with pathological fractures, tumor invasions, surgery, radiation and chemo.
- Metastatic cancer pain especially to bone.
- Nerve compression of infiltration may cause pain.
- Signs of depression and anxiety.

# Treatment

- Drug therapy such as NSAIDS and acetaminophen for mild to mod pain.
- Codeine for management of mod to severe pain.
- Opioids for severe cancer pain such as morphine and fentanyl.
- Tricyclic antidepressants for patients who remain depressed even when pain is controlled.
- TCAs are useful since they potentiate opioids.
- Anticonvulsants are useful for management of chronic neuropathic pain.
- Corticosteroids can lower pain perception decreasing need for opioids, improve mood, increase appetite and weight gain.

- Neuraxial administration
  -Morphine epidurally or intrathecaly.
  -Implantable infusion devices when systemic infusions have failed.
- Neurolytic procedures
  -Destroying sensory component of nerves using nerve blocks.
  -Celiac plexus blocks for pain originating in abdominal viscera.
  -Dorsal column stimulators or deep brain stimulators can be used.



# Pathophysiologic Manifestations of Paraneoplastic syndromes

- Fever, Anorexia, Weight Loss, Anemia
- Thrombocytopenia, Coagulopathies
- Neuromuscular abnormaities
- Ectopic hormone production
- Hypercalcemia
- Hyperuricemia
- Tumor lysis syndrome
- Adreneal insufficiency
- Nephrotc Syndrome
- Utereral syndrome
- Pulmonary hypertrphic osteoarthropathy /clubbing
- Pericardial effusion, Pericardial tamponade
- Superior vena cava syndrome
- Spinal cord compression
- Brain metastasis

# Carcnoid Tumor and Carcinoid Syndrome

- Slow growing malignancies of enterochromaffin cells usually found in the GI tract. (lung, pancreas, thymus, liver).
- Tumors secrete biologically active substances: serotonin, histamine, prostaglandins, adrenocorticoptropic hormone, gastrin, calcitonin, and growth hormone.
- 5-10 % develop carcinoid syndrome.
- **What 2 factors enhance release of carcinoid hormones?**
- Direct physical manipulation of the tumor.
- Beta Adrenergic stimulation.

# Carcinoid Syndrome Manifestations

- Episodic cutaneous flushing (kinin, histamine)
- Diarrhea
- Heart Disease
- Tricuspid regurgitation, pulmonic stenosis
- SVT
- Bronchoconstriction

- Hypotension
- Abdominal Pain
- Hypertension
- Hepatomegaly
- Hyperglycemia
- Hypoalbuminemia
- Vasoactive peptids released from carcinoid tumors in bronchi and ovaries

## Anesthesic Considerations in Carcinoid Syndrome

- Most common clinical signs are flushing, wheezing, Bp & HR Changes, and diarrhea.
- **Preop assessment**: CBC, Lytes, Liver function tests, BG, EKG, Urine 5 HIAA levels.
- Optimize fluid and lytes. Pretreat with **Octreotide**. Continue in post op period.
- **Octreotide :** Somatostanin analog is used to blunt the vasoactive and bronchoconstrictive effects of carcinoid tumor products.
- Bronchospasm (histamine or bradykinin) have shown to be resistant to ketamine or inhalation agents.
- Use Beta 2 agonists for bronchodilitation.
- **Both Histamine 1 and 2 receptor blockers** must be used fully to block histamine effects.

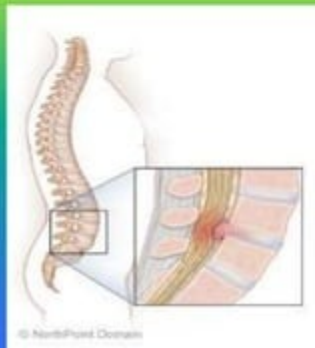
- **Avoid histamine releasing agents**: MSO4,Thiopental, Atracurium.
- **Avoid sympathomimetic agents** : ketamine and/or ephedrine.
- **Treat Low BP** with alpha-receptor: Neo
- **GA** over RA. Pts with high serotonin levels have prolonged recovery, use des or sevo for rapid recovery.
- Aggressively maintain **normothermia** to avoid catecholamine-induced vasoactive mediator release.
- Monitor **BG** intraoperatively, prone to hyperglycemia.

# Superior Vena Cava Obstruction

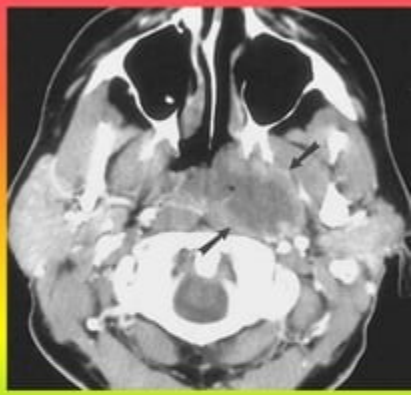
- Engorgement of veins above the waist, particularly jugular veins.
- Dyspnea, airway obstruction.
- Facial and arm edema.
- Hoarseness may reflect edema of the vocal cords.

# Spinal Cord Compression

- Metastatic lesions in the epidural space, most often relflecting breast, lung, prostate cancer or lymphoma.
- Pain, Skeletal muscle weakness, sensory loss, autonomic nervous system dysfunction.
- Corticosteroids, radiation, MRI, CAT, Myelography.



# Increased ICP



Nausea

Seizures

Decreased level of consciousness

Mental deterioration

Focal neuro deficits

CAT scan, corticosteroids, diuretics, mannitol

Radiation,  Intrathecal Chemo

# The Stress Response and CANCER

- B-adrenergic stimulation which increases during stress states suppresses NK activity and so promotes metastasis.
- Low NK activity increases cancer morbidity and mortality.
- Surgery suppresses immunity and so promotes metastasis.
- Surgical stress promotes angiogenesis and contributes to neoplastic growth.
- Minimally invasive procedures might be better for cancer patients.



# Animal Studies

- **Propofol** does not promote metastasis may be due to its weak beta adrenergic antagonist properties.
- A study in rats showed that **ketamine, thiopental, and halothane** reduced NK cell activity and increased lung metastasis.
- **Morphine** promotes angiogenesis and promotes breast tumor growth in rodents.
- **Pain relief** decreases metastasis susceptibility due to reduction in stress response.
- It is now know that **opioids** inhibit cellular and humoral immune function in humans.

# Animal Studies

- Decreases use of inhaled agents and opioids which decrease NK cells.
- Opioids administered intrathecally in small quantities do not have the same effect on NK cells.
- Decreases release of catecholamines which reduce NK cell activity.
- **Epidural anesthesia** improves post op outcomes by decreasing surgical stress.
- In a study of mice a laparatomy procedure using sevo increased liver mets as compared to sevo and spinal anesthesia.

# Neuraxial Anesthesia: Human Data

- **Use of paravertebral anesthesia** and analgesia for breast cancer decreases risk of reoccurence.
- A study on men undergoing a prostatectomy under GA with morphine compared to GA with epidural anesthesia, epidural technique was associated with a 65% reduction in biochemical recurrence of prostate CA.



# Neuraxial Anesthesia: Human Data

- Spinal anesthesia for a TURP resulted in less immunosupression after surgery.
- If reducing volatile anesthetic requirements or opiates is vital, use of dexmedetomidine or IV lidocaine might be beneficial.





# Thank you

