



التخدير-كورس اول

NON-OPERATING ROOM ANAESTHESIA (NORA)



Sawa University

College of health and medical
techniques

Department of Anesthesia

3rd Stage cours 1

جامعة ساوة الاهلية

كلية التقنيات الصحية والطبية

قسم تقنيات التخدير

المرحلة الثالثة

نظري محاضرة رقم 9

Lecture No. 9

Theoretical

: استاذ المادة Dr.Hasanein Ali

M.B.CH.B / F.I.C.M.S of Anes. And IC

NON-OPERATING ROOM ANAESTHESIA (NORA)

❖ Some terms;

- ❖ Nonoperating room anesthesia (NORA)
- ❖ Anesthesia at remote location.
- ❖ Outpatient anesthesia.
- ❖ Office-based anesthesia (OBA).

❖ Importance;

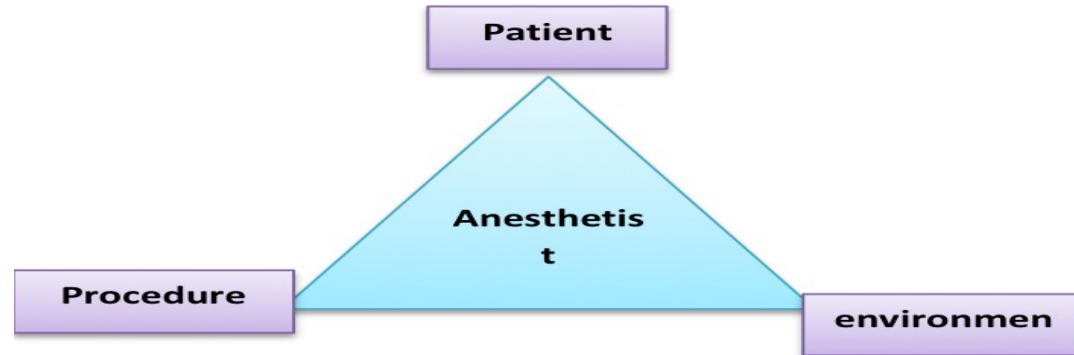
- ❖ Number of NORA activities have increased rapidly (CT, MRI, neuroradiologic procedure or electroconvulsive therapy)
- ❖ More Complex of the procedure, and situation and patients
- ❖ Include all sedation and anaesthesia provided by anesthesiology services outside of the operating room environment.
- ❖ **Area remote from main operating room:**
 - ❖ Radiology department.
 - ❖ Endoscopy suites.
 - ❖ MRI.
 - ❖ Dental Clinics.

Special problem of NORA

- ❖ Limited working place, limited access to the patient.
- ❖ Electrical interference with monitors and phones, lighting and temperature inadequacy.
- ❖ Use outdated, old equipment .
- ❖ Less familiar with the management of patients.
- ❖ Lack of skilled personnel, drugs and supports.



THREE STEP APPROACHES TO NORA



1 - Patients

- ❖ Most Patients tend to be older. (>50 yrs).
- ❖ Receive monitored anesthesia care (MAC) or sedation.
- ❖ Children commonly require sedation or anesthesia for diagnostic and therapeutic procedures.
- ❖ Thorough preanesthetic assessment, standard preanesthetic care.
- ❖ Sound anesthetic plan with appropriate level of monitoring and appropriate postanesthetic care.

Patient factors requiring Sedation or Anesthesia for Nonoperating Room:

- ❖ Claustrophobia.
 - ❖ Anxiety.
 - ❖ Cerebral palsy.
 - ❖ Developmental delay.
 - ❖ Learning difficulties.
 - ❖ Seizures.
 - ❖ Movement disorders.
 - ❖ Pain.
 - ❖ Acute trauma, with unstable cardiovascular, respiratory or neurological function.
- 6 ❖ Children below 10 years old.

2 -Procedures

- ❖ Nature of the procedure, including patient position, grade of painful procedure, and its duration.
- ❖ Optimum anesthesia plan provides safe patient care and facilitates the procedure.
- ❖ Discussion with proceduralist for emergencies and adverse outcomes

COMMON NONOPERATING ROOM ANESTHESIA PROCEDURES

Radiologic imaging

- ❖ Computed tomography (CT)
- ❖ Magnetic resonance imaging (MRI)
- ❖ Positron emission tomography (PET)
- ❖ Various vascular imaging, stenting, and embolization procedures.
- ❖ Radiofrequency ablation (RFA)
- ❖ Transjugular intrahepatic portosystemic shunt (TIPS)

Diagnostic and therapeutic interventional radiology

❖ Occlusive (“closing”) procedures:

- Embolization of cerebral aneurysm/AVM/vascular tumors

❖ Opening procedures:

- Angioplasty/stenting/thrombolysis in stroke cerebral atherosclerosis or cerebral vasospasm

Radiotherapy

- ❖ Radiation therapy.

- ❖ Intraoperative radiotherapy.

Diagnostic and therapeutic interventional cardiology

Cardiac catheterization laboratory

- ❖ Diagnostic cardiac catheterization.
- ❖ Percutaneous coronary interventions (PCI)

Electrophysiology laboratory (EPL)

- ❖ Electrophysiology studies and radiofrequency ablation.
- ❖ Implantation of biventricular pacing systems and cardioverter defibrillators.
- ❖ Cardioversion and transesophageal echocardiography.

Other Procedures

Diagnostic and therapeutic interventional gastroenterology

- ❖ Upper gastroenterology endoscopy.
- ❖ Esophageal dilatation or stenting.
- ❖ Percutaneous endoscopic gastrostomy tube placement.
- ❖ Endoscopic retrograde cholangiopancreatography (ERCP)
- ❖ Colonoscopy
- ❖ Liver biopsy

Psychiatry

- ❖ Electroconvulsive therapy (ECT)

11 Dentistry

- ❖ Dental extractions

3-ENVIRONMENT

ASA guidelines for non-operating room anesthesia locations

- ❖ Reliable O2 source .
- ❖ Suction apparatus.
- ❖ Waste gas scavenging.
- ❖ Self-inflating resuscitation bag.
- ❖ Adequate monitoring equipments.
- ❖ Safe electrical outlets for emergency power supply.
- ❖ Adequate illumination, battery backup .
- ❖ Sufficient space for anaesthesia personnel, equipment.
- ❖ Emergency cart, defibrillator, drugs, etc.
- ❖ Reliable means for two-way communication.
- ❖ Applicable facility, safety codes met.

PATIENT TRANSFER

- ❖ Sick, unstable patients are transferred back and forth between ICU, OR and NOR locations for imaging, therapeutic, or diagnostic procedures.
- ❖ Skilled personnel to evaluate, monitor and support the patient medical condition.
- ❖ Portable ventilators and adequate supplies of oxygen.
- ❖ Manual self-inflating bag.
- ❖ Anesthetic and emergency drugs, equipment for intubation or intubation, portable suction.

ANESTHETIC TECHNIQUE

General anesthesia: tracheal intubation or LMA best prevention of motion because invasive, time and resource consuming, atelectasis.

Sedation/analgesia: less invasive, cost and time saving
high rate of failure, high airway and respiratory depression.

No anesthesia

Conscious sedation versus monitored anesthesia care

Conscious sedation: a medically controlled state of depressed consciousness that allows protective reflexes to be maintained and retains the patient's ability to maintain a patent airway and to respond appropriately to physical and verbal stimulation.

MAC: an anesthesiologist provides specific anesthesia services to particular patients with local or no anesthesia who undergoing a planned procedure.

Definition of general anesthesia and levels of sedation/Analgesia

Factors	Minimal Sedation	Moderate Sedation/Analgesia	Deep Sedation	General Anesthesia
Responsiveness	Normal response to verbal stimulation	Purposeful response to verbal or tactile stimulation	Purposeful response to repeated or painful stimulation	Unarousable even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

Some may add a fifth state to these classifications, that is; **dissociative anesthesia** provided by ketamine, which causes analgesia and amnesia without loss of airway protective reflexes or cardiopulmonary stability.

ENVIRONMENTAL CONSIDERATION FOR NORA

X ray & Fluoroscopy

- ❖ C arm moves back & forth takes large space & means of dislodging IV and ETT.
- ❖ so, limit the time of exposure to radiation.
- ❖ increase the distance from source or radiation.
- ❖ $>$ or $<$ according to inverse square of distance from source.
- ❖ use protective shielding.

Anesthesia for CT

- ❖ Less complex.
- ❖ Use standard monitoring.
- ❖ Less anesthetic time.
- ❖ Higher levels of radiation exposure.

Contrast media

- ❖ Are iodinated compounds.
- ❖ MRI contrast are ionic & nonionic.
- ❖ chelated metal containing gadolinium, iron, manganese.

Allergic reaction

- ❖ **History**
- ❖ **Symptoms:** skin reactions, airway obstruction, angioedema, and cardiovascular collapse.
- ❖ **Treatment:** corticosteroids, H1 and H2 blockers. Oxygen, epinephrine, β 2-agonists, and intubation, IV fluids.
- ❖ **Prevention:** corticosteroids.
- ❖ **Renal** (increase S. Creatinine of 0.5mg/dl or 25% from baseline within 48 hrs to 72 hrs)
- ❖ **CIN** (contrast induced nephropathy).

Risk factor for CIN

- ❖ Renal disease
- ❖ Prior renal surgery
- ❖ Proteinuria
- ❖ DM
- ❖ HTN
- ❖ Gout

Magnetic Resonance Imaging

- ❖ a noninvasive diagnostic technique that uses magnetic properties of atomic nuclei
- ❖ to produce high-resolution, multiplanar cross-sectional images of the body.
- ❖ Ferromagnetic materials should be excluded from the area of magnet.

ANESTHESIA FOR MRI

- ❖ High magnetic field.
- ❖ Need specialized compatible equipment.
- ❖ Radiofrequency noise.
- ❖ Metallic implants or implanted devices.
- ❖ Patients with implanted pacemakers, ICDs, or pulmonary artery catheters may not have MRI scans.

ELECTROCONVULSIVE THERAPY (ECT)

❖ **Objectives:** treat major depression, no responded to medications, suicidal.

❖ **Periods:** 6 to 12 treatments over 2 to 4 weeks

❖ Anesthetic goals

- amnesia and rapid recover
 - Prevent damage
 - Control hemodynamic response.
 - Avoid interference with initiation and duration of induced seizure.
- 21
- absolute contraindication: intracranial hypertension

Choice of anesthetic technique depends upon

- ❖ Patient's comorbidities,
- ❖ duration,
- ❖ practitioner preference and patient requirements.
- ❖ Deep sedation or GA with intubation or supraglottic airways.
- ❖ Sedation with oral route benzodiazepines or as intravenous sedation or MAC.
- ❖ Small infants: "feed, wrap, and scan"
- ❖ Oral chloral hydrate: 80-100mg/kg 30-60 min before procedure.
- ❖ Rectally administered barbiturates or general anesthesia with propofol, ketamine or inhaled anesthetics

COMPLICATION OF NORA

Minor Complications

- ❖ Postoperative nausea and vomiting
- ❖ Inadequate postoperative pain control
- ❖ Hemodynamic instability
- ❖ Minor neurologic complications such as postdural puncture headache (cardiology and radiologic locations)
- ❖ Minor respiratory complications (cardiology and radiologic locations)
- ❖ Complications related to central/intravenous lines (cardiology locations)
- ❖ Need for opioid reversal (cardiology and radiologic locations)

Major Complications

- ❖ Unintended patient awareness (gastroenterological locations)
- ❖ Anaphylaxis (radiology procedures and cardiology locations)
- ❖ Need for upgrade of care
- ❖ Serious hemodynamic instability
- ❖ Respiratory complications
- ❖ Need for resuscitation
- ❖ Central and peripheral nervous system injury (radiology procedures and cardiology locations)
- ❖ Vascular access-related complications (radiology procedures and cardiology locations)
- ❖ Wrong patient/wrong site (radiology procedures and cardiology locations)
- ❖ Fall or burn (radiology procedures and cardiology locations)

DISCHARGE CRITERIA

- Cardiovascular function and airway patency are satisfactory and stable.

- The patient is easily arousable, and protective reflexes are intact.
- The patient can talk (if age appropriate)
- The patient can sit up (if age appropriate)
- Adequate state of hydration.



THANK YOU