Complications associated with percutaneous nephrolithotomy(PCNL)

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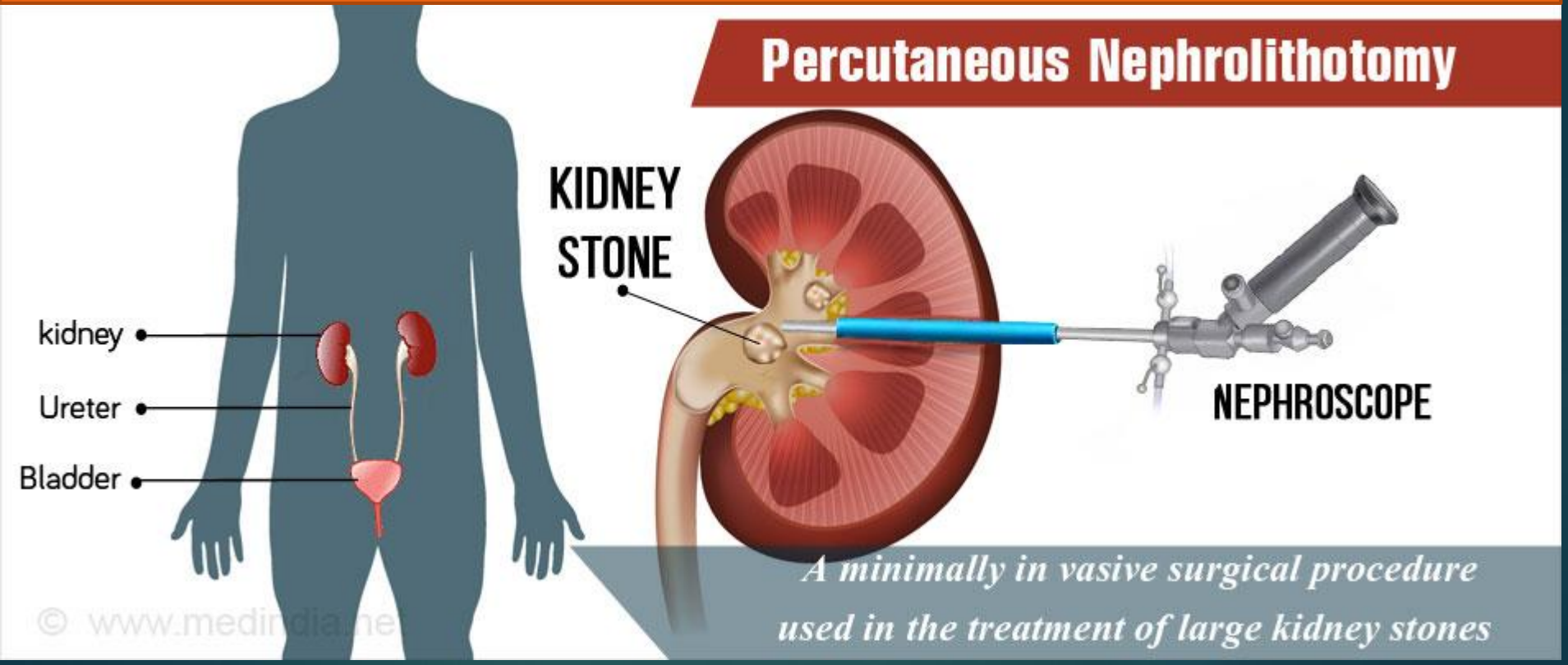
Percutaneous Nephrolithotomy(PCNL)

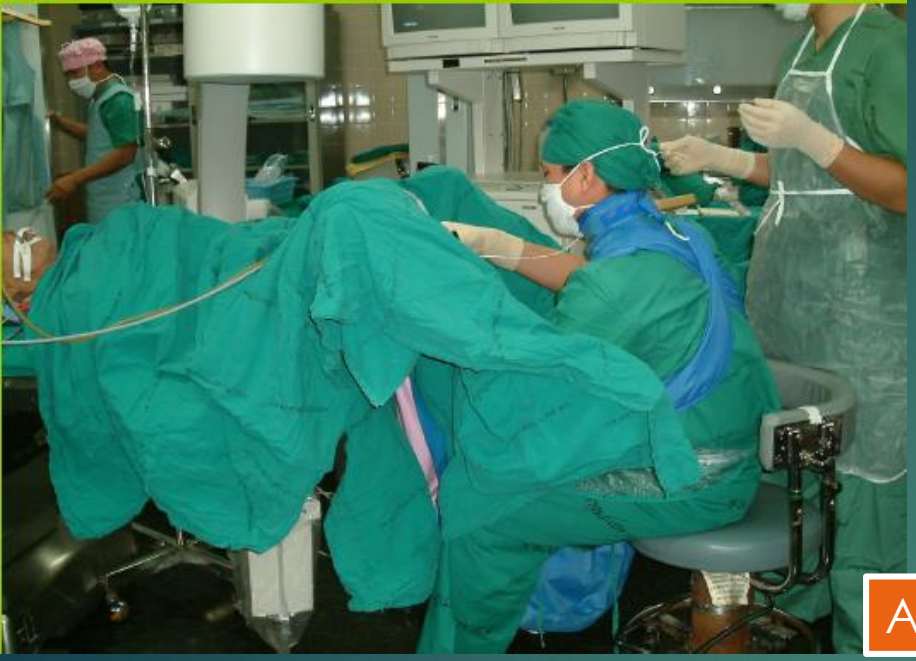
หมายถึง การผ่าตัดรักษานิ่วในไตโดยการส่องกล้องผ่านรูผิวหนังบริเวณเอว

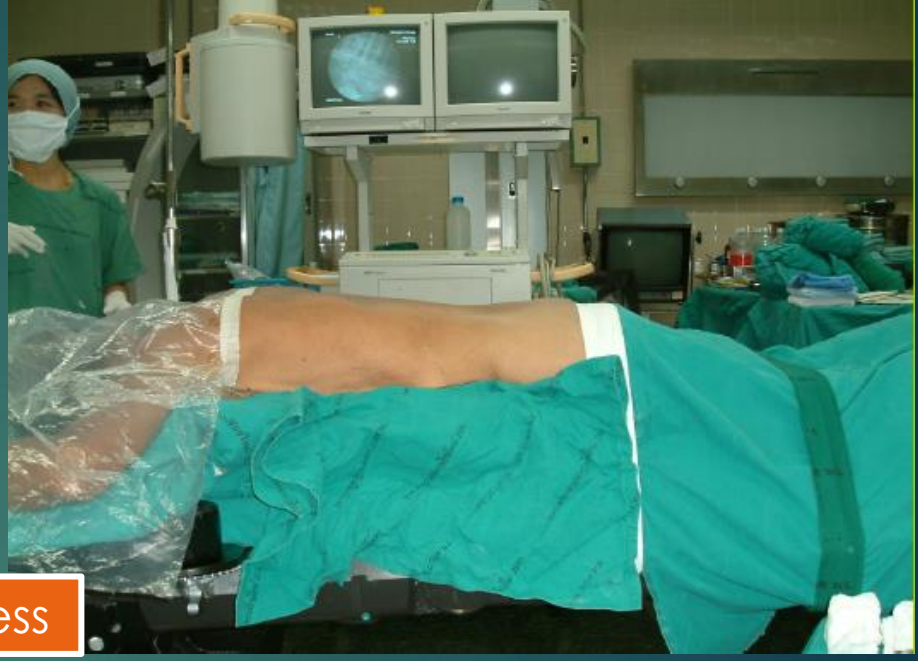
โดยการเจาะที่ไต ขยายแผล ส่องกล้องแล้วคีบนิ่วออกมา



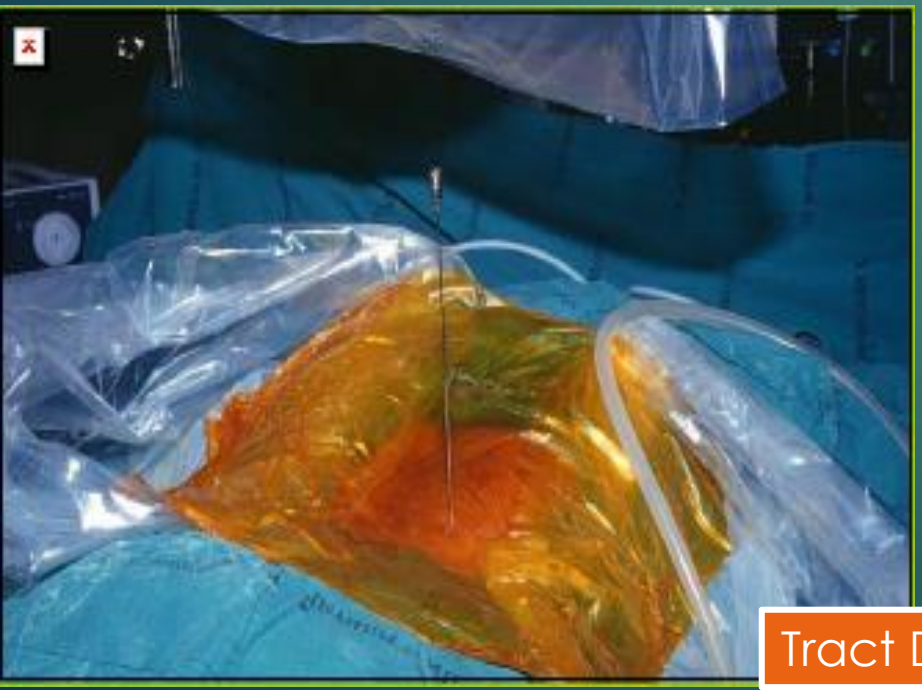
Stepping for PCNL

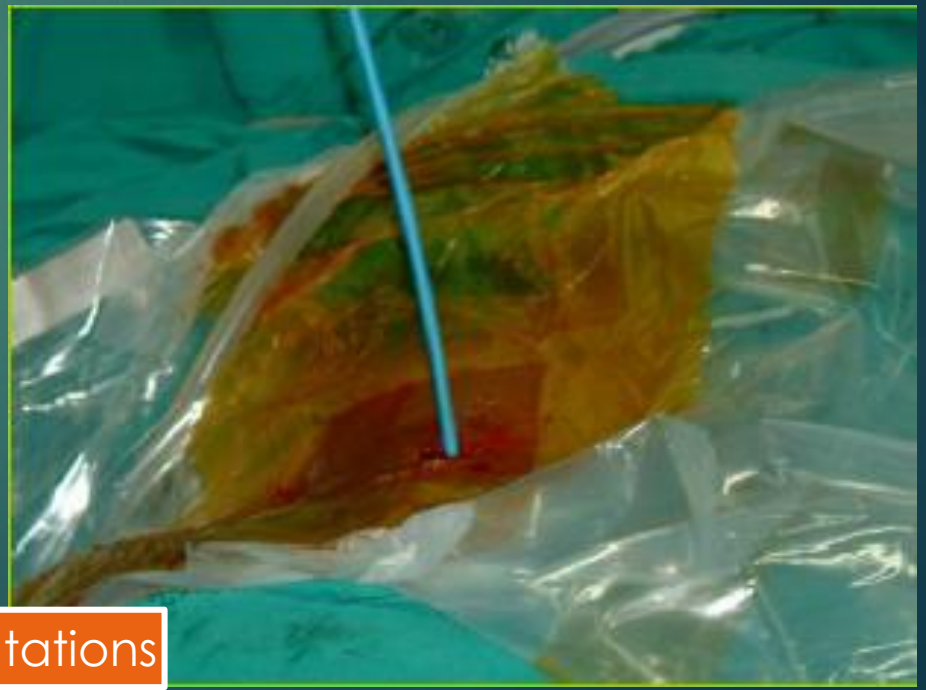
1. Access
2. Tract Dilatations
3. Nephroscopy with stone disintegration
4. Drainage





Access

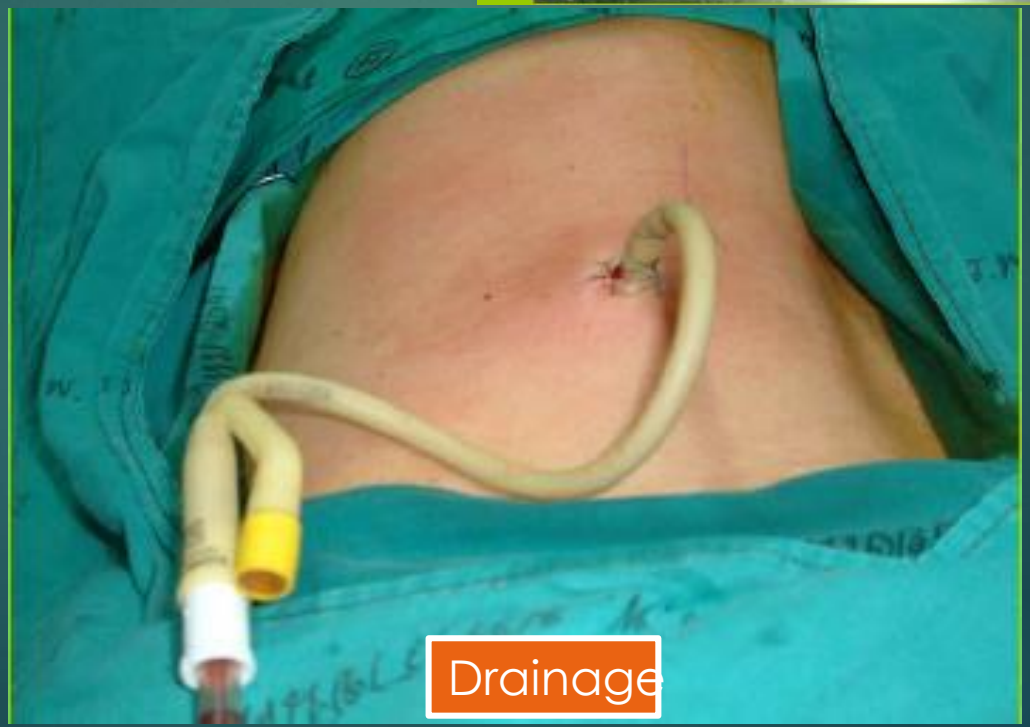




Tract Dilatations

Ultrasonic lithotripsy

Nephroscopy with stone disintigration



Drainage

Complications associated with percutaneous nephrolithotomy

- Complication rates for PNL reportedly range from **20-83%**
- Overall complication rate : **21.5%**
- Minor complications : The most common
  - nephrostomy tube leakage (15%)
  - transient fever (10-30%)
- Major complications
  - Renal collecting system injury : 8%
  - Adjacent organs injury : colon, liver, spleen, diaphragm : 0.3-1%
  - Violation of the pleural space : upper pole access : 16%
    - Pneumothorax, hydrothorax, both : 64% need ICD
  - Bleeding : 0.5%
  - Infection : SIRS/Sepsis : 0-3%
  - Death : 0.1-0.7%

Adrenal Insufficiency

- In the perioperative setting
  - the incidence of acute adrenal insufficiency is estimated to be between **0.01% and 0.1%**
- Mohler and colleagues
  - performed a retrospective review of **6947 urologic procedures** in glucocorticoid-treated patients.
  - **Only one case of perioperative AI was identified (0.01% of patients).**

Postoperative Sudden Hypotension Due to Relative Adrenal Insufficiency

- Mean arterial pressure = cardiac output (CO) x SVR
  - CO = heart rate x stroke volume

- Systemic blood pressure : 3 mechanisms : Neurohumoral pathways
  1. Sympathetic nervous system
  2. Renin-angiotensin system
  3. Arginine-vasopressin system

Hypothalamic–Pituitary–Adrenal Axis

Cortisol

- Improvement of impaired vasomotor tone in the vascular system
- Increase sensitivity of catecholamine receptors
- Potentiates production of catecholamines
- Regulation of the distribution of body fluids

Arginine-vasopressin system

- Vasopressin
  - peptide hormone
  - that is synthesized in the hypothalamus
  - stored in the posterior pituitary gland
  - primarily regulates serum osmolality and enables cardiovascular stability

Hypothalamic–Pituitary–Adrenal Axis

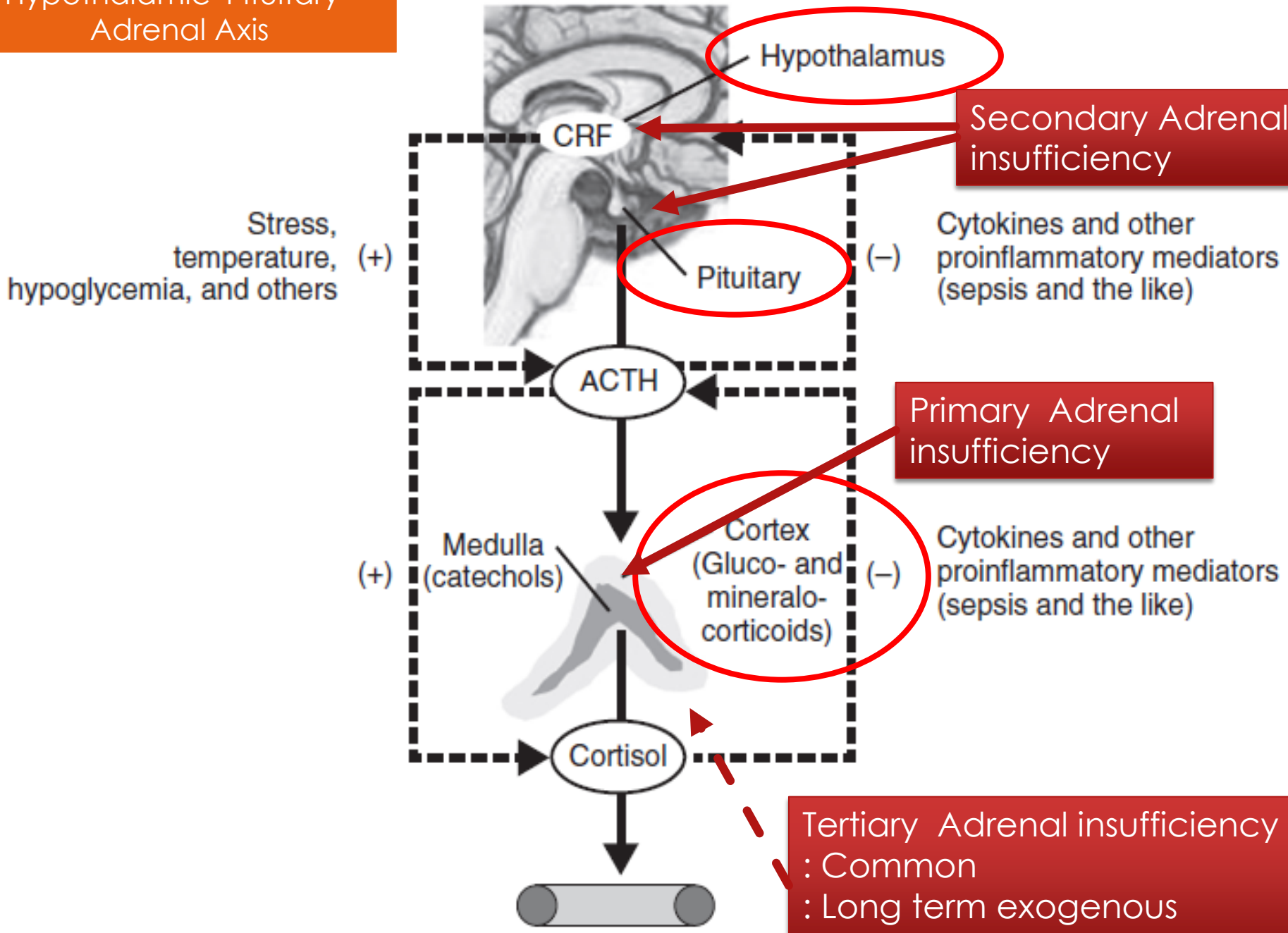


TABLE 26-1 Characteristics of Adrenal Insufficiency (AI)

Type	Features	Incidence	Etiologies
Primary	ACTH independent Adrenal gland dysfunction, destruction, or replacement; requires >90% loss of adrenal tissue Loss of mineralocorticoid and glucocorticoid production Increased ACTH production Requires lifetime therapy	Prevalence: 40-110 cases/million Incidence: 6 cases/million per year	Autoimmune (70%-90% of U.S. cases) frequently associated with a polyglandular deficiency syndrome Infectious: HIV is most common infectious cause in the United States Tuberculosis is most common infectious cause worldwide Inflammation Cancer Acute Addisonian crisis Infection Shock Stress Hemorrhage
Secondary	ACTH dependent Signs and symptoms usually caused by loss of glucocorticoid function Usually have intact mineralocorticoid function Rarely hypovolemic, more commonly hypoglycemic	Uncommon	Decreased or absent ACTH (may be panhypopituitary or anterior pituitary dysfunction) Pituitary depression, dysfunction/damage Tumor, postpartum, hypothalamic failure or dysfunction
Tertiary	Caused by hypothalamic/pituitary depression or absence	Most common form	Usually from iatrogenic corticosteroid therapy and suppression of the HPA axis

ACTH, adrenocorticotropic hormone (corticotrophin); *HIV*, human immunodeficiency virus; *HPA axis*, hypothalamic–pituitary–adrenal axis.
From Coursin DB, Wood KE. Corticosteroid supplementation for adrenal insufficiency. JAMA 2002;287:236–40.

Cortisol

- **Normal plasma cortisol levels (5-25 ng dL-1)**
  - do not exclude diagnosis in the presence of acute disease
- **A cortisol concentration of <3 ng dL-1**
  - indicates the diagnosis of adrenal insufficiency
- **A cortisol concentration of <20 ng dL-1**
  - **after ACTH stimulation test** also indicates the diagnosis of adrenal insufficiency

- A plasma cortisol concentration of 25 ng dL-1 in the presence of acute stress **excludes the diagnosis of adrenal crisis**.

Relative adrenal insufficiency

1. Inadequate **cortisol** response in stress conditions such as critical diseases

2. Despite normal serum cortisol concentrations**(5-25 ng dL-1)**

Etomidate

- Associated with transient inhibition of adrenal steroidogenesis
- Inhibit the 11beta-hydroxylase enzyme responsible for converting 11beta-deoxycortisol into cortisol within the adrenal gland
- Should be used judiciously in the critically ill patient

Risk Assessment

:development of adrenal insufficiency in the perioperative period

- Daily dose of steroids (>20 mg/day of prednisone or equivalent)
- Duration of steroid therapy (>3 weeks)
- Suppression of the HPA axis based on serum testing (cortisol level, ACTH stimulation test)
- High degree of physiologic stress (surgery, trauma, burns, infection)
- Primary or secondary adrenal insufficiency requiring steroid replacement therapy

Adrenal insufficiency (AI) Treatment

- Patients with primary adrenal insufficiency (AI)
  - usually require both **mineralocorticoid and glucocorticoid** replacement

- **Most patients with secondary or tertiary AI**
  - have intact aldosterone synthesis
  - and usually only require **glucocorticoid**

TABLE 26-2 Comparative Steroid Potency (mg Basis)*

Steroid Preparation	Glucocorticoid Effect	Mineralocorticoid Effect	Biologic Half-Life (hr)	Formulation
Hydrocortisone	1	1	6-8	PO, IV, IM
Prednisone	4	0.1-0.2	18-36	PO
Methylprednisolone	5	0.1-0.2	18-36	IV
Dexamethasone	30	<0.1	36-54	PO, IV
Fludrocortisone	0	20	18-36	PO

IM, intramuscular; *IV*, intravenous; *NPO*, nil per os (nothing by mouth); *PO*, per os (by mouth).

*Intravenous supplementation is the preferred route for patients who are NPO, have unpredictable or poor absorption of medications, or have major stresses or critical illness. Prednisone is not recommended in patients who are unable to methylate it into an active form.

TABLE 25.1 Supplemental Steroid Dosing ("Stress Dose") Guidelines

Daily Dose of Prednisone	Duration of Treatment	Degree of Surgical Stress	Perioperative Management[a]
<5mg	Any	Not applicable	Normal HPA axis; give daily dose if still on steroids.
5-20 mg	<3 weeks		
5-20 mg	>3 weeks, but stopped within 14 days		
5-20 mg	>3 weeks, but not stopped within 14 days	If HPA axis untested, follow recommendations for higher (>20 mg/day) chronic steroid dosing	If status of HPA axis is unknown, consider axis testing; otherwise, base supplement on degree of surgical stress. Give daily dose if on steroids.
>20 mg	Any	Minor (e.g., hernia repair)	Give daily dose only.
		Moderate (e.g., joint replacement)	Daily dose plus 50 mg IV preop, then 75 mg IV hydrocortisone over 24 hours, and then resume daily dosing.
		Major (e.g., Whipple)	Daily dose plus 100 mg IV hydrocortisone preoperative, then 150 mg over 24 hours. Taper dose by 50% until is daily dose achieved.

HPA, Hypothalamic-pituitary-adrenal.

[a]Concomitant antiemetic doses (4–8 mg) of dexamethasone may reduce or eliminate the need for additional hydrocortisone on the day of surgery. See Table 25.2 for equivalence dose.

THANK YOU