Difficulties of management in Hypertensive Emergency

Chang, Kuosong M.D.
MacKay Memorial Hospital
Taipei, Taiwan, ROC

馬偕紀念醫院

Definition of HTN

- A systolic blood pressure **(SBP) >139 mmHg** and/or
- A diastolic **(DBP) >89 mmHg.**
- Based on the average of **two or more** properly measured, seated BP readings.
- On each of **two or more** office visits.

BP Measurement

- At least **two** measurements should be made and the **average** recorded.
- Clinicians should **provide to patients** their specific BP numbers and the BP goal of their treatment.

Accurate Blood Pressure Measurement

- The **equipment** should be regularly inspected and validated.
- The **operato**r should be trained and regularly retrained.
- The **patient** must be properly prepared and positioned and seated quietly for at least 5 minutes in a chair.
- The **auscultatory method** should be used.
- **Caffeine, exercise, and smoking should be avoided** for at least 30 minutes before BP measurement.
- An **appropriately sized cuff** should be used.

Patient Evaluation Objectives

1. To assess **lifestyle** and identify other cardiovascular risk factors or concomitant disorders that may affect prognosis and guide treatment
2. To reveal identifiable **causes** of high BP
3. To assess the presence or absence of **target organ damage** and CVD

Hypertensive crisis

Hypertensive crisis is usually defined as an acute and severe increase in SBP greater than or equal to **180** mm Hg or a DBP greater than or equal to **120** mm Hg and can occur in both a hypertensive emergency and urgency situation.

- **Hypertensive emergency**: the severe increase in BP is associated with new or progressive **end-organ damage** and is a true emergency requiring immediate BP control usually over the course of minutes to hours.
- **Hypertensive urgency**: the severe increase in BP is not associated with end-organ damage, although **non–life threatening symptoms**, such as anxiety, headache, epistaxis, palpitations, or mild dyspnea, may be present. It is not an emergency, and, contrary to its name, the BP does not require urgent reduction most of the time but instead can be reduced over the course of hours to days.

Hypertensive Emergency, Suneja & Sanders

Hypertensive Emergencies

- Severely elevated BP (>180/120mmHg).
- **With** progressive target organ dysfunction.
- Require emergent lowering of BP.
- **Examples**: **Severely elevated BP** with:
  - Hypertensive encephalopathy
  - Acute left ventricular failure with pulmonary edema
  - Acute MI or unstable angina pectoris
  - Dissecting aortic aneurysm

Hypertensive Urgencies

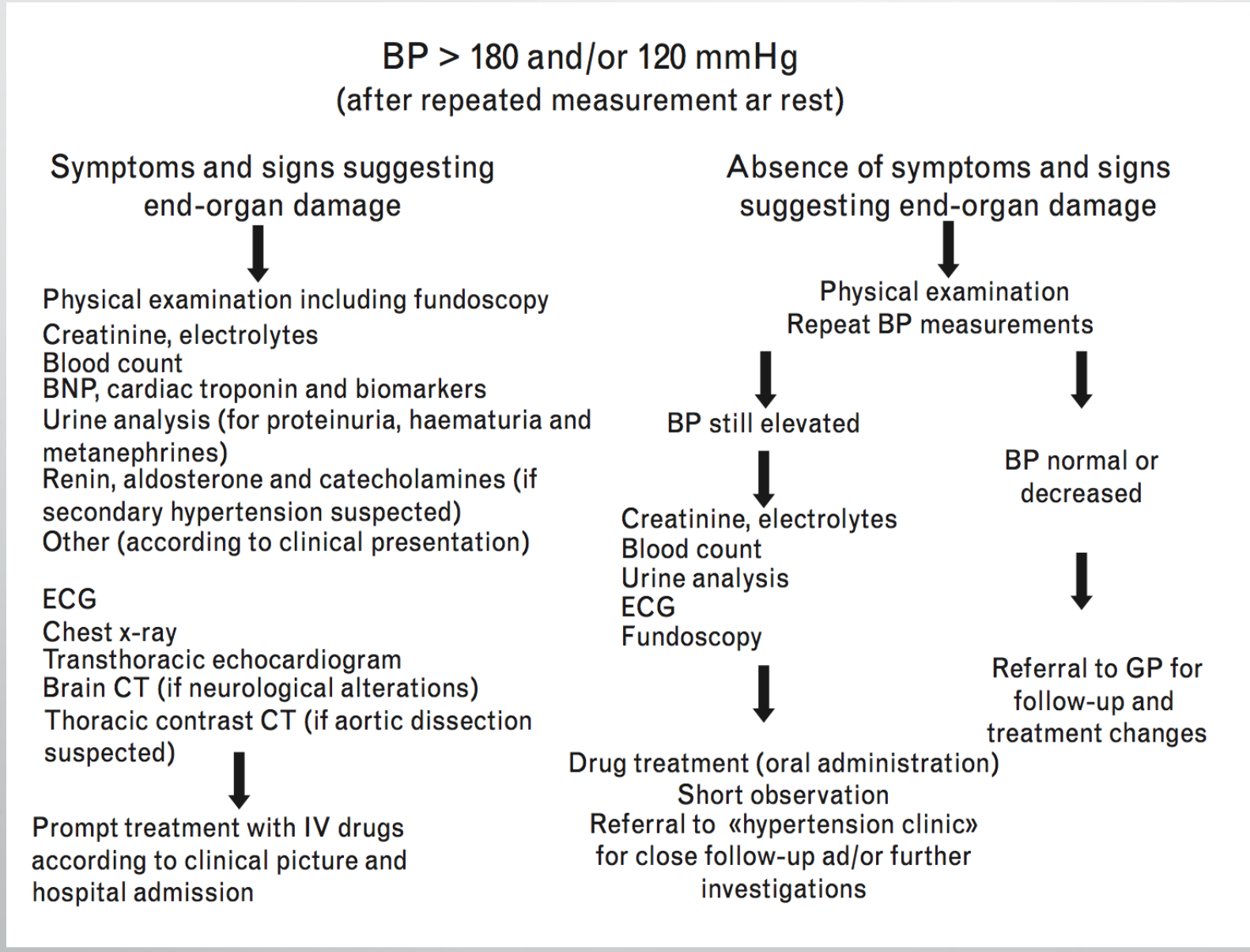
- **Severe elevated BP** in the upper range of stage II hypertension.
  - **Without** progressive end-organ dysfunction.
- **Examples**: Highly elevated BP without severe headache, shortness of breath or chest pain.
  - Usually due to under-controlled HTN.

Identifiable causes of hypertensive crisis

- Essential hypertension
- Endocrine
- Renovascular disease
- Drugs
- Central nervous system
- Coarctation of the aorta
- Pain
- Burns

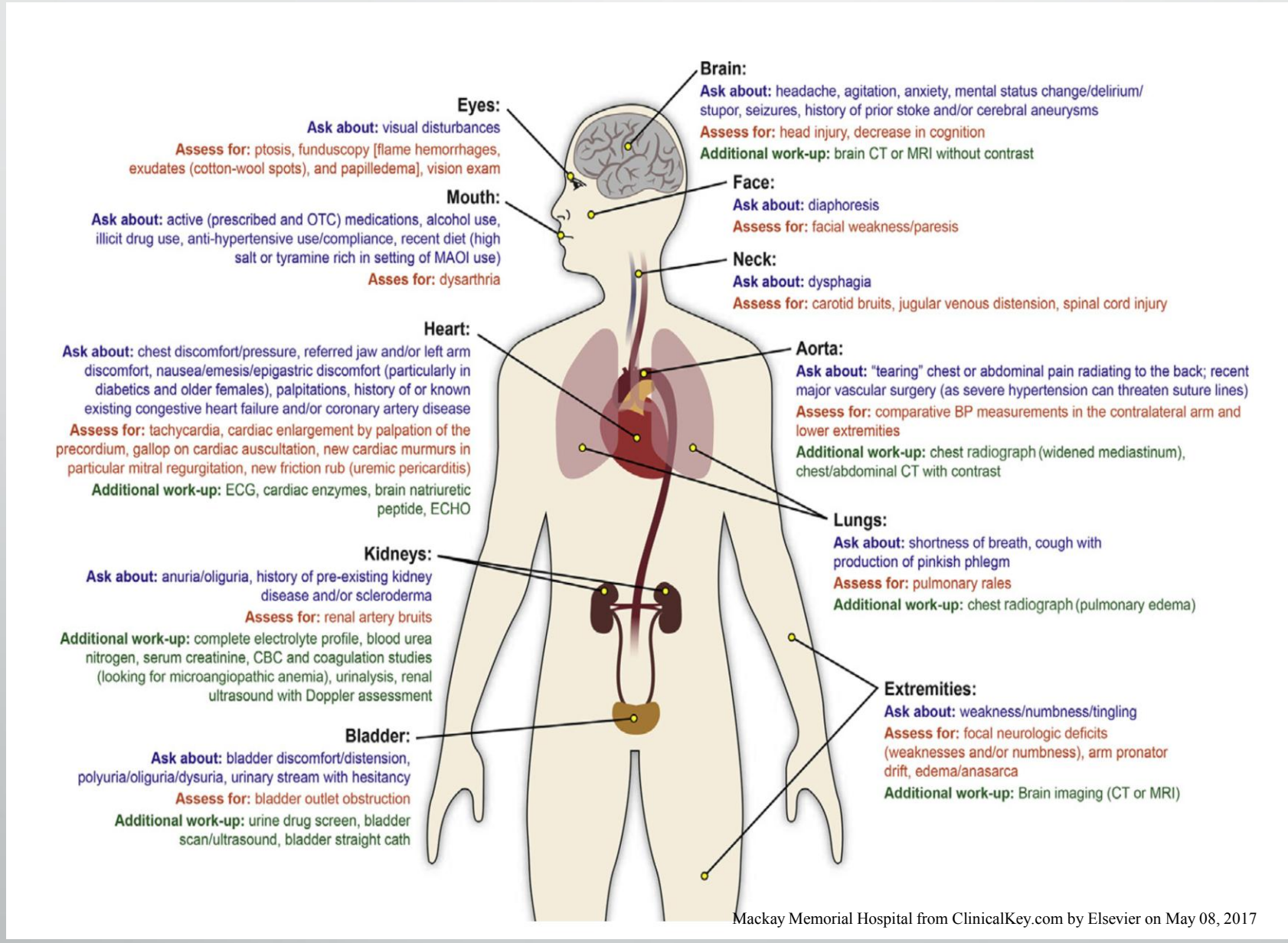
Risk factors promoting hypertensive crisis

- Female sex
- Obesity (body mass index ≥30 kg/m2)
- Hypertensive coronary a. disease
- Higher no. of antihypertensive drugs
- Non adherence to medication



Evaluation and management of the patients with acute elevation of blood pressure in the emergency department. BNP, Brain-natriuretic peptide; CT, computerized Tomography; GP, general practitioner; IV, intravenous.

An update on hypertensive emergencies and



Clinical assessment for end-organ damage in patients with hypertensive crisis. CBC, complete blood count; CT, computed tomography; ECG, electrocardiogram; ECHO, echocar- diogram; MAOI, monoamine oxidase inhibitor; OTC, over the counter.

History & Examination

- BRAINS
  - Headache, agitation, anxiety, mental status change/ delirium/ stupor, seizures, Hx of previous stroke and/ or cerebral aneurysm
  - @head injury, decrease cognition
  - & Brain CT or MRI without contract media
- FACE
  - Diaphoresis
  - @facial weakness/ paresis

History & Examination

- EYES
  - Visual disturbrance
  - @ ptosis, funduscopy(flame hemorrhage, exudates, papilledema), vision exam.
- MOUTH
  - Active medications, alcohol use, illicit drug use, anti-hypertensive use/ compliance, recent diet (high salt or tyramine rich in setting of MAOI use)
  - @ dysarthria

History & Examination

- NECK
  - Dysphagia
  - @carotid a. bruits, jugular venous distention, spinal cord injury
- AORTA
  - "Tearing" chest or abdominal pain radiating to the back, recent major vascular surgery.
  - @comparative BP measurements in the contralateral arm and lower extremities
  - & CXR (widen mediastinum), chest / abdominal CT with contrast media

History & Examination

- HEART
  - Chest discomfort/ pressure, referred jaw and/or left arm discomfort, nausea/ emesis/ epigastric discomfort, palpitations, Hx of CHF and/ or ACS
  - @ tachycardia, cardiac enlargement by palpation of the precordium, gallop on cardiac auscultation, new cardiac murmurs in particular MR, new friction rub
  - & ECG, cardiac enzymes, BNP, heart ECHO.

History & Examination

- LUNGS
  - SOB, cough with productive of pinkish phlegm
  - @pulmonary rales
  - & CXR (pulmonary edema)
- KIDNEYS
  - Anuria/ oliguria, Hx of pre-existing kidney disease and/or scleroderma
  - @ renal a. bruits
  - & Complete electrolyte profile, BUN, serum Cr., CBC and coagulation studies (microangiopathic anemia), U/A, Renal ultrasound with Doppler assessment

History & Examination

- BLADDER
  - bladder discomfort/ distention, polyuria/ oliguria/ dysuria, urinary stream with hesitancy
  - @Bladder outlet obstruction
  - & Urine drug screen, bladder scan/ ultrasound, bladder straight cath.
- EXTREMITIES
  - Weakness/ numbness/ tingling sensation
  - @Focal neurologic deficits (weakness and/or numbness), arm pronator drift, edema/ anasarca
  - & Brain CT and/or MRI

Goals of Treatment

- Treating SBP and DBP to targets that are **<140/90 mmHg**
- Patients with diabetes or renal disease, the BP goal is **<130/80 mmHg**
- The primary focus should be on attaining the SBP goal.
- To reduce c**ardiovascular and renal** morbidity and mortality

Initial management

- The best therapeutic approach is the oral administration of antihypertensive drugs aimed to **lower BP gradually over 24 – 48 h**.
- For hypertensive emergencies, **admission to an ICU** is recommended.
- Prompt **IV of short-acting** and titratable drugs is the preferred approach.
- In the 1 or 2 h, the decrease in BP should be around **15 – 25%** of the initial values.

Be caution about it !

- Avoid an **excessive velocity of BP reduction**, leading to ischemic complications such as acute myocardial infarction and stroke.
- The goal of patients with aortic dissection is to **reduce BP to below 120/ 80 mmHg**.

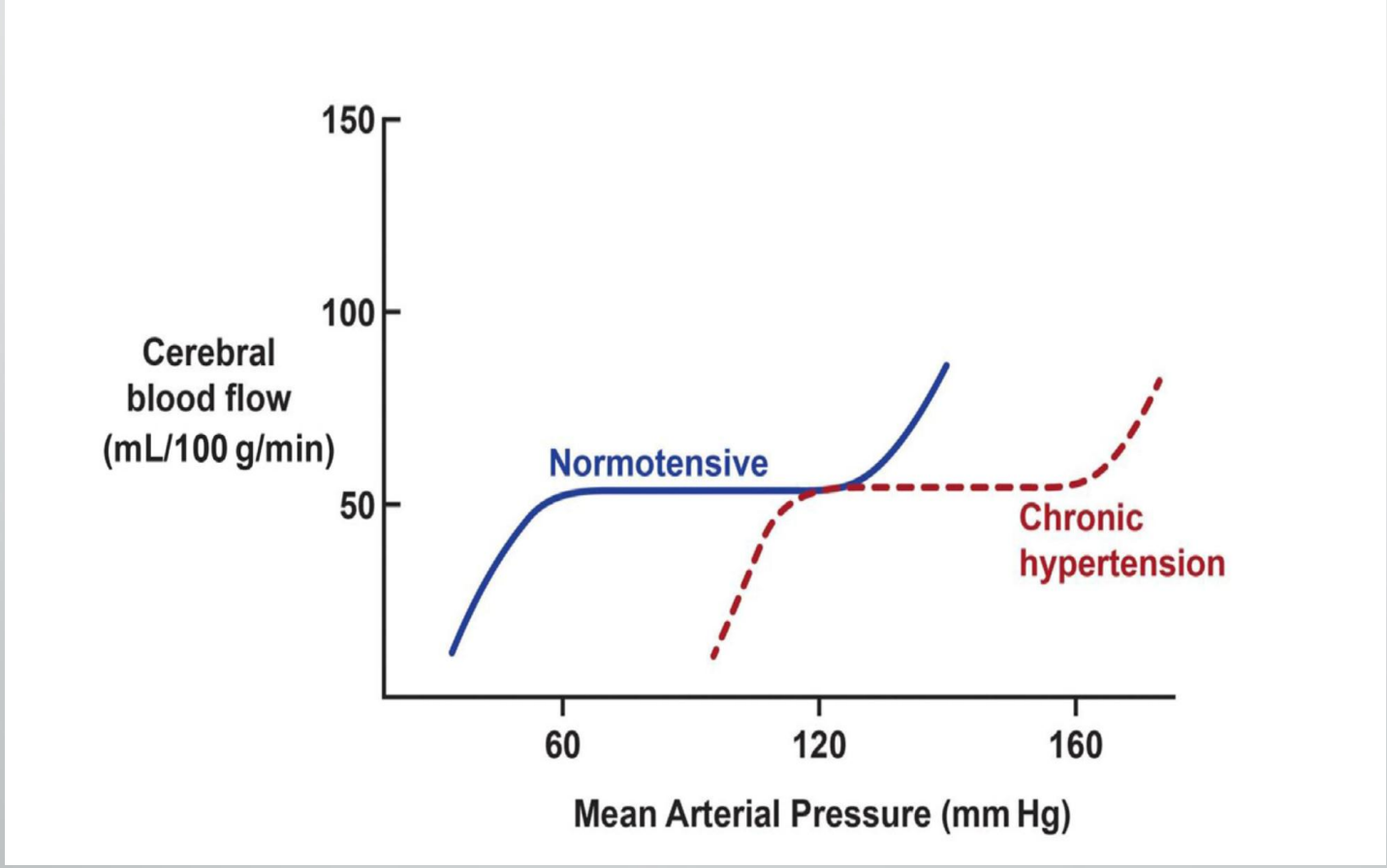
Target Organ Damage

- **Heart**
  - Acute pulmonary edema , Acute CHF, ACS
- **Brain**
  - TIA, Seizure, Cerebral infarction,
  - ICH, SAH, Hypertensive encephalopathy
- **Blood vessels**
  - Acute aortic dissection
  - Microangiopathyic hemolytic anemia
  - Peripheral arterial disease
- **Kidney**
  - Acute kidney injury
  - Acute renal failure
- **Uterus**
  - Preeclampsia
  - Eclampsia
  - HELLP syndrome
- **Retina**
  - Papilledema
  - Hemorrhages
  - Retinal edema

Hypertensive Encephalopathy

- The autoregulatory system of a normotensive patient maintains a steady state, **adequate for perfusion**, by maintaining a mean arterial pressure (MAP) of 60 to 120 mm Hg
- In patients experiencing ischemic stroke, the blood pressure should not be reduced by **more than 10% to 15% over the first 24 hours**
- The medications such as benzodiazepines, fosphenytoin, phenytoin, or barbiturates should be given for **delirium and seizure control**;

Cerebral auto-regulation



- *MAP* is mean arterial pressure, estimated by DBP + (SBP- DBP)/3 or ([2x DBP] +1x SBP)/3

Hypertensive Encephalopathy

- For blood pressure management of hypertensive encephalopathy not complicated by cerebral vascular accident, the **MAP should be reduced by about 20% to 25% in the first 1 hour of treatment**.
- Traditionally used medications include IV nitroprusside, labetalol, nicardipine, and enalapril.

Acute stroke

- Hypertension is common in the **first hours** after ischemic and hemorrhagic stroke and traditionally indicated as a hypertensive emergency.
- Hypertensive emergencies mandate **quick administration** of antihypertensive drugs to save the patient's life.
- *There was no convincing evidence that this is useful **to prevent death and disability** in both clinical conditions*.

Ischemic stroke

- Hypertension is a common early finding in patients with an acute ischemic stroke (85%), **become normotensive within 24–48h**.
- However, **a high baseline BP is not always deleterious** and BP reduction with antihypertensive drugs is not always advisable in patients with acute ischemic stroke.

Ischemic stroke

- The BP rise is due to **a number of mechanisms**, such as impaired neurogenic cardiovascular control, autonomic dysregulation, baroreflex failure, increased sympathetic drive, reflex response to cerebral ischemia and mental stress.
- **BP fall during this critical time** may reduce cerebral perfusion, extend the ischemic area, induce irreversible damage and worsen the disabling consequences of the initial stroke .

Ischemic stroke

- American Stroke Association (ASA) recommend that only **BP values repeatedly above 220/ 120mmHg** should be treated with either labetalol or sodium nitroprusside, intravenously .
- The BP target during the acute phase of an ischemic stroke **should not be a normal BP**, but rather 180 mmHg systolic – 105 mmHg diastolic in previously hypertensive patients and 160–180/90–100mmHg in previously normotensive patients.

Ischemic stroke

- A persistent SBP of 185 mmHg or a DBP 110 mmHg is a **contraindication** to intravenous thrombolytic therapy.
- A reasonable goal would be to lower BP by approximately **15% during the first 24 h** after onset of stroke.
- The cause of hypotension should be sought in those with hypotension.

Haemorrhagic stroke

- **Initial haematoma volume and haematoma expansion** are powerful predictors of mortality after ICH.
- **Modest elevation of BP** (<110 mmHg MAP or <160 mmHg SBP) is likely not associated with aneurysmal rebleeding and modest BP increases do not necessarily need to be treated.

Acute aortic dissection

- A high degree of diagnostic suspicion of aortic dissection (AD) is very important for the emergency clinician, in order to promptly activate a proper diagnostic workup and the subsequent treatment algorithm .
- **BP differential and widened mediastinum** on chest radiograph) is detectable in only one quarter of cases .

Acute aortic dissection

- Type A dissections are more common, entail a **much worse prognosis** and may progress proximally causing hemopericardium with cardiac tamponade, acute aortic valve regurgitation as well as acute myocardial infarction.
- According to the **local availability**, aortic imaging via trans-oesophageal echocardiography, CT scan with intravenous contrast or MRI may confirm (or reasonably exclude) the diagnosis .

Acute aortic dissection

- **The mortality for AD** increases **1% to 2% every hour** during the first 24 hours after the onset of symptoms.
  - **It is critical not to rely on classic findings**: ~19% of patients with type A dissections and ~9% of those with type B dissections have no identifiable pulse deficits. As many as **15%** of patients with AD have normal chest radiographs.
- More reliable is identification of a new **diastolic murmur** suggestive of aortic regurgitation.

Acute aortic dissection (AD)

- **The initial medication should be able to reduce the sheering force**; a B-blocker is typically used for this purpose, i.e. Esmolol has rapid on/off qualities and its ability to reduce the HR to less than 60 beats per minute.
- **A medication is also needed to reduce the systolic blood pressure to less than 120 mm Hg**. Nitroprusside is a reasonable option for fast and reliable blood pressure control.

Pulmonary Edema

- The use of **noninvasive ventilation therapy**, such as bi-level positive airway pressure ventilation, to circumvent the likelihood of these patients progressing to intubation.
  - **Nitroprusside**, is considered ideal for patients with flash pulmonary edema.
  - *Holzer-Richling Study showed,* participants who received **furosemide** required lower doses of antihypertensive agents, suggesting a role for loop diuretics in reducing blood pressure.

Myocardial Ischemia

- Treatment of ischemic chest pain is 3-fold
  - (1) reduction in myocardial work,
  - (2) reduction in myocardial oxygen consumption, and
  - (3) improvement in coronary artery perfusion.
- The first intervention is administration of **aspirin**.
- Severely hypertensive patients should be given an **IV B-blocker**.
- **Nitroglycerin** is often titrated to resolution of chest pain or hypotension.

Myocardial Ischemia

- Commonly recommended agents is **labetalol**.
- B-blockers should not be administered **after AMI**.
- Care should be used with medications such as *hydralazine and nitroprusside*.
  - Hydralazine causes reflex tachycardia, which increases myocardial work and oxygen consumption.
  - Nitroprusside has the potential to cause coronary steal syndrome, which worsens ischemia and could increase risk of death if it is given AMI.

Acute Renal Failure

- Acute renal failure (ARF) can be either the direct cause or an observed effect of a hypertensive emergency. **A patient's history** can help differentiate cause from effect.
- Assessment of the **patient's volume** status is also important to determine the need for adjunctive therapies, ie positive pressure ventilation or diuretics.
- **Calcium channel blockers** (eg, nicardipine) are typically preferred in ARF.

Acute Renal Failure

- **Nitroprusside** is effective in reducing blood pressure, but it places the patient at risk of **cyanide toxicity** because it decreases renal clearance and thus causes a buildup of metabolites.
- **Fenoldopam** is a more desirable second- line medication. An **arterial vasodilator**, it not only decreases blood pressure but also promotes renal excretion via its specific effects on the dopamine receptors in the nephron.

Sympathomimetic Crisis

- Severe increases in blood pressure secondary to many causes
  - **Cocaine, phencyclidine, or amphetamine abuse; pheochromocytoma**; interaction of monoamine oxidase inhibitor drugs with **selective serotonin reuptake inhibitors** or with wine and cheese (tyramine reaction); abrupt cessation of sympatholytic medications such as clonidine; and alcohol withdrawal.
  - The sole use of B-blockers is not recommended because of the reflex tachycardia that it induces, which could precipitate a rapid increase in blood pressure and cardiovascular collapse.

Hypertensive Emergencies in the ED, Adebayo & Rogers

Sympathomimetic Crisis

- **Phenoxybenzamine, phentolamine, nitroprusside**, and **labetalol** are good first-line medications.
  - In cocaine-induced crisis, **benzodiazepines** should be used in conjunction with antihypertensive drugs. In a study involving 378 patients with cocaine-induced chest pain, *Ibrahim and colleagues* found no difference in the troponin levels of patients who received b-blockers and those who did not.

Hypertensive Emergencies in the ED, Adebayo & Rogers

SUMMARY

- Take BP for the critical in the ED is difficult, for many factors involved including poor cooperation, drugs & alcohol, physical exercise.
- Blood pressure measurement is often not accurate due to cuff size, equipment validation & training.
- History taking is time consuming, may delay the treatment.
- Base line BP of patient is not always known, especially no family accompany.
- The patient is variable BP response to drugs used, the velocity of BP reduction is not well controlled.

SUMMARY

- Hypertension is quite common with S/S, like headache, SOB, chest pain/ discomfort. If target end organ failure or not is hard to find.
- Acute ischemic stroke with minimal S/S such as dizziness, BP reduction may worsen the condition
- Labetalol is drug of choice for AMI, but it can induce asthma as well.
- Aortic dissection is under diagnosis for unreliable clinical finding.

SUMMARY

- The patient's history of CRF, AKI can help differentiate cause from effect, but most of patients/ family don't know about it.
- Drug screen test for illicit drug is time wasting, and delay the treatment for drugs addictioner.
- The equipment for examination for hypertensive crisis patients is not always available in the hospitals at 24 hours basis.

Thanks for your attention