

Interesting case



5th floor ward

February 2024

Patient profile

- เด็กชาย 13 ปี 11 เดือน
- ศาสนาพุทธ
- ภูมิลำเนา จังหวัดสมุทรสาคร
- ประวัติได้จากผู้ป่วย มารดา และเวชระเบียน



ส่งตัวมาพบรแพทย์เฉพาะทาง ด้วยปัญหาความดันโลหิตสูง

Clinical Information

ข้อมูลจากการดูแลขณะไปตรวจรังแทกที่ รพ.ต้นทาง

1 ชั่วโมงก่อนไปรพ. มารดาให้ประวัติว่าผู้ป่วยมีอาการเกร็งกระตุก บริเวณแขนหั้งสองข้าง ขณะนั้นหลับตา เรียกแล้วดูซึ่มไม่ตอบสนอง ไม่มีปัสสาวะอุจจาระ而出
เริ่มเป็นขณะนั้งอยู่ ไม่ได้เป็นหลังอุบติเหตุทางศีรษะ เป็นครั้งละไม่เกิน 5 นาที
เป็นทั้งหมด 3 ครั้ง ตั้งแต่บ้านถึง รพ. หลังมีอาการสามารถเดินขึ้นและลงรถได้
แต่ช้าๆ ตอบคำถามได้ไม่มีไข้ ไม่มีตาพร่ามัวหรือเห็นภาพซ้อน
ปฏิเสธแขนขาอ่อนแรงครึ่งซีก ปฏิเสธอาการชา ปฏิเสธอาการคลื่นไส้อาเจียนพุง

ไปตรวจที่ รพ. แจ้งว่าแพทย์ตรวจพบความดันโลหิต $175/110 \text{ mmHg}$
ไม่พบว่ามีภาวะแขนขาอ่อนแรงครึ่งซีก และรู้ตัวตอบได้ขณะอยู่ที่ รพ.

Emergency problems evaluate and problems solving

Emergency Problems

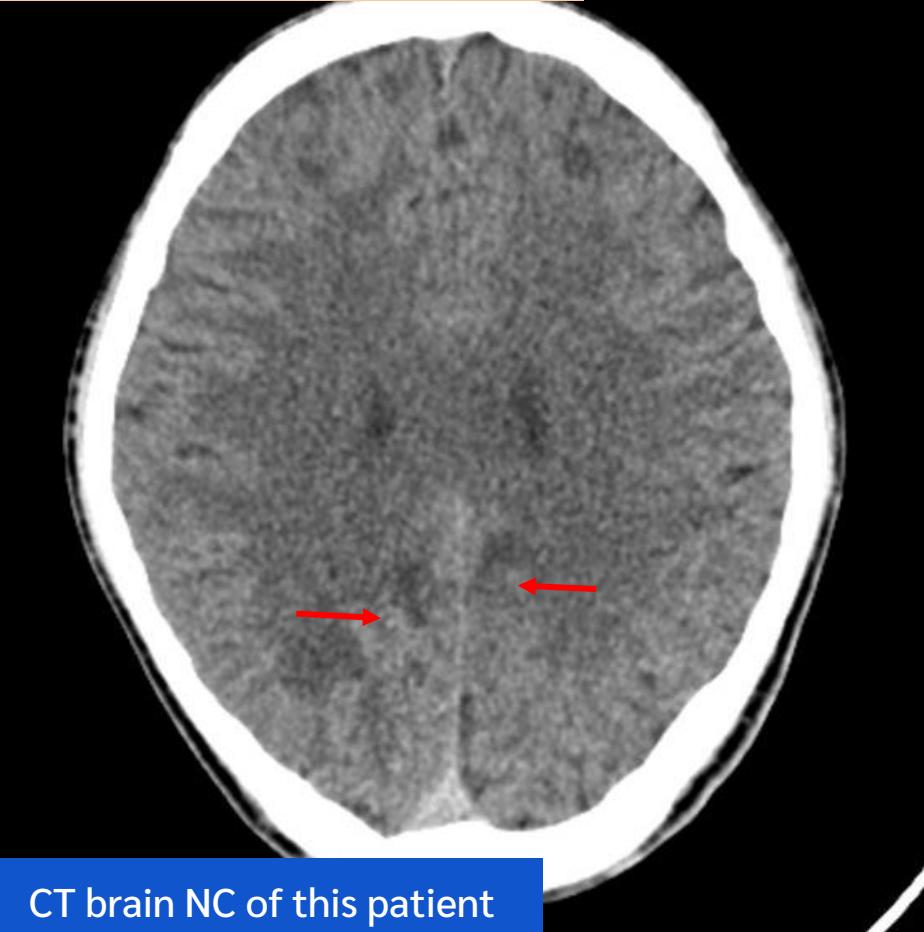
Hypertensive emergency !!

- Severe BP evaluation
- Evidence of severe symptoms and end organ damage

BP categories	AAP 2017	AAP2017
	1-12 years	>= 13 years
Normal	<P90th	< 120/80 mmHg
Elevated BP High normal BP	P90th to < P95th	120-139/<80 mmHg
Stage I hypertension	P95th to < P95th+12	130-139/80-89 mmHg
Stage II hypertension	>= P95th + 12	> 140/90 mmHg

Clinical symptoms
Brain
- AOC
- N/V
- Seizure
- Hemiplegia
Eye
- Blurred vision
- Cortical blindness
- Papilledema
Heart
- Chest pain
- Pulmonary edema
Kidney
- AKI
- Hematuria

Hypertensive encephalopathy



CT brain NC of this patient

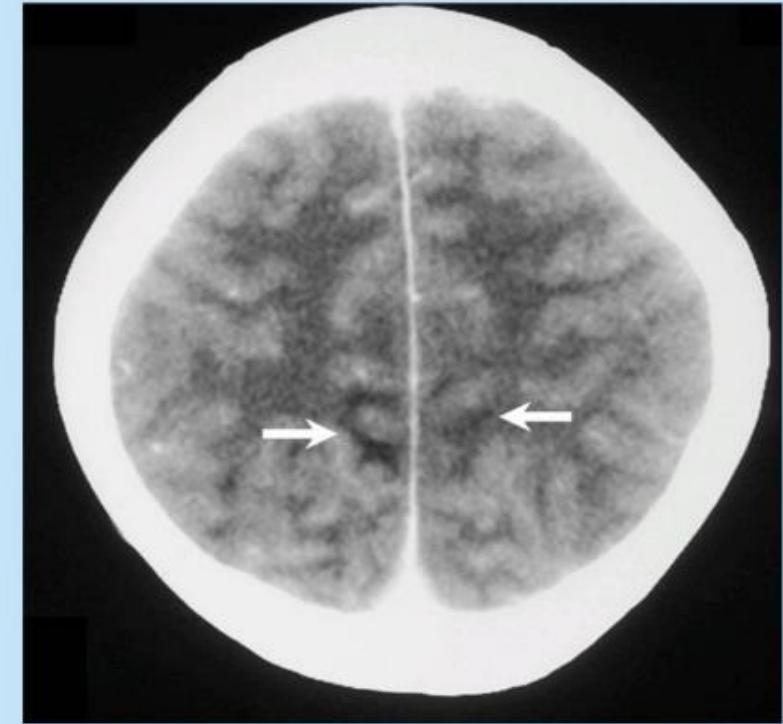


Fig. 1. Axial post-contrast CT scan of the brain shows bilateral parafalcine posterior parietal white matter low densities (arrows) without associated enhancement.

SA journal of radiology , Feb 2005

Hypertensive Emergency Management

MANAGEMENT

Stabilization: assess ABC
Anticonvulsant if seizure present: diazepam 0.1-0.3 mg/kg/dose
Collect blood sample for evaluation

Antihypertensive drugs

Goal BP around 95th percentile by age

Planned BP decrease = current BP - goal BP



DRUGS	DOSE	ONSET	S/E REMARKS
Nicardipine ★	IVF 1-3 mcg/kg/min	minutes	Reflex tachycardia
Nifedipine	PO 0.25 mg/kg/dose	20-30 min	Reflex tachycardia
Clevidipine	IVF 1-7 mcg/kg/min	5 min	Reflex tachycardia
Labetalol	IVF 0.25-3 mg/kg/hr	5-10 min	AVOID in asthma, HF
Phentolamine	IV 0.1-5 mg/kg	1-2 min	Use in pheochromocytoma
Phenoxybenzamine	PO 0.2-1.2 mg/kg	hours	
Prazosin	PO 0.02-0.04 mg/kg TID	30-90 min	Dizziness headache
Doxazocin	PO 1-2 mg/dose OD	2-6 hr	Orthostatic hypotension
Hydralazine	IV 0.2-0.6 mg/kg	5-20 min	Reflex tachycardia
Diazoxide	IV 1-3 mg/kg q 5-15 min	minutes	Risk of hypotension
Nitroglycerine	IVF 0.1-2 mcg/kg/min	1-2 min	Methemoglobinemia
Nitroprusside	IVF 0.5-8 mcg/kg/min	seconds	Thiocyanide toxicity
Minoxidil	PO 0.1-0.2 mg/kg/dose	minutes	Fluid retention

Investigation first presentation in first hospital

CBC	
Hb	15
Hct	46
WBC	16,800
PMN	64
Lymp	27
Plt	291,000
Thyroid function	Normal

ASO titer / Anti DNaseB : Normal

Electrolyte	
Na	139
K	3.6
Cl	106
HCO3	22
Renal function	
BUN	15 >> 12
Cr	1.27 >> 1.06
eGFR	55 >> 66

Urine analysis	
Spec	NA
pH	NA
WBC	NA
RBC	30-50 >> 0
Protein	NA
Blood	NA
Urine substance	Negative

C3 , C4 : Normal

What is the cause of acute severe hypertension in this time

???

Post discharge treatment

- Amlodipine (10) 1 tab po bid pc
- HCTZ (25) 2 tab po qid pc
- Doxazocin (2) 1 tab po hs

Ultrasound KUB bedside : Increased parenchymal echogenicity of right kidney

ส่งตัวปรึกษาแบบผู้ป่วยนอก กองกุมารฯ รพ.พระมงกุฎเกล้า

Past illness

2 เดือนก่อน มีอาการปอดศีรษะเป็นๆหายๆ มีช่วงที่หายสนิท

อาการปวดเป็นแบบบีบตัวทั้งศีรษะ ไม่มีลักษณะปวดแบบตุบเป็นจังหวะ ไม่มีแรงวูบวาบ
อาการเด่นช่วงกลางวัน และปอดมากขึ้นหากนอนราบ

บางครั้งรับประทานยาพาราเซตามอลแล้วอาการปวดไม่ดีขึ้น

ไม่มีตื่นมาเพราะปวดศีรษะ ไม่มีอาเจียนพุ่ง ไม่มีแขนขาอ่อนแรง หรือมองภาพซ้อน

1 สัปดาห์ก่อน อาการปวดศีรษะค่อยๆรู้สึกrunแรงมากขึ้นเรื่อยๆ ยังไม่เคยมาตรวจพบแพทย์
ปฏิเสธอาการใจสั่น เหงื่อแตกมาก วูบ กล้ามเนื้ออ่อนแรง น้ำหนักลด ผื่นแพ้แสง ไข้เรื้อรัง
ปวดข้อ บวม หรือ ปัสสาวะเป็นเลือด มาก่อนหน้านี้ เวลาเดินนานๆมีปวดขา แต่ไม่ชา นั่งพักหาย

Past history

- ปฏิเสธโรคประจำตัว หรือยาที่ใช้ประจำ
- ปฏิเสธการใช้สารเสพติด
- คลอดธรรมชาติ อายุครรภ์ครบกำหนด ไม่ได้ใส่สายสวนเข้าหลอดเลือดสายสะดิอ

Family history

- บิดาอายุ 43 ปี ปัจจุบันเป็นหัวหน้าครอบครัว
- มารดาอายุ 41 ปี ปัจจุบันเป็นหัวหน้าครอบครัว
- น้องชายอายุ 11 ปี ปัจจุบันเป็นหัวหน้าครอบครัว
- น้องสาวอายุ 9 ปี ปัจจุบันเป็นหัวหน้าครอบครัว

ไม่มีญาติสายตรงเสียชีวิตด้วยโรคหลอดเลือดหัวใจหรือหลอดเลือดสมองขณะอายุน้อย

Developmental status and vaccination

- ผลการเรียนอยู่ในระดับปานกลาง การเรียนเป็นไปตามชั้นอายุ ม.2
- การใช้กล้ามเนื้อในการทำกิจกรรมต่างๆ การสื่อสาร การเข้ากลุ่มเพื่อน เป็นตามวัย
- วัคซีน ครบ เหมาะสมตามวัย ปัลส์สูดได้วัคซีนไข้หวัดใหญ่แล้ว

History taking : HT in children

History	Suspected cause
Headache , Blurred vission (Yes)	I.....
Umbilical artery catheterization (No)	R.....
Birth history , Chronic lungs , Birth weight (No)	B.....
Edema , Hematuria (No)	G.....
Sweating , Palpitation , Flushing (No)	P.....
Palpitation , Tremor , Weight loss (No)	H.....
Muscle weakness , Cramp , Constipation (No)	H.....
Drug use , Medication (No)	D.....
Family history of kidney and endocrine disease (No)	H.....

Physical examination

Vital signs : BT 36.5 degree celcius
PR 86 bpm RR 18 /min BP 128/68 mmHg

Anthropometric Measurement :

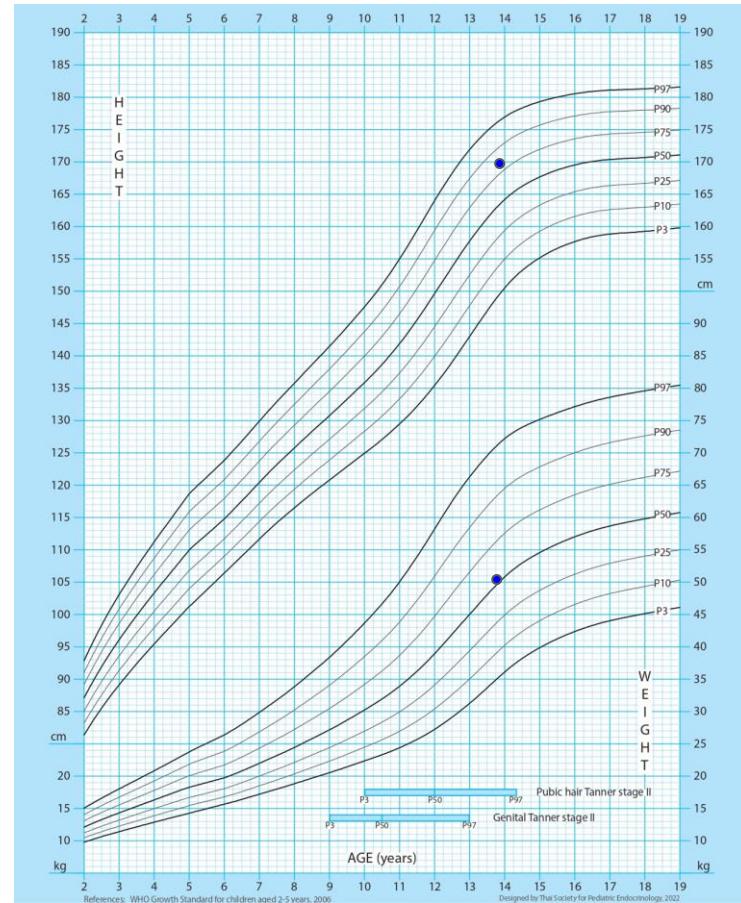
Height 170 cm (P75-90)

Weight 52 kg (P50-75)

WFH : 90% HFA : 104%

General appearance :
Active well response

ไม่ได้นำประวัติการเจริญเติบโตก่อนหน้านี้มา

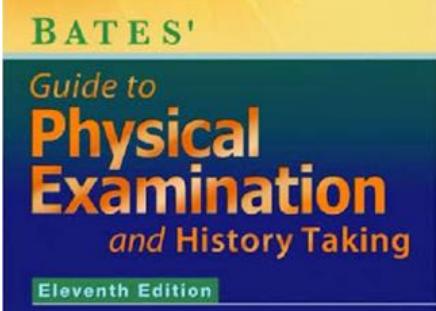
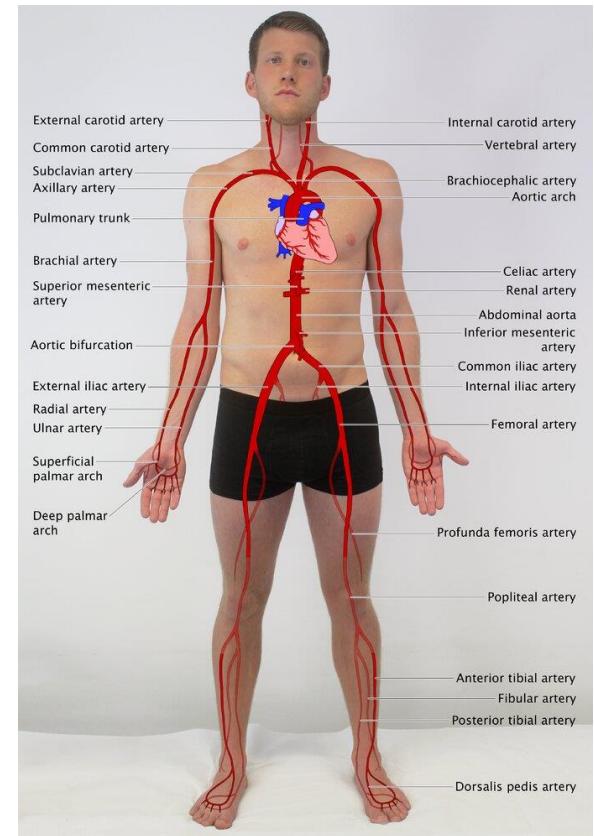
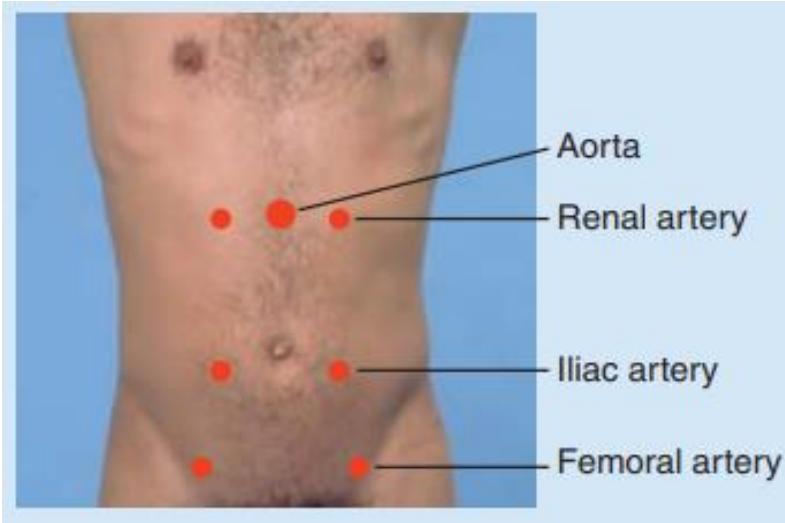


Physical examination

Physical examination	Suspected cause
Normostenic habitus	Thin.....Obese.....
Skin <ul style="list-style-type: none"> ● No Cafe au lait spot ● No Bruising ● No Neurofibroma 	N..... P..... C..... N.....
Rash <ul style="list-style-type: none"> ● No vasculitis liked ● No impetigo lesion ● No striae 	H..... A..... C.....
HEENT <ul style="list-style-type: none"> ● No moon face ● No papilledema ● No goiter 	C..... I..... H.....

Physical examination	Suspected cause
Abdomen <ul style="list-style-type: none"> ● Abdominal bruits ● No hepatosplenomegaly ● No abdominal mass 	R..... A..... W..... N.....
Pelvis : no mass	O.....
Extremities <ul style="list-style-type: none"> ● No differential pulse of both femoral , poplital and dorsalis pedis pulse ● No decrease leg blood pressure 	T..... C.....
Musculoskeletal <ul style="list-style-type: none"> ● No joint pain or swelling 	P.....

Physical examination : Bruits



<https://www.amboss.com/us/knowledge>

Physical examination

Cardiovascular

- Regular heart rhythm
- Normal S1 S2 no murmur
- No heaving no thrill
- No carotid bruits
- Abdominal bruits positive
- Good and same quality of pulse along radial, popliteal, femoral and dorsalis pedis pulse

Blood pressure

128/68
mmHg

132/70
mmHg

Neurological

- Alert active full EOM no nystagmus
- Normal CN no facial palsy
- Motor power grade V all , good motor tone
- No stiffness of neck
- Normal cerebellar sign

140/70
mmHg

139/70
mmHg

- Radial



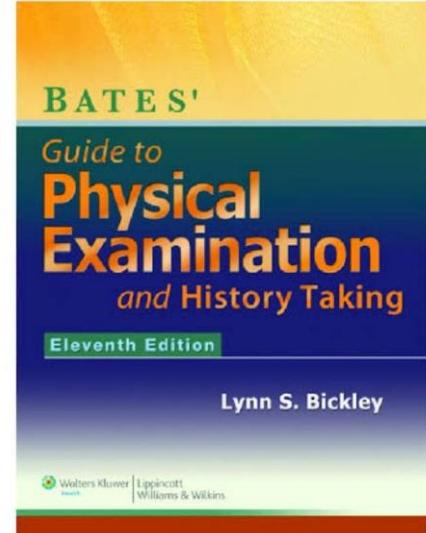
- Brachial



- Popliteal



- Dorsalis pedis



Grading Arterial Pulses

3+	Bounding
2+	Brisk, expected (normal)
1+	Diminished, weaker than expected
0	Absent, unable to palpate

- Posterior tibial

Palpate and grade the pulse

Pertinent finding

Positive	Negative
A 13 years old Thai boy	No abnormal skin sign , normosthenic habitus
Acute recurrent progressive headache	No history of umbilical cath at birth
Abdominal bruits positive , Claudication	No flushing , no palpitation , no Hx drugs used
Hypertension stage II	No abnormal skin sign , no rash , no arthritis
Hypertensive emergency	No edema , no history of hematuria
Renal impairment	No abdominal mass , no pelvic mass
Suspected chronic renal failure from U/S KUB	No different of pulse and abnormal legs BP

Problem list

A 13 years old Thai boy presented with
Acute recurrent progressive headache with
History of hypertensive emergency with renal impairment
with abdominal bruits



Approach to Headache in this patient

Primary headache	Secondary headache
Recurrent attack	Progressive
Symptoms free	Symptoms persist
Pain shift in side of the location	Side-locked
Physical exam : normal	Pain select to anatomical side
No organic cause	Physical examination : abnormal

Red flags	
Progressive	Changes of pattern
Nocturnal	Sign of increase intracranial pressure
First and Worst	

Secondary headache (Etiology based) >>

Approach : Headache with Hypertension in this patient

Time cause
Acute
Recurrent

Host
Immunocompetence

V ascular
I nfection
T rauma
Autoimmune
M etabolic / toxin / drugs
I diopathic
N eoplasm
S tructural / seizure

What is the lesion	Cause
Vascular	<ul style="list-style-type: none">Hypertensive encephalopathyCerebral venous sinus thrombosis
Autoimmune	<ul style="list-style-type: none">VasculitisSLE
Metabolic / Toxin / Drug	<ul style="list-style-type: none">PheochromocytomaHyperthyroidismMELAS
Structural / Seizure	<ul style="list-style-type: none">Seizure

Approach to Hypertension in the this patient

Age group approach

Secondary 80%

Primary 80 %

6-10 years

- Renal parenchymal disease
- Renal artery stenosis
- Essential hypertension
- Endocrine causes

Adolescence

- Essential hypertension
- White coat hypertension
- Renal parenchymal disease
- Substance abuse
(Cocain Amphetamine
Methamphetamines
Methylpenidate Caffeine)
- Endocrine causes

Differential diagnosis in this patient

	Pro	Cons
1.Renovascular hypertension		
• Renal artery stenosis	Abdominal bruits Difference kidney size Malignant hypertension	Adolescence
2.Renal parenchymal disease		
• Chronic kidney disease	Impaired kidney function Small size of kidney	No growth failure No Hx Renal disease in family
3. Autoimmune / Vasculitis	Adolescence , Encephalopathy Abdominal bruits , Claudication	No rash , No pulse deficit No difference BP
4.Endocrine		
• Pheochromocytoma	Headache	No flushing No palpitations No abdominal mass
5. Primary hypertension	Adolescence	Abnormal physical examination

Investigations : HT in children

Study or Procedure	Purpose	Target Population
Evaluation for identifiable causes History, including sleep history,	History and physical examination family history, risk factors, diet, and habits such as smoking and drinking alcohol; physical examination	All children with persistent BP \geq 95th percentile help focus subsequent evaluation
BUN, creatinine, electrolytes, urinalysis, and urine culture CBC	R/O renal disease and chronic pyelonephritis R/O anemia, consistent with chronic renal disease	All children with persistent BP \geq 95th percentile
Renal U/S	R/O renal scar, congenital anomaly, or disparate renal size	All children with persistent BP \geq 95th percentile
Evaluation for comorbidity Fasting lipid panel, fasting glucose	Identify hyperlipidemia, identify metabolic abnormalities	Overweight patients with BP at 90th– 94th percentile; all patients with BP \geq 95th percentile; family history of hypertension or CVD; child with chronic renal disease
Drug screen	Identify substances that might cause hypertension	History suggestive of possible contribution by substances or drugs
Polysomnography	Identify sleep disorder in association with hypertension	History of loud, frequent snoring
Evaluation for target – organ damage Echocardiogram	Identify LVH and other indications of cardiac involvement	Patients with comorbid risk factor* and BP at 90th– 94th percentile; all patients with BP \geq 95th percentile
Retinal exam	Identify retinal vascular changes	Patients with comorbid risk factor* and BP at 90th– 94th percentile; all patients with BP \geq 95th percentile
Additional evaluation as indicated ABPM	Identify white – coat hypertension, abnormal diurnal BP pattern, BP load	Patients in whom white – coat hypertension is suspected, and when other information on BP pattern is needed
Plasma renin determination	Identify low rennin, suggesting mineralocorticoid – related disease	Young children with stage 1 hypertension and any child or adolescent with stage 2 hypertension
Renovascular imaging Isotopic scintigraphy (renal scan) MRA Duplex Doppler flow studies 3 – Dimensional CT Arterography: DSA or classic	Identify renovascular disease	Positive family history of severe hypertension Young children with stage 1 hypertension and any child or adolescent with stage 2 hypertension
Plasma and urine steroid levels		
Plasma and urine catecholamines	Identify steroid – mediated hypertension Identify catecholamine – mediated hypertension	Young children with stage 1 hypertension and any child or adolescent with stage 2 hypertension

All case HT child

- CBC
- UA
- BUN Cr
- Electrolyte
- CXR , EKG
- Echocardiogram
- Renal ultrasound

The Fourth Report
on the Diagnosis, Evaluation, and
Treatment of High Blood Pressure
in Children and Adolescents.
Pediatrics 2004 Aug; 114

Investigation : At PMK

Electrolyte	
Na	134.6
K	3.34
Cl	97
HCO3	25.5
Alb , Ca , PO4	4.9 , 9.3 , 4.8
BUN	13.4
Cr	1.04
eGFR	68

Urine analysis	
Spec	1.002
pH	6.5
WBC	0-1
RBC	0-1
Protein	1
Blood	Negative
Glucose	Normal
Ketone	Negative

VBG	
pH	7.45
pCO2	39.1
HCO3	26.9
Proteinuria	
Urine protein	54 >> 310
Urine Cr	14.3 >> 70
UPCR	3.77 >> 4.4

Discussion lab

Investigation : Interpretation

Hypokalemia ($K < 3.5 \text{ mEq/L}$)

Check redistribution

- Hypokalemic periodic paralysis
- Thyrotoxicosis
- Insulin
- Cathecolamine
- B2 agonist

True HypoK
K depletion; GI / Renal

Metabolic alkalosis

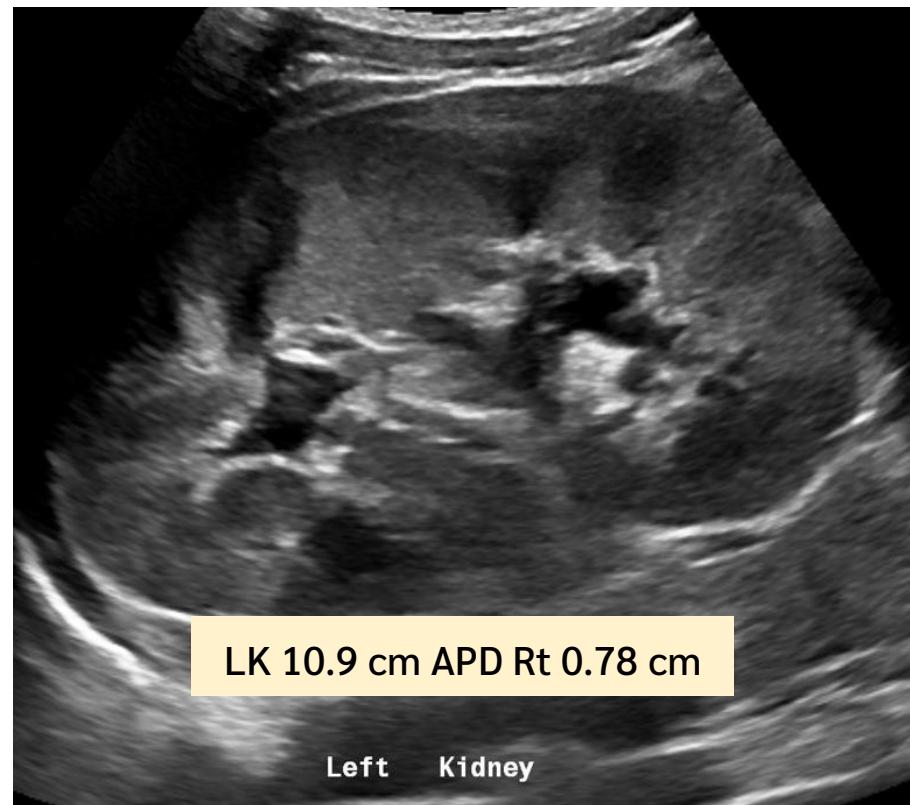
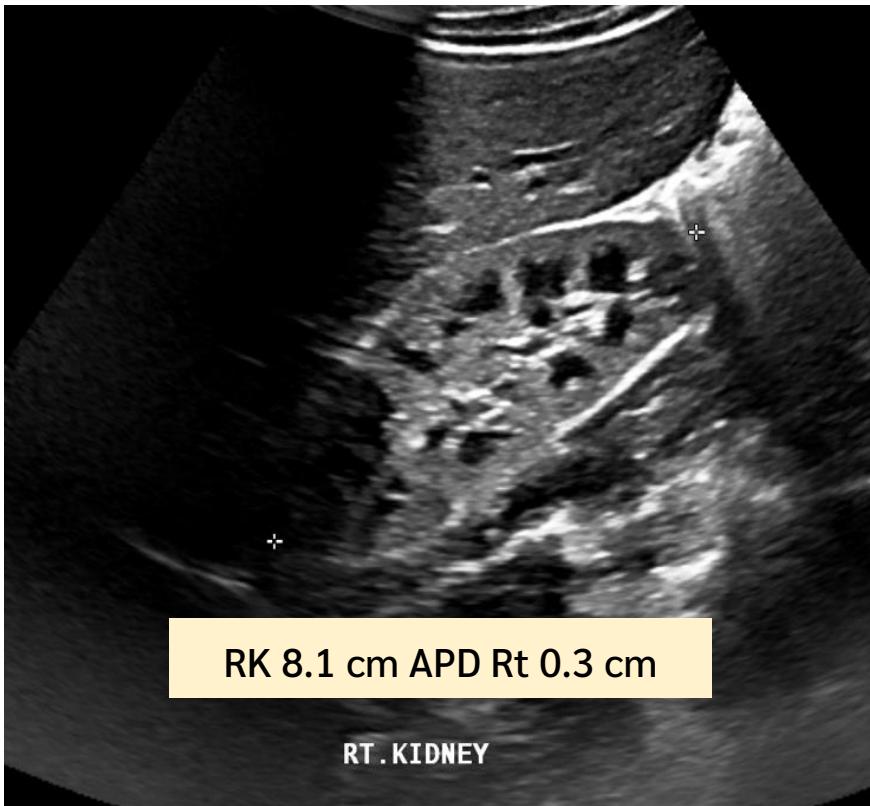
Blood pressure

Normotension >> Diuretics , Bartter's Gittelman's

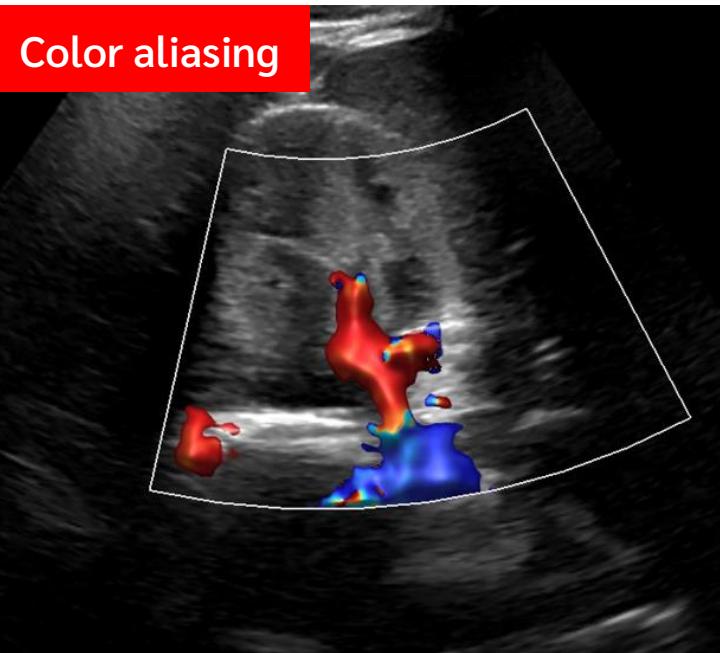
Hypertension

High PAC High PRA	High PAC Low PRA	Low PAC Low PRA	Norm. PAC Norm. PRA
Renovascular hypertension	Primary hyper aldosteronism	Liddle's syndrome	Cushing
Malignant hypertension	Adenoma	17 Beta hydroxylase deficiency	
Renin secreting tumor	Glucocorticoid remediable	11 Beta hydroxylase deficiency	

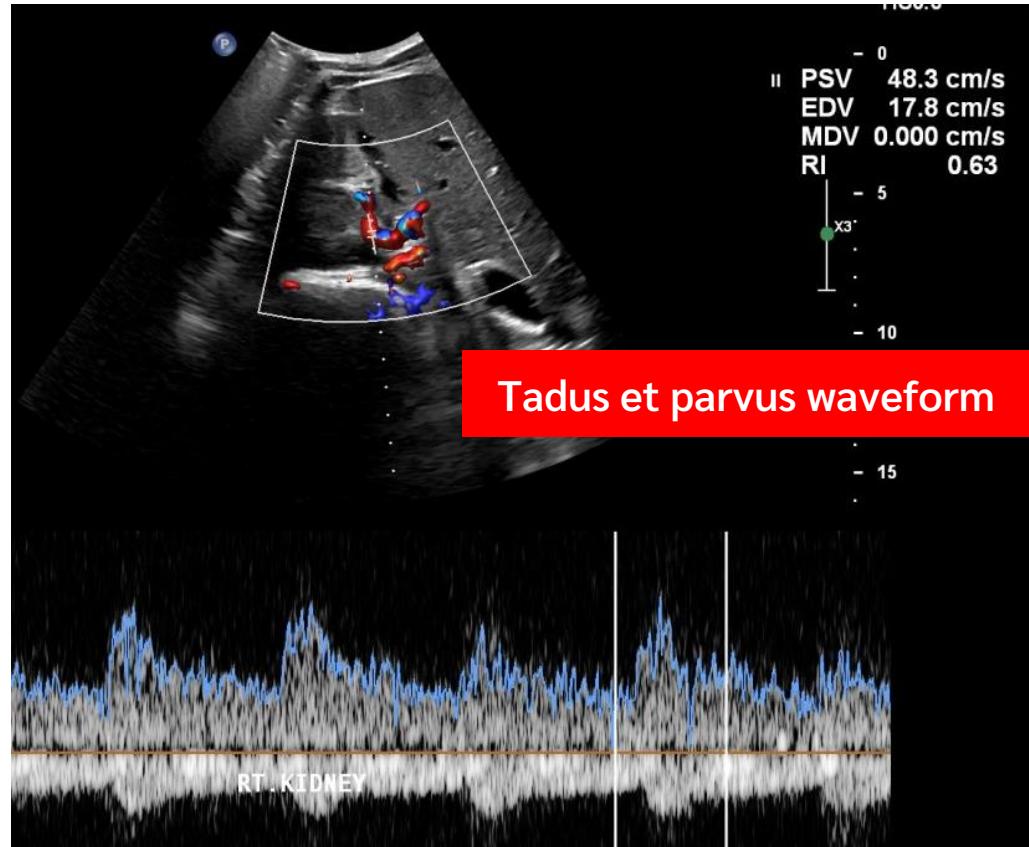
Investigation : Ultrasound KUB



Investigation : Doppler ultrasound of kidney



Doppler ultrasound of kidney
sense 92% spec 88%



Investigation : Doppler ultrasound of kidney

COLOR DOPPLER ULTRASOUND OF BOTH KIDNEYS.

HISTROY: A 13 year-old with history of hypertension in the young

FINDINGS:

- The grayscale ultrasound reveals relative small size of right kidney. Left kidney is unremarkable. Right kidney is measured about 8.3x4.9x4.2 cm. Left kidney is measured about 10.7x4.8x5.2 cm. No evidence of stone or hydronephrosis is seen.
- The doppler ultrasound reveals tadus pavus wave from of intrarenal arteries at right kidney. With suspected stenosis at mild part of right main renal artery is noted.
- Normal acceleration time (AT) and wave form of left intrarenal arteries are seen. Peak systolic velocity (PSV) of proximal, mid and distal part of renal arteries is within normal limit. Peak systolic velocity of renal artery and aorta ratio is less than 2.5.

IMPRESSION;

- Small size of right kidney
- Suspected renal artery stenosis at mid part of renal artery

Rt renal artery stenosis

Investigation : Interpretation

Proteinuria	
UPCR	3.77

Electrolyte	
Na	134.6
K	3.34
Cl	97
HCO ₃	25.5
BUN	13.4
Cr	1.04
GFR	68



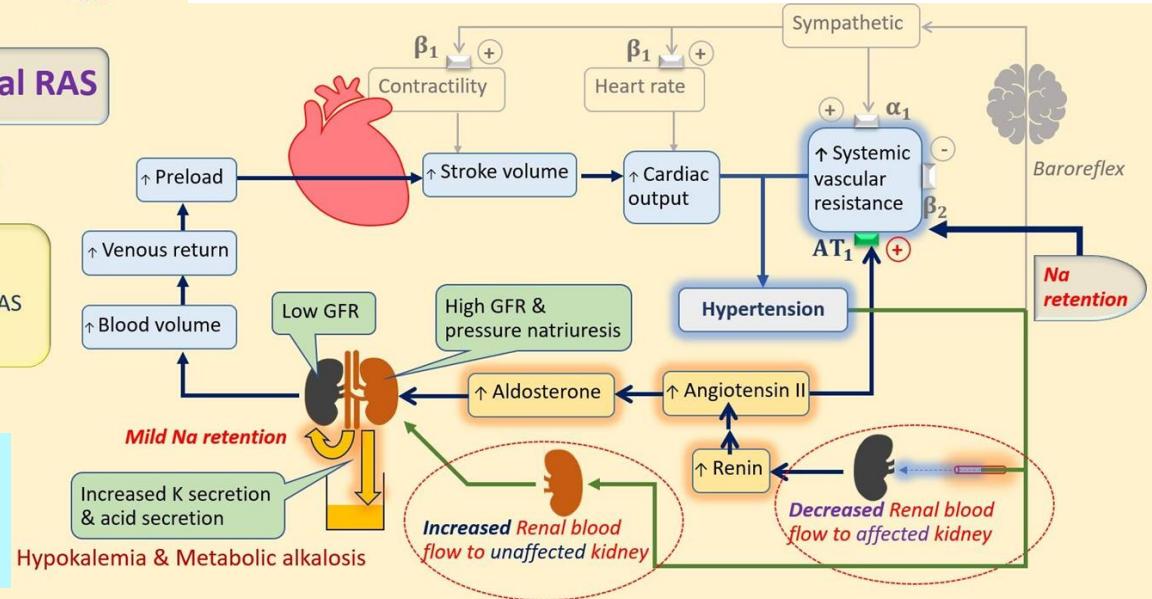
Proteinuria from increase peritubular capillary hydrostatic pressure
>> glomerular overfiltration

Unilateral RAS



- Mild volume expansion
- Sustained RAAS activation

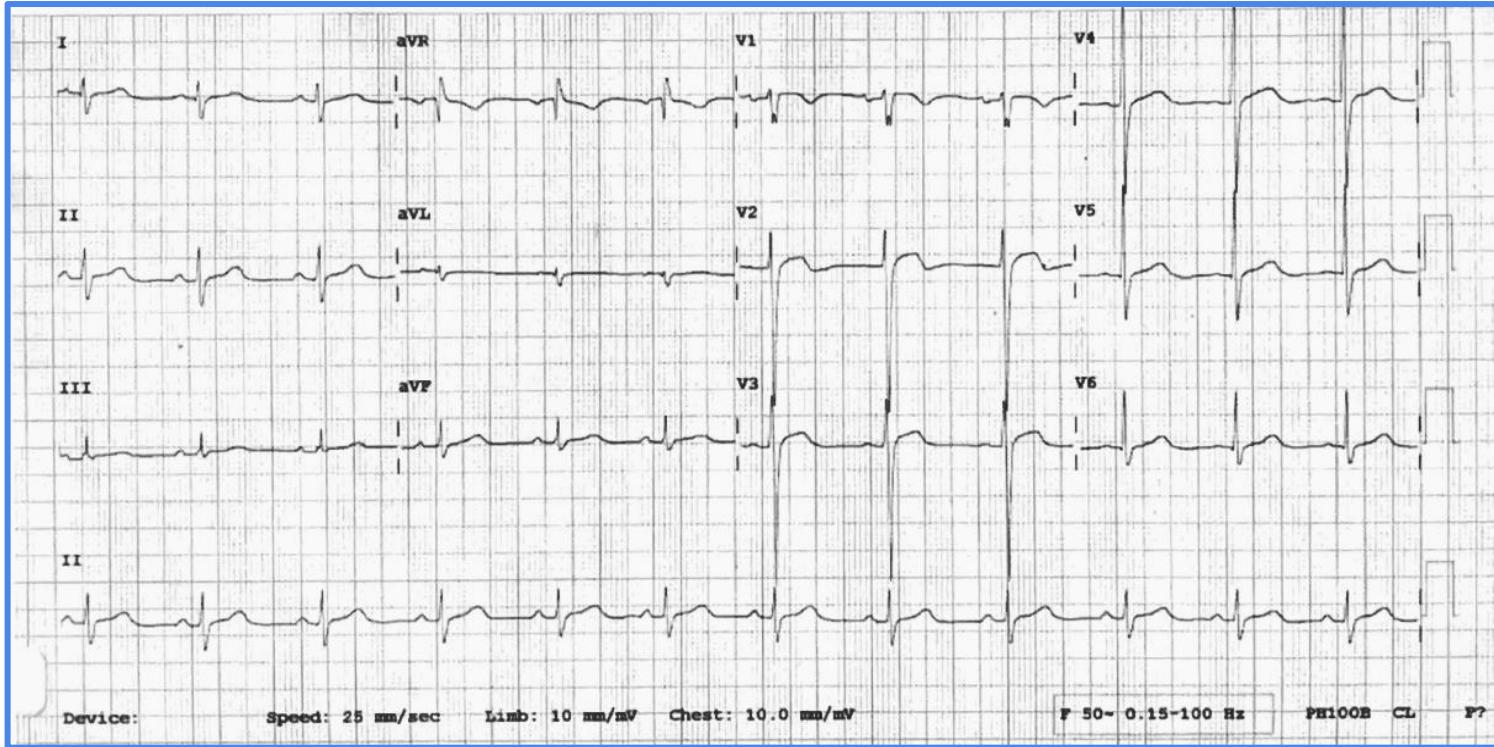
Two kidney HT



Investigation : CXR PA upright and lateral



Investigation : EKG and Echocardiogram



Echo

- Trivial AR
- Trivial MR
- No VSD
- No coarctation of aorta
- No PDA

WNL

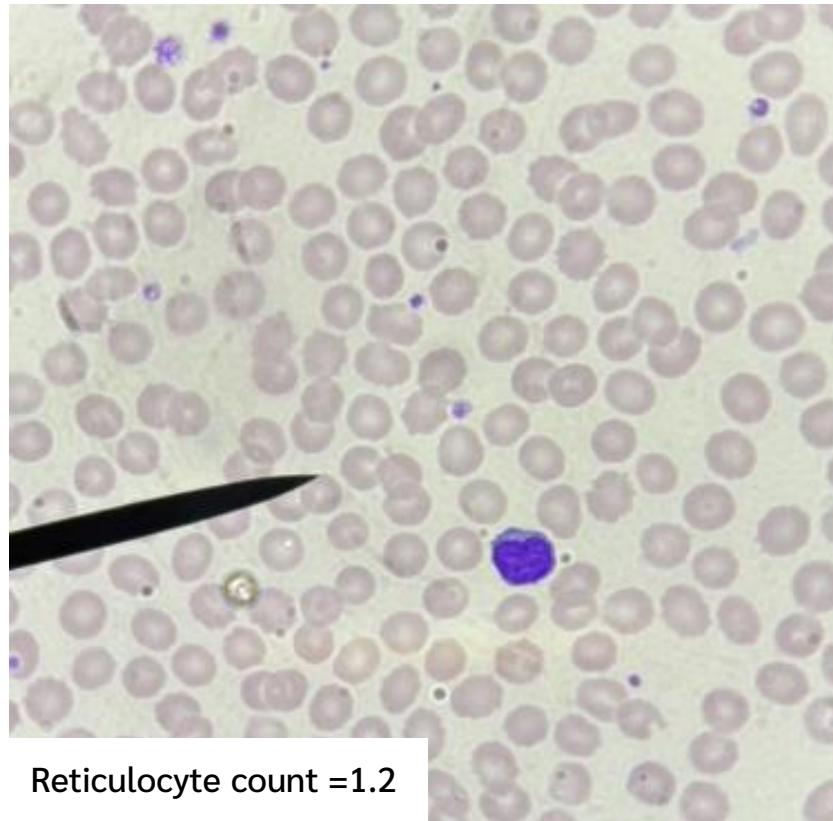
Investigation

Anti nuclear antibody	Negative
C3	0.99
C4	0.16
Anti-dsDNA	Negative

Ophthalmologic examination	<ul style="list-style-type: none">● No evidence of hypertensive retinopathy● No uveitis both eye● No cataract or glaucoma both eyes
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Investigation : At PMK

CBC	
Hb	12.7
Hct	38.3
MCV	82
MCH	27
RDW	12.5
WBC	5,800
PMN	66
Lymp	25.8
Mono	5
Plt	193,000



Normochromic
normocytic RBC no
anisocytosis
Poikilocytosis 1+ -
microspherocyte few
-shizocyte few
Polychromasia 1 /OF

Normal diff. of WBC
I:T < 0.2
No blast cell of WBC

Adequate platelet,
giant platelet 1-2/OF

Anemia of
chronic
disease

Problem list

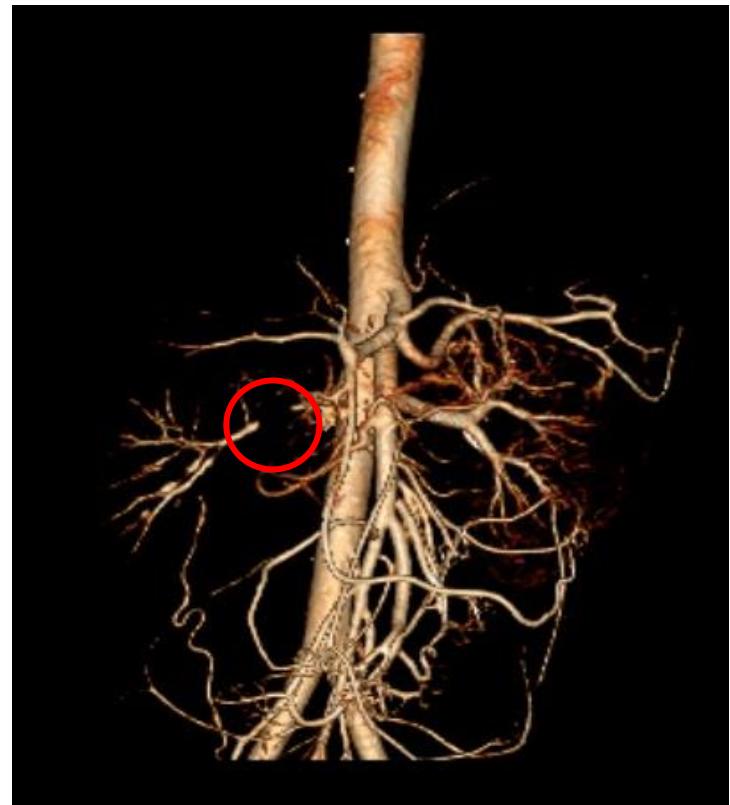
A 13 years old Thai boy with

- Suspected right renal artery stenosis
 - Chronic kidney disease stage II
 - Secondary Hypertension
 - History hypertensive encephalopathy
 - Anemia of chronic disease



Further investigation

Investigation : CTA renal artery (sense94% spec98%)



Investigation : CTA renal artery (sense94% spec98%)

Findings:

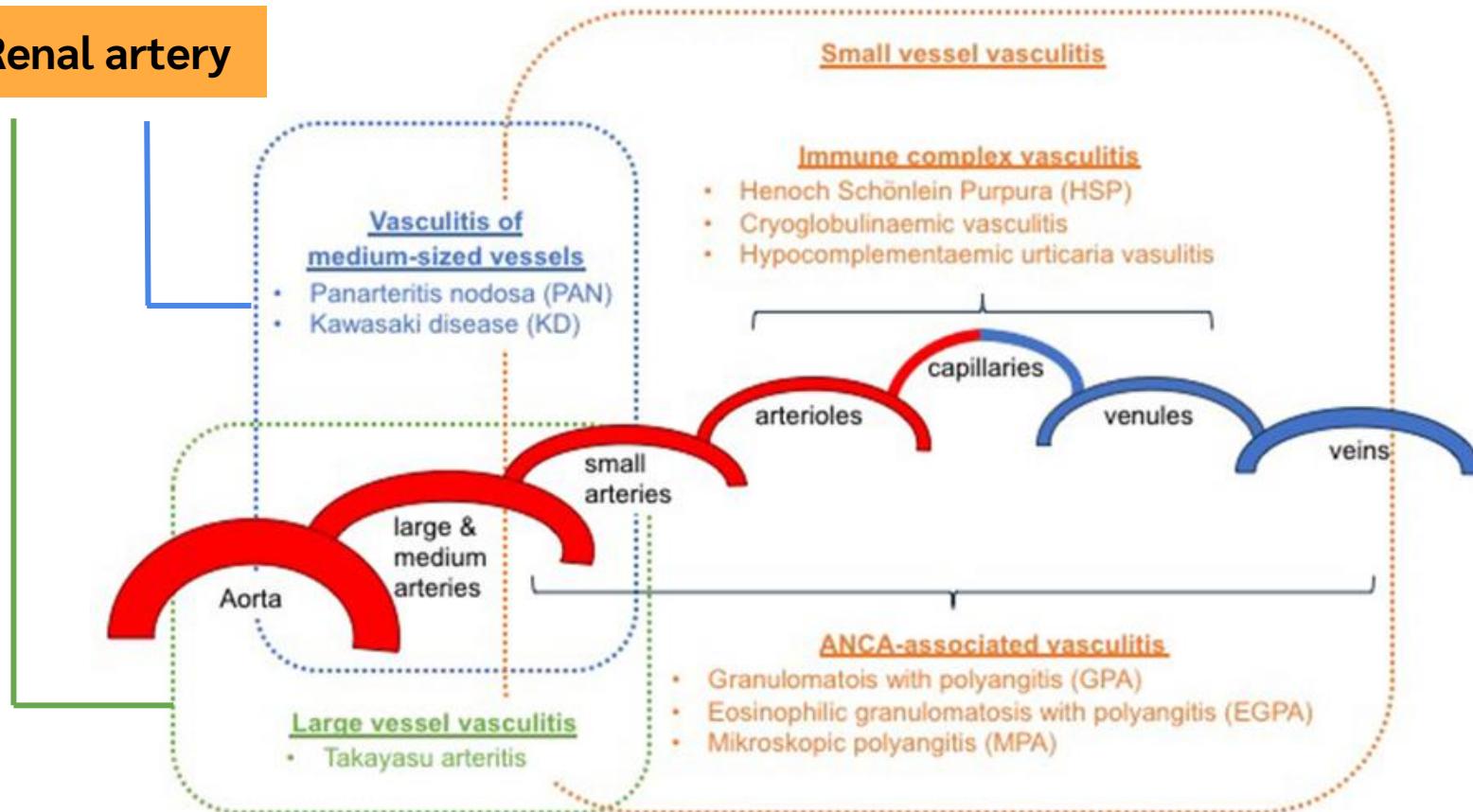
Intravascular finding:

- The study shows short segmental severe stenosis at mid part of right renal artery (luminal patency= 1-2 mm) and multifocal severe stenosis at segmental branches of right renal artery associated with one collateral vessel at inferior portion.
- A 0.4x0.6-cm fusiform aneurysmal dilatation at inferior segmental branch of right renal artery (Se11 im 30).
- Single renal artery at both kidney is noted.
- Normal caliber of left renal artery is demonstrated.
- Bilateral renal veins are patent.
- Celiac, SMA, left renal artery and IMA are patent.
- No evidence of dissection, ruptured or contrast extravasation is identified.

Probable vasculitis and suspected aneurysm due to vasculitis

Vasculitis approach in this case

Renal artery



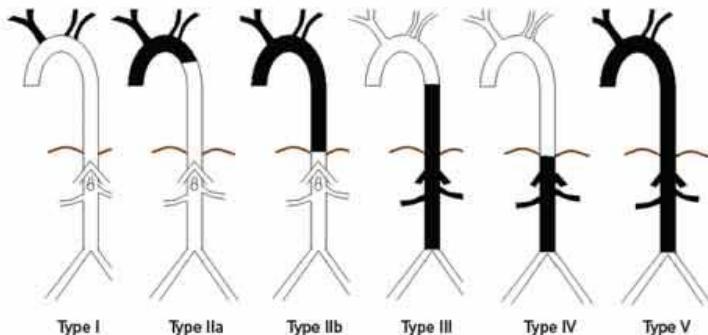
Differential diagnosis

	Pro	Cons
Renal artery stenosis	Hypertension	
<ul style="list-style-type: none"> • Vasculitis - Takayasu arteritis 	Headache Claudication Abdominal bruits Adolescence group	No pulse deficit No limp BP discrepancy > 10 mmHg No evidence of TB infection
<ul style="list-style-type: none"> • Vaculitis - Polyarthritis nodosa (PAN) 	Age 3-17 years old Headache Claudication Renal involvement Renal aneurysm	No purpura or Raynaud's No arthralgia No fever No evidence of TB or staph infection
<ul style="list-style-type: none"> • Renal fibromuscular dysplasia (FMD) 	Abdominal bruit Renal artery stenosis	No flank pain, No hematuria Age group, no string of bead pattern
<ul style="list-style-type: none"> • Thromboembolic • Atherosclerosis 	Abdominal bruit	No murmur No Hx heart disease No carotid bruit no Fx Hx sudden death from CVD
Middle aortic syndrome	Hypertensive encephalopathy present Renal impairment Claudication-like Refractory hypertension	No abdominal angina Normal femoral pulse

Further investigation for this patient : Takayasu's arteritis

Criterion	Definition
Angiographic abnormality (mandatory criterion)	Angiography (conventional, computed tomography, or magnetic resonance imaging) of the aorta or its main branches and pulmonary arteries showing aneurysm/dilatation, narrowing, occlusion or thickened arterial wall not due to fibromuscular dysplasia, or similar causes; changes usually focal or segmental
Pulse deficit or claudication	Lost/decreased/unequal peripheral artery pulse(s) Claudication: focal muscle pain induced by physical activity
Blood pressure discrepancy	Discrepancy of four limb systolic blood pressure > 10 mmHg difference in any limb
Bruits	Audible murmurs or palpable thrills over large arteries
Hypertension	Systolic/diastolic blood pressure greater than 95th percentile for height
Acute phase reactants	Erythrocyte sedimentation rate > 20 mm per first hour or C-reactive protein any value above normal (according to the local laboratory)

TA is classified when the mandatory criterion is present plus any other criteria.



**EULAR/PRINTO/PReS
Criteria**

**Whole aorta
angiography
: gold standard**

Laboratory marker for TAK activities
IL-2 IL-3 IL-4 IL-6 IL-8 TNF α IFN γ
Associated with TB infection

Further investigation for this patient : PAN

EULAR/PRINTO/PRES classification criteria for childhood Polyarteritis nodosa (c-PAN)

Histopathology or angiographic abnormalities (mandatory) plus one of the five following criteria:

1. Skin involvement
2. Myalgia/muscle tenderness
3. Hypertension
4. Peripheral neuropathy
5. Renal involvement

- Histology: necrotising vasculitis in medium or small-sized arteries.
- Angiography: aneurysm, stenosis or occlusion of a medium or small sized artery,

Livedo reticularis, skin nodules, superficial ulcers, peripheral tissue necrosis

Muscle pain or tenderness

Blood pressure > 95th centile

Sensory or motor neuropathy

Proteinuria, haematuria, impaired function

Histopathology or angiographic abnormal + $\geq \frac{1}{5}$ of criteria



Possible triggers
Streptococcus , HBV , HCV

Investigation

ESR	28 mm/h
CRP	0.2 mg/L
IL-6	pending

Tuberculin skin test	48hr..... 72hr.....
ASO titer , Anti DNaseB	Normal (รพ.ต้นทาง)

Elective CTA whole abdomen on February 23rd 2024

Management

- Slow progression of CKD stage II and treatment in unilateral renal artery stenosis

ACEI : Enalapril (5) 1 tab po OD

In this patient

Protien intake : RDA by age

- Control and treatment complication :

Control hypertension : Amlodipine (5) 1 tab po pc OD ; dilate afferent arteriole

Hydralazine (25) 2 tabs po tid pc hs ; vasodilator

Doxazocin (2) 1 tab po hs ; alpha blocker

- Specific cause treatment : Takayasu Arteritis/PAN ; immunosuppressive

Work up occult infection : TST , Dental exam and procedure , stool conc for parasite

- Revascularization in some condition : RAS from FMD ; Balloon angioplasty with stent insertion

Take home massage

- More than 80% of hypertension in children under 12 years old are secondary hypertension.
- Acute severe hypertension with blood pressure more than P95 + 30 mmHg ; clinicians should be concerned about the development of complications.
- Approach to hypertension in children based on age group history and complete physical examination
- Measurement of blood pressure 4 extremities , abdominal bruits , palpate and grade pulse are the important cures of renovascular hypertension.
- Renal artery stenosis can be associated with various condition such as fibromuscular dysplasia, vasculitis, Williams syndrome and NF1.
- Doppler ultrasound of kidney is screening investigation of renal artery stenosis. (sense92% spec88%)
- CTA renal is the gold standard of diagnosis of renal artery stenosis. (sense94% spec98%)