A TALE OF TWO …. KIDDIES

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CASE PRESENTATION 1

FIRST KIDDIE – S N

HISTORY

- S N – 11 year-old boy – Seen in OPD on 15.04.2016
- BH: LSCS for maternal DM – SAJ Govt Hospital. Bwt 2.79kg. ?Neonatal sepsis. Discharged D21. F'ed up for poor wt gain by Paediatrician 1.
- Diagnosed as asthma aged 1 year: nebulized ß2 agonist +/- steroid injection
- Follow-up privately Paediatrician 2: age 1-3 years – inhaled salbutamol and inhaled steroid –marginal improvement. Intermittent oral steroids
- Hypertension diagnosed 2015 SAJ Govt Hosp – followed up by Paediatrician 3 & 4
- Blood tests and renal USS done - ?Normal
- Due for further renal imaging
- Started on Enalapril 5mg OD – remained hypertensive

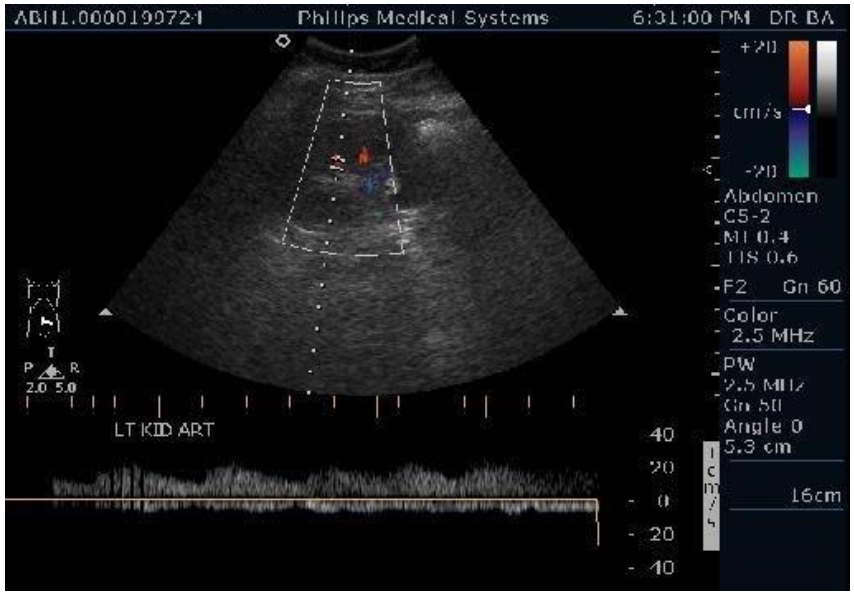
EXAMINATION

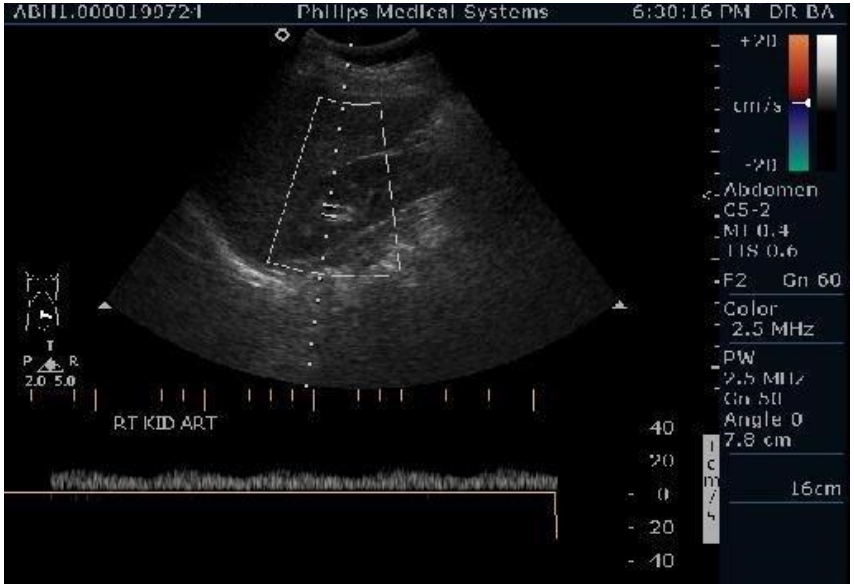
- Obese – BMI 24 WT 43.9 HT 135CM
- BP 160/120
- HR 107
- SpO2 98%

INVESTIGATION

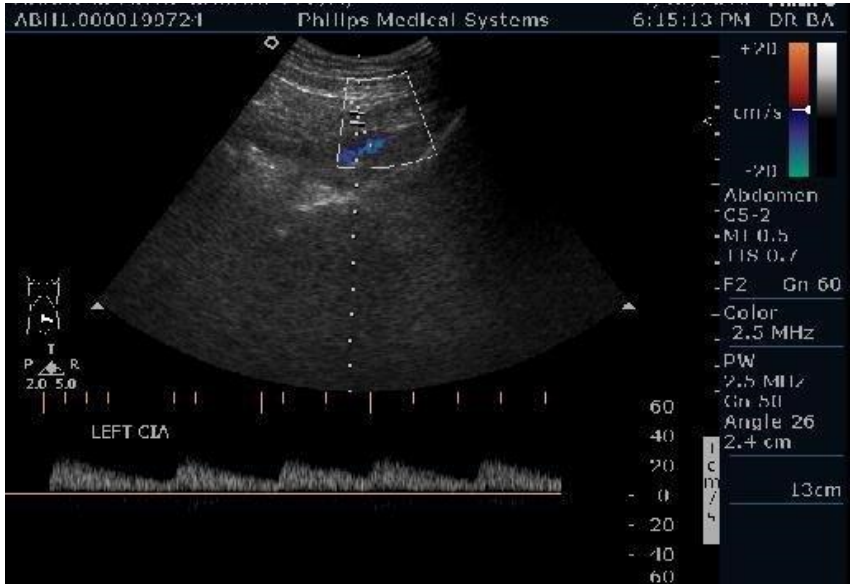
- Seen by private internal medicine physician – referred for abdominal USS
- Normal liver, GB, spleen, pancreas.
- Normal kidneys – normal echogenicities, no hydronephrosis, no calculi
- Normal bladder contour and bladder wall thickness

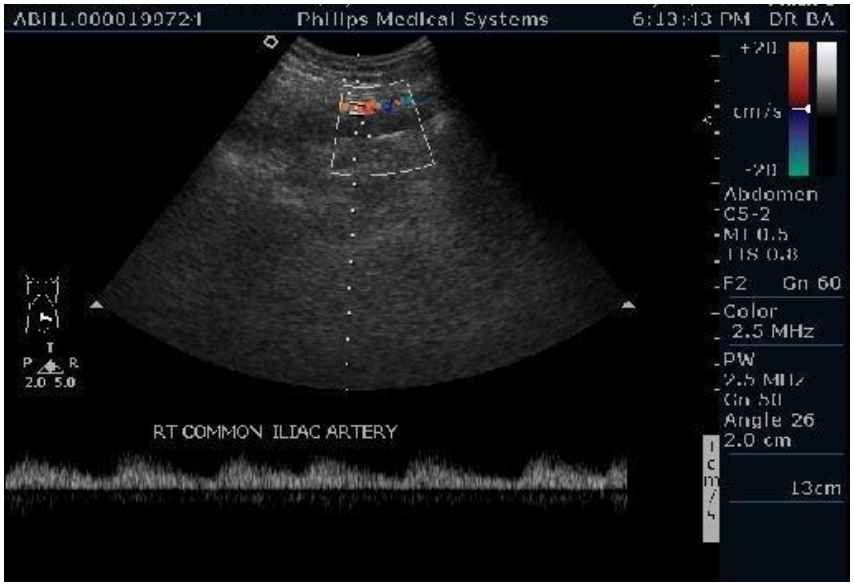
DOPPLER – KIDNEY ARTERIES





DOPPLER – COMMON ILIAC ARTERIES

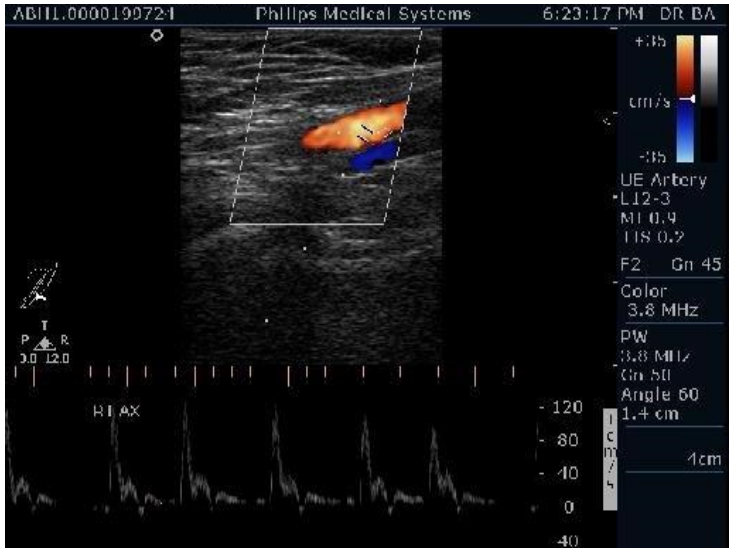




DOPPLER - EXTREMITIES

Lower extremity

Upper extremity



EXAMINATION

- Obese – BMI 24 WT 43.9 HT 135CM
- BP 160/120
- HR 107
- SpO2 98%
- 2/6 ESM ULSB and interscapular region
- FP not palpable

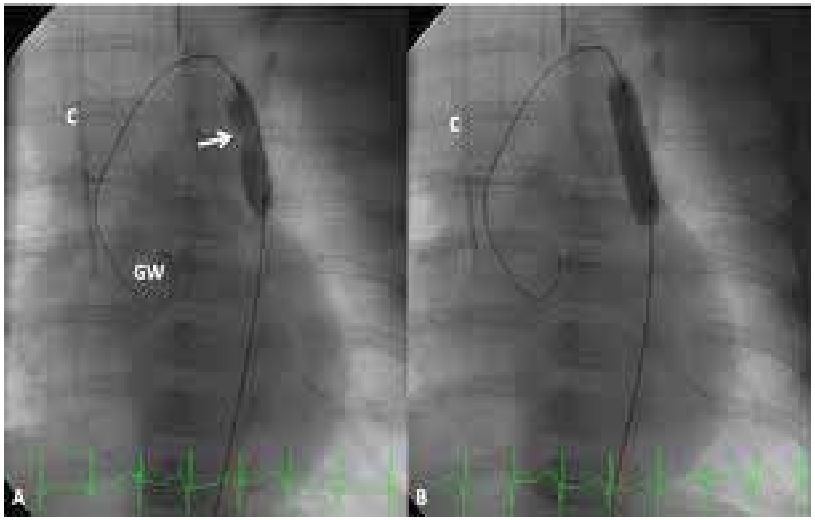
DIAGNOSIS

Cardiac echo:

- Coarctation of Aorta
- Gradient 70 mmHg across coarctation
- Concentric LVH
- Normal LV systolic function

TREATMENT

- Referred DDY
- Balloon angioplasty 29.04.16
- Reviewed 17.05.16:
  - BP 140/70
  - Less SOB
  - Enalapril
  - Inhaled steroids



CASE PRESENTATION 2

SECOND KIDDIE – S R

HISTORY

- BH: Born in private clinic Plaine Wilhems – 13.03.2014 – LSCS failure to progress. Bwt 2.9kg - Female
- Seen in OPD 15.04.2014
- "Moaning" from D3-4: diagnosed as colic
- "Moaning" worse + poor feeding

EXAMINATION

- Weight 3.6kg
- SpO2 96%
- Grunting ++
- Tachypnoeic/subcostal recession
- No cardiac murmur
- FP not palpable
- 2-3 cm hepatomegaly

MANAGEMENT

- Partial septic screen and iv antibiotics
- Iv fluids
- 4-limb BP:
  - RA 115/98 (104); LA 107/94 (99)
  - RL 79/59 (67); LL 55/37 (43)
- Fluid restriction; iv frusemide; prostin infusion
- Transferred to SSRNH NICU 16.04.14 for eventual transfer to India via MOH

Cardiac echo:

- Severe coarctation of aorta: 42mmHg gradient
- Globally hypokinetic LV
- Mildly impaired LV function
- Dilated RA/RV
- Severe PAH

MANAGEMENT

- Admitted to MHI on 13.05.14
- Pre-op echo: severe coarctation – 130 mmHg gradient
- Repair of coarctation on 14.05.14 – excision of coarcted segment and end to end anastomosis
- Post-op echo: gradient 35 mmHg. No PAH. Normal LV function
- Discharge drugs: frusemide + spironolactone (2 weeks), ramipril (6 wks), propranolol (stopped June 2015)

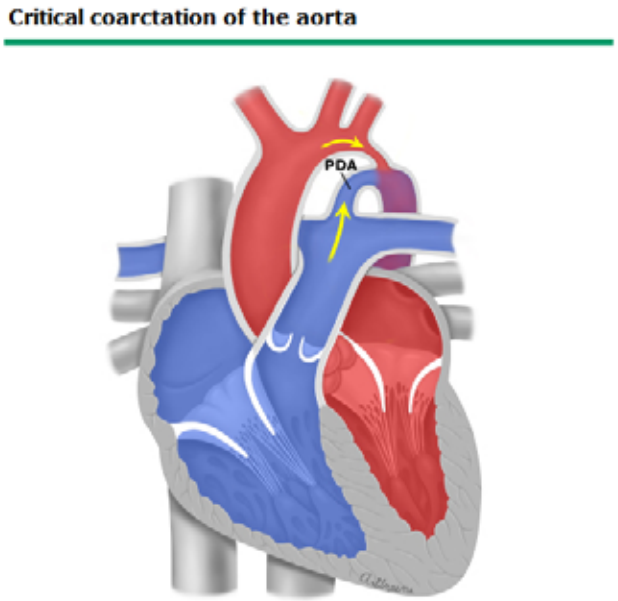
CURRENT STATUS

- Age 2½ years
- Wt 12.4 kg
- Normal development
- BP 117/54

COARCTATION OF THE AORTA

INTRODUCTION

- Narrowing of the descending aorta
- Distal to left SCA
- At level of insertion of ductus arteriosus
- Prevalence of 4/10,000 livebirths
- M > F



EARLY PRESENTATION: DUCT-DEPENDENT LVOTO → CHF

- Usually well at birth and at discharge (PDA)
- Differential cyanosis
- Poor feeding, tachypnea, lethargy first few weeks of life
- Progress to overt CHF
- Murmur – Non-specific or associated lesions
- Hepatomegaly
- Diminished or absent FP
- BP discrepancy between upper/lower limbs

NEONATAL SHOCK

- Pale/irritable
- Dyspnoeic
- Hepatomegaly
- Weak pulses
- No BP gradient

DD: Sepsis; IMD; other duct-dependent LVOTO

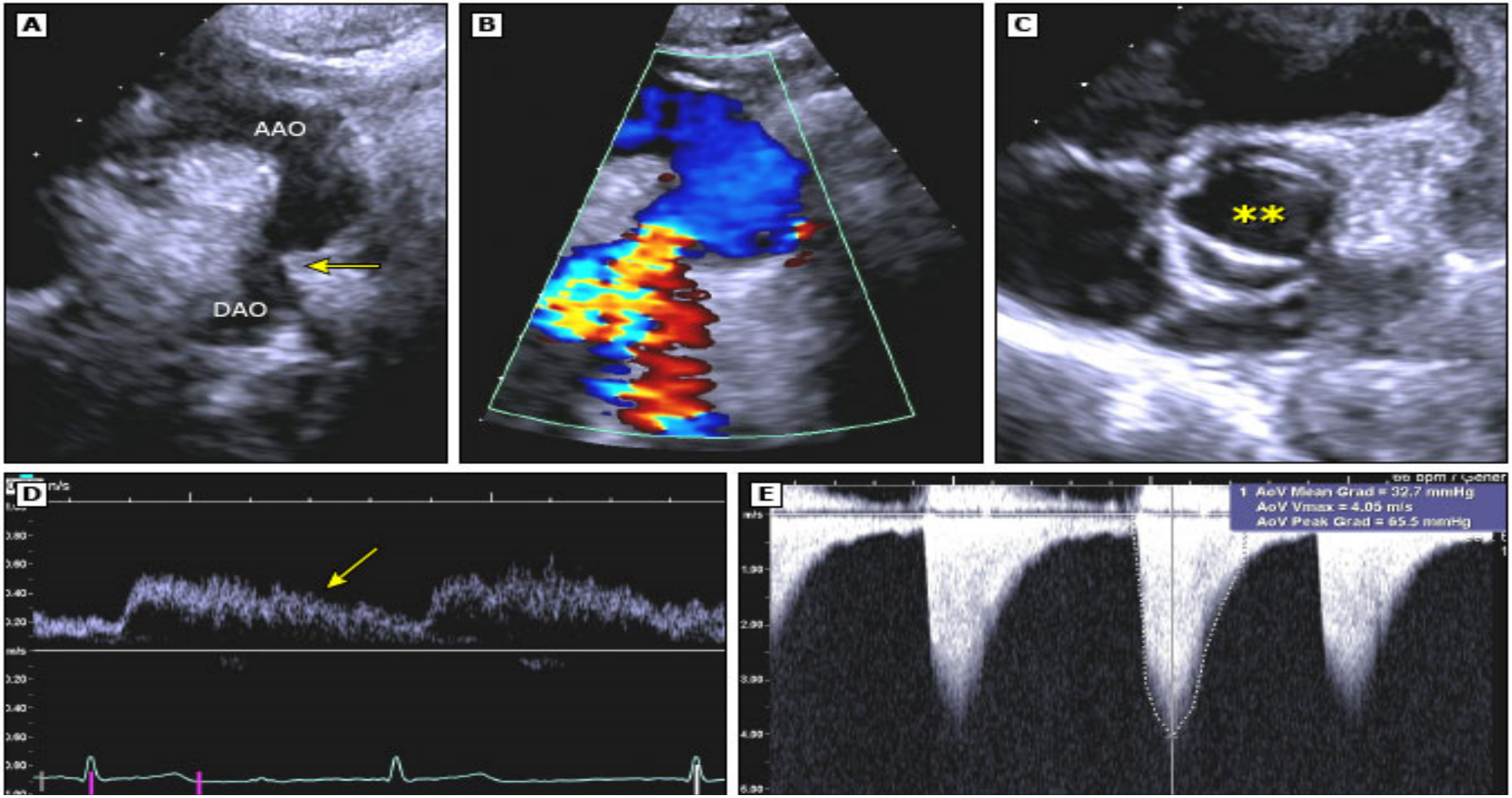
LATE PRESENTATION - HYPERTENSION

HISTORY

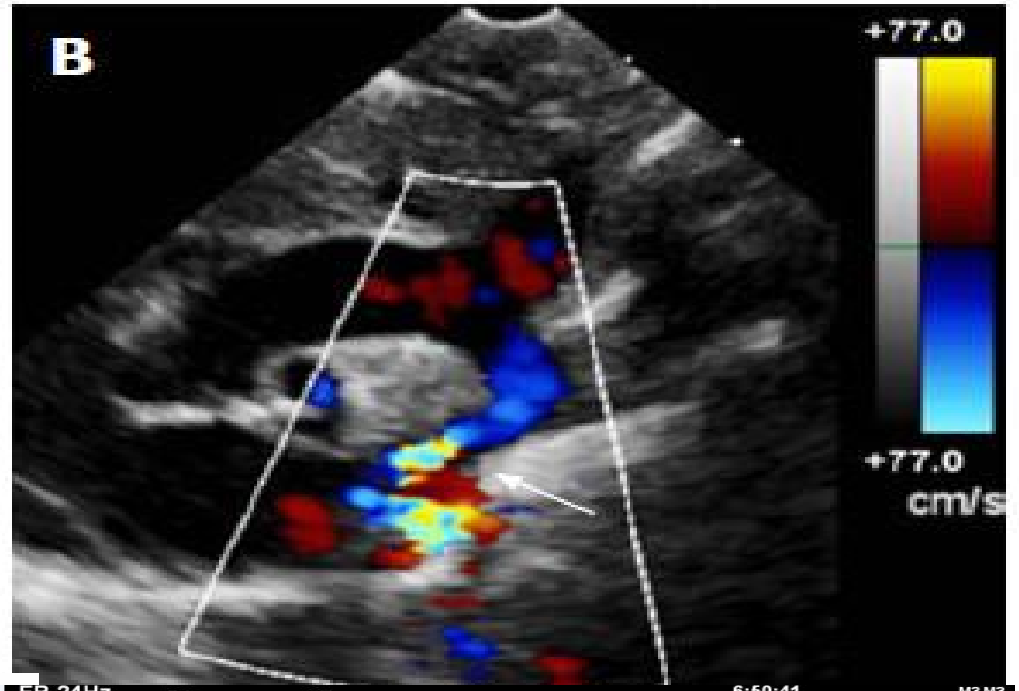
- Incidental hypertension
- Headache
- Chest pain
- Fatigue/Claudication
- Life threatening intracranial haemorrhage
- No Sx of CHF because of collateral arteries

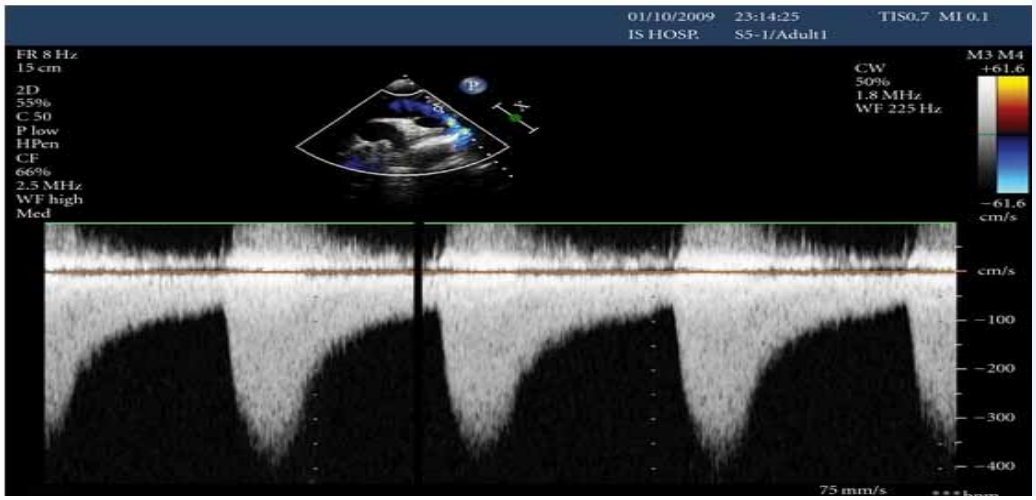
EXAMINATION

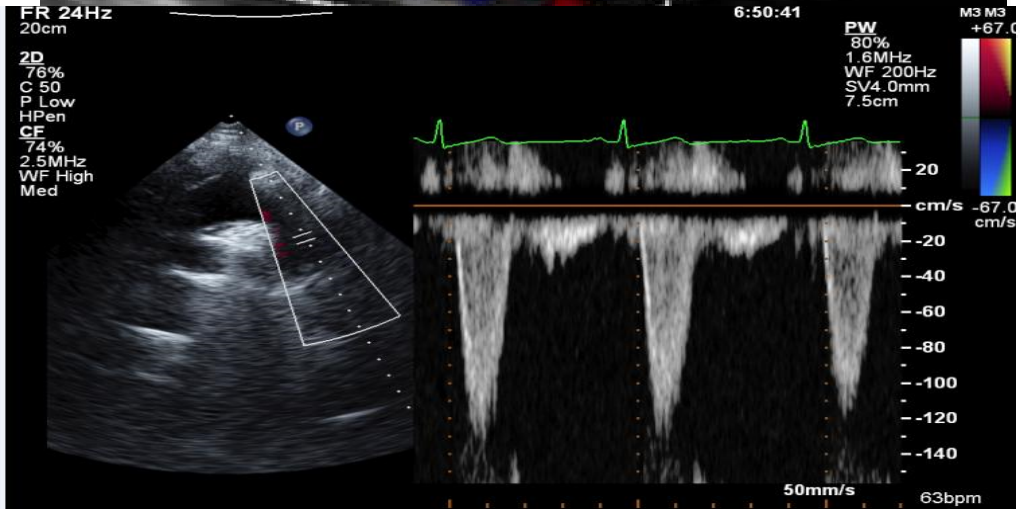
- Radio/Brachio – femoral delay
- Proximal hypertension: pressure difference of 20+ mmHg
- SM – left infraclavicular/infrascapular
- CM – collateral arteries
- Ejection click of bicuspid aortic valve
- Gallop rhythm – LVH
- Suprasternal notch pulsation


A
AAO
DAO
B
C
**
D
E
1 AoV Mean Grad = 32.7 mmHg
AoV Vmax = 4.05 m/s
AoV Peak Grad = 65.5 mmHg


A


B
+77.0
+77.0
cm/s


01/10/2009 23:14:25 TIS0.7 MI 0.1
IS HOSP. S5-1/Adult1
FR 8 Hz
15 cm
2D
55%
C 50
P low
HPen
CF
66%
2.5 MHz
WF high
Med
CW
50%
1.8 MHz
WF 225 Hz
M3 M4
+61.6
-61.6
cm/s
cm/s
100
200
300
400
75 mm/s


FR 24Hz
20cm
6:50:41
2D
76%
C 50
P Low
HPen
CF
74%
2.5MHz
WF High
Med
PW
80%
1.6MHz
WF 200Hz
SV4.0mm
7.5cm
M3 M3
+67.0
-67.0
cm/s
20
cm/s
-20
-40
-60
-80
-100
-120
-140
50mm/s
63bpm

MANAGEMENT

Early CoA

- PGE1 – Alprostadil infusion
- Inotropes
- Mechanical ventilation
- Surgical repair:
  - Resection with end-to-end anastomosis
  - Subclavian flap aortoplasty
  - A bypass graft across the area of coarctation
  - Prosthetic patch aortoplasty

Late CoA

- Beta blockers

AHA guidelines:

- Older infants and young children (4M-5Y)
  - Balloon angioplasty
- Older children and adults: (>25KG)
  - Stent placement

COMPLICATIONS

- Severe systemic hypertension
- Accelerated coronary artery disease
- Stroke
- MI/endocarditis
- Aortic dissection/rupture
- Intracerebral haemorrhage

TAKE HOME MESSAGE – KIDDIE 2

- 50-70% of CCHD detected antenatally (Developed world). Challenging to detect CoA on antenatal screening
- Post-natally 20-30% of CCHD are missed by physical exam, as Sx occur later when PDA closes.
  - CoA is the most commonly missed CHD
  - Murmurs are not always present with CCHD and may occur in 60% of healthy newborns
  - Clinical assessment of cyanosis is unreliable to detect hypoxaemia
- Newborn pulse oximetry screening

TAKE HOME MESSAGE – KIDDIE 1

- Hypertension in pre-pubertal children is almost always secondary
- CoA 3rd commonest cause of secondary hypertension in children
- CoA is a lifelong disease, with complications occurring years after an apparently successful repair
- Hypertension may persist, even after successful repair and usually relates to the duration and severity of pre-operative hypertension
- All children aged more than 3 years should have their BP measured during routine/emergency visits ***(American Academy of Pediatrics/American Heart Association)***
- Every patient with systemic arterial hypertension should be assessed for the presence of CoA by simultaneous palpation of radial/brachial and femoral pulses to detect "brachial-femoral delay" , and by BL arm and leg BP to detect lower extremity BP reduction ***(American College of Cardiology and American Heart Association – 2008)***

DEFINITION OF HYPERTENSION

- **ADULTS:**

Stage 1: systolic 140 to 159 mmHg or diastolic 90 to 99 mmHg

Stage 2: systolic ≥160 mmHg or diastolic ≥100 mmHg

- **CHILDREN:**

Stage 1 HTN – Systolic and/or diastolic BP between the 95th percentile and 5 mmHg above the 99th percentile.

Stage 2 HTN – Systolic and/or diastolic BP ≥99th percentile plus 5 mmHg.

BP centiles depend on age, gender and height

Blood pressure levels for boys by age and height percentile

Age (year)	BP (percentile)	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		Percentile of height							Percentile of height						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
1	50th	80	81	83	85	87	88	89	34	35	36	37	38	39	39
	90th	94	95	97	99	100	102	103	49	50	51	52	53	53	54
	95th	98	99	101	103	104	106	106	54	54	55	56	57	58	58
	99th	105	106	108	110	112	113	114	61	62	63	64	65	66	66
2	50th	84	85	87	88	90	92	92	39	40	41	42	43	44	44
	90th	97	99	100	102	104	105	106	54	55	56	57	58	58	59
	95th	101	102	104	106	108	109	110	59	59	60	61	62	63	63
	99th	109	110	111	113	115	117	117	66	67	68	69	70	71	71
3	50th	86	87	89	91	93	94	95	44	44	45	46	47	48	48
	90th	100	101	103	105	107	108	109	59	59	60	61	62	63	63
	95th	104	105	107	109	110	112	113	63	63	64	65	66	67	67
	99th	111	112	114	116	118	119	120	71	71	72	73	74	75	75
4	50th	88	89	91	93	95	96	97	47	48	49	50	51	51	52
	90th	102	103	105	107	109	110	111	62	63	64	65	66	66	67
	95th	106	107	109	111	112	114	115	66	67	68	69	70	71	71
	99th	113	114	116	118	120	121	122	74	75	76	77	78	78	79
5	50th	90	91	93	95	96	98	98	50	51	52	53	54	55	55
	90th	104	105	106	108	110	111	112	65	66	67	68	69	69	70
	95th	108	109	110	112	114	115	116	69	70	71	72	73	74	74
	99th	115	116	118	120	121	123	123	77	78	79	80	81	81	82
6	50th	91	92	94	96	98	99	100	53	53	54	55	56	57	57
	90th	105	106	108	110	111	113	113	68	68	69	70	71	72	72
	95th	109	110	112	114	115	117	117	72	72	73	74	75	76	76
	99th	116	117	119	121	123	124	125	80	80	81	82	83	84	84
7	50th	92	94	95	97	99	100	101	55	55	56	57	58	59	59
	90th	106	107	109	111	113	114	115	70	70	71	72	73	74	74
	95th	110	111	113	115	117	118	119	74	74	75	76	77	78	78
	99th	117	118	120	122	124	125	126	82	82	83	84	85	86	86
8	50th	94	95	97	99	100	102	102	56	57	58	59	60	60	61
	90th	107	109	110	112	114	115	116	71	72	72	73	74	75	76
	95th	111	112	114	116	118	119	120	75	76	77	78	79	79	80
	99th	119	120	122	123	125	127	127	83	84	85	86	87	87	88
9	50th	95	96	98	100	102	103	104	57	58	59	60	61	61	62
	90th	109	110	112	114	115	117	118	72	73	74	75	76	76	77
	95th	113	114	116	118	119	121	121	76	77	78	79	80	81	81
	99th	120	121	123	125	127	128	129	84	85	86	87	88	88	89
10	50th	97	98	100	102	103	105	106	58	59	60	61	61	62	63
	90th	111	112	114	115	117	119	119	73	73	74	75	76	77	78
	95th	115	116	117	119	121	122	123	77	78	79	80	81	81	82
	99th	122	123	125	127	128	130	130	85	86	86	88	88	89	90
11	50th	99	100	102	104	105	107	107	59	59	60	61	62	63	63
	90th	113	114	115	117	119	120	121	74	74	75	76	77	78	78
	95th	117	118	119	121	123	124	125	78	78	79	80	81	82	82
	99th	124	125	127	129	130	132	132	86	86	87	88	89	90	90
12	50th	101	102	104	106	108	109	110	59	60	61	62	63	63	64
	90th	115	116	118	120	121	123	123	74	75	75	76	77	78	79
	95th	119	120	122	123	125	127	127	78	79	80	81	82	82	83
	99th	126	127	129	131	133	134	135	86	87	88	89	90	90	91
13	50th	104	105	106	108	110	111	111	60	60	61	62	63	64	64
	90th	117	118	120	122	124	125	126	75	75	76	77	78	79	79
	95th	121	122	124	126	128	129	130	79	79	80	81	82	83	83
	99th	128	130	131	133	135	136	137	87	87	88	89	90	91	91
14	50th	106	107	109	111	113	114	115	60	61	62	63	64	65	65
	90th	120	121	123	125	126	128	128	75	76	77	78	79	79	80
	95th	124	125	127	128	130	132	132	80	80	81	82	83	84	84
	99th	131	132	134	136	138	139	140	87	88	89	90	91	92	92
15	50th	109	110	112	113	115	117	117	61	62	63	64	65	66	66
	90th	122	124	125	127	129	130	131	76	77	78	79	80	80	81
	95th	126	127	129	131	133	134	135	81	81	82	83	84	85	85
	99th	134	135	136	138	140	142	142	88	89	90	91	92	93	93
16	50th	111	112	114	116	118	119	120	63	63	64	65	66	67	67
	90th	125	126	128	130	131	133	134	78	78	79	80	81	82	82
	95th	129	130	132	134	135	137	137	82	83	83	84	85	86	87
	99th	136	137	139	141	143	144	145	90	90	91	92	93	94	94
17	50th	114	115	116	118	120	121	122	65	66	66	67	68	69	70
	90th	127	128	130	132	134	135	136	80	80	81	82	83	84	84
	95th	131	132	134	136	138	139	140	84	85	86	87	87	88	89
	99th	139	140	141	143	145	146	147	92	93	93	94	95	96	97

The 90th percentile is 1.28 standard deviation, 95th percentile is 1.645 standard deviation, and the 99th percentile is 2.326 over the mean.

BP: blood pressure.

From: the Fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. National Heart, Lung and Blood Institute. National Institutes of Health. May 2004.

Blood pressure levels for girls by age and height percentile

Age (year)	BP (percentile)	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		Percentile of height							Percentile of height						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
1	50th	83	84	85	86	88	89	90	38	39	39	40	41	41	42
	90th	97	97	98	100	101	102	103	52	53	53	54	55	55	56
	95th	100	101	102	104	105	106	107	56	57	57	58	59	59	60
	99th	108	108	109	111	112	113	114	64	64	65	65	66	67	67
2	50th	85	85	87	88	89	91	91	43	44	44	45	46	46	47
	90th	98	99	100	101	103	104	105	57	58	58	59	60	61	61
	95th	102	103	104	105	107	108	109	61	62	62	63	64	65	65
	99th	109	110	111	112	114	115	116	69	69	70	70	71	72	72
3	50th	86	87	88	89	91	92	93	47	48	48	49	50	50	51
	90th	100	100	102	103	104	106	106	61	62	62	63	64	64	65
	95th	104	104	105	107	108	109	110	65	66	66	67	68	68	69
	99th	111	111	113	114	115	116	117	73	73	74	74	75	76	76
4	50th	88	88	90	91	92	94	94	50	50	51	52	52	53	54
	90th	101	102	103	104	106	107	108	64	64	65	66	67	67	68
	95th	105	106	107	108	110	111	112	68	68	69	70	71	71	72
	99th	112	113	114	115	117	118	119	76	76	76	77	78	79	79
5	50th	89	90	91	93	94	95	96	52	53	53	54	55	55	56
	90th	103	103	105	106	107	109	109	66	67	67	68	69	69	70
	95th	107	107	108	110	111	112	113	70	71	71	72	73	73	74
	99th	114	114	116	117	118	120	120	78	78	79	79	80	81	81
6	50th	91	92	93	94	96	97	98	54	54	55	56	56	57	58
	90th	104	105	106	108	109	110	111	68	68	69	70	70	71	72
	95th	108	109	110	111	113	114	115	72	72	73	74	74	75	76
	99th	115	116	117	119	120	121	122	80	80	80	81	82	83	83
7	50th	93	93	95	96	97	99	99	55	56	56	57	58	58	59
	90th	106	107	108	109	111	112	113	69	70	70	71	72	72	73
	95th	110	111	112	113	115	116	116	73	74	74	75	76	76	77
	99th	117	118	119	120	122	123	124	81	81	82	82	83	84	84
8	50th	95	95	96	98	99	100	101	57	57	57	58	59	60	60
	90th	108	109	110	111	113	114	114	71	71	71	72	73	74	74
	95th	112	112	114	115	116	118	118	75	75	75	76	77	78	78
	99th	119	120	121	122	123	125	125	82	82	83	83	84	85	86
9	50th	96	97	98	100	101	102	103	58	58	58	59	60	61	61
	90th	110	110	112	113	114	116	116	72	72	72	73	74	75	75
	95th	114	114	115	117	118	119	120	76	76	76	77	78	79	79
	99th	121	121	123	124	125	127	127	83	83	84	84	85	86	87
10	50th	98	99	100	102	103	104	105	59	59	59	60	61	62	62
	90th	112	112	114	115	116	118	118	73	73	73	74	75	76	76
	95th	116	116	117	119	120	121	122	77	77	77	78	79	80	80
	99th	123	123	125	126	127	129	129	84	84	85	86	86	87	88
11	50th	100	101	102	103	105	106	107	60	60	60	61	62	63	63
	90th	114	114	116	117	118	119	120	74	74	74	75	76	77	77
	95th	118	118	119	121	122	123	124	78	78	78	79	80	81	81
	99th	125	125	126	128	129	130	131	85	85	86	87	87	88	89
12	50th	102	103	104	105	107	108	109	61	61	61	62	63	64	64
	90th	116	116	117	119	120	121	122	75	75	75	76	77	78	78
	95th	119	120	121	123	124	125	126	79	79	79	80	81	82	82
	99th	127	127	128	130	131	132	133	86	86	87	88	88	89	90
13	50th	104	105	106	107	109	110	110	62	62	62	63	64	65	65
	90th	117	118	119	121	122	123	124	76	76	76	77	78	79	79
	95th	121	122	123	124	126	127	128	80	80	80	81	82	83	83
	99th	128	129	130	132	133	134	135	87	87	88	89	89	90	91
14	50th	106	106	107	109	110	111	112	63	63	63	64	65	66	66
	90th	119	120	121	122	124	125	125	77	77	77	78	79	80	80
	95th	123	123	125	126	127	129	129	81	81	81	82	83	84	84
	99th	130	131	132	133	135	136	136	88	88	89	90	90	91	92
15	50th	107	108	109	110	111	113	113	64	64	64	65	66	67	67
	90th	120	121	122	123	125	126	127	78	78	78	79	80	81	81
	95th	124	125	126	127	129	130	131	82	82	82	83	84	85	85
	99th	131	132	133	134	136	137	138	89	89	90	91	91	92	93
16	50th	108	108	110	111	112	114	114	64	64	65	66	66	67	68
	90th	121	122	123	124	126	127	128	78	78	79	80	81	81	82
	95th	125	126	127	128	130	131	132	82	82	83	84	85	85	86
	99th	132	133	134	135	137	138	139	90	90	90	91	92	93	93
17	50th	108	109	110	111	113	114	115	64	65	65	66	67	67	68
	90th	122	122	123	125	126	127	128	78	79	79	80	81	81	82
	95th	125	126	127	129	130	131	132	82	83	83	84	85	85	86
	99th	133	133	134	136	137	138	139	90	90	91	91	92	93	93

The 90th percentile is 1.28 standard deviation, 95th percentile is 1.645 standard deviation, and the 99th percentile is 2.326 over the mean.

BP: blood pressure.

From: the Fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. National Heart, Lung and Blood Institute. National Institutes of Health. May 2004.

THANK YOU

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