

Bilateral adrenal vein sampling

HOSP #	Mr JB	WARD	Endocrine Department – CathLab – UCT private Hospital
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Abnormal Result

Upon authorizing blood results I came across a aldosterone result of 23300 pmol/L.

After a moment of brief anxiety, luckily I realized this was part of a series of tests performed by my colleagues in the Department.

Presenting Complaint

Medical complaint: Suspected Conn's disease – right adrenal lesion/ irregular left adrenal gland.

History

The patient was confirmed to have primary hyperaldosteronism.

Unfortunately more information is not known. We were asked to assist with the sampling and the whole history weren't available.

Examination

Not available

Laboratory Investigations

Sample	Time	Episode	Aldosterone result pmol/L	Cortisol result nmol/L	Selectivity Index: Cortisol AV/PV	ACR A/C	Lateralisation Index: Dom A/C : nonDom A/C	Mean Aldo/Cort RAV	Aldo/Cort LAV
RAV 1	12:23	SA04663261	794	429	0.9	1.9			
RAV 2	12:39	SA04663254	887	520	1.1	1.7			
RAV 3	12:55	SA04663243	771	486	1.0	1.6			
Mean RAV			817.3	478.3	1.0				
LAV 1	12:50	SA04663243	22000	7325	15.3	3.0	1.8		3.0
LAV 2	12:51	SA04663239	23300	8449	17.6	2.8	1.6		2.8
LAV 3	12:51	SA04663234	17900	11550	24.1	1.5	0.9		1.5
Mean LAV			21066.7	9108	19.0		1.4	1.7	2.3
PIVC 1	12:53	SA04663214	865	480	1.0	1.8			
Peripheral 1	11:56	SA04663228	331	146	0.3	2.3			
Peripheral 2	12:35	SA04663189	850	518	1.1	1.6			
Key:									
RAV	Right Adrenal Vein				Mean peripheral				
LAV	Left Adrenal Vein				Aldosterone	865			
PIVC	Peripheral Inferior Vena Cava				Cortisol	480			
PFEM	Peripheral Femoral Vein								
UTC	Unable to calculate								
*	Not assayed in dilution								
AV/PV	Adrenal Vein to Peripheral Vein Ratio								
ACR	Adrenal to Cortisol Ratio								

Table 1 – Results and calculations done in Excel.

Other Investigations

Not available for this patient.

Ideally one would need a CT with contrast beforehand to adequately visualize the positions of the adrenal veins, as this may aid in the cannulation, especially of the right adrenal vein.

One needs to diagnose hyperaldosteronism (by an appropriate salt loading test) before proceeding to bilateral adrenal vein sampling.

Final Diagnosis

Interpretation

Definition	Formula	Clinical significance
Selectivity index	$\frac{\text{PCC}(\text{side})}{\text{PCC}(\text{ivc})}$	<p>>cutoff confirms cannulation of adrenal vein</p> <p>>3 stimulated >2 unstimulated</p>

Lateralization index	PAC/PCC (dom) : PAC/PCC (non-dom)	>cutoff confirms laterilization of hyperaldo secretion >4 stimulated >2 unstimulated
Contralateral suppression index (used if inadequate canulation)	PAC/PCC (non-dom) : PAC/PCC (ivc)	<cutoff (<1 or <0.5 – sources differ) indicate ipsilateral suppression and suggest contralateral aldosterone overproduction.

Table 1 – Interpretation of bilateral adrenal vein sampling. PCC: plasma cortisol concentration, PAC: plasma aldosterone concentration, ivc: inferior vena cava or peripheral vein, dom: dominant side, non-dom: non-dominant side.

Selectivity index

Right: 1.0 (mean)

Left: 19.0 (mean)

These two results indicate that the left adrenal has been canulated adequately, but the right vein inadequately.

Lateralization index

Unable to comment because of the inadequate canulation of the right adrenal vein. If determined, it would very likely provide a false result.

Contralateral suppression index

1.5 : 1.8 = 0.8

This falls in between some of the referenced cutoffs (<1 and <0.5)

All of the other samples also fall somewhere in this range. Biochemically, these results suggests inadequate right sided venous sampling (a commonly described problem)

Take Home Message

- Procedure is done in the Cath Lab
- The patient received continuous synacthen infusion – as this improves the sensitivity (or perhaps rather specificity) of the test.
- Done under imaging with contrast used for the localisation of the adrenal gland and adrenal vein
- Sequential sampling technique used, generally > 20 mins infusion
- Multi-disciplinary: nurses, anaesthetist, radiographer, intervention radiologists, students, chemical pathologists
- Difficulty with sampling right side for both patients
- Difficulty with interpreting results – most likely due to inadequate cannulation of the right adrenal vein

Some important learning points

1. Adrenal vein sampling may be a valuable tool that is underutilised
2. Careful selection of patients essential – also patient should consent to surgical removal of the affected adrenal before this invasive procedure is initiated
3. Inter-disciplinary approach is necessary
4. Obtaining cosyntroponin (aka synacthen) can be difficult (Section 21), but recommended.
5. Right adrenal access difficult: may require specific imaging. Recommended to start on the right or do simultaneous sampling.
6. Adrenalectomy may be curative or help achieve better control of BP thus decrease associated morbidity and mortality in those with unilateral adenoma

A likely case of thyrotoxic periodic paralysis

Patient presented with a few isolated episodes of muscle weakness. This progressed from 2 weeks before, during the index episode, to become so severe that he couldn't walk.