Adrenal Vein Sampling - Full Clinical Guideline – Derby Sites Only

Reference No: CHISCG3

THIS TEST IS ONLY TO BE PERFORMED FOLLOWING DISCUSSION WITH A CONSULTANT BIOCHEMIST AND ENDOCRINOLOGIST

1. Introduction

Samples of blood can be collected from the right and left adrenal vein by inserting a catheter into the adrenal vein via the femoral vein.

2. Guideline

INDICATIONS

Investigation of patients with biochemically proven primary hyperaldosteronism with at least one confirmatory test in which adrenal surgery is being considered. Adrenal venous sampling provides evidence of lateralisation and differentiates aldosterone producing adenoma from bilateral adrenal hyperplasia.

CONTRAINDICATIONS

This is an invasive procedure only to be carried out by a Radiologist.

SIDE EFFECTS

Small risk of bleeding, renal and adrenal vein thrombosis, infarction of the adrenal gland and accelerated hypertension that means the procedure needs to be abandoned. Patient should be consented by Endocrinology team prior to referral for procedure. Consent must be confirmed by Radiologist on day of procedure. Patient should be informed of the possibility of failure to cannulate the adrenal vein and resultant failure to give definite diagnostic information. There is a 5-10% risk of rupture of the adrenal vein. If this occurs the patient is likely to experience significant pain and will need to stay in hospital overnight.

PREPARATION

Planning

Prior to a request being made to the radiology department for adrenal venous sampling the Endocrinology team need to confirm that the risks and benefits of adrenalectomy are explained to the patient and the patient wishes to be considered for surgery. It is worth noting that normalization of hyperaldosteronism after adrenalectomy is seen in most cases, but this does not always lead to normalization of the BP. Only ~70% of adrenalectomy patients get a significant reduction of BP and/or number of antihypertensive medications.

Patients wishing to pursue adrenalectomy should undergo a dexamethasone suppression test and undergo CT/MRI adrenal venous mapping prior to referral for Adrenal venous sampling. The patient should be given the patient information sheet about adrenal venous sampling to be informed about the risk and benefits.

A request should be made to the radiology department for the procedure. When the date is known, the patient should be booked into EPU and arrangements made in advance of the procedure for a member of the laboratory staff to be available during the procedure (email or call the duty biochemist on ext 89383 in advance when the date of the procedure is known). The laboratory staff member is required to handle the samples while they are being collected (the environment risks exposure to X-ray radiation). Additionally, a member of the endocrinology team (SpR or Consultant) needs to be available for clerking the patient on EPU and dealing with any complications.

The procedure can take place in the morning or afternoon. However, it should be noted that it can take several hours to complete and a start time after 2pm should be avoided. When a convenient date/time is decided, a bed should be booked for the patient.

Patient

The Endocrinology team are responsible for ensuring proper management of medication in advance of test. Spironolactone must be discontinued 6 weeks before the procedure. Eplenerone, Amiloride and high dose diuretics should be stopped two weeks beforehand. The patient is to be rendered normokalaemic by use of potassium supplements.

Alpha-adrenoreceptor blockers and calcium channel blockers negligibly affect results and can be continued. ACE inhibitors, A-II-blockers, beta-blockers and diuretics all have the potential to influence results but the test is likely to be interpretable if renin is fully suppressed whilst on these medications and a pragmatic approach is required to allow an acceptable combination of medication and blood pressure control leading into the test and to reduce the risk of accelerated hypertension during the test.

Acceptable results from recent U&E and FBC are mandatory. Patients must not be on anticoagulants. In patients stopping warfarin for the procedure, INR must be less than 1.4. Clopidogrel & DOAC's/NOAC's must be omitted for usually 1 week before the test unless otherwise advised by the interventional radiology team.

Patient needs to be able to lie flat and still for a prolonged period during the procedure. They do not need to be fasted (a light early breakfast or light early lunch is acceptable).

Equipment

- Blood collection tubes: minimum 3 SST tubes (gold top) and 4 EDTA tubes (purple top)
- Marker pen, request form, protective gloves

PROCEDURE

- The patient should be clerked by the Endocrinology team
- Thirty minutes before procedure (exact timing not critical) an intravenous tetracosactide (Synacthen) infusion will be started at 50 micrograms per hour (250 micrograms synacthen diluted in 0.9% saline to 50 ml and infused at 10 ml per hour). The infusion will be continued until all samples drawn. Synacthen is to be prescribed by endocrinology team and the ward pharmacist needs to be contacted in advance to ensure it can be supplied to the ward.
- Procedure is carried out in X-ray. Once the catheter is in-situ and blood has been drawn, transfer to the appropriate tubes as listed below, minimum volume of blood 3 mL each. Record the site of the catheter on the tubes, (eg, right adrenal vein 1), mix specimen tube

gently. The renin sample must be processed by the laboratory within 15 minutes of venepuncture **(it is therefore useful if the peripheral sample is the last sample to be collected)**. Samples taken from the adrenal veins for aldosterone and cortisol can be kept together until the end of the procedure and then taken directly to the laboratory. **Do not place samples on ice.**

Three specimens are generally collected from each sampled vein. Separate catheters are commonly used for each site - but in close time sequence. Laboratory staff need to be prepared in case multiple veins form each side need to be sampled:

- **Right adrenal vein** - cortisol & aldosterone (1 purple top & 1 gold top per vein sampled)
- **Left adrenal vein** - cortisol & aldosterone (1 purple top & 1 gold top per vein sampled)
- **Peripheral (eg external iliac)** - cortisol, aldosterone, renin and U&E (1 purple top & 1 gold top only)

(Laboratory action - Centrifuge samples at room temperature, separate and freeze samples for aldosterone and renin at -20^{o}C. The site of the blood collection should be recorded on the frozen aliquots).

NOTE: For interpretation, absolute values are required for cortisol and aldosterone. The clinical scientist in attendance at the procedure should ensure that absolute values are provided (i.e. no greater than (>) levels). Once the absolute cortisol levels are known, a phone call to the aldosterone/renin referral lab should help them know any appropriate dilution factor and speed up the reporting of these results.

INTERPRETATION

Calculations

Adequate adrenal vein cannulation is confirmed by:

Selectivity Index (SI) = Ratio of (adrenal vein cortisol / peripheral vein cortisol)

- SI >4 indicates successful cannulation of an adrenal vein under ACTH stimulation.
- SI >2 indicates successful cannulation of an adrenal vein not under ACTH stimulation.
- SI <2 indicates that cannulation has been unsuccessful and so lateralisation cannot be performed for that vein.
    - Where cannulation is unsuccessful then comparing the aldosterone/cortisol ratio between the successful canulated vein and the peripheral sample can aid diagnosis
        - (Cannulated adrenal vein (Aldosterone / Cortisol)) / (Peripheral vein (Aldosterone / Cortisol))
            - If <0.5 suggests non-cannulated adrenal side is dominant.

Lateralisation index (LI) is calculated by comparing Aldosterone/Cortisol ratios for both adrenal veins.

LI = (Dominant Adrenal (Aldosterone / Cortisol)) / (Nondominant Adrenal (Aldosterone / Cortisol)).

Interpretation of Lateralisation Index

- LI >2 indicates a dominant side for aldosterone secreting adenoma/hyperplasia

- LI >4 indicates a dominant side for aldosterone secreting adenoma/hyperplasia where adrenalectomy is more likely to be successful

In cases where there is failure to cannulate the adrenal vein of a unilateral adrenal adenoma seen on CT/MRI, then significant aldosterone suppression of the contralateral adrenal gland provides a >90% confidence that the lesion is unilateral.

Intermediate values to be decided on a case-by-case basis. Radiological findings should be considered in these cases alongside age, family history, degree of hypertension and hypokalaemia.

* Low cortisol in adrenal vein may be seen in contralateral autonomous cortisol secretion- which is why pre-procedure Dexamethasone Suppression test are always indicated.

ASSAYING LABORATORY

Renin and Aldosterone are analysed at Royal Victoria Infirmary, Newcastle-upon-Tyne
Cortisol is analysed at Royal Derby Hospital.

TURNAROUND TIME

Results are normally available within three weeks.

3. Documentation Controls

<table>
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Final</td><td>Authors:
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Consultant Endocrinologist (Antonia Ugur)</td></tr>
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