Utility of using only left-sided adrenal vein sampling data in lateralizing primary aldosteronism

W Brandon, H Carmichael, B Launer, RC McIntyre Jr., L Fishbein, MB Albuja-Cruz, PS Trivedi, CD Raeburn
University of Colorado School of Medicine, Aurora, CO

Background

- Primary Aldosteronism (PA) is hypersecretion of aldosterone from unilateral adrenal adenomas or bilateral hyperplasia.
- Adrenal vein sampling (AVS) is a procedure in which aldosterone and cortisol are sampled from each adrenal gland and the IVC.
- AVS is the gold standard diagnosis, however it is technically challenging.
- Failure rates have been reported to be as high as 50% at some facilities.
- Difficulty cannulating the right adrenal vein with its anatomic variations and angulating course is largely to blame for high failure rates.
- It has been hypothesized that left adrenal vein (LAV) and IVC data can predict laterality by comparing aldosterone/cortisol ratios.
- Previous groups reported LAV/IVC aldosterone/cortisol ratios of >5.5 and <0.5 accurately predicted left- and right-sided disease, respectively.
- We hypothesize that these cutoffs can accurately predict laterality at our institution.

Results

- AVS was successful on first attempt in 60 patients (89.6%) with 7 patients undergoing successful repeat AVS.
- Based on assessment of complete AVS data, 48 patients (71.6%) had unilateral and 19 (28.4%) had bilateral disease.
- If only the LAV/IVC data were utilized (Figure 1), the upper cutoff (>5.5) was 100% specific (100% PPV) for correctly predicting left lateralization; however, the sensitivity was only 14% (3 of 21 patients met the > 5.5 cutoff).
- The lower (<0.5) LAV/IVC cutoff was only 90% specific (85% PPV) and would have resulted in 4 out of 19 patients in the bilateral cohort being incorrectly identified as lateralizing to the right.
- Lowering the LAV/IVC cutoff to <0.1 resulted in 100% specificity/PPV for both high and low cutoffs, but would have resulted in 33/48 patients with unilateral disease having inconclusive results.
- This would still allow for ~22% (15/67) of patients to avoid repeat AVS if these guidelines were followed.

Conclusion

- Published LAV/IVC “5.5-0.5” criteria would have correctly predicted laterality in 26/48 (54%) of our patients with unilateral disease, but would have incorrectly predicted unilateral disease in 4/19 (21%) patients with bilateral disease, leading to unnecessary surgery.
- Adjusting the LAV/IVC criteria to "5.5-0.1" achieved 100% PPV but limited the utility, as only ~20% of AVS patients would meet the criteria.
- Thus, the LAV/IVC ratio may be useful in guiding management of PA in select patients with unsuccessful AVS; however, the decision of whether to repeat AVS versus proceed to surgery should be based on careful discussion between surgeon and patient.

Methods

- Retrospective review was performed on all patients undergoing AVS at our institution from 2012-2019 (n=67).
- AVS was performed with ACTH stimulation, adrenal veins were cannulated sequentially with a selectivity index (AV/IVC cortisol level) > 5 defined successful cannulation.
- Only patients with complete AVS data were included.
- A lateralization index (high-side aldosterone/cortisol over low-side aldosterone/cortisol) > 4 defined unilateral disease.
- Results were then analyzed as if the RAV data was unavailable, utilizing only the LAV/IVC “5.5-0.5” criteria to predict laterality.

Figure 1. Analysis of LAV/IVC aldosterone/cortisol “5.5-0.5 Rule”

References