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Article

Test Characteristics of Electrocardiography for Detection of Left Ventricular Hypertrophy in Asymptomatic Emergency Department Patients With Hypertension.
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Clinical Question

If a patient has asymptomatic hypertension while in the ED, can an EKG be used as a screening tool for LVH?

Study Type

Subanalysis of a larger prospective cohort study on patients with hypertension

Methods

1. Is the patient: over 35, have 2 BP readings 1 hr apart with SBP>140 or DBP >90, and are they at the ED for a non-chest pain or non-dyspnea complaint?, If “yes” to all, continue to next inclusion criteria
2. Does the patient have a history of: HF, CAD, cardiomyopathy, renal failure, or valvular disease? If “no” to all, continue to next inclusion criteria
3. Does the patient have a complaint of: exertional dyspnea or PND? If “no” to both, enroll the patient in the trial
4. Obtain an EKG, give it to the principle investigator who will mark where the EKG (QRS complexes, R waves, S waves, etc) should be measured. Then, have 2 blinded subinvestigators perform the necessary measurements using the same ruler.
5. Using the Cornell Voltage, Cornell Product, and the Minnesota Code EKG LVH criteria, compare the measurements taken and see if there are any criteria met for LVH.
6. Perform an echocardiogram on the patient, assess if patient meets criteria for LVH: interventricular septal or posterior wall thickness $\geq 1.3\text{cm}$, LV mass $\geq 225\text{g}$ (male) or $\geq 163\text{g}$ (female), or LV mass indexed to height raised to the power of $2.7 \geq 48\text{g}/\text{m}^{2.7}$ (male) or $\geq 45\text{g}/\text{m}^{2.7}$ (female).

Results

A total of 161 patients were included in this study. Of those, 89 had LVH according to the echocardiography criteria. The 3 different LVH EKG criteria had the following Sensitivity/Specificity for identifying patients that actually had LVH:

Cornell Voltage 25.4%/50%; Cornell Product 25.4%/75%; Minnesota Code 26.9%/75%.

These data were calculated using a logistic regression model. The c-statistic (which is essentially the area under the curve) barely improved the two Cornell criteria when BMI and BNP were added to their logistic regression models.

Study Limitations/Issues

This study has a few limitations that makes it difficult to apply and use, as they admit in the article. First of all, this was done in a single, urban ED. Although this Detroit hospital sees about as many patients as MVH does each year, it has a specific population that may have a different make-up than the patients I see at Kettering, Sycamore, and Good Samaritan. Second, the racial make-up of the patients was extremely skewed with 151 being black and 6 being white. Certainly this would be invaluable for my African American patients had the study demonstrated a useful tool, but would have had poor utility in Caucasian, Latino, and Asian patients. Third, the inclusion criteria required the patients to self-report certain symptoms and histories that may be difficult both to understand and remember, such as exertional or nocturnal dyspnea. Finally, as the study states, only 3 out of many ECG LVH criteria were used, and I do not use any of those 3 regularly. From experience, I tend to use (and see used) the Sokolow-Lyon rule (S in V1+R in V5 or V6). There are others that exist as well.

Discussion

Although it would rarely change the management of what I do in the ED, if I could tell a patient that his or her HTN was causing dangerous damage to the heart using a simple EKG, it might be beneficial. Unfortunately, with sensitivities of about 25%, there is little value in just getting an EKG to check for LVH. The Minnesota Code and Cornell Product criteria had decent specificity, so if an EKG shows LVH and is performed on a patient with HTN, it might be helpful for telling a patient to follow-up with a PCP to explore this finding further. Overall, from this article I can say that if a patient comes in for a laceration or a sprained ankle and has HTN throughout the visit, I would not get an EKG simply for the purpose of checking for LVH.
