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Poor sensitivity of multiple-gated blood-pool imaging in diagnosing left ventricular aneurysms

A P ALLEN, I PEART, D N TAYLOR, B R CONDON, B C OGILVIE, J W FRANK, H SUTTON, D M ACKERY

Abstract

A study was carried out to determine the accuracy of multiple-gated blood-pool imaging in diagnosing left ventricular aneurysm. Fifteen patients with an aneurysm and 17 with left ventricular hypokinesia were studied by contrast ventriculography and multiple-gated blood-pool imaging. The results of blood-pool imaging were examined blind by five independent observers, the results of contrast ventriculography being used as the standard. The mean sensitivity of the procedure was 56%, the specificity 61%, and diagnostic accuracy 59%.

These results indicate that contrast ventriculography remains the best method for diagnosing left ventricular aneurysms. Moreover, ventriculography provides additional information—for example, on wall thickness—not provided by multiple-gated blood-pool imaging.

Southampton General Hospital, Southampton SO9 4XY
A P ALLEN, MB, BS, senior house officer in nuclear medicine and cardiology
I PEART, MB, MRCP, registrar in cardiology
D N TAYLOR, BTECH, PHD, senior physicist
B R CONDON, BSC, MSC, physicist
B C OGILVIE, MRCP, FRCR, consultant radiologist
J W FRANK, MSC, FRCR, consultant radiologist
H SUTTON, MB, MS, senior registrar in nuclear medicine
D M ACKERY, MB, MSC, consultant in nuclear medicine

Introduction

Ischaemic heart disease may be associated with global left ventricular hypokinesia (left ventricular "bag") or localised impairment of motion of the ventricular wall (an aneurysm). Differentiation between these two conditions is important as a patient with an aneurysm may benefit from cardiac surgery. Such differentiation cannot be done clinically,[1 2] and at present contract ventriculography performed at cardiac catheterisation is the only method that will reliably distinguish the two conditions. This procedure has a small but important morbidity and mortality, so in recent years non-invasive radionuclide techniques have been examined as alternatives. It is important to determine whether radionuclide dynamic imaging is as successful as conventional contrast ventriculography in distinguishing between left ventricular aneurysms and left ventricular bags. This study was designed to evaluate the use of equilibrium radionuclide blood-pool imaging in making this distinction.

Patients, methods, and results

Thirty-two patients underwent contrast ventriculography in the right anterior oblique position and multiple-gated blood-pool imaging in both the right and left anterior oblique positions. Only patients with either an aneurysm (15) or a left ventricular bag (17) were included. In each case the result of multiple-gated blood-pool imaging was examined by five independent observers (with no knowledge of the result of contrast ventriculography) and classified as "aneurysm" or "not aneurysm." An aneurysm was defined as a region of akinesia or dyskinesia with good function in the remainder of the left ventricle. Diagnostic accuracy was defined as the percentage of patients correctly identified using contrast ventriculography as the standard. The table shows the results of the study for each observer.

Sensitivity, specificity, and diagnostic accuracy of multiple-gated blood-pool imaging for each of five observers

Observer	Sensitivity (%)	Specificity (%)	Diagnostic accuracy (%)
1	40	55	50
2	58	62	59
3	60	64	63
4	60	59	59
5	60	64	63
Mean	56	61	59

Discussion

These results show that multiple-gated blood-pool imaging achieved a low diagnostic accuracy. This was common to all five observers, even though only two diagnoses were possible, which ruled out the possibility of appreciable observer error. In one of two cases when all observers were in agreement their interpretation was incorrect.

These results may possibly reflect poor technique, but we think this unlikely since we paid scrupulous attention to optimisation of factors such as the choice of collimator, the orientation of the camera, counting statistics, subtraction of background, correction for arrhythmias, and matrix filtering. An analysis of regional wall motion using this radionuclide method[3] showed that motion of the basal segments of the left ventricle could not be assessed as accurately as motion of the distal segments.

We conclude that multiple-gated blood-pool imaging cannot detect accurately the presence of a left ventricular aneurysm. A possible reason for this is that in the right anterior oblique position the overlapping right ventricular activity may mimic or obscure good basal left ventricular contraction, the recognition of which is essential for the diagnosis of an aneurysm.

These disappointing results do not support the accuracy reported for detection of left ventricular aneurysm, which has been as high as 96%.[4] The reason for this difference is not clear although patient selection and varying techniques may be partially responsible. One alternative technique measures the first pass of a bolus of activity through the ventricle using a multicrystal gamma camera.[5] This delineates the left ventricle without right ventricular overlap. This imaging device, however, is not widely available. In the future tomographic techniques using conventional gamma cameras may help to overcome the problem of right ventricular overlap. At present contrast ventriculography remains the best method for diagnosing left ventricular aneurysms; it also provides additional information on wall thickness, loss of normal trabecular pattern, and the presence of thrombus. These features may help in the specific diagnosis. Our study shows that multiple-gated blood pool imaging should not be used to screen patients for contrast ventriculography.

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A CUSTOM has long prevailed among phyſicians, of prognoſticating, as they call it, the patient's fate, or foretelling the iſſue of the diſeaſe. Vanity no doubt introduced this practice, and ſtill ſupports it, in ſpite of common ſenſe and ſafety of mankind. I have known a phyſician barbarous enough to boaſt, that he pronounced more *ſentences* than all his Majeſty's judges. Would to God that ſuch ſentences were not often equally fatal! It may indeed be alleged, that the doctor does not declare his opinion before the patient. So much the worſe. A ſenſible patient had better hear what the doctor ſays, than learn it from the diſconſolate looks, the watery eyes, and the broken whiſpers of thoſe about him. It ſeldom happens, when the doctor gives an unfavourable opinion, that it can be concealed from the patient. The very embarraſſment which the friends and attendants ſhew in diſguiſing what he has ſaid, is generally ſufficient to diſcover the truth.

KIND Heaven has, for the wiſeſt ends, concealed from mortals their fate; and we do not ſee what right any man has to announce the death of another, eſpecially if ſuch a declaration has a chance to kill him. Mankind are indeed very fond of prying into future events, and ſeldom fail to ſolicit the phyſician for his opinion. A doubtful anſwer, however, or one that may tend rather to encourage the hopes of the ſick, is ſurely the moſt ſafe. This conduct could neither hurt the patient nor the phyſician. Nothing tends more to deſtroy the credit of phyſic than thoſe bold prognoſticators, who, by the bye, are generally the moſt ignorant of the faculty. The miſtakes which daily happen in this way are ſo many ſtanding proofs of human vanity, and the weakneſs of ſcience.

WE readily admit, that there are caſes where the phyſician ought to give intimation of the patient's danger to ſome of his near connexions; though even this ought always to be done with the greateſt caution: but it never can be neceſſary in any caſe that the whole town and country ſhould know, immediately after the doctor has made his firſt viſit, *that he has no hopes of his patient's recovery*. Perſons whoſe impertinent curioſity leads them to queſtion the phyſician with regard to the fate of his patient, certainly deſerve no better than an evaſive anſwer.

THE vanity of foretelling the fate of the ſick is not peculiar to the faculty. Others follow their example, and thoſe who think themſelves wiſer than their neighbours often do much hurt in this way. Humanity ſurely calls upon every one to comfort the ſick, and not to add to their affliction by alarming their fears. A friend, or even a phyſician, may often do more good by a mild and ſympathizing behaviour than by medicine, and ſhould never neglect to adminiſter that greateſt of all cordials, HOPE.

NEXT to milk, we would recommend good light bread. Bread may be given to a child as ſoon as it ſhews an inclination to chew; and it may at all times be allowed as much plain bread as it will eat. The very chewing of bread will promote the cutting of the teeth, and the diſcharge of *ſaliva*, while, by mixing with the nurſe's milk in the ſtomach, it will afford an excellent nouriſhment. Children diſcover an early inclination to chew whatever is put into their hands. Parents obſerve the inclination, but generally miſtake the object. Inſtead of giving the child ſomething which may at once exerciſe its gums and afford it nouriſhment, they commonly put into its hands a piece of hard metal, or impenetrable coral. A cruſt of bread is the beſt gum-ſtick. It not only anſwers the purpoſe better than any thing elſe, but has the additional properties of nouriſhing the child and carrying the ſaliva down to the ſtomach, which is too valuable a liquor to be loſt.

(Buchan's *Domeſtic Medicine*, 1786.)