Correspondence

British Heart Journal, 1974, 36, 104-106.

Safety of coronary arteriography

Sir:

The Judkins technique of coronary arteriography has been the subject of review, comparison, and criticism since its introduction in 1966. The most recent criticism of this technique is by Petch, Sutton, and Jefferson (1973) who reviewed 400 coronary studies, 250 of which were via the Judkins technique. They describe their morbidity and mortality as follows: *Mortality* - 1.5 per cent total in 400 patients. All deaths occurred with the Judkins technique (6 in 248 patients or 2.4 per cent). *Morbidity* - 16.7 per cent (67/400) of which 14.1 per cent occurred with the Judkins technique (45/248) - includes 13 incomplete studies.

As the overwhelming number of their complications occurred with the Judkins technique, they concluded that, 'the safety of the Judkins technique (Green *et al.*, 1972) has been overestimated', and they reserve the Judkins technique for emergencies where speed is essential.

I would like to direct my remarks to three areas:

- 1) The mode of death discussed.
- 2) The safety of the Judkins technique.
- 3) Their recommendations.

The precipitating event which led to death in 4 of the 6 patients was acute hypotension when a left coronary catheter was manipulated in the aortic arch. I can only state that having been involved with several thousand coronary arteriograms I have never seen an isolated hypotensive episode occur purely because a catheter was manipulated in the aortic arch. The comment that the left coronary catheter, because of its angulation, may be a special hazard stimulating aortic baroreceptors is pure conjecture. Angulated catheters, similar to coronary catheters, are used to do cerebral arteriograms from the femoral approach and hypotension is not a problem when using these catheters. Additionally, catheters of varying shapes are used to enter selectively the aortocoronary bypass graft during postoperative examinations, and hypotension is not a problem in my experience with the examination nor has it been reported by others who have performed a large volume of postoperative coronary arteriograms. Factors other than the type of catheter used must be

involved. The type of premedication, the patient's state of hydration, and his electrolytes could all be contributing factors. Scopolamine, as a premedication, may be a special hazard as in therapeutic doses it has a definite central nervous system depressive effect; scopolamine also is reported to have less vagolytic activity than atropine (Goodman and Gilman, 1970).

I believe the authors erroneously conclude that the morbidity and mortality of angiography is related to the technique. Actually, the morbidity and mortality are related to the skill and ability of the angiographer. There is no one right way to perform a particular procedure. This is an oft forgotten fact. The Judkins and Sones techniques are very safe and satisfactory procedures if one is knowledgeable and skilled in either of these methods.

Coronary arteriography can be done safely with the Judkins technique. I have been associated with a cardiovascular laboratory at Good Samaritan Hospital in Portland, Oregon, where six different individuals perform arteriography. In the past 18 months we have performed 815 Judkins coronary arteriograms. During this period there have been no (0) deaths, 3 (0.37%) cardiac, and 4 (0.49%) femoral complications. The cardiac complications included 1 myocardial infarction and 2 episodes of ventricular fibrillation, both of which responded to electrical countershock. There were 2 femoral artery thromboses, 1 femoral artery laceration, and 1 false aneurysm. These results are even better than those originally reported (Green *et al.*, 1972). The patients studied encompassed the entire spectrum of coronary heart disease, i.e. stable angina, preinfarction (unstable) angina, ventricular aneurysms, as well as unexplained heart failure, unknown chest pain, and arrhythmias. Our figures prove that coronary arteriography can be done safely via the Judkins technique. Those individuals and cardiovascular laboratories with a morbidity and mortality that is unacceptable should stop functioning until they demonstrate technical improvement, i.e. further training, seeking expert consultation, etc.

Although the American Heart Association has outlined certain minimum standards for the performance of coronary arteriography, there is no

practical method of reviewing individuals or existing facilities. Attention should be directed toward this goal. This is the only way the complications can be reduced to the absolute minimum.

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References

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- Petch, M. C., Sutton, R., and Jefferson, K. E. (1973). Safety of coronary arteriography. *British Heart Journal*, **35**, 377.

Sir:

May I comment on the recent article in the *British Heart Journal*, **35**, 377, by Petch, Sutton, and Jefferson? The article is misleading. Virtually all the complications occurred using the Judkins technique and the mortality was 2.4 per cent (6 deaths in 248 investigations). This is higher than almost any other series and was due to a complication which is insignificant in most other material, that of fatal vasovagal syncope. In addition, the failure rate for the Judkins technique was 8 per cent (13 out of 174), much higher than that of other workers.

The questions that need to be asked are as follows: How many different people perform these investigations and with what experience of arterial techniques? Were steps taken to ensure adequate atropinization of the patients at the very first sign of vasovagal syndrome? Is a venous line always available, and is atropine in adequate doses drawn up ready for immediate administration?

It is hard to attribute such deaths uniquely to the technique of coronary arteriography when they occurred largely before coronary artery intubation.

This article gives a false impression both of the safety and the facility of the Judkins technique for coronary arteriography.

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These letters were shown to the authors of the paper who reply as follows.

Sir:

We are grateful to Drs. Green and Raphael for their comments on our paper and for this opportunity to reply. We fully appreciate the significance of our 4 fatal cases of vasovagal syncope and, while we agree that our explanation is speculative, these events occurred and we felt it our duty to report them. It was the purpose of our paper to draw attention to this complication, which we think may be due to the left Judkins catheter.

In answer to Dr. Raphael's specific questions the 13 incomplete studies with the Judkins technique were due to the following reasons:

- (1) Failure of the operator to engage the coronary ostium (5 patients).
- (2) Discontinuation of procedure for 'medical' reasons, such as excessive damping of the arterial pressure or cardiac pain when the coronary ostium was intubated (3 patients).
- (3) The presence of severe aortic valve disease, making it impossible to engage the coronary ostium (2 patients).
- (4) Early postoperative studies (2 weeks) where the coronary arteriography was incidental to the visualization of the vein graft when the graft was occluded (2 patients).
- (5) Failure to demonstrate a right coronary artery both at angiography and surgery (1 patient).

The great majority of investigations were performed by six operators, all of whom were fully experienced in left heart catheterization. In addition, we would like to emphasize that our patients who suffered vasovagal reactions deteriorated suddenly and unexpectedly, in skilled rather than unskilled hands. All patients were given atropine or scopolamine with their premedication and again if there was a bradycardia during the procedure. A venous line was always available and atropine was given promptly and freely during the resuscitation.

Since our paper was submitted we have performed a further 182 coronary arteriograms with no deaths and no cases of cardiac infarction. There have been 3 cases of ventricular fibrillation (2 Sones, 1 Judkins), 2 cerebrovascular accidents (1 Amplatz, 1 Judkins), and one episode of systemic hypotension (Judkins); arterial problems have again been more common with the Sones technique, and there have been no incomplete studies.

Fortunately we did not feel inclined to adopt Dr. Green's suggestion to 'stop functioning', but we did deliberately use the Sones technique in preference to the Judkins. Since our paper was written we have

modified our position slightly and we now use the Judkins technique not only in those cases where speed is essential, but also in those cases where the aortic root is severely distorted as in aortic valve disease.

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