DETECTION OF PERICARDIAL EFFUSION BY ECHOCARDIOGRAPHY

K. T. Singham
MRCP, FRACP

M. Anuar
MBBS, MRCP

M. Ariffin
ASMLT

Department of Medicine,
University Hospital,
Kuala Lumpur.

INTRODUCTION

OVER THE YEARS various methods have been employed for the detection of pericardial effusion. Of these, detection of pericardial fluid by ultrasound have been shown to have a high degree of accuracy (Feigenbaum *et al.,* 1965). The purpose of this paper is to review our experience at the University Hospital, Kuala Lumpur using this method for detection of pericardial fluid.

METHOD

All patients referred to the Echocardiographic Laboratory of the University Hospital for detection of pericardial effusion over an 18 month period ending March 1978 were studied. Echocardiographic recordings were performed using a Smith Kline Instruments, Ekoline 20A ultrasonoscope with a polaroid photographic recording system. A 1.5 cm diameter 2.25 MHz transducer prefocused at 10 cm and repetition rate of 1000 per second, permitting an examination of up to 20 cm tissue depth with excellent resolution was used. Simultaneous electrocardiographic recordings were obtained in all patients. The patients were examined in the supine or propped up position. The transducer was positioned in the 4th left intercostal space parasternally. Both anterior and posterior pericardial effusions were scanned for using the standard technique. False positive posterior pericardial effusions were excluded by scanning the posterior left atrial wall. A large pericardial effusion was defined by the finding of anterior pericardial fluid and at least 1 cm depth of posterior pericardial fluid; a moderate effusion showing only posterior fluid exceeding 1 cm in depth; and a small effusion less than 1 cm in depth of posterior pericardial fluid (Feigenbaum, 1976; Horowitz *et al.,* 1974). A total of 26 patients had technically satisfactory echocardiograms and these were used for the study.

FINDINGS

Eight patients were noted to have large pericardial effusions and were confirmed by pericardiocentesis or surgery. One of these patients who had 950 mls at pericardiocentesis has his echocardiogram illustrated. It demonstrates a small pericardial effusion between the chest wall and anterior right ventricular wall (Fig. 1) and a large posterior pericardial effusion measuring 2.25 cm in depth posteriorly (Fig. 2). In 8 patients moderate sized posterior

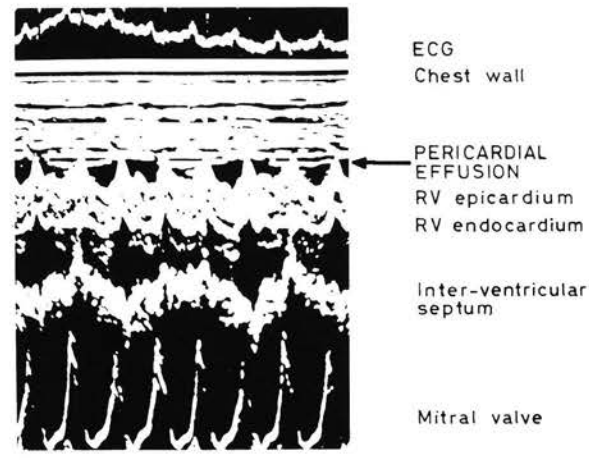

Figure 1
Anterior pericardial effusion
(RV = Right Ventricle)

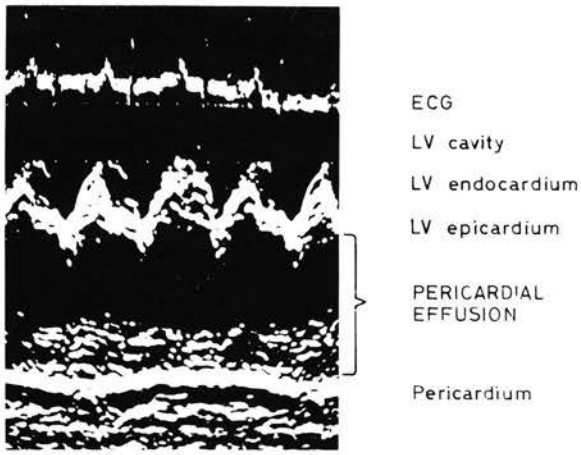

Figure 2
Posterior pericardial effusion
(LV = Left Ventricle)

pericardial effusions were present, while in the remaining 10 patients only small pericardial effusions were noted. No attempt has been made in this study to correlate echocardiographic findings with the quantity of fluid obtained at pericardiocentesis or surgery as these procedures were performed by the referring physicians at variable intervals after echocardiography. Hence, an attempt at quantitative correlation was not possible.

DISCUSSION

The basis for the ultrasonic method of detecting pericardial fluid is simple. The pericardial sac is only a potential space and the pericardium is in contact with the heart except for the area posterior to the left atrium which is free of pericardium. When a pericardial effusion develops this space fills up. As the fluid is relatively transonic, an echo-free separation occurs between the anterior right ventricular wall and chest wall (Edler, 1955) and the posterior left ventricular wall and posterior pericardium (Feigenbaum, 1965). As there is no pericardium covering the posterior left atrial surface, echocardiographic separation should not be seen in that area. This can be detected by scanning the heart from the left ventricular cavity to the aortic root. If separation is present then a pleural effusion is present either isolated or in association with a pericardial effusion. Hence, if care is not exercised a false positive posterior pericardial effusion may be diagnosed. However, false positive results are commonly due to poor technique.

Efforts to quantitate the amount of pericardial effusion using ultrasound (Horowitz *et al.*, 1974) have been punctuated with some obvious difficulties. There are various limitations of the present technique in attempting to quantitate the amount of pericardial effusion (Feigenbaum, 1976). However, moderate to large pericardial effusions can easily be predicted by ultrasound. It is worthy of note that echocardiography is very sensitive in detecting even small pericardial effusions and is currently the most sensitive method available for this purpose.

It has been our experience, that this is a relatively easy and rapid method of diagnosing pericardial effusion with a high degree of accuracy. Other advantages are that it is a non-invasive technique and may be performed with total safety to the patient. It may be used in critically ill patients for distinguishing cardiomegaly from pericardial effusion and the machine can be wheeled to the bed side if required. To assist in pericardiocentesis a special ultrasonic transducer with a central lumen may be used to direct the needle into the pericardial sac (Goldberg and Pollack, 1973) providing additional safety to the procedure.

SUMMARY

Investigatory confirmation of pericardial effusion has been a problem in clinical practice for several years. Our clinical experience with echocardiography for the detection of pericardial fluid has shown that it is a relatively easy, rapid and accurate method of diagnosing pericardial effusions with complete safety to the patient.

REFEREKCES

Edler, I. (1955) Diagnostic use of ultrasound in heart disease, *Acta Med. Scand.*, **308,** 32–36.

Feigenbaum, H. (1976) Echocardiography, 2nd Edition, Philadelphia. Lea and Febiger, 430–431.

Feigenbaum, H., Waldhausen, J.A. and Hyde, L.P. (1965). Ultrasound diagnosis of pericardial effusion, *J.A.M.A.* **191,** 711–714.

Goldberg, B.B., Pollack, H.M. (1973) Ultrasonically guided pericardiocentesis, *Am. J. Cardiology,* **31,** 490–493.

Horowitz, M.S., Schultz, C.S., Stinson, E.B., Harrison, D.C. and Popp, R.L. (1974) Sensitivity and specificity of echocardiographic diagnosis of pericardial effusion, *Circulation,* **50,** 239–247.