areas of the myocardium over a prolonged period. In contrast to the low incidence of myocardial infarction, ECG changes consistent with myocardial ischaemia and arrhythmias have been frequently found (50 and 80% of patients respectively) during painful crises of SCD. In addition, a large proportion of young patients with SCD had evidence of myocardial ischaemia during exercise. On the basis of these findings it seems that myocardial ischaemia is frequent in patients with SCD, but there is no analogous data in the literature regarding cardiovascular involvement in S/S thalassaemia patients.

In the two cases reported here, we found sound evidence of myocardial infarction in patients whose coronary arteries were normal. In the first case, the incident was combined with a painful crisis as well as with severe anaemia. In the second case, there was no history of chest pain, but the ECG was consistent with an old myocardial infarction. Furthermore, there was evidence of more diffuse damage of the left ventricle, which was manifested as diffuse hypokinesia in the angiogram of the left ventricle.

These preliminary findings and the fact that ischaemic heart episodes can be mistaken for sickle cell crises and be overlooked, point to the need for a more systematic study of cardiovascular involvement in a large sample of S/S thalassaemia patients.

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References


Comprehensive analysis of aortic valve vegetation with anyplane, paraplane, and three-dimensional echocardiography

Echocardiographic visualization of a vegetation is now recognized as a major criterion for the diagnosis of infective endocarditis. Transoesophageal echocardiography, providing improved resolution and superior image quality, is an important modality in the evaluation of patients suspected of having infective endocarditis. Computer-controlled image acquisition with spatial and temporal information enables the integration of cross-sectional images into three-dimensional dataset and dynamic three-dimensional display of cardiac structures. The anatomical information can also be displayed as a reconstructed cross-section in any desired plane (anyplane mode). The acquisition of the basic images with a multplane transoesophageal transducer minimizes both motion artifacts and patient discomfort. The technique allows a clear and convincing picture of the pathological anatomy and improves quantitative analysis. To date, the experience with three-dimensional echocardiography for the evaluation of endocarditis remains limited.

We present a patient with aortic valve endocarditis in whom the dynamic three-dimensional reconstruction of transoesophageal echocardiographic images permitted comprehensive visualization of the mass lesion as well as detailed measurements of its size.

A 71-year-old man with no history of cardiac disease presented with complaints of increasing general malaise and dyspnoea over the last 5 months. A transthoracic echocardiogram made at the beginning of his symptoms demonstrated thickened aortic valve cusps with a peak blood flow velocity of ~1.6 m .s~1 and grade II aortic regurgitation with a good functioning but slightly enlarged left ventricle.

On admission the patient was afebrile, with heart rate of 90 beats. min~1, and cuff blood pressure was 120/55 mmHg. The apex impulse was displaced leftwards and downwards.

Cardiac auscultation revealed a holodisstolic aortic regurgitation grade IV/V murmur, as well as a systolic ejection type grade IV/V murmur at the right sternal border and a holosystolic grade III/V murmur over the apex. Breath sounds were normal but crepitations at the base of the lungs were heard. No peripheral signs of heart failure were present. ECG tracings revealed ventricular trigeminy, incomplete right bundle branch block pattern and anterior hemiblock. The laboratory tests revealed haemoglobin 61 g . dl~1 and a white blood cell count of 5800 mm~3 without leftward shift. Blood cultures were positive for Streptococcus bovis and antibiotic therapy with penicillin i.v. was started.

A transoesophageal echocardiogram was performed with a 5 MHz, 64-element multplane transducer connected to a Hewlett-Packard Sonos 500 system. Transoesophageal echocardiography thoroughly visualized the aortic valve, with its thickened cusps and severe regurgitation on colour Doppler, revealing a large mobile vegetation attached to the right aortic cusps. The size of the vegetation, measured in an optimized cutplane, was 20 x 10 mm. The left ventricle was enlarged (end-diastolic diameter 62 mm) with moderately depressed function and there was moderate mitral regurgitation due to annulus dilatation. Atherosclerotic lesions were detected in descending aorta. During the transoesophageal examination, the images for three-dimensional reconstruction were acquired with rotational scanning (2-degree interval) under ECG and respiratory gating. This method has been described in detail elsewhere. Reconstruction was performed off-line with a TomTec Echo-Scan system (Munich, Germany). The time required for data postprocessing was 15 min and the time for reconstruction and analysis of the optimal images was about 90 min. Three-dimensional echocardiography allowed the cross-section of the vegetation to be displayed in any desired cutplane (anyplane mode), and gradient shading algorithm provided the views with the best depth perception (volume-rendered three-dimensional echocardiography) (Fig. 1(A,B)). Computer-reconstructed cut-
planes of the left ventricle were obtained with a view towards the aortic valve demonstrating the motion of the vegetation from the left ventricular outflow tract in diastole into the ascending aorta in systole, and away from the observer (Fig. 1(C,D)). The aniplanar mode allowed cutplanes to be obtained in the long axis of the structure which permitted detailed measurements. The maximal dimensions of the vegetation were 15 × 12 × 7 mm. Linear measurements could also be performed in the three-dimensional voxel space, providing the real distance between reconstructed points in space. With this method, the length of vegetation was 16 mm. Volume calculation was also performed using the Simpson’s rule, with manual tracing of equidistant (1 mm) parallel cross-sections (paraplane mode) and modified biplane Simpson’s rule. Both methods yielded the concordant value of 0.6 cm³.

The patient also underwent invasive diagnostics. Coronary angiography showed no significant coronary lesions, and aortography—a grade III aortic insufficiency. Pulmonary artery pressures were elevated (41/20 mmHg). Despite medical therapy, the patient worsened, developing renal insufficiency and psychotic episodes. Finally it was decided to operate. Intra-operative findings confirmed the presence of a large, mobile vegetation on the right aortic cusp. A Carpentier- Edwards bioprosthesis size 23 was implanted.

Echocardiography is of great value in the diagnosis of infective endocarditis. The detection of vegetations represents a major criterion, next to positive blood cultures, for its definitive diagnosis, and is also related to the more dramatic course of the disease compared with patients without detectable vegetations. Quantitative criteria for risk stratification have been proposed, suggesting that vegetation size greater than 10 mm has prognostic significance for embolic events.

We described a patient with aortic valve endocarditis, in whom the vegetation detected by transoesophageal echocardiography could be more accurately evaluated after three-dimensional reconstruction. To date, few data are available concerning the usefulness of this method in infective endocarditis. The potential advantages include clear presentation of small pathological structures of unpredictable shape, their anatomical relationships as well as mobility. It is noteworthy that with ‘electronic vivisection’ any view can be obtained, independent of limited acoustic windows, enabling optimal visualization and quantitative analysis of the details of pathoanatomy. Such unrestricted imaging capabilities may be of value in surgical planning.

With the rotational approach, images for three-dimensional echocardiography can be acquired during a routine multiplane transoesophageal echocardiographic procedure with little discomfort to the patient. In our case, the acquisition time was as short as 3 min. Aniplanar echocardiography offers the exceptional possibility of adjusting the cutplane to the long axis of a small structure, such as a vegetation, which is necessary for accurate linear measurements. Moreover, the present software also permits measurements in reconstructed three-dimensional views (‘voxel space’), which eliminates the need for careful selection of the optimal long axis. The selection of adequate views in orthogonal planes and the unique capability of slicing the lesion with parallel planes (paraplane echocardiography) also enable accurate calculation of volume with methods based upon the Simpson’s rule.

In conclusion, three-dimensional echocardiography is a new imaging modality with a remarkable potential for both anatomical displays of heart pathology and quantitative measurements, which can be used for detailed assessment of valvular vegetations.

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Successful thrombolysis treatment of a spontaneous left main coronary artery dissection without subsequent surgery

Spontaneous coronary artery dissection is a very rare and severe event\(^4\)\(^-\)\(^6\). Primary left main coronary dissection is even less common, usually leading to sudden death or extensive infarction. We describe the clinical and angiographic follow-up of a patient suffering an acute anterior myocardial infarction linked to a spontaneous left main coronary dissection, treated by thrombolytic therapy with a favourable outcome without need of subsequent surgery.

A 49-year-old woman was referred to our institution in July 1994 3 h after the onset of sudden chest pain; she had an uneventful medical history with an uncomplicated pregnancy 25 years previously; she had no risk factor for coronary artery disease. Physical and cardiovascular examination were normal. The diagnosis of anterior myocardial infarction was assessed on the 12-lead ECG and thereafter was confirmed by serial creatine kinase isoenzyme measurements. As a result of persistent chest pain and evidence of ongoing ischaemia, cardiac catheterization was performed as an emergency; coronary angiogram revealed a thin radiolucent line corresponding to a dissection observed in the proximal part of the left main (LM) coronary artery, extending over the left anterior descending (LAD) and the left circumflex coronary (LCx) arteries. The proximal LAD was occluded (Fig. 1). The right coronary artery was normal. Concomitant ascending aorta dissection was eliminated by aortography. In order to reperfuse the LAD, thrombolysis was performed with recombinant tissue-type plasminogen activator therapy (rt-PA): 20 mg of rt-PA was continuously infused in the LM through the guiding catheter over 10 min. Then, 70 mg of rt-PA was perfused intravenously over 60 min after the catheter had been removed from the left coronary ostium. Medical treatment associated with thrombolysis included heparin for 5 days, aspirin, beta-blockers, and nitrates. During thrombolysis, chest pain ceased and the ECG revealed a limited antero-apical infarction. Another cardiac catheterization was performed 5 days later: the dissection persisted but the LAD was reperfused (TIMI grade III). After 15 uneventful days, the patient was discharged with aspirin, beta-blocker and angiotensin-converting enzyme inhibitor treatment. The coronary angiogram remained systematically controlled 3 months later, but revealed the same aspect: left coronary dissection with the filling of the LAD remaining normal. The isotopic treadmill testing confirmed the absence of residual ischaemia and at 5 months follow-up the patient remained asymptomatic.

Myocardial infarction or sudden death is rarely due to spontaneous coronary dissection. It typically occurs in young people, mostly women, especially in the puerperium\(^1\)\(^-\)\(^3\). To our knowledge, only 10 cases of LM primary dissection have been reported in living patients; all were women\(^1\)\(^-\)\(^3\). Surgery is usually proposed in coronary dissection including left main; however, coronary bypass grafting is not without risk in such a fragile, even if reperfused, vessel\(^1\)\(^-\)\(^3\). Thrombolytic treatment has rarely been performed in acute coronary dissection and was always used, in the reported cases, before this diagnosis was assessed\(^1\)\(^-\)\(^3\). Thrombolytic treatment has already been used in catheter-induced left main coronary dissection and has allowed successful non-emergency coronary-artery bypass surgery\(^4\).

We reported here the first case of thrombolysis treatment performed for spontaneous left main obstructive dissection, diagnosed with emergency coronary angiography in the acute phase of a myocardial infarction. In this particular case of obstructive dissection with acute myocardial infarction and ongoing ischaemia, thrombolysis treatment may be effective in lysis thrombi in the false lumen, allowing the true lumen to re-expand, and can be an alternative to emergency high risk surgery. Successful emergency coronary stenting was also reported for acute occlusive dissection of LM complicating diagnostic cardiac angiography. This therapeutic strategy allowed secondary emergency surgical revascularization\(^5\).

After the acute phase, and in the absence of residual ischaemia, some reports suggest that long-term event-free survival can be obtained with medical therapy alone. Furthermore, despite the frequent persistence of angiographic evidence of dissection, spontaneous healing may occur\(^1\)\(^-\)\(^3\). In our case, we observed the angiographic persistence of a large non-occlusive dissection, with a favourable clinical outcome, and therefore no subsequent surgery was performed.

Thus, this report suggests that thrombolytic therapy may be an alternative to high risk surgery in primary left main coronary dissection associated with a large anterior myocardial infarction linked to a LAD occlusion. At mid-term follow-up, in the absence of residual ischaemia, and with or without spontaneous healing of dissection, favourable results can be obtained with medical therapy alone. Nevertheless, a recently reported case of progression of asymptomatic iatrogenic left main dissection leading to a major stenosis requiring surgery, argues for a long-term follow-up.

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Figure 1 Coronary angiogram in anterior projection obtained immediately after admission: a left main dissection with occluded LAD is observed.