branches of the right coronary artery showed similar intimal fibrosis and proliferation.

The appearance of congestive heart failure in one of our patients and of fatigue in the other were most probably due to the slow heart rate caused by the second and third degree heart block, rather than to extensive myocardial damage induced by irradiation or to generalized atherosclerosis. Support for this assumption is provided by the complete disappearance of these signs following implantation of a pacemaker.

REFERENCES


Bullet in the Left Ventricle from a Remote Gunshot Wound to the Heart*

Eugene M. Silverman, M.D.*, ** and Ellsworth R. Littler, M.D.†

A bullet was found at necropsy in the left ventricle of a man who died of carcinoma of the urinary bladder. The bullet had entered the body at an unknown time in the remote past. The bullet probably gained entrance to the heart through the left atrial wall and lodged in the left ventricle.

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The present report was prompted by the finding of an embolic bullet in the left ventricle of a man who survived for many years after being shot.

CASE REPORT

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Figure 1. Chest x-ray film (lateral view). Note bullet (large arrow) and metallic fragments adjacent to eighth thoracic vertebra (small arrow).
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vesical neck. The patient's past medical history included mild episodes of congestive heart failure.

Physical examination revealed a loud high-pitched "buzzing" systolic murmur heard best at the left sternal border at the base of the heart. An electrocardiogram showed sinus tachycardia, complete left bundle-branch block, and a suggestion of left atrial enlargement. Radiographic examination of the chest revealed an enlarged heart with a configuration suggestive of left ventricular enlargement. A bullet-shaped radiopaque mass was evident in the region of the heart (Fig 1 and 2). In one projection (Fig 2), motion of the bullet was evident. Several small radiopaque fragments were present in the region adjacent to the left border of the eighth thoracic vertebra (Fig 1).

During the next month the patient was treated for infections of the urinary tract and pneumonia, but his condition continued to deteriorate, and he died.

The patient gave no information about his gunshot wound to the medical personnel who cared for him during his terminal illness. It was learned from his long-time friend that the shooting must have occurred more than 30 years earlier, before his emigration to this country from Italy.

Pathologic Findings

A careful search of the skin revealed no scars. A large, firm, white transitional cell carcinoma arose from the anterior wall of the bladder and involved the left ureteral meatus and the prostate gland. The left ureter, renal pelvis, and calices were dilated, and acute pyelonephritis was found in the left kidney. The right kidney was unremarkable. There were no peritoneal adhesions, and the abdominal viscera were unremarkable.

There were small fibrous pleural adhesions over the anterior aspect of the right lung, which weighed 280 gm. The left lung weighed 680 gm and had extensive areas of bronchopneumonia throughout.

The pericardial cavity was obliterated by dense fibrous adhesions. The heart weighed 800 gm. The coronary arteries showed moderate focal atherosclerosis, with no stenosis or obstruction. The cardiac chambers and great vessels were in the usual anatomic positions. There were no defects in the interatrial or interventricular septae. The left ventricular wall was 13 mm thick at the base of the anterior papillary muscle and had no scars. The tricuspid and pulmonary valves were unremarkable. The aortic valve was of normal circumference, and its three intact cusps contained moderate calcific deposits. The mitral valvular leaflets were unremarkable. A deformed nonjacketed bullet 1 cm long and 0.8 cm in diameter (Fig 3) was lodged behind the apex of the anterior papillary muscle in the left ventricle and was adherent to several thickened, shortened, and fused chordae tendineae. The chordae tendineae arising from the posterior papillary muscle were less deformed. The base of the left atrium contained an irregular scar roughly 2.5 cm in diameter (Fig 3) with regions of subendothelial fibrous thickening.

DISCUSSION

The irregular scar in the base of the left atrium probably marks the site of this bullet’s entry into the heart. The presence of the small metallic fragments adjacent to the left border of the eighth thoracic vertebra suggests that the bullet struck this region (which lies posterior to the base of the left atrium) and then entered the heart.

The region behind a papillary muscle has been a favored site for bullets and metallic foreign bodies which were embolic to the right ventricle. From the present case, it appears that this region may also be a favored location of foreign bodies which, more rarely, lodge in the left ventricle. The deformity of the mitral valve may have been due to old rheumatic valvulitis and could have contributed to the bullet’s remaining within the ventricle, either by alteration in left ventricular hemodynamics, or because the deformed valvular leaflets and thickened shortened chordae tendineae entrapped...
the bullet; however, the greater deformity of the chordae tendineae to which the bullet was attached, in comparison to the only slightly thickened chordae arising from the posterior papillary muscle, indicate a more likely possibility that the deformity of this valve was due to the presence of the bullet.

Although gunshot wounds of the heart are generally fatal, if the wound is not fatal, missiles may be retained for many years with no apparent ill effects. In a follow-up of servicemen with metallic foreign bodies in their hearts as a result of injuries sustained in World War II, Bland and Beebe found all 40 subjects to be alive at least 20 years later. Most were employed and had few or no symptoms referable to the retained foreign bodies. Since all of these men were alive at the time of follow-up, no anatomic studies of the long-term effects of these missiles on the cardiac valves were available, and the relation of the retained bullet to the deformed chordae tendineae in the present case remains obscure.

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