Gunshot Wound of the Heart*

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A patient shot in the heart usually does not live long enough to benefit from any type of therapy, either medical or surgical. Those who do, however, are favored because of partial cardiac tamponade or because the bullet follows a path which avoids strategic anatomic structures such as a coronary artery or the bundle of His. Even under these circumstances, prompt action is called for the moment the patient arrives in the emergency room if he is to survive.

Case Report

On November 23, 1959, a 35-year-old man was admitted to the emergency room of the Palo Alto Hospital following an attempted suicide. He had been in good health until that afternoon when he shot himself twice in the left anterior chest with a .25 caliber revolver.

Physical examination revealed that he was conscious, but restless and in shock. Respirations were 36/min., shallow and rapid; pulse was 136/min. and regular; blood pressure was 60/0. There were two bullet holes of entrance in the left anterior chest each measuring 1½ cm. in diameter, and two wounds of exit in the left posterior chest each measuring approximately 4 mm. in diameter. These wounds were hemorrhaging minimally. There was discernible subcutaneous emphysema, and air could be heard passing through one of the anterior gunshot wounds with each respiration. Over the left anterior and posterior chest, the percussion note was flat and no breath sound was audible. Percussion and auscultation of the right chest were normal. The heart sounds were slightly diminished in intensity; otherwise, heart findings were not remarkable. The veins of the neck were not prominent and the remainder of the physical examination showed nothing unusual.

The admission hemogram gave a PCV of 26 per cent. A portable chest x-ray revealed massive left hemothorax with shift of the mediastinum to the right. No foreign body was seen and there was no rib fracture.

Dextran followed by whole blood was administered immediately upon arrival in the emergency room, and when shock persisted, he was taken directly to the operating room. Under general intratracheal anesthesia, a left posterolateral incision was made and the chest entered through the bed of the resected, left fifth rib. Approximately 1000 ml. of blood was found in the left pleural cavity and evacuated. Inspection of the left lung showed it to be lacerated in two peripheral areas, one in the upper lobe near the division between the lingula and the anterior segment,

Figure 1: First postoperative day. Changes suggest pericarditis, i.e. S-T segment elevated in leads I-VL.

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and the other in the lower lobe in the region of the lateral basilar segment. There was a hole in the pericardium just anterior to the left phrenic nerve rhythmically spurring blood with each beat of the heart, thus preventing complete tamponade. The pericardium was then opened widely through this wound and a considerable amount of blood was aspirated. There could then be seen a wound of entrance 5 mm. in diameter in the anterior wall of the left ventricle near the apex, and a slightly smaller wound of exit 4 mm. superior to the wound of entry in the left wall of the left ventricle. A major branch of the left coronary artery was found, completely exposed yet intact. The ventricular cavity had apparently not been entered and the wounds were bleeding only minimally. Because hemorrhage was not profuse, and further because sutures might have compromised the integrity of the coronary artery lying exposed at the bottom of the wound of exit. Gelfoam was used successfully to stop all bleeding. The pericardium was loosely approximated so as to prevent tamponade. The pulmonary lacerations then were repaired using continuous, locking chronic catgut sutures. No pulmonary tissue was resected. Apparently the two bullets had entered and emerged from the chest without breaking a rib, one bullet penetrating both lung and cardiac tissue in its course while the other pierced only lung. The chest was closed in a routine manner, employing two large chest tubes for temporary closed intercostal drainage. He left the hospital on December 3, 1959, without complication in the postoperative period.

**Discussion**

Those patients who die soon after a bullet wound of the heart do so because of massive hemorrhage or cardiac tamponade. In either case, hypotension is present, the patient is in shock, and the exact nature of the lesion is not always obvious. It

![Figure 2](http://example.com/image2.png)

*Figure 2: Third postoperative day. Changes are more marked with ST elevation in leads I, II, III, vL and vF and all precordial leads.*

![Figure 3](http://example.com/image3.png)

*Figure 3: Seventh postoperative day. Tracing has reverted toward normal with healing of wound in heart.*
is important to differentiate between the two conditions, however, since immediate surgery is mandatory in the former while with tamponade one may sometimes procrastinate to good effect by doing pericardiocenteses.\textsuperscript{8-11} If, however, the patient's condition is rapidly deteriorating, thoracotomy should be done without delay.

In this case, the hole in the pericardium was large enough to permit partial evacuation of the blood, while the bullet missed the ventricular chambers and the coronary arteries, piercing only the myocardium. Because of these fortunate circumstances, he was alive when he reached the hospital, and a short time could be allowed for evaluation. We found little evidence of increased venous pressure, decreased precordial pulsations, or muffled heart sounds. The physical findings pointed to left hemithorax and this was confirmed by roentgenograms. A diagnosis of massive hemorrhage was entertained and thoracotomy, therefore, was undertaken promptly.

**Electrocardiograms**

A series of electrocardiograms were taken on the patient which showed the characteristic pattern of pericarditis (Fig. 1). This pattern persisted from the first postoperative day until December 1, 1959. Unfortunately, because of surgical dressings, no precordial electrode was placed over that part of the chest wall closest to the injured myocardium until November 26, 1959. Possibly for this reason, no record characteristic of infarction was obtained despite the extreme muscle damage.

It is interesting that there is often apparent complete recovery of myocardial function following a wound of the heart in which severance of a coronary artery has occurred if the victim is young and without heart disease.\textsuperscript{12-13} In this case the progressive electrocardiographic characteristics of infarction did not develop. Serial tracings show first the evolution of infarction (Fig. 2), but finally reversion to a completely normal pattern (Fig. 3).

**References**