

Case 1

A 53-year-old mechanic was admitted to Parkland Memorial Hospital on December 17, 1964 with substernal chest pain of two hours' duration. For three days prior to admission, he experienced recurrent attacks of substernal pain that lasted one to two minutes. The day of admission the pain became worse, radiating to the neck, medial aspect of left arm. Shortness of breath.

## Cardiac Arrhythmias in Acute Myocardial Infarction-

### The prophylactic use of Dilantin (Diphenylhydantoin)

by F.A. Bashour, M.D.

On admission at 2:00 p.m. the patient was complaining of moderately severe substernal chest pain. The pulse was irregular, 48 beats per minute. Blood pressure 100/70. The heart sounds were distant, no murmurs or gallops were heard. On admission, he received Morphine/Atropine for chest pain. One dose of Prednisolone (20 mg) was administered on December 19, 1964. He was on 100% O<sub>2</sub> breathing from December 19, 1964.

## Parkland Memorial Hospital

The pertinent laboratory findings were: ECG 14500 with normal differential count; ESR 30 mm/hour; this rose to 100 mm/hour; SGOT 194 U/ml. On December 17, 1964, revealed complete AV block (ventricular rate 36/min), marked ST elevation in leads I, II, III, aVF, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub>, first AV block and ectopic beats. Signs of acute posterior myocardial infarction were observed. On January 1, 1965, the PR interval was normal (0.18 sec.) He was discharged home on January 29, 1965 with normal PR interval, Q<sub>3</sub>T<sub>3</sub> pattern.

## Medical Grand Rounds

October 28, 1965

Case 1

A 53-year-old mechanic was admitted to [REDACTED] on [REDACTED], 1964 with substernal chest pain of two hours' duration. For three days prior to admission, he experienced recurrent attacks of substernal pain that lasted one to two minutes. The day of admission the pain became worse, radiating to the neck, medial aspect of left arm; it was accompanied by nausea, vomiting and shortness of breath.

On admission, 2:00 p.m., the patient was still complaining of moderately severe pain. He was pale, cold, clammy. The pulse was irregular, 45-50/min., blood pressure 100/70. The heart sounds were distant, no murmurs or gallops were heard. On admission, he received Morphine/Atropine for chest pain. One dose of Prednisolone (20 mg) was administered on [REDACTED], 1964. He was on 100% O<sub>2</sub> breathing from [REDACTED], 1964 to [REDACTED], 1964.

The pertinent laboratory findings were: WBC 14500 with normal differential count; ESR 30 mm/hour, this rose to 100 mm/hour; SGOT 194 units per ml. ECG on [REDACTED] revealed complete AV block (ventricular rate 36/min), marked ST elevation in II, III, AVF. On [REDACTED], 1964 first AV block and evolutionary changes of acute posterior myocardial infarction were observed. On [REDACTED], 1965, the PR interval was normal (0.18 sec.) He was discharged home on [REDACTED], 1965 with normal PR interval, Q<sub>3</sub>T<sub>3</sub> pattern.

He was discharged on September 18, 1964. On his last visit (October 20, 1965), he was asymptomatic.

Case 3

The day prior to admission, this 30-year-old truck driver experienced a transient episode of chest discomfort which lasted four to five minutes before spontaneously subsiding.

Case 2

This 59-year-old man was admitted on [REDACTED] 1964 to the medical service with chest pain of four to five hours' duration. The pain radiated to the back and down the left arm medially. The chest pain was accompanied with nausea, vomiting, some shortness of breath, but no perspiration. The night prior to admission he experienced some retro-sternal discomfort relieved by soda.

On admission, blood pressure was 168/104, pulse 66/min., and regular. Moist crepitant rales were heard over both lung bases, neck veins were not distended. The heart size was normal, no murmurs were heard. The patient was given Morphine/Atropine and O<sub>2</sub> inhalation.

Total WBC 8500, ESR 17 mm/hour, normal FBS, uric acid, cholesterol. SGOT 127 units/ml. The ECG revealed acute posterior myocardial infarction and no premature ventricular contractions.

Continuous cardiac monitoring (on tape) revealed multifocal PVC's and for approximately twenty-five minutes slow ventricular tachycardia (rate 72/min.) appeared twelve hours after the onset of the myocardial infarction. During that period of time, the patient complained of severe headaches and no palpitations. The arrhythmia was not recognized clinically and subsided spontaneously.

He was discharged on [REDACTED] 1964. On his last visit ([REDACTED] 1965), he was asymptomatic. The heart sounds were muffled. The ECG revealed extensive anterior myocardial infarction, ST elevation from V<sub>1</sub> to V<sub>6</sub>, Q from V<sub>1</sub> to V<sub>6</sub>. The SGOT rose to 274 units/ml.

The pain continued to be severe for three to four days after admission, requiring large doses of morphine for relief. On the eighth day of his hospitalization he developed an acute left heart failure and was digitalized. On the twelfth day, he developed a right hemiplegia which was treated. He was discharged home on August 23, 1965. Two months after discharge he was back at work (on a part-time basis).

Cardiac monitoring revealed that two hours after admission and prior to Dilantin therapy, he developed a right bundle branch block. This block subsided in approximately one hour after Dilantin therapy was instituted. At 8:50 p.m., a run (of four beats) of ventricular tachycardia was observed. Dilantin therapy was continued for a period of three weeks (August 20, 1965).

Case 3

The day prior to admission, this 50-year-old [REDACTED] experienced a transient episode of chest discomfort which lasted four to five minutes before resolving spontaneously. The morning of admission, he experienced a sudden, severe, oppressive precordial pain radiating to both arms and accompanied by nausea, breathlessness and perspiration.

Physical examination revealed no abnormalities in pulse (regular, 90/min.), blood pressure 150/90. The heart, lungs and abdominal findings were essentially normal.

SGOT 175-370 u/ml, normal WBC, ESR 11 mm/hour.

ECG revealed an acute anterior myocardial infarction (10:35 a.m.)

At 1:00 p.m. the blood pressure dropped to below 80 mm Hg systolic, and the cardiac monitor was showing a slow ventricular tachycardia. The blood pressure was restored with Aramine without correction of the arrhythmia or suppression of the frequent PVC's. I.V. Dilantin 250 mg. was given with dramatic response. The patient was maintained subsequently on Dilantin 100 mg. P.O. for 31 days without side effects.

Case 4

A 52-year-old [REDACTED] was admitted to the medical service on [REDACTED], 1965 with severe chest pain of one hour duration. The pain appeared when walking to his apartment, it was associated with excessive perspiration, shortness of breath, nausea and vomiting. For three weeks prior to admission, he had experienced several episodes of chest pain, each lasting a few minutes and disappearing spontaneously at rest.

On admission, he was complaining of severe chest pain, and was extremely pale. Blood pressure was 160/100, pulse 80/min. and regular. The neck veins were flat, lungs were clear. The heart sounds were muffled. The ECG revealed extensive anterior myocardial infarction, ST elevation from V<sub>1</sub> to V<sub>6</sub>, Q from V<sub>1</sub> to V<sub>5</sub>. The SGOT rose to 274 units/ml.

The pain continued to be severe for three to four days after admission, requiring large doses of morphine for relief. On the eighth day of his hospitalization he developed an acute left heart failure and was digitalized. On the twelfth day, he developed a right hemiplegia which was treated. He was discharged home on [REDACTED] 1965. Two months after discharge he was back at work (on a part-time basis).

Cardiac monitoring revealed that two hours after admission and prior to Dilantin therapy, he developed a right bundle branch block. This block subsided in approximately one hour after Dilantin therapy was instituted. At 8:50 p.m., a run (of four beats) of ventricular tachycardia was observed. Dilantin therapy was continued for a period of three weeks ([REDACTED] 1965).



Table 1- Incidence of Cardiac Arrhythmias Following Acute Myocardial Infarction

Authors	No. Cases	Atrial fibrill.-flutter %	Supraventricular Tachycardia %	Complete AV Block %	Multifocal PVC's %	Ventricular Tachycardia %
<u>A-Non-Monitored Group</u>						
Master et al (1937)	300	8.3	0.6	1.0	25.7	0.3
Rosenbaum et al (1941)	208	14	--	2.4	25.0	3.0
Chambers (1946)	100	13	2	6	24.0	--
Mintz et al (1947)	572	3.7	0.6	1.0	--	1.0
Smith et al (1951)	920	5.2	0.7	1.2	7.0	1.3
Ball et al (1955)	342	13	0	--	25.0	2.0
Johnson et al (1958)	187	8.9	1.0	3.7	--	0.6
Imperial et al (1960)	153	10.5	1.3	3.3	12.4	0.7
<u>B-Monitored Group</u>						
Julian et al (1964)	100	15.0	4.0	--	76.0	6.0
Spann (1964)	30	10.0	3.3	--	82.0	50.0
Present (1965)	30	10.0	16.6	10.0	100.0	70.0

Table II- Complete AV Block of Acute Myocardial Infarction

- 1) Sex and Age    a)- 23 men, average age- 60.3 years.  
                      b)- 10 women, average age- 72.8 years.
- 2) Site of Myocardial Infarction-    Diaphragmatic and/or true posterior    ---30  
  
  Anterior, atrial and Subendocardial    --- 3
- 3) Severity of the Infarction-
  - a) extent of the lesion: SGOT over> 200 in 10 mean value 175 unit/ml
  - b) clinical state:
    - 1 shock- 17
    - 2 left ventricular failure-12
    - 3 ventricular tachycardia- 8
    - 4 none-----11
    - 5 Adams-Stokes-- 2
- 4) Recovery of the arrhythmia- 25 patients were followed daily by ECG. Within 24 hours:
  - a)- eight reverted to sinus rhythm ( $PR \leq 0.20$  sec.)
  - b) three had first degree AV Block.
  - c) one had second degree AV Block.
  - d) thirteen were left with complete AV Block.
- 5) Mortality rate                    20%

Table III- Results of the Prophylactic use of Dilantin in Acute Myocardial Infarction

	<u>Untreated Group</u>	<u>Treated Group</u>
Number of Cases	30	15
Atrial fibrill. flutter	10	13
Supraventricular Tachycardia	16.6	7
Complete AV Block	10	0
Multifocal PVC's	100	93. (but few)
Ventricular Tachycardia	70	27*

\* Two patients were admitted with ventricular fibrillation

Table IV- Cardiovascular Action of Dilantin (Diphenylhydantoin)

	<u>Small dose</u>	<u>Large dose</u>
Heart rate	Slight or no decrease	Decreased
Blood pressure	Transient	Marked decrease
Pulmonary artery pressure	Slight decrease	Decreased
Left Ventricular E.D. Pressure	No or slight decrease	Decreased
Right atrial pressure	Slight decrease	Decreased
Cardiac output*	Slight or no decrease	Decreased
Stroke volume	No change	Decreased
Coronary blood flow	Increased	Increased
Peripheral resistance	Transient	Transient

\* Probable blood pooling in the Splanchnic vascular bed.

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- A. Routine Laboratory
- B. Electrocardiogram
- C. Radiological techniques

### VI. Treatment

- A. Non-specific Prophylaxis
- B. Anticoagulants
- C. Surgical Procedures
- D. Thrombolysis