Clinical Experience of Cardiogenic Shock in Coronary Care Unit

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AMONG major causes in patients with acute myocardial infarction, deaths from severe arrhythmia have been markedly reduced after the establishment of antiarrhythmic treatment in coronary care unit.³ However the mortality due to the acute pump failure, namely cardiogenic shock and left heart failure, has not been altered, because of lack in beneficial treatment. Some severe patients, those should be classified into the group of arrhythmia in the era prior to CCU, have been successfully treated for their rhythm disturbances, and fallen in shock afterward. Then the incidence and significance of pump failure, especially cardiogenic shock has been rather increasing in the patients in CCU.

Definition of cardiogenic shock:

The incidence and mortality rate of cardio-

genic shock in acute myocardial infarction were variable in different reports.^{1,2} There was the tendency that the higher the incidence, the lower the mortality of cardiogenic shock. Because the prognosis was better, if the group of patients was including the hypotension without lower tissue perfusion.

The clinical definition of cardiogenic shock in this study was as following:

1) A systolic arterial pressure of less than 90 mmHg or 30 mmHg less than the definite previous basal level.

2) Evidence of the decrease in tissue perfusion.

a) Urine volume less than 20 ml per hour.

b) Disturbed mental function, cold sweating, peripheral vasoconstriction, or metabolic aci-

Fig.1. Incidence and mortality rate of various complication in 307 cases with acute myocardial infarction are expressed in percentage.

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Fig.2. Causes of deaths in 85 dead cases in 307 patients with acute myocardial infarction.

Fig.3. Onset and duration of cardiogenic shock in studied cases.

dosis.

These condition should be present at least for 1 hour in patients, in whom hypotension due to pain, vasovagal reactions, serious arrhythmia or drug reaction have been excluded. It is, however, not always possible to exclude the shock condition, initiated by such vagal tone or arrhythmia. For example, there were such patients those initially became shock for the ventricular tachycardia and still remained in shock after the restoration of normal sinus rhythm.

MATERIALS

Three hundred and seven cases of acute myocardial infarction, admitted to coronary care unit of Heart Institute Japan, Tokyo Women's Medical College from Jan. 1970 to Dec. 1972, were studied.

RESULTS

Seventy seven cases (25.1%) among 307 acute myocardial infarction were complicated with cardiogenic shock. Other major complications

Fig.4. Incidence and mortality rate of cardiogenic shock in advancing age groups.

A) With cardiogenic shock

B) With reversible shock (recovered within 6 hours)

C) Without cardiogenic shock

Fig.5. Mass of infarction determined by the area of abnormal Q waves and incidence of cardiogenic shock.

namely arrhythmia, left ventricular failure and Adams-Stokes attack were found in 271 cases, 120 cases and 32 cases, respectively. (Fig. 1) There were 85 cases of hospital deaths. Forty-nine cases (57.6%) of 85 deaths have experienced cardiogenic shock. Cardiogenic shock was main

cause of death in 31 cases among them. (Fig. 2) These cases consisted 45% of deaths in CCU. The deaths, caused by left ventricular failure, were complicated with shock in 50%. As shown in Fig. 3 cardiogenic shock was observed mostly during first 24 hours after the attack. Ninety-

Fig.6. Incidence and mortality rate of cardiogenic shock in various locations of myocardial infarction.

eight cases were admitted within 4 hours after attack. In the early admitted group within 4 hours, there were 34 cases (35%) of cardiogenic shock with the mortality rate of 71%. Another 50 cases, admitted between 4 and 12 hours after attack, showed 13 cases of cardiogenic shock with a mortality rate of 54%. Hypotension or primary shock in the early stage of this disease could not be always distinguished from real cardiogenic shock and so should be treated as a serious conditions. Mortality rates, related to complications were as following: Cardiac rupture 92%, cardiogenic shock, 75%, left ventricular failure 37%, and severe arrhythmia 32%. Conditions predisposed to cardiogenic shock were reported as larger mass of infarcted myocardium, higher age and associated severe arrhythmia.⁴ In this study it was confirmed, that in advancing age the incidence of cardiogenic shock was increasing (Fig. 4). Mortality rates in different age groups were not significantly different. Though mass of infarction determined by ECG findings didn't make any influence to the incidence of cardiogenic shock, the cases with extensive infarction could scarcely be recovered. Concerning with the location of infarction, incidence and mortality rate of shock were high in combined antero-posterior infarction, 38.9% and 85.7%, Mortality rate was also high in anterior infarction, 81.5% and subendocardial infarction, 87.5%. Among precipitating factors of cardiogenic shock, there were vomiting (10 cases), severe recurring pain (4 cases), chills, micturition and brady-arrhythmia in posterior infarction.

Seventy percent of recovered cases were posterior infarction with brady-arrhythmia. Other major complication in cardiogenic shock was left ventricular failure, especially pulmonary edema. The ratio peak GPT/ peak GOT was higher in the group with shock than in the group without shock. Eighty percent of cases with cardiogenic shock showed the ratio value (peak GPT/ peak GOT) of more than 0.3, on the contrary the ratio in 79% of cases without shock remained under 0.3. Low PH value of capillary blood less than 7.35, was frequently seen in shock groups (60%). Treatment of cardiogenic shock is not yet established nor significantly effective. In this series, following drugs or methods were used frequently. Those were oxygen inhalation atropin, adequate drip infusion in all cases, and cardioactive glycoside, diuretics, heparin, pressor agents, adrenal steroids, antiarrhythmic agents, defibrillation, temporary pacing in more than 20 cases. Assist respiration with tracheal intubation and assist circulation (V-A shunt) were also administered in several cases. Among them, dopaxmine was effective in three cases to maintain the systemic blood pressure and urine volume. Temporary pacing was also effective in severe brady arrhythmic cases with posterior infarction.

CONCLUSION

Cardiogenic shock is one of the most important problems in the treatment of acute myocardial infarction and is yet very difficult to treat. Cardiogenic shock in acute myocardial infarction

tion, was frequently seen in older patients, antero-posterior infarction, during the initial 24 hours. The mortality rate was higher in anterior or subendocardial infarction, especially with extensive myocardial lesion. Some cases of posterior infarction with bradyarrhythmia were reversible and were effectively treated by tempo-

rory pacing.

REFERENCES

1. MEYER, H. E.: *Ann. Heart. J.* 62: 436, 1961.
2. FRIEDBERG, C. K.: *Circulation* 23: 326, 1961.
3. LOWN, B., et al.: *J.A.M.A.* 199: 188, 1967.
4. SWAN, H.J.C., et al.: *Circulation* 45: 1097, 1972.