Acute Cardiac Pacing; Indications and Results

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Although the pharmacologic therapy of the heart block has been progressed, the development of the techniques for the cardiac pacing has proved the cardiac pacing as the technique of the first choice for the management of patients with the symptomatic heart block and even brady and/or tachy dysrhythmia associated with Stokes-Adams episodes and heart failure unresponsive to the pharmacologic therapy. An acute or emergency use of the electrical stimulation of the heart has practically resulted in an enormous success in the management of patients with acute or chronic symptomatic brady-tachy arrhythmia as well as acute and chronic heart block. However, such useful and valid technique for Stokes-Adams attack has not likely been so familiar in this country compared to those in European countries and U.S. Therefore, the purpose of the present report is to introduce an outline of the acute or temporary cardiac pacing by keeping a focus on the indication and results.

METHODS

Classifications of cardiac pacing: There had been some ways to classify the cardiac pacing, but the acute or temporary cardiac pacing used in the present report was a definition based on a pacing term contrasted with a chronic cardiac pacing. Pacemakers and apparatus for cardiac pacing: There have been generally known two types of pacemakers which are a portable type and a non-portable type, and also there are two mechanisms which are a fixed rate type and a demand type in a pacing pulse generation. In the present study, the portable pacemakers with the catheter type electrodes were mainly used transvenously, and less often the non portable or bedside type pacemaker with connection to skin electrodes was used only for some special emergency cases. In early stage of this study, the fixed rate external pacemaker was used, but the demand external pacemaker in late stage because of an anxiety of competition which might lead to ventricular tachycardia and fibrillation.

Indications of the acute or temporary cardiac pacing: Indications of the cardiac pacing have been widely extended from the classic heart block associated with Stokes-Adams episodes to the tachy and/or brady disrhythmia accompanied by Stokes-Adams attack and/or heart failure. Consequently, the indications for acute or temporary cardiac pacing were classified as (1) acute heart block especially atrioventricular (A-V) block, (2) acute or recurrent brady and/or tachy disrhythmia, and (3) recurrent or chronic A-V block. All of these three items should be associated with Stokes-Adams episodes and/or heart failure. Former two items of these may often occur in patients with an acute myocardial infarction, patients during some drug therapy for any kind of diseases, and patients under some kind of operations or laboratory procedures.

RESULTS

Table I shows all of our cases in the present report. Statistic evaluation was avoided because of such a small number of cases. Ages of patients ranged from 49 to 88. Cases 1 and 2 had an acute posterior myocardial infarction associated with a complete A-V block and heart failure. Cases 3 and 4 were patients with stomach cancer and multiple myeloma respectively accompanied by acute heart block and brady arrhythmia. In these four cases, case 1 and 3 were treated with an indirect cardiac pacing by skin electrodes succes-

Key Words:
Direct cardiac pacing
Indirect cardiac pacing
Acute cardiac pacing
Chronic cardiac pacing
Stokes-Adams episode
Heart block
Brady and/or tachy arrhythmia

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TABLE I RESULTS OF ACUTE CARDIAC PACING

<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age</th>
<th>Diagnosis</th>
<th>Purpose</th>
<th>Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>64m</td>
<td></td>
<td>post. infarction A-V block</td>
<td>emerg.</td>
<td>skin electrode ext. pacing</td>
<td>E, but died of shock</td>
</tr>
<tr>
<td>2</td>
<td>78m</td>
<td></td>
<td>&quot;</td>
<td>&quot;</td>
<td>transvenous pacing</td>
<td>E, but died of pneumonia</td>
</tr>
<tr>
<td>3</td>
<td>71m</td>
<td></td>
<td>gastric cancer A-V block</td>
<td>&quot;</td>
<td>skin electrode ext. pacing</td>
<td>E, but died of cachexia</td>
</tr>
<tr>
<td>4</td>
<td>59f</td>
<td></td>
<td>multiple myelon A-V block</td>
<td>&quot;</td>
<td>transvenous pacing</td>
<td>E, but died of renal failure</td>
</tr>
<tr>
<td>5</td>
<td>60f</td>
<td></td>
<td>chronic A-V block</td>
<td>&quot;</td>
<td>&quot;</td>
<td>E, → implantation</td>
</tr>
<tr>
<td>6</td>
<td>54f</td>
<td></td>
<td>&quot;</td>
<td>interim</td>
<td>&quot;</td>
<td>E, &quot;</td>
</tr>
<tr>
<td>7</td>
<td>88f</td>
<td></td>
<td>rapid-slow arrhythmia</td>
<td>&quot;</td>
<td>&quot;</td>
<td>E, &quot;</td>
</tr>
<tr>
<td>8</td>
<td>62m</td>
<td></td>
<td>&quot;</td>
<td>emerg.</td>
<td>&quot;</td>
<td>E, &quot;</td>
</tr>
<tr>
<td>9</td>
<td>49m</td>
<td></td>
<td>recurrent A-V block</td>
<td>&quot;</td>
<td>&quot;</td>
<td>E, &quot;</td>
</tr>
<tr>
<td>10</td>
<td>68m</td>
<td></td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>E, &quot;</td>
</tr>
<tr>
<td>11</td>
<td>64f</td>
<td></td>
<td>chronic A-V block</td>
<td>interim</td>
<td>&quot;</td>
<td>E, &quot;</td>
</tr>
<tr>
<td>12</td>
<td>79m</td>
<td></td>
<td>&quot;</td>
<td>emerg.</td>
<td>&quot;</td>
<td>E, → long-term ext. pacing</td>
</tr>
<tr>
<td>13</td>
<td>65f</td>
<td></td>
<td>combined VHD ventr. tachy. fibr.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>E, → implantation</td>
</tr>
</tbody>
</table>

E: effective (consciousness, heart failure and blood pressure improved).

sfully, and cases 2 and 4 were treated with a direct cardiac pacing by transvenous catheter type electrodes successfully at bedside. Results of the therapies of these four patients were apparently fair, but case 1 died of cardiac pump failure, case 2 died of pneumonia, case 3 died of cachexia, and case 4 died of renal failure respectively. Fig. 1 shows the tracing of electrocardiograms of case 3 treated with skin electrodes, and Fig. 2 shows those of case 4 paced with transvenous catheter type electrodes. Case 5, 6 and 11 had chronic complete A-V block associated with recurrent episodes of Stokes-Adams. Cases 7 and 8 had brady-tachy dishrhythmia accompanied by Stokes-Adams syndrome. Cases 9 and 10 had recurrent A-V block associated with Stokes-Adams attacks and/or heart failure. These seven patients were successfully treated with acute or temporary transvenous endocardial pacing immediately after occurrence of Stokes-Adams episode and/or heart failure, and then transferred to chronic pacing i.e. implantation of pacemaker after 1 or 2 weeks of acute pacing (temporary pacing). Case 12 had pulmonary mycosis and chronic complete A-V block associated with recurrent episodes of Stokes-Adams, and was treated by acute cardiac pacing transvenously with bipolar catheter electrodes for 2 months, but died of deterioration of the pulmonary mycosis. Case 13, female patient of age 65
with combined valvular disease and ECG of marked sinus bradycardia with significant prolongation of QT interval and ST-T changes. These findings of ECG changed gradually time to time, and led this female patient to recurrent episodes of Stokes-Adams associated with generalized convulsion which were caused by ventricular tachycardia and/or fibrillation (Fig. 3). Fig. 3 showed a part of the continuous recording of ECG disclosing the onset of ventricular tachycardia or fibrillation which had been considered as the mechanism of Stokes-Adams attack in chronic complete A-V block and chronic sinus bradycardia. Fig. 4 showed ECG of
the transvenous endocardial pacing of case 13 who had no more syncopal attacks and transferred to pacemaker implantation.

Complications: Serious complications were not encountered in present study except for muscle twitch and pain in precordium by the indirect pacing with skin electrodes.

DISCUSSION

Classic indications of cardiac pacing had been considered for years as complete A-V block associated with syncopal episodes and/or heart failure, but recently extended to any types of bradycardia or brady-tachy disrhythmia including complete A-V block associated with syncopal episodes and/or heart failure. The number of cases of the present study was too small but almost all kinds of indications were included in this series.

Results of acute cardiac pacing depend likely on the methods and selection of the indications. The direct cardiac pacing by the catheter type electrodes of which bipolar type has been believed to be easy to use, is apparently most safe and valid in the acute or temporary cardiac pacing, but even the indirect cardiac pacing with skin electrodes has been sometimes valid in the treatment of the special emergency patients by doctors who has no experience of cardiac catheterization. Therefore, the indirect cardiac pacing can’t be likely scrapped away, but useful only for a short-term just before transferring patients to endocardial pacing. Two cases in the present report were effectively paced only for a short duration with skin electrodes.

The determination of the prognosis of heart block has been extremely difficult, but the data of Johansson dealing with 193 untreated patients between 1951 and 1964 showed a one year survival rate of 50 percent. Especially, 83 patients with coronary artery disease or acute myocardial infarction had only 36 percent of one year survival rate, and particularly patients died within 4 months of heart block. Others have reported almost similar data of approximate 50 percent of one year survival rate in chronic heart block. Therefore, 1 would say that the acute cardiac pacing, especially the transvenous procedure is valid for not only reducing the mortality but also abolishing symptoms in patients with heart block or brady and/or tachy disrhythmia.

SUMMARY AND CONCLUSION

Outlines of the acute cardiac pacing were presented as an enlightenment by introducing our small numbers of patients with various types of heart block and brady and/or tachy arrhythmia accompanied by Stokes-Adams episodes and/or heart failure.

Indications of acute cardiac pacing were emphasized to be extended to all patients with acute or recurrent episodes of Stokes-Adams, and/or heart failure caused by (1) acute A-V block, (2) acute or recurrent brady-tachy arhythmia such as sick sinus syndrome, and (3) chronic or recurrent A-V block.

Fairly good results were demonstrated to be obtainable in emergency or temporary treatment of patients with above-mentioned indications.

Discussion:

Answer to the question from chairman prof. E. Kimura

Matsumoto, S.: I have experienced two cases with synchronous diaphragmatic contraction induced by transvenous endocardial pacing. One case, who is 68 years old female with recurrent complete A-V block and Stokes-Adams episodes, became to complain abdominal pulsation and severe diarrhea after pacemaker implantation. In this case, catheter electrode was inserted in right ventricle, but no evidence of perforation of ventricular wall by catheter electrode, which believed as an evidence of perforation, was confirmed, and these complications subsided soon after an adjustment of electrode’s position. Another case of 62 years old male with brady-tachy
arrhythmia experienced right hemidiaphragmatic contraction during temporary right atrial pacing by semi floating catheter electrode without wall perforation.

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REFERENCES