Psychogenic Paroxysmal Cardiac Arrhythmias
Contents of Mental Events, Age and Patterns of Arrhythmias

Kimiaki Nakamoto

The Central Clinical Laboratory and the Department of Internal Medicine, Mitoyo General Hospital, Toyohama, Mitoyo, Kagawa Prefecture
(Director: S. Ichiki, M.D.)

Previously, the author differentiated the ECG changes induced by a transient emotional tension from those produced by a persistent stressful life situation; the former as a reflex and the latter as an adaptation. By studying those patients in whom arrhythmia was confirmed to be transient and from whom preceding mental events were drawn out by analytic history taking, the relations between the characteristic of mental events, age and the pattern of arrhythmia were investigated. Psychogenic paroxysmal cardiac arrhythmia might be a manifestation of an excess counter-regulation.

We often experience non-organic cardiac arrhythmias such as supraventricular tachycardia and ventricular premature contraction during the first several minutes of auscultation which can not be demonstrated by a subsequent registration of ECG. It is well known to the cardiologist that some of cardiac arrhythmias are not organic in origin. They are termed functional, uncomplicated, idiopathic, lone, psychogenic, neurogenic, nervous or vegetative. According to Maekawa and Kimura, "Patients with extrasystoles sometimes have organic heart disease but sometimes not. However, extrasystoles occur more often in patients with organic heart disease than in those without it . . . . It is, however, an undeniable fact that an extrasystole occurs also in patients without organic heart disease, probably of a functional origin . . . . As the cause of the functional extrasystoles the influence of the autonomic nervous system must first be taken into consideration . . . . As to the provocative factor of extrasystoles, excercise, emotional tension or emotional upset, smoking, overwork etc. should also be considered” White stated also as follows: “One can have disagreeable otherwise unimportant palpitation from emotional stress, consisting of forceful but regular heart beating or extra-systoles, that is, premature beats, regular paroxysmal tachycardia, atrial in nature, or even atrial flutter or fibrillation and ventricular paroxysmal tachycardia”. Delius and Keller published a report entitled “Die paroxysmalen Rhythmusstörungen des Herzens als klinisch-pathogenetische Einheit” in which they made the following statement: “Unsere Meinung geht dahin, daß jede Störung des vegetativen Gleichgewichts, unabhängig von der Richtung ihres Vorzeichens, als provocative factor in Frage kommt, daß ein solche Störung jedoch in

(Received for Publication, February 22, 1965)
der Regel nicht isoliert, sondern stets oder doch vorwiegend vor dem Hintergrund einer irritierten Psychodynamik ablaufen bzw. von dort her gespeist wird”. Many other authors also admitted the presence of psychogenic paroxysmal cardiac arrhythmias, but few of them studied the relations between the contents of preceding mental events, age and the patterns of cardiac arrhythmias.

In this paper, representative cases of psychogenic paroxysmal cardiac arrhythmias of various types which were precipitated by a certain emotional upset, emotional tension or mental and bodily exhaustion and which were neither preceded nor accompanied by gross bodily changes except those due to the arrhythmias themselves.

**Report of Cases**

Among those who showed cardiac arrhythmias at my consultation hours between 1962 to 1964, only those in whom arrhythmias were ascertained to be transient and from whom preceding mental events or in other words provocative factors were drawn out by analytic history taking are reported, i.e., 6 cases of ventricular premature contraction, 6 cases of second degree A-V block of Wenckebach type, 5 cases of supraventricular premature contraction or supraventricular tachycardia and 5 cases of atrial fibrillation.

I. Ventricular Premature Contraction

Paroxysmal ventricular premature contraction tended to be elicited by a sudden mental shock and to disappear when the trouble which caused the mental shock was settled or as the psychic trauma gradually faded away. Even in the aged as in Case 6, the heart responded to an unexpected mental shock and subsequent emotional difficulties with ventricular premature contraction and not with atrial fibrillation which appears more often in the aged as a psychogenic paroxysmal cardiac arrhythmia. Nevertheless, it can safely be stated that psychogenic paroxysmal ventricular premature contraction occurs more frequently in the young and middle-aged than in the aged.

Case 1) K. S., a 43-year-old widow with the splenic flexure syndrome. Toward evening November 7, 1963, she asked for medical examination complaining of precordial discomfort. There had been no cardiac arrhythmia until the end of October. The ECG taken on that day revealed a presence of ventricular premature contraction. A part of the ECG showed successive ventricular premature contractions simulating ventricular fibrillation. To my questions she answered that early that morning she was informed of a traffic accident which had occurred to her single son, and that her father went to Nagoya to see the details. About a week later, she came again for the drugs she had been taking for the splenic flexure syndrome. Palpation and auscultation revealed a regular sinus rhythm that day. She explained that the traffic accident gave damage only to the cars and not to the drivers (Fig. 1-A).

Case 2) T. Y., a 47-year-old woman who had been hospitalized for cholecystitis. At midnight November 7, 1963, she asked for medical examination complaining of precordial discomfort. There had been no cardiac arrhythmia until the end of October. The ECG taken on that day revealed a presence of ventricular premature contraction. A part of the ECG showed successive ventricular premature contractions simulating ventricular fibrillation. To my questions she answered that early that morning she was informed of a traffic accident which had occurred to her single son, and that her father went to Nagoya to see the details. About a week later, she came again for the drugs she had been taking for the splenic flexure syndrome. Palpation and auscultation revealed a regular sinus rhythm that day. She explained that the traffic accident gave damage only to the cars and not to the drivers (Fig. 1-A).
December 10, 1963, her sister was brought into the hospital with an ambulance by her neighbours and operated on for acute abdomen. The laparotomy revealed a rupture of extrauterine pregnancy. Because of an absence of her sister's husband who had left port for fishing, the patient had to attend on her sister. The following day she complained of precordial discomfort, and the ECG disclosed a presence of ventricular premature contraction. Two days after the operation her sister recovered consciousness and talked. So the patient felt relieved and slept well in her own sickroom that night.

Three days after the operation of her sister, no ventricular premature contraction was demonstrated in the patient (Fig. 1-B).

Case 3) A.T., a 48-year-old woman whose husband was chronically invalid. On June 22, 1964 she came for medical examination with chief complaints of tightness of the chest, excessive fatigue and insomnia. Three years before she once had an attack of syncope but no episode of cardiac arrhythmia. The invalidity of her husband had produced a tripartite love-affair. The traffic accident of her son occurred in such circumstance. The ECG taken on that day

A. During a Paroxysm, June 22, 1964.
B. After a Paroxysm, November 6, 1964.

Fig. 2. (Case 3) Ventricular Premature Contraction.

Japanese Circulation Journal Vol. 29, August 1965
demonstrated a presence of ventricular premature contraction, which subsided after a week of hospitalization. Laboratory examinations disclosed red cell count 4.04 million and haemoglobin 80 per cent. The liver and kidney function tests were normal (Fig. 2).

Case 4) D.A., a 53-year-old man who had been a sailor for about 30 years. Medical examination performed at the time of every embarking revealed no cardiac arrhythmia before. Lately, he had a terrible experience on the sea, resigned in October 1964 and found a new employment on land in which he was inexperienced. He was on bad terms with his younger boss and fellows who were obedient to the boss. He came for medical examination on October 26, 1964 with chief complaints of precordial and abdominal discomforts and insomnia. He had borderline hypertension and ventricular premature contraction. Analytic history taking failed to make him confide concretely what had happened to him at his new employment. He only said “It was a shock of surprise after 30 years of life on the sea.” The author told the patient “Your heart is not so bad as to produce extrasystoles. The extrasystoles may be an ex-

A. During a Paroxysm, October 26, 1964.
B. After a Paroxysm, November 18, 1964.

Fig. 3. (Case 4) Ventricular Premature Contraction.

*Japanese Circulation Journal Vol. 29, August 1969*
pression of your emotional upset you experienced at your new employment." Four days later, the cardiac rhythm was regular, and the blood pressure 160/90 mmHg. Laboratory examinations disclosed serum total cholesterol 263 mg/dl, serum total protein 8.6 g/dl, haemoglobin 102.5 per cent, haematocrit 51.5 per cent, Co R1 and Cd R2. BSP excretion test was normal (Fig. 3-A and B).

Case 5) T.G., a 58-year-old housewife whose husband managing a small workshop had been invalid with hemiplegia. Lately, among 10 of his workmen 5 resigned because of serious depression and a low labour cost. Moreover, her husband nominated the son of his former wife for the successor of his business. The workshop was nearly to fail, and she had a quarrel with this son almost every day for several days. She had never been told of arrhythmia before, but the ECG taken on July 6, 1964, when she complained of tightness of the chest, stiff shoulders and insomnia, showed a presence of ventricular premature contraction. On the 2nd consultation day, November 26, 1964, when she asked for the drugs given on the 1st consultation day, no ventricular premature contraction was demonstrated.

Case 6) S.G., a 72-year-old man with cerebral softening. Early on the morning October 12, 1964 he was astonished when he found that he could not speak. From that morning he felt precordial discomfort and dyspnea. The ECG

A. During a Paroxysm, July 13, 1964.

Fig. 4. (Case 8) Second Degree A-V Block of Wenckebach Type.

Japanese Circulation Journal Vol. 29, August 1965
Wenckebach’s period seemed to be related not only to mental but also to bodily exhaustions, and the source of mental and bodily stresses was nearly always present in their occupation. It disappeared after the busiest week or month such as the deadline of contract works, the end of school terms or the day or term of settlements was over or after several days of removal from the business which gave a good repose, both mental and bodily. Rarely, it left first degree A-V block as in Case 8). We had a few patients who had had a episode of precordial discomfort before and whose PQ interval was always more than 0.30 sec with a regular sinus rhythm.

Case 7) M. Y., a 34-year-old fisherman who had been accused of a kind of porching. At the end of December, 1962, he came for medical examination with chief complaints of precordial oppression, insomnia and headache. The ECG recorded on that day showed a typical Wenckebach’s period and a concave RS-T elevation in mid- and left precordial leads. Because of his subjective symptoms and objective signs of vegetative dysregulation, he was sent to a university clinic on suspicion of a cerebral tumour. The presence of a cerebral tumour was ruled out at the university clinic and psychotherapy was carried out. The ECG taken immediately after he was discharged from the university clinic, i.e., 2 months after his first visit to our department revealed a regular sinus rhythm with a normal PQ interval.

Case 8) S. O., a 26-year-old high school teacher. For several days prior to the 1st consultation, July 13, 1964, he had been extraordinarily busy in the adjustment of a term examination till the small hours of the morning. It was the first term examination after he became a teacher. Precordial discomfort disappeared soon after the term was over. The ECG taken on September 10, 1964, when he was asymptomatic, showed a normal ECG except for a slight degree of PQ prolongation. The blood pressure was 140/90 to 120/80 mmHg, and laboratory findings included CRP (−) and ASLO 333 units (Fig. 4. A and B).

Case 9) Y. F., a 18-year-old boy preparing for university entrance examination. He was a single son of a widow who wanted him to be a

*Japanese Circulation Journal Vol. 29, August 1965*
university graduate. The ECG taken on the consultation day, February 21, 1962, showed a typical Wenckebach's period and the concave RS-T elevation in mid- and left precordial leads, psychosomatic significance of which was previously reported by the author.\(^4\) The blood pressure was 130/86 mmHg, and CRP (−). They say that the patient became well after he entered university (Fig. 5).

Case 10) H. K., a 22-year-old working woman. From 2 months before the first visit on December 8, 1964, she had been engaged in a new employment. She was appointed to a branch workshop which was situated at a distance of 2 hours' ride of her home town. However, she did not give up her job because this was her second employment after her graduation from high school. She got up early in the morning, worked hard daytime and returned home late at night. Lately, she felt general malaise and precordial discomfort. The ECG taken on the first visit revealed a presence of second degree A-V block of Wenckebach type. Examinations of blood and urine were almost normal. She was recommended to get a week off in order to avoid an excessive load. Two weeks later, December 21, 1964, she came again for the medicines given on the first consultation day, and the ECG on the second consultation day showed a regular sinus rhythm (Fig. 6. A and B).

(Case 11) M. G., a 56-year-old man with diabetes mellitus and essential hypertension. He had never been told of cardiac arrhythmia before. From a month prior to the first consulta-
tion on November 11, 1964, he had been busy with a business tour which was partly unsuccessful. He complained of easy fatigability, stiff shoulders and insomnia. The blood pressure was 190/100 mmHg, and the ECG taken on that day revealed a presence of second degree A-V block with Wenckebach's period. Nine days later, November 20, 1964 he came again for abdominal discomfort, and the ECG showed a regular sinus rhythm without abnormalities in the PQ interval. Laboratory findings included serum total cholesterol 253 mg/dl, CRP (−), RAT (+) and fasting blood sugar 115 mg/dl.

Case 12) S. K., a 45-year-old chief of an agricultural cooperative association. On medical examinations he had never been told of cardiac arrhythmia before. For 1 month before the first consultation, September 18, 1964, he had been afflicted with personnel affairs in his office. He complained of stiff shoulders, tightness of the chest and insomnia. The blood pressure was 120/80 mmHg, and the ECG taken on that day showed second degree A-V block of Wenckebach type. He was placed on psychotherapy and given a tranquilizer for 2 weeks, and then the arrhythmia disappeared. Laboratory findings on the first consultation day disclosed CRP (−), ALSO 250 units, serum total cholesterol 172 mg/dl, serum total protein 7.0 g/dl, Co R₂, Cd R₇, serum GPT 15 units, haemoglobin 80 per cent and erythrocyte 4.51 million. BSP retention was 13 per sent at 30 minutes and ESR 14 mm at 1 hour.

A. During a Paroxysm, December 8, 1964.

Fig. 6. (Case 10) Second Degree A-V Block of Wenckebach Type.
III. Supraventricular Premature Contraction and Supraventricular Tachycardia

Paroxysmal supraventricular premature contraction tended to be elicited by a gradually increasing mental uneasiness or tension when it reached or exceeded a certain threshold level. Supraventricular premature contraction tended to occur most frequently in the middle-aged than in the young and than in the aged. In the young, mental tension or uneasiness of the same nature usually produces ventricular premature contraction, and in the aged atrial fibrillation occurs more often than supraventricular premature contraction. Supraventricular premature contraction usually disappeared when the trouble was settled or when the degree of mental tension or anxiety was decreased by a tranquilizer and/or psychotherapy. Paroxysmal supraventricular tachycardia was commonly induced by a sudden mental tension or surprise. It usually disappeared within several minutes as the tension or surprise faded away. But when not only the mental tension but also the precordial discomfort due to the tachycardia continued, supraventricular tachycardia could not be suppressed without sedatives or anti-arrhythmic drugs. The effects of Aschner’s and Czermak-Hering’s tests were usually transient. We experienced the Wolff-Parkinson-White syndrome not associated with paroxysmal tachycardia and supraventricular tachycardia with bundle branch block.

Case 13) V.S., 56-year-old woman. Several weeks after she became a chief of a women’s...
society of the city in April, 1962, she began to feel precordial oppression, stiff shoulders and headache. The ECGs taken several times during the ambulatory treatment showed supraventricular premature contraction to which procaine amide was not effective. This supraventricular contraction continued for about a year during which she had been a chief of a women's society of the city. About a month after she resigned the post the supraventricular premature contraction disappeared spontaneously. The blood pressure was 130/80 to 110/60 mmHg, and serum total cholesterol was between 210 to 270 mm/dl.

Case 14) S.K., a 49-year-old dayworker who had been operated on for subphrenic abscess.

He was sent from the Department of Surgery to the Department of Internal Medicine in August 1964. The fee for the operation, drugs and hospitalization was to be paid by his boss. When the bill was given to him by a hospital clerk, supraventricular premature contraction (December 12, 1963) and supraventricular tachycardia (November 11, 1963) occurred, and in both occasions the arrhythmias disappeared after he phoned 2 to 3 times to his boss (Fig. 7, A and B).

Case 15) K.H., a 54-year-old man who had been working away from home for 2 months before the first consultation. After his day's work was over, he killed time by seeing television program. Every night for about a week during which he absorbed in the program of professional baseball matches in which his protein was participated. The ECG taken in that week (September 24, 1964) showed a presence of supraventricular premature contraction. The arrhythmia disappeared spontaneously after the baseball season was over. He developed supraventricular premature contraction also between January 10 to 24, 1965 during which the grand "sumo" tournament was televised (Fig. 8, A and B).

Case 16) Y. U., a 63-year-old man who asked for medical examination complaining of palpitation, precordial discomfort and insomnia. Analytic history taking revealed that after a couple of his adopted son had a baby, the patient was requested by his adopted son to build a new separate house for them. One night his adopted son threatened the patient by saying that if the patient rejected it, he might leave not only the patient but also his wife (patient's daughter) and his son (patient's grandson). The ECG taken on the first consultation day (October 26, 1964) showed a presence of supraventricular premature contraction. About a month later (November 11, 1964), when a new house was in course of construction, no premature contraction was demonstrated by palpation and by auscultation. Serum total cholesterol was 225 mg/dl and serum GPT 12 units.

Case 17) H. T., a 39-year-old woman who had undergone thoracoplasty after her first delivery. Her husband wished to have 1 more child but

*Japanese Circulation Journal Vol. 29, August 1965*
she was afraid of conception and delivery. Several days before the first consultation at our department (October 30, 1964) she had been diagnosed as having gastroparesis and hyperthyroidism for her abdominal discomfort and palpitation. However, after fluoroscopic examination, BMR determination and analytic history taking at our department, she was told that "You are slim. So your stomach is also slim. Gastroparesis itself is not a disease entity. It only means that your stomach is located vertically and lower within your slender abdomen.

There is no decisive sign of hyperthyroidism. All the symptoms similar to those in hyperthyroidism is due to your uneasiness and a fear of the disease and the conception". After several times of persuasion and administration of a tranquilizer, she became bright and peaceful, and no palpitation occurred thereafter.

IV. Atrial Fibrillation

Paroxysmal atrial fibrillation occurred almost exclusively in the aged with a persistent mental tension or anxiety as a provocative factor. The
ECG before and after a paroxysm of atrial fibrillation usually showed coronary insufficiency. This type of psychogenic paroxysmal cardiac arrhythmia, especially that of tachyarrhythmia might cause the Adams-Stokes syndrome as in Cases 21) and 22). The paroxysm of atrial fibrillation usually subsided spontaneously as the mental tension or excitement gradually faded away or as the degree of tension was decreased by a tranquilizer and/or psychotherapy. Only when atrial fibrillation took a pattern of tachyarrhythmia, digitalis and/or sedatives should be given in order to prevent pulmonary congestion or the Adams-Stokes syndrome. Case 19) T. C., a 72-year-old widow without children. She made a living under the care of the town office. The money given monthly by the town office was always insufficient for her living. However, for a month prior to the first visit she could not do her private work because of her easy fatigability. She was surprised at the bills given by merchants at the end of the month. Complaining of precordial oppression, insomnia, anorexia and easy fatigability, she came for medical examinations with a certificate of medical protection of the town on July 15, 1964. The ECG taken on the first consultation day showed atrial fibrillation. Together with administration of segontin and nialamid, she was encouraged to go back to her private work and to take a walk either in the morning or in the evening for diversion. A week later, her

*Japanese Circulation Journal Vol. 29, August 1965*
expression was bright, and the pulse was regular. Laboratory examinations disclosed serum total protein 7.0 g/dl, serum total cholesterol 140 mg/dl, Co R₅ and Cd R₅. BSP retention was 10 per cent at 30 minutes.

Case 19) K.H., a 54-year-old man with diabetes mellitus and hypertension. For 2 weeks after the change of his post, he came to his new office from a former residence which was situated at a distance of 1 hour’s ride. On July 31, 1964 he came for the first medical examination before he moved to his new residence, when the ECG showed a regular sinus rhythm with coronary insufficiency. The ECG taken on the day of the change of his residence (August 7, 1964) showed atrial fibrillation, when he complained of precordial discomfort. The ECG taken on August 18, 1964 showed a regular sinus rhythm. He stated “Precordial discomfort disappeared as the things in a new residence were put in order”. The blood pressure was 150/90 to 140/80 mmHg. Laboratory studies revealed fasting blood sugar 85 mg/dl, serum total cholesterol 150 mg/dl, serum total protein 7.2 g/dl, Co R₅, Cd R₅ and serum GPT 8 units (Fig. 9. A, B and C).

Case 20) T.W., a 68-year-old doctor with essential hypertension who had been hospitalized for bronchopneumonia. The first paroxysm of atrial fibrillation occurred after he listened into a radio program of professional baseball matches until late at night (June 8, 1964). The atrial fibrillation continued for a day and disappeared spontaneously. He was ordered not to listen...
into a baseball program. The second attack occurred after he saw a television program of a professional baseball matches on the afternoon of July 10, 1964. The second attack also continued for a day and disappeared spontaneously. The last attack which occurred during hospitalization was induced by seeing finals of baseball matches of high schools of the whole country appeared in a television broadcast on August 18, 1964. The last paroxysm also continued for a day and subsided spontaneously. The blood pressure was 160/90 to 130/80 mmHg, and the eyeground of Scheie I. Laboratory examinations disclosed serum total cholesterol 255 mg/dl, fasting blood sugar 85 mg/dl, serum total protein 7.5 g/dl, Co R₅, Cd R₅, and serum GPT 13 units. BSP retention was 5 per cent at 30 minutes (Fig. 10 A, B, C, D and E).

Case 21) N. I., a 73-year-old woman with pulmonary tuberculosis. She had been hospitalized for 1 year and 7 months during which no arrhythmia had been observed. On September 18, 1964 she was informed of the death of her second daughter who had died of acute yellow liver atrophy 2 months before. The families had decided not to tell this to their mother lest their mother should be disheartened to death. On the following day she was uneasy and complained of precordial oppression and insomnia. Two days later she lost consciousness. The systolic blood pressure was lower than 70 mmHg, and the ECG recorded on that day showed a presence of tachyarrhythmia with a heart beat of more than 160/min. Immediately, a rapid intravenous digitalization was carried out. One day after the digitalization she recovered consciousness, when the blood pressure was 100/70 mmHg, and the ECG showed a regular sinus rhythm with a pulse rate of ca. 70/min. Laboratory examinations revealed erythrocyte sedimentation rate 27 mm/hour, serum total protein 7.5 g/dl, Co R₅, Cd R₅, serum GOT 15 units and serum GPT 15 units. The clinical course of this patient will be reported in details in a separate paper. (Jap. Dtsch. med. Ber. 10/4/1965).

Case 22) E. T., a 77-year-old man with pulmonary tuberculosis and emphysema. He had long been discontented with a couple of his son who carried on a printing office because of their in-hospitality to him. He frequently suffered from asthma when he got angry. At the end of December 1964, his son, who was very busy with contracts of printing a New Year's card and others, left his father who had been suffering from asthma without sending for a doctor for a few days. Even when a practitioner recommended hospitalization, the son refused to send his father to the hospital. One day before admission he developed dysarthria and status asthmaticus. Late at night December 28, 1964, the patient was carried into the hospital on a stretcher. The sensorium was obscure, and auscultation revealed a presence of tachyarrhythmia of more than 160 beats per minute. After drop infusion of 40 units of ACTH and injection of sedatives, he recovered consciousness. The ECG taken on December 30, 1964 showed atrial fibrillation of about 100 beats per minute. During New Year's days the patient was attended on by his son, son's wife and grandchildren, and the ECG taken on January 4, 1965 showed a regular sinus rhythm. Laboratory examinations disclosed erythrocyte count 3.25 million, leukocyte 11.200, eosinophils 0, haemoglobin 60 per cent, erythrocyte sedimentation rate 15 mm/hour, serum total protein 7.0 g/dl, serum total cholesterol 80 mg/dl, NPN 41.5 mg/dl, Co R₅, Cd R₅ and serum GPT 20 units.

V. Ventricular Fibrillation

"Psychogenic ventricular fibrillation" was reported by Gottsegen and Török 8, and "Paroxysmal ventricular tachycardia in patients with no demonstrable evidence of heart disease" by Armbrust and Levine (in 12%) 9, by Herrmann, Park and Hejtmancik (in 10%) and by Mackenzie and Pascual (in 5%) 10. However, we have as yet had no chance to observe a typical psychogenic ventricular fibrillation or paroxysmal ventricular tachycardia. Only in Case 1, a part of the ECG showed ventricular fibrillation or successive ventricular premature contractions (Fig. 1 A).

DISCUSSION

It is generally accepted that changes in emotion manifest themselves through the autonomic nervous system in the interbrain. If so, several literatures are of help to understand the patho-

Japanese Circulation Journal Vol. 29, August 1965
physiology of functional or psychogenic cardiac arrhythmias. As to the automatism of the nodal rhythm, Rothberger and Winterberg\textsuperscript{12} discussed as follows: "Diese Beschleunigung der Herzaktion und das nicht seltene anfallsweise Auftreten der AV-Automatie beim Menschen deutet gewiss darauf hin, dass eine Reizung der beschleunigenden und zwar der die Atrioventrikulargrenze versorgende Herznerven im Spiele ist... Vielmehr muss an reflektorische Erregungen gedacht werden, von denen wir auch aus experimentellen Erfahrungen wissen, dass sie sehr wohl imstande sind, ganz isolierte Reizwirkungen hervorzubringen. Aber auch andere Möglichkeiten der Entstehung v.a. Automatie werden in der Klinik zu berücksichtigen sein. Höhere Grade von v.a. Tachykardie können durch eine primäre Steigerung der Erregbarkeit bzw. der Reizbildungsfähigkeit des Atrioventrikularknotens hervorgerufen sein..."

As to the mechanism of the auricular arrhythmias in dogs Prinzmetal et al.\textsuperscript{13} stated as follows: "From our cinematographic, electrocardiographic and oscillographic observations the same basic mechanism would appear to be responsible for auricular premature systoles, auricular paroxysmal tachycardia, auricular flutter and auricular fibrillation, that is, a single ectopic focus... When the ectopic focus is cooled by spraying with ethyl chloride, the rhythm often changes in the following order: from auricular fibrillation to auricular flutter, auricular tachycardia, and sinus rhythm with auricular premature systoles. When the cooling is stopped and the point of application of the aconitine is allowed to come towards body temperature, a return of the arrhythmias in reverse order is usually observed... The same sequence of auricular arrhythmias described above may be produced by electrical stimulation instead of the local application of aconitine..." As to the role of prolonged repolarization in vulnerability to ventricular fibrillation Surawicz and his co-workers\textsuperscript{14} stated as follows: "Re-entry and ventricular fibrillation occurred when absolute refractory period terminated before the end of QRS. The interval between the end of QRS and the end of absolute refractory period was termed safety... Decreased safety and increased vulnerability to ventricular fibrillation in the early premature beats were not dependent on the threshold of excitability but on the duration of repolarization. They concluded that "Prolonged repolarization renders ventricles less vulnerable to late and more vulnerable to early premature beats". Kato\textsuperscript{15} demonstrated in dogs a shift of a pacemaker and a reduction of the PQ interval by application of sympato- or parasympathomimetic drugs to the sino-atrial node. He demonstrated also a PQ prolongation and a marked bradycardia by a direct vagal stimulation. Calvin and his co-workers\textsuperscript{16} reported "atropine reversal of potassium-induced atrioventricular block". Moore, Morse and Price\textsuperscript{17} produced cardiac arrhythmias by intravenous injections of catecholamines in anesthetized dogs. Clinically, Maekawa and Nohara\textsuperscript{18}, who recommended a combined administration of quinidine with serpasil for cardiac arrhythmias, observed an increase in urinary excretion of catecholamines 4 days before and a decrease 1 day before the restoration of a regular sinus rhythm. Gault and associates\textsuperscript{19}, advocating the "coupling index" (coupling interval/preceding cycle length), stated as follows: "Atrial premature contraction may initiate spontaneous atrial fibrillation in man. The likelihood of atrial fibrillation following an atrial premature contraction can be predicted from the coupling index." Harris and his co-workers reported the cardiovascular response to fear and anger under hypnosis and cardiac catheterization. Observing respiratory alkalosis and an increase in mean plasma hydrocortisone levels, they indicated that "Fear and anger produce identical haemodynamic responses, and that the mechanisms mediating the cardiovascular effect of emotion include significant non-adrenergic components."

With the foregoing observations and references it can safely be stated that psychogenic paroxysmal cardiac arrhythmia may occur in every individual with normal emotion when mental tension, excitement or exhaustion exceeds a certain threshold level which may differ individually according to his psychic and somatic predispositions and experiences. And the fact that arrhythmia is transient implies or even proves the presence of preceding or
provocative unusual mental events when no other gross bodily changes except those due to the arrhythmia are demonstrated. The author is of the opinion that psychogenic paroxysmal cardiac arrhythmias of any type may be a manifestation of an excess counter-regulation in which the cerebral cortex (correlation center), brain stem (feeling center), peripheral fibers of the autonomic nervous system and some humoral factors are participated. The author agrees with Delius and Keller when they advocate that all types of paroxysmal cardiac arrhythmias should be considered as one separate disease entity in clinical medicine, because the differentiation of psychogenic from organic arrhythmia is clinically very important. Namely, it makes a great difference in the effects of physician’s words when he says to a patient “The extrasystoles are merely an expression of your emotional upset” on one hand and when he says without searching for the preceding emotional upset “Your heart is badly damaged because extrasystoles occur only when the heart is extensively injured” on the other hand. In the latter case, the physician may lead the patient to suicide.

Summary

In 22 patients with paroxysmal cardiac arrhythmia from whom preceding unusual mental events were drawn out by analytic history taking, the relations among the contents of mental events, age and the pattern of arrhythmia were investigated. 1) Ventricular premature contraction tended to be elicited by an unexpected mental shock and subsequent emotional difficulties and to disappear when the trouble which caused the mental shock was settled or as the degree of the mental shock gradually faded away. Psychogenic paroxysmal ventricular premature contraction occurred more frequently in the young and middle-aged than in the aged. 2) Second degree A-V block of Wenckebach type tended to be related not only to mental but also bodily exhaustion, and the source of the mental and bodily stresses nearly always originated in their occupations. It disappeared after the busiest week or month such as the deadline of contract works, the end of school terms or the day or term of settlement was over or after several days of removal from the occupation. In a case it left first degree A-V block after the disappearance of Wenckebach’s period. The Wenckebach period tended to occur more often in the young and middle-aged than in the aged. 3) Supraventricular premature contraction tended to be precipitated by a gradually increasing mental uneasiness or tension when it reached or exceeded a certain threshold level. It usually disappeared when the trouble was settled or when the degree of mental tension or anxiety was decreased by a tranquilizer and/or psychotherapy. It tended to occur more frequently in the middle-aged than in the young. In the aged, mental tension or uneasiness of the same nature and degree usually induced atrial fibrillation more often than supraventricular premature contraction. Supraventricular tachycardia was commonly induced by a sudden mental tension or surprise. It usually disappeared within several minutes as the tension or surprise faded away. But when not only the mental tension but also the precordial discomfort due to the tachycardia continued, supraventricular tachycardia could not be suppressed without sedatives or anti-arrhythmic drugs. The effects of Aschner’s and Czermak-Hering’s tests were usually transient. 4) Paroxysmal atrial fibrillation occurred almost exclusively in the aged with a persistent mental tension as a provocative factor. The paroxysm usually subsided spontaneously as the mental tension or excitement gradually faded away or as the degree of tension was decreased by a tranquilizer and/or psychotherapy. In 2 cases of tachyarrhythmia of more than 160 beats per minute caused the Adams-Stokes syndrome. 5) The clinical importance of differentiating psychogenic from organic cardiac arrhythmia was emphasized, and the necessity of regarding all types of paroxysmal cardiac arrhythmia as a separate clinical disease entity was illustrated.

Part of the material of this paper was presented before the 13th Chugoku-Shikoku regional meeting of Japanese Circulation Society, Okayama, October 25, 1964.

REFERENCES


Japanese Circulation Journal Vol. 29, August 1965

ADDENDUM
Since this article was submitted for publication, I found that R. Hünig and C. H. Viets had published a paper entitled "Psychisch auslösbare Kammerflimmern beim Jugendlichen" in which they reported a 14-year-old girl with a clinically normal heart who developed intermittently the Morgagni-Adams-Stokes syndrome due to paroxysmal ventricular fibrillation. The paroxysm was easily induced within a few seconds by pleasant surprise or by simple leading questions. The authors proposed a condition of "labile Eurythmie" as a working hypothesis (Münch. med. Wschr. 106 Jahrg. Nr. 40 : 1759, 1964).