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SERIOUS HYPOTENSION FOLLOWING SEAFOOD INGESTION

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Serious hypotension has been reported in allergic states such as serum sickness, reactions to parenteral injection of foreign material for diagnostic or therapeutic purposes and hypersensitivity to ingested foods.(1) The latter is a rare clinical entity which has seldom been observed and is not well documented in the literature. The purpose of this paper is to present a case of serious hypotension which the authors believe to be an allergic reaction to ingested shrimp.

CASE REPORT

Case number 344069, a 61 year old man, entered the Emergency Room of the Henry Ford Hospital on November 7, 1953 at 6 p.m. with the complaints of “stuffy nose, shortness of breath and hives.”

The patient had eaten no food from early morning until his evening meal, prior to which he had drunk approximately one ounce of bonded whiskey. The meal consisted entirely of shrimp fried in hydrogenated vegetable oil. Symptoms occurred within ten minutes after eating the shrimp and he was brought immediately to the Emergency Room. He had a previous history of mild hives on several occasions for which specific causative factors were not elicited. There was a past history of chest tightness which occurred with upper respiratory infections and during the cold weather. The patient had never had hay fever and there was no family history of allergy. He had eaten shrimp, lobster, and other shell fish previously with impunity. For three weeks prior to the presenting illness he had been receiving penicillin injections from his family physician for a rectal abscess, with gradual clearing of the lesion. The last injection had been given two days prior to his admission.

This man had enjoyed good health throughout his life. There had been no symptoms of angina pectoris, coronary artery disease or congestive heart failure.

PHYSICAL EXAMINATION:

The patient, a moderately obese colored man, was scratching many areas of urticaria. When first seen he appeared rational and well oriented. The temperature was 97.6° F., the pulse was weak and rapid, and the blood pressure was 50 mm. Hg systolic and 40 diastolic. There was rhinorrhea and bilateral conjunctivitis. The retinæ were not unusual. Examination of the throat, chest and abdomen were normal. Rapid faint heart tones were noted. Deep tendon reflexes were equal and active. During the examination the patient became disoriented, and stated he “must get some air.” Against advice, he arose from the examining table.

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but immediately needed support as he started to collapse. The blood pressure was again found to be 50 mm. Hg systolic and 40 diastolic. Intravenous administration of 5% glucose and sterile water containing 4 mgm. of nor-epinephrine was started immediately. The blood pressure promptly rose to 110 systolic and 70 diastolic, orientation returned, and the hives subsided.

After two hours, the blood pressure and pulse remained at satisfactory levels and the nor-epinephrine was discontinued. Coronary artery occlusion was considered as a probable cause of the severe hypotension and the patient was admitted to the hospital for further observation.

An electrocardiogram taken soon after the intravenous medication was started showed a P-R interval of 0.24 seconds. The hemoglobin on admission was 12 grams%. Twelve hours later, the hemoglobin was 11.1, RBC 4,980,000, WBC 23,000, polys. 74, eos. 1, lym. 24, and mono. 1. The serological test for syphilis was negative and the urinalysis was normal. The blood NPN was 30 mg. %, and the fasting blood sugar was 126 mg. %. Four days later the blood count was as follows: hemoglobin 13.1, RBC 3.76, WBC 6,150, polys. 65, eos. 6, baso. 1, and lym. 27. Electrocardiograms taken four and twenty one days after the hypotensive period were similar to the first.

Skin testing with protein substances (animal epidermals, pollens, molds, and bacteria) showed no significant reaction. After it was learned that the patient had eaten shrimp prior to the onset of the original symptoms, scratch tests for clam, oyster, lobster and shrimp were applied. Tests with these substances showed an immediate skin reaction characterized by marked erythema and whealing, with pseudopodia extending along adjacent lymphatic channels. Within ten minutes after skin testing the patient complained of chest tightness and the pulse rate increased from 72 min. to 96 min. The blood pressure was 118 systolic and 70 diastolic. Three minim's of epinephrine were given subcutaneously with marked relief of symptoms. Subsequent tests for other foods, including fish and cotton seed (contained in vegetable fat preparations), showed no reactions. Passive transfer of the antibodies from the patient to normal subjects was accomplished by the method outlined by Prausnitz and Kustner. (2) In this procedure 0.1 cc. of the patient's serum was injected intracutaneously into three individuals previously proven to be non-sensitive to shell fish proteins. Subsequent testing at these sites of passive inoculation revealed positive reactions to all four members of the shell fish group.

COMMENT:

The characteristic symptoms of allergic shock occur most frequently following administration of pollen extract, serum, or other injectable substances. Reviewing the literature from 1895 through 1935 and reporting on the probable frequency of human anaphylaxis, Vaughan and Pipes (3) found 69 cases of severe shock or death. Two of these cases were presumably due to food hypersensitivity. In such instances the mechanism of the reaction seems to depend upon three factors: (1) the degree of the patient's sensitivity, (2) the dosage of the antigenic material and (3) the rate of absorption of the antigen. The accelerated skin reactivity to the scratch test for shrimp implies that our patient was markedly hypersensitive
Fig. 1—Control shows intradermal injection of 0.1 cc. of shrimp antigen in non-sensitized site in non-allergic subject.

Fig. 2—Results of intradermal injections of 0.1 cc. of shrimp antigen in same subject at site of passive transfer inoculation with patient’s serum.

Fig. 3—Scratch tests for various shell fish at site of passive transfer inoculation in non-allergic subject, showing antigenic relationship between members of these groups.
to this material. This is compatible with Cooke's observations (4) that immediate allergic responses (within 30 min.) following food ingestion may be confirmed by skin testing. This was further verified by the demonstration of circulating antibodies in our patient's serum by the passive transfer test. This is shown in Figures I, II and III.

It is well recognized that fish, especially of the shell fish type are highly antigenic and will provoke considerable reactivity in susceptible individuals. Tuft and others (5) have shown that multiple sensitivities to members of the fish family exist, and that there is a common antigenic relationship between members of the Crustacea and Mollusca species. This was well demonstrated in our patient by the presence of immediate skin reaction to all members of these species, although only shrimp was considered clinically significant.

The patient had eaten no food since early morning. Furthermore, the presence of alcohol presumably facilitated the absorption of shrimp from the intestinal tract in sufficient amounts to cause a generalized hypersensitive response. In all probability, absorption occurs as an intact protein substance. Walzer (6) has shown experimentally that immediate positive skin reactions can occur at the site of passive transfer inoculation following oral ingestion of specific antigenic substances. Our patient could therefore fulfill all three criteria necessary for anaphylaxis; namely, increased sensitivity and prompt absorption of a highly antigenic substance. This is demonstrated in diagramatic form in Figure IV.

![Diagram of Usual Anaphylaxis](attachment:usual_anaphylaxis.png)

![Diagram of Case Presented](attachment:case_presented.png)

The electrocardiographic findings of a prolonged P-R interval, persisting after recovery, indicates a mild conduction defect probably of arteriosclerotic origin and not due to the allergic reaction or the pharmacologic effect of nor-epinephrine. Coronary vasculitis and cellular infiltration of the myocardium have been reported...
during allergic states, and confirmed by post-mortem studies. (7-8) These entities were not felt to be present in the case reported since the electrocardiographic changes persisted long after the allergic manifestations had subsided. It is possible that some cases of unexplained sudden death, usually attributed to myocardial infarction, are actually episodes of fatal anaphylaxis due to food.

It seems unlikely that the attack could represent a delayed anaphylactic response to penicillin, in view of the two day interval between the last injection and the presenting symptoms. Furthermore, prompt and sustained recovery with anti-allergic measures is the exception rather than the rule in delayed penicillin reactions.

We cannot explain the initial leucocytosis of 23,000. Wintrobe (9) has reported a leucopenia in anaphylactic shock and other allergic states, including serum sickness. Vaughan (10) has used the leucopenic index as a measure of individual sensitivity to ingested substances, but this procedure has not met with universal approval.

**SUMMARY**

A case of serious hypotension thought to be due to shrimp ingestion is reported. Such an occurrence depends on the rapid absorption of highly antigenic substances to which the subject is hypersensitive. A careful history is essential in determining the etiologic factors involved in such cases. Skin testing and passive transfer of antibodies was used to confirm the allergic response. It is possible that some cases of unexplained sudden death are due to allergic shock.

**REFERENCES**


