ASPIRIN POISONING

BY

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Reports of cases of aspirin poisoning, with the exception of those of Balázs (1930, 1931), have in the main been concerned with isolated instances and have discussed the clinical features, the difficulties of diagnosis, the post-mortem appearances, or therapeutic measures (Dyke, 1935; Wyllie, 1935; Neale, 1936; Charters, 1944). Hopkins (1945) was able to collect only 22 cases from the English literature during the years 1919-45, when he reported a case with recovery after the ingestion of 1,250 gr. (81 g.).

In the present paper the clinical features of aspirin poisoning are described from experience of 48 cases of attempted suicide with aspirin seen in the past two years. Two were fatal. These patients were all seen in the psychiatric wards of a general hospital serving, for purposes of Section 20 of the Lunacy Act, an urban population of about a million inhabitants. All cases of attempted suicide in the area notified to the police or to relieving officers before the National Health Act and to duly authorized officers since are brought to these wards, and therefore an unusual opportunity exists for observing a high percentage of the cases of attempted suicide in a large population.

From the figures presented in Tables I and II it is apparent that there has been a relative and an absolute increase in the number of cases of aspirin poisoning with

TABLE I.—Incidence of Aspirin Poisoning: Males

	1940	1941	1942	1943	1944	1945	1946	1947	1948
Aspirin poisoning ..	2	1	0	6	3	5	4	2	9
Total attempted suicide ..	47	37	27	39	37	61	81	57	65
Total admissions ..	447	337	343	363	366	348	350	320	315

TABLE II.—Incidence of Aspirin Poisoning: Females

	1940	1941	1942	1943	1944	1945	1946	1947	1948
Aspirin poisoning ..	0	2	7	4	7	3	4	16	21
Total attempted suicide ..	35	33	31	43	35	45	53	67	95
Total admissions ..	427	375	350	339	375	357	401	438	450

suicidal intent in 1947 and 1948 in this area. During this period there were 48 cases of aspirin poisoning out of 284 cases of attempted suicide. The increase is mainly confined to females. Aspirin is the household remedy in most common use, and this ready availability is no doubt the most important factor in the increased incidence. Several other interesting points emerge from an examination of these tables. In males there was a higher attempted suicide rate over the period 1945 and onwards, whereas in females this increase did not occur until 1947. Before 1947 aspirin was used in about 10% of attempts at suicide in females, while over the past two years this figure has

TABLE III.—Quarterly Incidence of Attempted Suicide: Females

	1947			1948		
	Total Patients	Attempted Suicide	Aspirin Suicides	Total Patients	Attempted Suicide	Aspirin Suicides
Jan.—March ..	110	9	0	104	17	0
April—June ..	112	18	6	130	40	12
July—Sept. ..	117	22	3	95	19	6
Oct.—Dec. ..	99	18	7	121	19	3
Totals ..	438	67	16	450	95	21

increased to between 20 and 25%. It has often been observed that attempts at suicide are relatively infrequent during the first quarter of the year. Table III illustrates not only this but also that, remarkably, no cases of aspirin poisoning occurred during this period of 1947 or 1948.

In the description that follows no special attempt is made to classify the cases according to the psychiatric manifestations. Hopkins (1937) described psychotic patients adopting self-mutilation, cut throat, hanging, immersion, and the caustic poisons for purposes of attempting suicide. The more bizarre the attempt the more questionable is the mental state. In my series of cases the psychic manifestations were in the main relatively mild.

No minimum fatal dose has been established, although most of the recorded deaths occurred within the range of 400-600 gr. (25.9-38.9 g.), but recovery has taken place after very much larger amounts. Hopkins (1945) reported 1,250 gr. (81 g.) (treated within three hours); Evans (1938) 1,500 gr. (97.2 g.) (treated within two hours); and in one of my cases 2,000 gr. (129.6 g.) (treated within five hours). In these three cases gastric lavage was performed early and powder was found in the stomach washings. In contrast to these cases, which recovered after early recognition and treatment, Biddle (1938) reported a fatal case with epileptic convulsions preceding death, which took place after 17 hours. The patient was a schizophrenic with delusions, and her story of having taken the aspirins was not believed.

Clinical Features

These are determined by two factors—excessive dosage and individual susceptibility. The earliest symptoms are mainly gastric and occur shortly after taking the drug. There is first a feeling of gastric discomfort, followed by pain in the epigastrium, nausea, and later vomiting. These symptoms are doubtless due to the direct irritant effect of the aspirin on the gastric mucosa (Douthwaite and Lintott, 1938). Aspirin is relatively insoluble, and large fragments will remain in contact with the gastric mucosa for a long time. The presence of an irritant in the stomach often leads to some degree of pylorospasm, which will delay the passage of the aspirin. This explains the finding of aspirin powder in the stomach after the normal emptying-time, and the value of gastric lavage up to many hours after the ingestion of the tablets.

Giddiness, tinnitus, and deafness occur later, and in the average case last for as long as 48-72 hours. The face often shows a blotchy erythema with some oedema, especially around the eyes. Profuse perspiration has been a constant finding. The patient is literally bathed in sweat until the toxæmia is overcome, and is very restless and resentful of interference. In Hopkins's (1945) case hallucinations occurred over a period of four days, but I have not met with this symptom. In more severe cases coma supervenes and the patient shows the features of shock, with subnormal temperature and low blood pressure. Renal symptoms have not played a prominent part in my cases, and I observed no abnormality apart from the presence of traces of albumin in the urine. Other authors have found greater evidence of renal damage. The speed with which treatment is usually possible may have some bearing on this finding. Haematemesis was not observed in my series. A pyrexia of up to 100 or 101° F. (37.8 or 38.3° C.) was often seen during the first 48 hours in severe cases.

Many of the clinical features are the result of acidosis with reduction of the alkali reserve. Respirations are deep

and rapid, but in spite of the apparent urgency of the respiratory embarrassment there seems to be little discomfort, and in no case has the patient complained of it. Severe or acute allergic reactions were not seen. The only findings suggestive of allergy were the slight oedema around the eyes and the blotchy erythema of the face. Dehydration, which develops if an adequate intake of fluids is not assured, is the result of the profuse perspiration and the rapid deep respirations.

Diagnosis and Prognosis

Diagnosis may be a difficult problem, especially where no history is available, and patients who have taken poison with suicidal intent may on occasion withhold this information even when conscious. One patient denied that she had taken any drug even after she had vomited material with the appearance of aspirin and giving the chemical reactions of acetylsalicylic acid. Aspirin poisoning should be considered when there is a blotchy erythema of the face with profuse perspiration and tachypnoea and tachycardia without distress, cyanosis of severe degree, and pathological signs in the heart or lungs.

Examination of the urine is a particularly valuable diagnostic measure. Aspirin is excreted in the urine as salicylic acid, which gives a purple colour with ferric chloride. To about 5 ml. of urine 10% ferric chloride is added drop by drop. A white precipitate of ferric phosphate is obtained and the urine then turns purple if salicylates are present. To distinguish this coloration from that produced by the presence of aceto-acetic acid, boil thoroughly 10 ml. of the urine, cool, and add ferric chloride. If the urine contains salicylates it will still give a purple colour; if it contains aceto-acetic acid there will be no colour change; and if it contains both substances the purple colour will be less intense than before (Harrison, 1947). Confirmatory tests are also described by that author.

In mild cases recovery is rapid, symptoms clearing in the first 48 hours. In the more severe cases coma may supervene and death may occur at any time during the first 72 hours. This is usually preceded by a rise in temperature; epileptic convulsions have been described, and stertorous or gasping respirations occur more regularly, with myoclonic twitching of the face and limbs. During 1947-8 there were two deaths out of the 48 patients seen. The first was the result of bronchopneumonia even though treatment was instituted early and the patient had been in good condition when first seen; in the second the patient was moribund on admission to hospital, having taken the aspirin almost three days previously.

During the period 1940-8 there were seven deaths associated with aspirin poisoning. Obvious pathological symptoms were present in two of these and the aspirin was only contributory. In the first there was a large cerebral haemorrhage, and in the second advanced generalized atherosclerosis with hypertrophy of the left ventricle and renal changes. Most of these seven patients had taken 500 gr. (32.4 g.) of aspirin, one dying after 400 gr. (25.9 g.) and another after 625 gr. (40.5 g.). In none of the seven cases had the patient been brought to hospital within the first twelve hours—i.e., during the period that gastric lavage would be of value. The majority were not seen until after the first 24 hours, and in two cases there was a lapse of at least 48 hours. The patients were either comatose on admission or rapidly became so after admission, and death occurred within five hours in three of the cases. The treatment in these cases included the use of stimulants (niketha-

mid, strychnine, etc.), drainage of C.S.F., intravenous fluids, and sodium bicarbonate. From the records available these measures do not seem to have greatly modified the clinical picture before death.

Briefly, the post-mortem findings have been those of an asphyxial death: cyanosis of the skin and viscera, petechial haemorrhages on serous surfaces, and congestion of the lungs. In one case bronchopneumonia developed on chronic bronchitis, and two others showed gross morbidity as indicated above.

Treatment

In general, early gastric lavage is the most important single therapeutic factor. All the measures advocated by Dyke (1935), Neale (1936), Oakley and Donnell (1942), and Charters (1944) have their place, depending on the clinical picture and the general condition of the patient. Although the degree of toxæmia inevitably depends on the amount of aspirin taken, subsequent clinical events bear a more direct relation to the speed with which treatment is instituted. If gastric lavage can be performed within the first few hours of taking the drug recovery can almost be assured. In the case described below 2,000 gr. of aspirin had been taken, yet the patient recovered, although she was dangerously ill for about 36 hours before improvement was apparent. In this connexion it is noted that all the deaths occurred in patients whose admission to hospital had been considerably delayed. Where this delay occurred treatment had no apparent effect on the patient's condition.

The bulk of the patients were brought to hospital within a few hours of taking the drug. Where the diagnosis was clear from the history—and a history was usually available—immediate gastric lavage was performed. A clinical impression is that washing the stomach with a weak solution of sodium bicarbonate is a better measure than using simple water. The stomach is washed until no trace of aspirin powder can be seen in the washings, and then, before the tube is withdrawn, one pint (570 ml.) of a solution containing 1% sodium bicarbonate is left in.

Later sodium bicarbonate is given in doses of 60 gr. (3.9 g.) at two-hourly intervals for a time and then four-hourly, depending on the clinical picture. If there is evidence of increasing acidosis two-hourly doses should be given, but as soon as acidosis is being overcome four-hourly doses are sufficient. In all but the deeply comatose—and this is a rare event if treatment is started early—the sodium bicarbonate can be given by mouth in water, soda-water, or milk. Fluids should be pushed to prevent dehydration. Shock is treated by the usual simple methods of warmth and intravenous fluids, the latter especially if there is any dehydration. Where there is evidence of vasomotor collapse with a pronounced fall in blood pressure "eucortone" or desoxycortone acetate is valuable.

The patient is made more comfortable with sponging, but care should be taken to prevent pulmonary infection, and penicillin should be given prophylactically until acidosis has been controlled. Where treatment as described above was adequately and speedily carried out, especially the gastric lavage, improvement was rapid, and within 48 hours the condition of the patient was good and such symptoms as tinnitus, deafness, tachypnoea, and excessive perspiration to all intents disappeared. It is doubtful whether intravenous sodium bicarbonate can influence severe and late cases. Lumbar puncture was used in such cases but only with other medication, and it is again doubtful whether the result was modified by this measure. A practical difficulty in carrying out lumbar puncture may be the

extreme restlessness and resistiveness of the patient, and an anaesthetic may have to be administered, which will increase the risk and is scarcely justified.

The following case report illustrates most of the features described above.

Case Report

A married woman aged 26 was brought to hospital at 3.30 p.m., having taken 400 tablets of aspirin about five hours previously. The dose of 400 5-gr. (0.32-g.) tablets was later confirmed by the patient on recovery and by police investigations. She had vomited once, and on arrival at hospital was very agitated and complained of severe ringing in the ears. Her general condition was good, but she was flushed and perspired freely. Her temperature was 98.4° F. (36.9° C.) and the pulse rate 100. The stomach was washed with a solution of sodium bicarbonate until the washings were clear, and 1 pint was left in the stomach. The early washings contained aspirin powder. Nikethamide, 4 ml. intramuscularly, was given. The heart, lungs, and C.N.S. were normal.

After this first-aid treatment she remained flushed, drowsy, and perspiring, and complained of tinnitus and deafness. The pulse rate increased to 120. Nikethamide and copious fluids containing 2% sodium bicarbonate were given throughout the night.

The following day her physical condition was not so satisfactory. There was much restlessness and profuse perspiration. Respirations were regular but forced at a rate of 28 per minute, the pulse thready and the rate rising to 130. Systolic blood pressure ranged from 80 to 90 mm. Hg. The diastolic pressure could not be recorded. Heart sounds were normal. Fine crepitations were heard over the anterior aspects of both lung fields. With the exception of absent knee reflexes the C.N.S. was normal. There was no abdominal tenderness and the liver was not palpable. The urine contained a trace of albumin, and tests for salicylates were positive. Penicillin was given prophylactically in addition to sodium bicarbonate, nikethamide, and fluids. On account of the low blood pressure 10 mg. of desoxycortone acetate was given and later repeated.

The next day her general condition was much improved. Her blood pressure was 100/60 and her pulse rate 115. The deafness and tinnitus gradually declined in intensity, and she made an uninterrupted recovery. Salicylates were excreted in the urine until the fifth day.

At no time had there been more than mild confusion of thought. Her mental state was one of severe depression.

Summary

There was an increase in the use of aspirin as an agent for attempting suicide in 1947 and 1948.

The clinical features of aspirin poisoning are described.

Treatment, with special reference to the value of early gastric lavage, is discussed.

A case of aspirin poisoning in which 2,000 gr. were taken, with recovery, is reported.

It is with pleasure that I acknowledge my thanks to Dr. F. Hopkins, consulting psychiatrist, Smithdown Road Hospital, for his constant encouragement, advice, and stimulation; to the nursing staff for their help; and to Dr. J. P. Steel, medical superintendent, for permission to refer to hospital records and to publish this report.

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HAEMATEMESIS AS A SURGICAL PROBLEM

BY

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In the past three years 150 patients have been admitted to the Royal Berkshire Hospital with gastro-duodenal haemorrhage. After excluding 15 patients who were known to have bled from tumours, oesophageal varices, etc., there remain 135 cases in which the haemorrhage was believed to be from an acute or chronic peptic ulcer. Their treatment forms the subject-matter of this paper. There were 10 deaths in the series. The cases were all admitted to surgical wards and were therefore regarded as potential surgical problems. Thirty-three patients were selected for surgical treatment, with two deaths.

There is still considerable difference of opinion about the part to be played by surgery in the treatment of this condition. This is partly due to a widespread belief that under medical treatment the mortality is very low, and partly to a concept that these patients cannot be treated surgically without a very high death rate. Avery Jones (1947), reporting on the results of his large series of cases so carefully treated and so fully investigated, has given us much new information and a very clear picture of the dangers of the disease with which we are dealing. There were 615 cases of peptic ulceration in his series, and the mortality was 7.8%. This is undoubtedly much lower than for the country as a whole; thus Lewin and Truelove (1949) have recently reported a 19% death rate from Oxford.

Avery Jones emphasized that we are dealing with two distinct and almost unrelated diseases—the acute erosion and the chronic ulcer—the most striking difference between the two conditions being in their respective death rates. He gives us the following facts with regard to medical treatment. (1) The mortality following haemorrhage from a chronic gastric ulcer is 20%. If bleeding recurs the mortality rises to 48%. (2) The mortality following haemorrhage from a chronic duodenal ulcer is 9% for males and 6% for females. If bleeding recurs this rises to 35%. (3) The risk of death falls almost entirely on patients over 40 years of age. (4) The acute ulcer has a very low mortality, but this rises to 7% if bleeding is recurrent. (5) Very severe recurrent haemorrhage may be caused by an acute ulcer.

From his results Avery Jones logically concluded that surgery might be indicated in “those patients, particularly over 50, with good clinical evidence of a chronic ulcer . . . who had brisk recurrent haemorrhage after admission.”

Gordon-Taylor (1946) has long taught that surgery could save many lives if employed with discretion and skill and if supported by adequate blood transfusion. He pleads for early consultation with the surgeon in all cases where surgery might be of value.

Unfortunately, the results of surgery have not in the past been encouraging, and although Finsterer obtained a mortality of less than 4% by operating on all cases within 48 hours he could have achieved this only by operating on many patients who would have recovered without surgery. It is not justifiable to subject large numbers of patients to an unnecessary operation in order to save the few who would die without it.