regressed. His mental state, however, remained unchanged, and as it was considered possible that the encephalitis could have precipitated schizophrenia in a genetically predisposed individual a course of electric convulsion therapy was given, with definite improvement. At the time of writing (September 1970) he showed features of a chronic schizophrenic defect state.

Discussion

The occurrence of schizophrenia-like states in encephalitis is of great theoretical interest and there has been much discussion on the significance of such a presentation. It has been postulated that the patient must be genetically loaded for schizophrenia and that the illness has released a constitutional predisposition (Bumke, 1924). However, a recent review of the whole topic of schizophrenia-like psychoses associated with organic disorders of the central nervous system, including encephalitis of various types, showed that such cases usually occur in patients without a genetic loading for schizophrenia (Davison and Bagley, 1969). Only one of our

three cases had a positive family history for mental illness. It would seem, therefore, that in these schizophrenia-like cases the encephalitis is usually of direct aetiological significance rather than merely a precipitating factor.

Of more practical relevance, in view of the importance of early diagnosis in encephalitis, is the fact that all these cases were admitted to a psychiatric unit with a provisional diagnosis of acute schizophrenia and with clinical pictures initially indistinguishable from the latter. They are recorded as a reminder of a possible presentation of encephalitis.

References

- Bumke, O. (1924). *Klinische Wochenschrift*, 3, 437.
 Davison, K., and Bagley, C. R. (1969). In *Current Problems in Neuropsychiatry*, ed. R. N. Herrington, p. 113. London, Royal Medico-Psychological Association Publications.
 von Economo, C. (1931). *Encephalitis Lethargica: Its Sequelae and Treatment*. Translated by K. O. Newman. London, Oxford University Press.
 Hall, S. B. (1929). *British Medical Journal*, 1, 444.
 Jelliffe, S. E. (1925). *American Journal of Psychiatry*, 6, 413.
 Weinstein, E. A., Linn, L., and Kahn, R. L. (1955). *Journal of the Mount Sinai Hospital*, 21, 341.

PRELIMINARY COMMUNICATIONS

Xylose Test: Effect of Aspirin and Indomethacin

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Summary

The xylose test was used to assess the effect of drugs on intestinal absorption. Both aspirin and indomethacin reduced the urinary output of xylose. By giving xylose intravenously as well as orally it was found that aspirin had a parenteral effect, probably impairing renal function, whereas indomethacin depressed intestinal absorption.

Introduction

Drugs such as neomycin (Jacobson, Prior, and Faloona, 1960; Jacobson, Chodos, and Faloona, 1960) and phenformin (Stowers and Brewsher, 1969) affect intestinal absorption and reduce xylose excretion. Both aspirin and indomethacin cause dyspepsia, but their effect on intestinal function in man is unknown. Experiments on animals suggest that they might interfere with absorption since both drugs inhibit the active transport of an amino-acid (Levy, Angelino, and Matsuzawa, 1967) and salicylates affect the passage of glucose (Smith, 1958) across isolated intestinal preparations. Drugs may also modify renal function. Aspirin may cause analgesic nephro-

pathy (Nanra and Kincaid-Smith, 1970), though acute renal effects have not been described.

The xylose test is a useful way of assessing intestinal function, the site of its absorption being the jejunum. Low values may, however, be due either to malabsorption or to renal impairment, though in the latter the excretion of intravenously administered xylose will also be low (Kendall, 1970). We have used oral and intravenous xylose to study the effects of aspirin and indomethacin on absorption and excretion.

Patients and Methods

The oral test was performed with a 5-g dose of D-xylose and an initial two-hour and subsequent three-hour collection of urine as suggested by Sammons *et al.* (1967). For the intravenous test the same dose is given as 50 ml of 10% solution; the urine is then collected as for the oral test to give two-hour and total five-hour excretions (Kendall, 1970). Excretion of xylose in the urine decreases with age, but this was not a factor here as patients acted as their own controls. Our normal range in 100 tests varied from a mean of 1.13 g at 21 to 30 years to 0.8 g at 61 to 70 years after two hours, and 1.97 to 1.56 g respectively at five hours after oral xylose (Kendall, 1970). After intravenous xylose the means were 1.93 and 1.41 g, and 2.53 and 2.0 g respectively. Two-hour collections of urine really provide all the information and may be a better guide to absorptive efficiency (Kendall and Nutter, 1970).

The influence of drugs was assessed by comparing the excretion of xylose while taking the drug with the control value for that patient. Salicylate was given as four tablets of soluble aspirin (1,200 mg) and indomethacin as four capsules (100 mg). Each was taken with the oral xylose or 30 minutes before the intravenous dose. The differences in xylose excretion were analysed by Student's *t* test. The changes in xylose excretion were also expressed as a percentage of the control value so that a mean percentage rise or fall was obtained.

The intravenous xylose test has been used to study the effect of drugs at sites other than the gastrointestinal tract. Though variation in metabolism could explain changes in xylose excretion, modification in renal function is more likely.

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Changes in excretion rate following a dose of 5 g of xylose intravenously correlate fairly closely with glomerular filtration rate as assessed by creatinine clearance studies. (Figs. 1 and 2).

The effect of indomethacin on gastric emptying was studied in the gastrointestinal laboratory by comparing the amount of xylose leaving the stomach in 20 minutes. Five grammes of D-xylose in 300 ml of water at 37°C was given over five minutes down a Salem sump tube positioned for gastric acid studies. After 20 minutes the stomach was aspirated and the residual quantity of xylose estimated. The test was then repeated in the same way with patient and tube in the same position after giving 50 mg of powdered indomethacin down the tube at the onset.

Patients.—Oral xylose studies were performed on 16 unselected consenting medical patients with and without aspirin and on a further 16 with and without indomethacin. Intravenous tests were performed on 10 patients with each

drug. Gastric emptying studies were carried out on seven. Two of the patients who had xylose tests with and without aspirin had some renal impairment—a man with ischaemic heart disease and a blood urea of 66 mg/100 ml and a hypertensive man whose blood urea was 58 mg/100 ml. The other patients had no evidence of kidney disease, the serum urea and creatinine were less than 40 mg/100 ml and 1.2 mg/100 ml respectively, and there was no abnormality on urine analysis. Tests were performed on patients in a steady state and under the same conditions.

Results

The influence of aspirin on the oral and intravenous xylose tests is shown in Figs. 3 and 4 for two and five hours respectively. Decreases in excretion in the oral and the two-hour

FIG. 1—Xylose excreted in two hours after 5 g D-xylose intravenously plotted against creatinine clearance.

FIG. 2—Xylose excreted in five hours after 5 g D-xylose intravenously plotted against creatinine clearance.

FIG. 3—Effect of aspirin on the two-hour oral and intravenous xylose tests.

FIG. 4—Effect of aspirin on the five-hour oral and intravenous xylose tests.

intravenous tests are highly significant ($P<0.001$) and the five-hour intravenous one is significant ($P<0.005$). The percentage falls are shown in the Table. These results show that aspirin produces a considerable reduction in xylose output by a parenteral effect, probably on renal function.

The corresponding effects of indomethacin are shown in Figs. 5 and 6 and in the Table. There is a highly significant reduction in the two-hour oral test ($P<0.001$) and a significant reduction at five hours ($P<0.05$). Indomethacin has no significant influence on the excretion of xylose given intravenously. Thus the reduction in excretion produced by giving indomethacin with oral xylose is an intestinal effect.

Mean Percentage Change in Oral and Intravenous Xylose after Aspirin and Indomethacin

	2-hour Oral	5-hour Oral	2-hour Intravenous	5-hour Intravenous
After aspirin ..	-24.2	-24.2	-23.7	-16.8
After indomethacin ..	-19.7	-10.6	+ 4.4	+ 0.5

To exclude the possibility that the fall in xylose excretion simply indicates gastric retention, the effects of indomethacin on gastric emptying are given (Fig. 7); an increase in

FIG. 5—Effect of indomethacin on the two-hour oral and intravenous xylose tests.

FIG. 6—Effect of indomethacin on the five-hour oral and intravenous xylose tests.

FIG. 7—Effect of 50 mg of indomethacin on the amount of xylose leaving the stomach in 20 minutes.

the amount of xylose leaving the stomach in 20 minutes is shown.

Discussion

Aspirin reduced urinary excretion of xylose by a parenteral effect without influencing absorption. While increased metabolism or diversion of xylose into an extravascular compartment is possible, a reduction in output due to a renal effect is more likely. Chronic changes in the kidney are known to be associated with salicylate therapy (Nanra and Kincaid-Smith, 1970) though acute changes in renal function have not hitherto been recognized. Beeley and Kendall (1971), however, produced evidence that aspirin does modify renal function acutely by using ¹²⁵I Hypaque (diatrizoic acid) in a plasma clearance technique which measures glomerular filtration rate.

Indomethacin reduced xylose absorption. This was not due to delay in gastric emptying, which was in fact more rapid; so malabsorption may be due to increased intestinal motility. It does not appear to cause mucosal damage like neomycin (Jacobson, Prior, and Faloon, 1960), as jejunal biopsies in five of our patients on indomethacin were normal. It could influence mucosal enzyme systems for it is an uncoupler of oxidative phosphorylation; this may explain the inhibition of amino-acid transport in the rat intestine (Levy *et al.*, 1967).

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References

- Beeley, L., and Kendall, M. J. (1971). *British Medical Journal*, In press
 Jacobson, E. D., Chodos, R. B., and Faloon, W. W. (1960). *American Journal of Medicine*, 28, 524.
 Jacobson, E. D., Prior, J. T., and Faloon, W. W. (1960). *Journal of Laboratory and Clinical Medicine*, 56, 245.
 Kendall, M. J. (1970). *Gut*, 11, 498.
 Kendall, M. J., and Nutter, S. (1970). *Gut*, 11, 1020.
 Levy, G., Angelino, N. J., and Matsuzawa, T. (1967). *Journal of Pharmaceutical Sciences*, 56, 681.
 Nanra, R. S., and Kincaid-Smith, P. (1970). *British Medical Journal*, 3, 559.
 Sammons, H. G., et al. (1967). *Gut*, 8, 348.
 Smith, M. J. H. (1958). *American Journal of Physiology*, 193, 29.
 Stowers, J. M., and Brewster, P. D. (1969). *Postgraduate Medical Journal*, May supplement, p. 13.

MEDICAL MEMORANDA

Pancreatic Ascites

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Ascites is common in Uganda, being a manifestation of hepatic cirrhosis, renal disease, malabsorption, malnutrition, neoplasm, particularly hepatoma, peritoneal tuberculosis, and heart disease, especially endomyocardial fibrosis. Furthermore, it is much commoner in other forms of heart disease than it is in Europe or the U.S.A. (Somers, Brenton, and Sood, 1968). We report here the case of a patient whose ascites was completely cured by surgery.

Case Report

The patient, a 16-year-old Rwandan boy, had intermittent vomiting for one month, swelling of the left leg for six days, and abdominal pain and distension for three days. Examination showed gross ascites and left femoral vein thrombosis but no other abnormal physical signs. The ascitic fluid was blood-stained (protein 120 mg/100 ml) and the prothrombin time was prolonged, so the venous thrombosis was not treated with anticoagulants. After complete paracentesis no intra-abdominal masses or organs could be palpated except for a slightly enlarged spleen. The fluid reaccumulated within 24 hours.

Other investigations showed no neoplastic cells in ascitic fluid or bone marrow; no tubercle bacilli on smear or culture of fluid; urine normal except for occasional glycosuria; glucose tolerance test, mild diabetic curve; haemoglobin initially 12.9 g falling to 8.0 g/100 ml; liver function tests normal, including total serum proteins (differential not available); serum amylase 291 Somogyi units/100 ml. Barium studies showed a mass behind the stomach (see Fig.).

The venous thrombosis resolved while investigations were in progress but the ascites responded poorly to diuretics and salt restriction. Nausea, anorexia, and intermittent vomiting continued. At a second examination the ascitic fluid was straw-coloured (protein 70 mg/100 ml) but at a third examination it was turbid, with many polymorphs (protein 5.5 g/100 ml). Ascitic fluid culture was sterile on each occasion.

At laparotomy (performed by R.C.) a pseudopancreatic cyst about 15 cm in diameter was found displacing the stomach and transverse colon anteriorly. About 1 litre of straw-coloured ascitic fluid was drained but the cyst itself contained altered blood. Multiple fibrinous adhesions between loops of small intestine were easily divided by blunt dissection. Some oedema was noted in the root of the transverse mesocolon and the pancreas itself could not

be clearly defined. The spleen was slightly enlarged but no other abnormality was found. A cystogastrostomy 3 cm in diameter was fashioned in the posterior wall of the stomach via an anterior gastrotomy.

Barium-meal study showing mass behind stomach.

Biopsy specimens of the liver and subpyloric and aortic lymph nodes were normal. Histological examination of the cyst wall showed granulation tissue. Postoperative progress was uneventful. There was no further vomiting or recurrence of the ascites. He gained weight and his appetite improved. A repeat glucose tolerance test was normal.

Comment

Since 1958 21 cases of ascites due to pancreatic disease (excluding malignancy) have been reported, as reviewed by Dreiling (1970). Two of these patients had pseudocysts resulting from blunt trauma but most were middle-aged patients with a history of alcoholism and pancreatitis. Our patient had fallen from his bicycle some weeks before admission. Some patients improve with diuretics and pancreatic enzymes (Lasare et al., 1969).

The mechanism of the ascites is obscure. Dreiling (1970) noted that though the serum amylase activity was not raised in all cases of pancreatic ascites the amylase level was always very high in the ascitic fluid. A simple estimation of the ascitic fluid amylase would be helpful in the diagnosis of ascites of obscure origin.

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References

- Dreiling, D. A. (1970). *American Journal of Gastroenterology*, 53, 119.
 Lasare, E. J., Das, P. B., and Abraham, P. V. (1969). *American Journal of Gastroenterology*, 51, 287.
 Somers, K., Brenton, D. P., and Sood, N. K. (1968). *British Heart Journal*, 30, 309.

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