but might have benefited from admission to a specialized unit. The occurrence of arrhythmias was not a marked feature of this series, and this may be the reason for the low mortality rate in those who survived the initial period of infarction. The stress of awaiting the ambulance, the journey often down steep and narrow stairs, and the subsequent ride to hospital may predispose to arrhythmias and contribute to the high mortality rate seen in the first few hours after admission. The advantage of treatment at home, particularly in the early stages, is that it avoids the moving of an ill patient to hospital under difficult circumstances. If poor social conditions necessitate transfer for treatment it would seem reasonable to delay until pain and shock are controlled.

Adequate explanation of the cause and effect of the illness, and the management in the first month, are required if relatives are to be asked to co-operate. In this series none objected to treatment at home, and most welcomed it. Frequent visiting by family doctor and district nurse is necessary in the first few days; this ensures the well-being of the patient and gives reassurance to the helping relatives. The provision of a home help and a night attendant, when necessary, ensured that no family was subjected to excessive strain.

The use of a bedside commode was appreciated and did not seem to affect the patient's recovery. As a result constipation was not a feature of this study. Breathing and leg exercises were implemented from an early stage. Such limited activity was taken by both patient and relatives to be a sign of improvement and had a beneficial effect on morale.

No patient was given anticoagulants as a routine, but the development of a pulmonary embolus in one patient might have been prevented had such a prescription been given.

During this four-year study those patients who were treated at home have appreciated this form of management. No relatives, after explanation of what home care entails, have objected to caring for the patient in his own house. It is felt that patients so treated have more rest and less upset than those admitted to hospital, and this may help in their recovery.

I am indebted to Dr. Richard Buckle, consultant physician, Southampton General Hospital, for his advice on the preparation of this paper.

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Vasopressin in Prevention of Lumbar Puncture Headache

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Brit. med. J., 1968, **4**, 677-678

Summary: A double-blind controlled trial of aqueous vasopressin injection (Pitressin) in the prophylaxis of lumbar puncture reactions in 50 patients showed that the incidence of reactions was unaffected, but that severe reactions occurred less frequently in the treatment group. Moderately severe side-effects occurred in 27% of those receiving vasopressin.

Introduction

Unpleasant reactions to lumbar puncture consisting of headache, nausea, and vomiting are common in clinical practice. Their incidence is partly dependent on the skill and experience of the person performing the lumbar puncture, but even in the best hands reactions occur despite apparently atraumatic punctures of the theca. Though no drug has yet proved to be capable of preventing such reactions, the use of vasopressin injection (Pitressin) as a prophylactic was in vogue some years ago but was never subjected to critical analysis. The impressions and experience of a number of clinical neurologists were obtained by postal survey, and opinions concerning the efficacy of vasopressin injection in lumbar puncture headache prophylaxis varied from "ineffective" to "usually effective." Because of the variation of clinical impression a controlled trial was undertaken.

Material and Methods

Fifty consecutive unselected patients in the Combined Neurological Service of the Hull Royal Infirmary requiring a lumbar puncture for diagnostic purposes were studied. They were allocated by one of us (E. M.) (not involved in clinical care) by random numbers to one of two groups—treated and control. Identical 1-ml. ampoules containing respectively 20 units of aqueous vasopressin injection and isotonic saline were dispensed by the pharmacy according to the random numbers.

After lumbar puncture the patients were advised to rest in bed lying on one pillow for 24 hours. The word headache was not mentioned by nursing or medical staff, but simple analgesics were given on request of the patient when necessary.

Each patient was given 1 ampoule of vasopressin injection or placebo intramuscularly immediately after lumbar puncture and then 12-hourly for 48 hours. The reaction to lumbar puncture was assessed 24 and 48 hours after the procedure, care being taken not to suggest or minimize symptoms. Side-effects were carefully recorded. Each assessment was made jointly by two clinicians and arbitrarily scored as follows: grade 1, no headache, sickness, or other symptoms; grade 2, headache alone, lasting less than 24 hours; grade 3, headache for 24 to 48 hours with or without nausea or vomiting; and grade 4, severe headache and/or vomiting lasting longer than 48 hours.

Results

The numbers and percentages of patients falling into each grade are shown in Table I. The difference between the

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number of patients given vasopressin injection and those given placebo who showed no reaction (grade 1) is definitely not significant, and it can therefore be assumed that vasopressin does not affect the incidence of reactions to lumbar puncture.

TABLE I

		Grade								Total
		1		2		3		4		
		No.	%	No.	%	No.	%	No.	%	
Vasopressin	..	20	77	4	15	2	8	0	0	26
Placebo	..	17	71	2	8	4	17	1	4	24
Total	..	37	74	6	12	6	12	1	2	50

For those showing no reaction (grade 1) P was not significant.

The data in Table I cannot be further analysed, since the numbers in some of the cells are not adequate for the requirements of statistical tests. The effects of the two drugs have therefore been compared in Table II by combining the numbers showing no reaction or only a mild reaction (grades 1 and 2) and the numbers showing more severe reaction (grades 3 and 4). By the Fisher exact probability test the expectation of results as extreme as these by chance is 0.18 for a one-tailed test. This is definitely outside the generally accepted 5% level of significance, but the data do suggest a weak trend towards a reduced severity of reaction due to vasopressin injection.

TABLE II

			Grades 1 and 2	Grades 3 and 4	Total
Vasopressin	..	..	24	2	26
Placebo	..	..	19	5	24

P=0.18.

Since there is no difference in the proportion of patients under each drug showing no reaction it is legitimate to examine the reactions alone. This is done in Table III, where the reactions are divided into those showing a mild reaction (grade 2) and those showing more severe reactions (grades 3 and 4). The Fisher exact probability test applied to Table III

TABLE III

					Grade 2	Grades 3 and 4
Vasopressin	..	..	..	..	4	2
Placebo	..	..	..	..	2	5

P=0.07.

fails to reach the 5% level (P=0.07, for a one-tailed test). This suggests that although vasopressin injection may not reduce the incidence of reaction to lumbar puncture it may well reduce the severity of reactions that do occur.

Side-effects of diarrhoea, abdominal cramps, and sweating occurred with varying degrees of severity in seven (27%) patients on vasopressin injection and one (4%) patient on placebo. In six of these cases, including the single patient on placebo, the side-effects were so severe as to prevent the completion of the course of injections. The side-effects were significantly more frequent in the patients on vasopressin injection (P=0.032, one-tailed, by the Fisher exact probability test).

Discussion

The headache which follows lumbar puncture is thought to be due to the continued leakage of cerebrospinal fluid (C.S.F.) through the hole in the theca made by the needle. The subsequent low pressure in the C.S.F. pathways is thought to induce pain by traction on the pain-sensitive neural endings in the dura and intracranial venous sinuses and arteries. Hypothetically, vasopressin injection might act by its antidiuretic action, which would tend to retain fluid in all extracellular spaces, including the C.S.F. pathways. The incidence of lumbar puncture headache in four large series cited by Wolff (1963) is 25%. This figure is very similar to our own overall occurrence in 26% of patients (Table I). The reaction was mild in half of these subjects.

The present trial shows that the occurrence of any form of reaction to lumbar puncture is unaffected by aqueous vasopressin injection administered in the regimen outlined (Table I).

Tables II and III indicate a trend that the administration of vasopressin injection is associated with a reduced frequency of severe (grades 3 and 4) reactions. Statistically this almost reaches the accepted 5% level of significance (P=0.07). However, moderately severe side-effects occurred in 27% of patients given vasopressin injection and in only 4% given placebo. This suggests that any overall marginal benefit attributable to vasopressin injection is largely offset by the occurrence of side-effects. Our results do not justify the routine use of vasopressin injection in the *prevention* of lumbar puncture reactions. However, vasopressin injection may be of value in the *treatment* of severe reactions to lumbar puncture, but this possibility requires further investigation.

We are indebted to Dr. S. Singh, Dr. M. A. Ron, and Mr. R. J. Barrett for technical assistance. The sisters of wards 9 and 90 provided invaluable help in this trial.

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