

this structure differed so widely from that of any known trypanocidal agent, King, Lourie, and Yorke¹⁰ prepared and investigated a number of related derivatives, such as guanidines, isothioureas, amidines, and amines connected by alkyl or alkylene chains of varying lengths. One of the diamidine compounds, 1:11-undecane diamidine, was exceptionally active against trypanosomes, and was also active against malaria. Shortly afterwards Ewins prepared a series of related compounds in which the central inert carbon chain was replaced by aromatic linkages. Certain of these preparations, and in particular 4:4'-diamidinostilbene, have very remarkable therapeutic properties. Not only are the aromatic diamidines active against experimental infections with trypanosomes but they exert a definite therapeutic effect on babesia, leishmania, and certain malarial infections. Clinical trials against sleeping sickness and kala-azar have already been instituted, and the preliminary results are not unhelpful, especially when it is remembered that the compounds at present being used are only the first of a chemical series which may be modified still further.

PROSTATIC CALCULI

As a rule prostatic calculi are found in conjunction with either benign enlargement of the prostate or a gland which has been the seat of chronic inflammation. In such cases the symptoms are those which may be ascribed to the prostate itself, but chills and fever may be initial indications of prostatic calculi and may appear quite independently of any urinary symptoms. T. L. Pool and G. J. Thompson of the Mayo Clinic¹¹ suggest that in any case of unexplained fever in adult males radiographs should be taken of the prostate. Small calculi which may pass casual examination may be found if the films are carefully inspected. Bouts of chill and fever are due to subacute prostatitis associated with calculi which lie within infected cavities in the gland. Only in selected cases is removal of prostatic calculi indicated, and the Mayo Clinic workers favour a transurethral operation. After removal of the calculi the cavity from which they have been extracted is "saucerized" by means of the resectoscope. These authors publish details of three cases in patients aged 50, 56, and 54 respectively, in one of which the stones were so large that it was necessary to push them into the bladder and then crush them with a lithotrite. The cavities in the prostate were then obliterated by removing the overhanging tissue with the resectoscope. The removal of calculi can be carried out with greater accuracy by the transurethral route than through an incision in the perineum, but a sound knowledge of urethral anatomy is essential, and care must be taken to avoid the adjacent rectum or a troublesome and distressing fistula may result.

HIGH-ALTITUDE FLYING FOR WHOOPING-COUGH

It is hoped that the recording angel will make an entry on the credit side for those German aviators who have assisted in the study of the effect of high altitudes upon whooping-cough. F. Pflug and H. Jungheim of Berlin report¹² their observations on 136 patients between the ages of 7 weeks and 49 years treated in this way. Usually one flight only was undertaken, to a height of approximately 16,000 feet and lasting sixty minutes. To get over the well-known seasonal variations in the course of whooping-cough two separate periods of the winter

of 1938-9 were chosen, but the results were approximately the same in each. Some of the patients had received other treatment before the flights, and this was continued without alteration afterwards. It was found that about 82 per cent. of the patients showed a definite improvement within five days of soaring into the blue. While few paroxysms actually occurred during the flight the immediate effect was often to make the condition slightly worse for a short period. Improvement then set in and was maintained. It appears that most of the patients were in the second or third week of the disease. In fact the best results were obtained—namely, a 100 per cent. improvement in a few days—in those in the second week of the paroxysmal stage. The general improvement appeared to be much the same at all ages. Objective evidence was sought in the leucocyte picture, and it is claimed that a reduction in the lymphocytes by about 20 per cent. was found on an average in the first few days after the flight. No satisfactory explanation is offered for the results obtained, though such factors as lowered oxygen tension and altered humidity in the air at high altitudes are mentioned as possibilities. Psychological influences are held to be excluded because forty-six of the patients were under 3 years of age, twelve of them being infants, and the results were as good as with older children and adults. Eleven patients failed to benefit; in seven others who showed no benefit from one flight a second expedition to the higher reaches of the atmosphere brought about definite improvement.

NOTICE TO CORRESPONDENTS

The need for strict economy in the use of paper for all purposes was emphasized by the Control of Paper Order made by the Ministry of Supply, which came into force in April. In view of the restrictions now imposed on the use of paper, and the increase in the rates of postage which came into operation on May 1, it will no longer be possible to acknowledge the receipt of letters and memoranda, etc., offered to the *British Medical Journal* for publication. The space devoted to correspondence has had to be curtailed, and readers are urged once again to be concise in all communications addressed to the Editor.

At a meeting of the Royal Society on May 23 Dr. Francis Peyton Rous of the Rockefeller Institute for Medical Research, New York, was elected a Foreign Member in recognition of his distinguished contributions to pathology, and particularly his pioneer studies on filterable tumours. The same honour was conferred on le Duc de Broglie, member of the French Academy, for his work on x rays and x-ray spectroscopy; on Professor Ross Granville Harrison of Yale University, chairman of the National Research Council of the United States, for his pioneer work on tissue culture and his researches on experimental animal morphology; and on Professor Gilbert Newton Lewis of the University of California, a founder of the electronic theory of valency and of a number of important branches of general chemistry.

The Secretary of State for the Colonies has appointed Sir Wilson Jameson, M.D., F.R.C.P., as his Medical Adviser, in succession to the late Dr. A. J. R. O'Brien. The appointment is a part-time one, and Sir Wilson Jameson will continue his duties as Dean of the London School of Hygiene and Tropical Medicine.

¹⁰ *Lancet*, 1937, 2, 1360.

¹¹ *Proc. Mayo Clin.*, 1940, 15, 77.

¹² *Klin. Wschr.*, 1939, 18, 1247.

of gastric concretion, among which is included the shellac bezoar found among painters who drink alcoholic solutions of shellac; this apparently forms by precipitation of the resins if the addict rashly reverts to the more usual custom of drinking water. One excessively rare occurrence is the formation of a bezoar caused by prune or raisin seeds and skins, by celery or salsify fibres, by pumpkin, and once by peaches. As with other things rarity brings its reward, and prices of bezoars—when supplies were available—were apt to be high in olden times, for they enjoyed a great reputation as remedies for poisonous and pestilent diseases. Even the temporary use of small pieces cost a high figure; in the scale of values the porcupine and monkey bezoars held the place of honour. The peach bezoar must be almost beyond price.

HIGH FLYING FOR WHOOPERS

Some three years ago an article in the German medical press described how children with whooping-cough had been taken up in aeroplanes with resulting amelioration of their symptoms.¹ Now two members of the Berne school medical service record² their investigation of this therapy in Switzerland, with the co-operation of local aviation and transport companies. P. Lauener and E. Maeder made the first attempt in the late spring and the early summer of 1939, but weather conditions were particularly unpleasant, and it required further studies in 1940 and 1941 before enough patients had been obtained to make statistical analysis possible. The patients were mostly school children, but some infants and toddlers and a few adults were included in the series. Each flight lasted about 90 minutes, of which about 40 were spent at a height of approximately 11,000 to 12,000 ft. A sudden transition to great height by a rapid ascent was ruled out as being too dangerous. The flights generally took place in the mornings, and observations on weather conditions and humidity were included in the records. Only a few children showed any apprehension before going up, and this quickly disappeared once they were in the air. The infants and small children usually went to sleep at a height of about 6,000 ft., and they woke again only on landing. About 30% of the children and adults experienced some nausea—the only disturbance caused by the flights—and none of the infants was sick. The authors collected 250 patients all in the paroxysmal stage of whooping-cough. In 57 cases (22.8%) an abrupt cure took place after one flight. Within at the most two or three days, and often immediately after the flight, these patients stopped whooping, and their astonished parents exclaimed that with the flight the whole picture of coughing and vomiting "had blown away." Another 80 (32%) were "cured" more slowly, a period of eight days being necessary to secure freedom from paroxysms. Thus in 55% of cases the flights may be said to have given good results in a short enough time to justify the conclusion that they had some therapeutic effect. A further 411 cases were improved; in 69 there was no change. Two of this last group were taken up a second time with good effect, and 4 children were taken up as a prophylactic measure, none developing the disease. Of the series 12 were adults, and all but 1 were benefited. Here the possible psychological effect has to be considered, but this could not be present in the case of infants, only 10 out of 34 showing no appreciable improvement. No very clear relation with weather conditions was established: some days gave better results than others, and it appeared that low humidity was better than high.

The Berne authors conducted two further series of observations, one on the Jungfrau and the other in low-pressure chambers. A group of 23 children and 1 adult were taken up by railway to a height of over 10,000 ft. and kept there for three hours before returning to Berne. The results were disappointing. In 16 out of the 24 cases there was slight improvement but no sudden disappearance of symptoms as after the aeroplane flights. The results with the low-pressure chambers were better. A group of 68 children were studied. They spent 60 minutes in the pressure chamber, with about 15 minutes for decreasing the pressure, 30 minutes at a pressure corresponding to a height of about 14,000 ft., and another 15 minutes coming back to normal pressure. Sudden "cure," as after the aeroplane flights, occurred in 31%, undoubted improvement in 50%, no improvement in 16%, and in 3% the disease became worse. Clearly the low-pressure chamber had advantages over the aeroplane, for it is independent of weather conditions. The psychological effect of the flight is also eliminated. When we recall that during the first half of 1941 between 3,000 and 5,000 cases of whooping-cough were being notified weekly in this country, aircraft firms, we imagine, would look upon the opportunity as one not to be sneezed at. Lauener and Maeder do not explain how this unusual method of treatment works. Does exposure to low pressure have an effect on *H. pertussis*? Or does it break a link in the chain of an ill-conditioned cough reflex?

HOSPITAL CONTRIBUTORY AND PROVIDENT SCHEMES

Two brief reports that have reached us throw sidelights upon the revolutionary changes in health and medical services which underlie the Beveridge plan. While Sir William Beveridge proposes that 100% of the population should be entitled to domiciliary and hospital treatment as part of the benefits of a universal compulsory insurance scheme, the Bristol Hospitals Fund publishes an interesting analysis of hospital contributory schemes—that voluntary system of comparatively recent growth which provides for the collection of regular contributions towards the cost of hospital care and treatment from some 10,000,000 people.

The author of the Bristol memorandum, Mr. John Dodd, sees two dangers ahead. One is that financial provision for hospital and ancillary services should be grafted on to national health insurance and be operated through a multitude of competing approved societies. But the other danger is that the present haphazard and inadequate methods should indefinitely continue. He urges regionalization of hospital services and of hospital finance, with only one contributory scheme in each of the divisions into which the several regions would be split up, and also that all contributory schemes should pledge themselves to observe minimum standards of contribution and of benefit, to provide unlimited services in general wards for acute sickness and to practise universal reciprocity. In the second report the British Provident Association, whose subscribers are people of moderate means, discusses the position of provident schemes in the future. Its executive council and its medical advisory board are strongly of the opinion that, whatever form future medical services may take, the two principles of free choice of doctor, hospital, and nursing home and of non-interference in the relationship of doctor and patient should be maintained. The council has circularized its subscribers on this subject, and reports that there is a large body of opinion that the facilities available for medical and institutional treatment for those with moderate incomes are in need of improvement in two main directions—namely, suitable institutional accommodation at reason-

¹ See *British Medical Journal*, 1940, 1, 900.

² *Schweiz. med. Wschr.*, 1942, 72, 819.

DECOMPRESSION TREATMENT OF WHOOPIING-COUGH

A CLINICAL SURVEY OF 903 CASES

BY

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Weekly or twice-weekly clinic sessions for the treatment of whooping-cough by low air-pressure in a decompression chamber have been held in this hospital since May, 1949, except for short periods when the prevalence of the disease was very low. The chamber was purchased from the Royal Air Force by the Ministry of Health in 1948, was conveyed to its present site by the London County Council, and was reconditioned and refitted by the Lewisham Group Hospital Management Committee. At that time considerable public interest had been aroused in high flying and decompression treatment, and, by request, I published a brief preliminary account of it with illustrations of the chamber in action (Banks, 1949).

Selection and Examination of Patients

During the five and a half years 903 patients were treated, but the results could be assessed in only 782, of whom 686 were out-patients and 96 in-patients. The out-patients were sent by their doctors by arrangement with the Emergency Bed Service, and in accordance with a simple plan. Patients were generally accepted only if they had been coughing for about three weeks or more, and the doctor was asked to instruct the parent to take to the clinic a record of the number of coughs, whoops, and vomits observed during the 48 hours before attendance. Every case was personally interviewed and examined by me or by my colleague Dr. L. J. M. Laurent. The history was checked and the estimated day of disease recorded. The record of coughs and vomits of food day and night for two days was verified; particulars of appetite, activity, lethargy, fretfulness, or loss of weight were noted; and the parent was asked whether she thought the condition was stationary, improving, or getting worse. The faeces, tympanic membranes, and chest were examined, the temperature was taken, any cyanosis or tachypnoea was noted, and in a very large proportion of cases the chest was radiographed.

I soon learned to reject the more acutely ill cases, especially those with pyrexia, or cyanosis, or with more than a minimal degree of pulmonary collapse as shown radiographically, usually by shadows filling the cardiophrenic angles. The cases deemed too ill for decompression were either admitted to hospital or sent home with a letter to the doctor advising rest in bed and, if necessary, treatment later for pulmonary collapse. Minimal atelectasis in a bright, active, afebrile child was not regarded as a contraindication, nor were rhonchi and other signs of bronchitis without fever.

Decompression Treatment

The selected cases, up to six or eight at a time, went into the chamber accompanied by a nurse or ward orderly, or by the parent in the case of some infants or a young frightened child. In cold weather the children were kept warm by hot bottles and blankets, the chamber itself having been pre-heated by an electric radiator. Picture books and toys were provided and stories were read to the younger children, usually until they fell asleep lulled by the hum of the motor. Oxygen was laid on inside the chamber, but was used only once in five and a half years. A telephone connected the occupants of the chamber with the porter-operator, who watched them through a porthole window during the whole

course of the treatment. The pressure of air in the chamber was reduced progressively for about 20 minutes until the equivalent of a height of 12,000 feet (3,660 metres) was reached. This low pressure was maintained for 45 minutes and then gradually increased during the 20 to 25 minutes "descent." The treatment thus lasted about 90 minutes. Some pain in the ears and deafness were commonly experienced during the "descent" and for a short time thereafter. In this routine a hitch occurred only on two occasions, once when a woman in the chamber became hysterical, and once when the motor failed. In both cases "ground level" was regained without incident.

Assessment of Results

A form was provided upon which the parent or ward staff was asked to record the time and character of each cough and food vomit during a period of 48 hours *commencing one week after the treatment*; in addition they were asked to report in a few words their impressions of the progress or otherwise of the child from the date of treatment until the date of the report. The completed forms were sent to me generally about the tenth day after decompression. They were delayed for two weeks or so in a small proportion and occasionally a reminder had to be sent out after about two weeks. The factual report on coughs and vomits, and the mother's or ward sister's statement of her impressions of the result of the treatment, taken in conjunction with the recorded data before treatment and the stage of the disease, formed the basis upon which the assessment of the results was made. The factual report on coughs and vomits was usually far better done by the parent than by the ward staff, although the "summing up" by the ward staff after a week was quite good. A feature of this work, however, was the obvious care taken by most of the parents to produce an accurate factual record of coughs and vomits for the 48-hour period. Sometimes the statement of their impressions seemed unduly optimistic in view of the factual report, and in such cases it was treated with reserve.

The assessment of the results on this basis was usually not difficult. It was made by me personally in the great majority of cases, and by Dr. Laurent in my absence. Our marking was conservative and showed almost complete agreement. A sample series of 462 cases was assessed by Dr. Laurent independently, without knowledge of the marking which had already been given by me. His marking turned out to be the same as mine except in 14 cases—a difference of assessment of only 3% between two observers working independently.

The following classification of results was adopted:

XX=Improvement marked and rapid in four to seven days or less, with virtual cessation of the paroxysmal cough.

X=Improvement more gradual over seven to ten days, but probably significant.

X- =Improvement likely to be attributable to the natural progress of the disease at that stage.

O=No improvement in 10 days.

OO=Worse. (Cases excepted in which increased cough and expectoration was limited to 24-48 hours; this was not uncommon.)

TABLE I.—Cases Treated but Not Assessed

	1949	1950	1951	1952	1953	1954	Total
Disease too mild ..	1	7	7	6	5	—	26
" " acute ..	2	5	1	1	—	—	9
" " early* ..	—	8	1	1	2	1	13
No report ..	—	12	9	12	25	15	73
Total ..	3	32	18	20	32	16	121

* Less than 2½ weeks of disease.

Cases Excluded from Assessment (Table I)

Mild Cases.—Twenty-six cases, though treated, were so mild that no accurate assessment of the result was possible.

Acutely Ill Cases.—Nine cases with mild pyrexia or cyanosis and atelectasis were treated by decompression

experimentally in the first year or two. Such cases were thereafter excluded, as this was found to be wrong practice.

Early Cases.—Decompression is a physical treatment which cannot be expected to stem the advance of the disease in the first two and a half to three weeks. Although there was an occasional apparent exception to this rule the assessment of results probably gained in precision by the exclusion of the 13 cases treated at a stage of the disease earlier than two and a half weeks.

No Report.—Seventy-three treated cases had to be excluded because no report on the results was received.

Results

Effect on Cough, Vomiting, and General Conditions.—Table II indicates that marked rapid improvement with virtual cessation of paroxysmal cough (XX) occurred in

TABLE II.—Cases Treated by Decompression and Assessed Results

Classified Result*	1949	1950	1951	1952	1953	1954	Total	%
XX	20	68	55	30	26	21	220	28.2
X	21	93	60	33	36	23	266	34.1
X-	15	48	34	17	16	11	141	18.0
O	18	36	37	18	29	13	151	19.2
OO	—	3	—	1	—	—	4	0.5
Total assessed ..	74	248	186	99	107	68	782	100.0

* See text.

28.2% of the assessed cases, and slower but probably significant improvement (X) in a further 34.1% ; while in 37.7% the treatment appeared to have no effect.

Effect on Vomiting.—A particularly valuable sequel to the treatment in many cases was the relief of vomiting (Table III). Among the 427 children who were vomiting

TABLE III.—Cases Vomiting Food (more than once daily)

	1949	1950	1951	1952	1953	1954	Total	%
Vomiting stopped ..	18	84	60	33	30	21	246	57.7
„ reduced ..	10	30	22	7	10	6	85	20.0
„ unre- lieved ..	9	34	22	12	15	4	96	22.3
Total ..	37	148	104	52	55	31	427	100.0

food more than once daily just before treatment, the vomiting stopped fairly abruptly in 57.7%, was reduced in a further 20%, and was unrelieved in 22.3%. This was something for which the parents were especially grateful.

Influence of Sex.—Table IV shows the sex incidence of the assessed cases. There is a considerable preponderance of females, as in all statistics of whooping-cough. This

TABLE IV.—Sex Incidence of Assessed Cases

	1949	1950	1951	1952	1953	1954	Total
Males	36	112	80	41	44	28	341
Females	38	136	106	58	63	40	441

is an unexplained feature of the disease. The assessed results showed no relation to sex. To category XX, 26% males and 28.5% females were assigned ; and to category X, 37.5% males and 30.8% females.

Influence of Age.—Table V shows that 63 of the assessed cases were infants under 12 months, 454 were children aged

TABLE V.—Age Groups of Assessed Cases

Age:	Under 1 Year	1-4	5-9	10-15	15+	Total
No. of cases	63	454	244	7	14	782

1-4 years, 244 were 5-9 years, 7 were 10-15 years, and 14 were over 15 years. Table VI suggests that results may be best in the age group 5-9 years, with 34.4% assessed as XX and 36% assessed as X. Results in the 1-4 years group were about average, while those in infants under 12 months

were possibly slightly inferior (19% assessed as XX and 35% as X) ; the number in this group, however, was rather small for comparison. Most observers have concluded that the results of decompression treatment are independent of

TABLE VI.—Results in Relation to Age

Assessment	Under 1 Year		1-4		5-9		10-15	15+
	Cases	%	Cases	%	Cases	%	Cases	Cases
XX	12	19	117	25.8	84	34.4	—	2
X	22	35	156	34.1	87	36	2	6
X-	15	—	85	—	37	—	—	2
O and OO ..	14	—	96	—	36	—	5	4
	63		454		244		7	14

age, but there is a suggestion in Table VI that results in babies and adults may not be quite so good as in children aged 1-9 years and especially in those aged 5-9 years.

Second Decompression.—Although the figures are small, Table VII suggests that a second treatment did not often yield good results when the first treatment failed, except,

TABLE VII.—Results After a Second Decompression Treatment

Assessment:	XX	X	X-	O and OO	Total
All cases	5	6	8	5	24
First decompression too early	2	2	1	1	6
Net No. of second decompression cases	3	4	7	4	18

perhaps, when the first treatment was given too early (before two and a half weeks of the disease). When the latter subgroup was excluded, a second decompression yielded results only about half as good as the average for all cases.

Results of Other Observers

Treatment of whooping-cough by high flying began in Strasbourg in 1927, when air pilots took children in the paroxysmal stage up to a height of 10,000 feet (3,050 metres). From 1937 to 1939 small-scale trials were carried out in Strasbourg, Switzerland, Germany, Holland, Poland, Spain, Uruguay, Chile, and a very few in England. Not all were favourable. In 1943 open aeroplanes were used in Strasbourg and Switzerland, a dangerous practice which was soon abandoned. Matter (1946) reported on high-flying treatment in 100 patients between the ages of 2 months and 40 years. He concluded that cases over three weeks from onset of the disease profited most, that vomiting stopped in one to two days, appetite returned, sleep improved, and convalescence was shortened.

Baldy and Richou (1946), employing the decompression chamber in Paris, treated 275 children and 21 adults, of whom, however, only 128 were followed up for 21 days. Of the latter group, 22% were reported as practically cured in less than five days, 51% frankly improved, and 4% had paroxysms and vomiting temporarily aggravated. They concluded that the third to fourth week of the disease was the best time for treatment and that repetition of the treatment did not materially increase successes. Contraindications to the treatment were fever, respiratory and cardiac complications, epistaxis and other haemorrhage, acute nasopharyngeal or ear infections, hernia, surgical emphysema, and malnutrition (conditions which I have grouped together generally as the "acutely ill patient").

Lauener and Maeder (1942), in Berne, treated 256 cases by flights to a height of 12,000 ft. (3,660 metres), each lasting one and a half hours. They reported "abrupt cure" after one flight in 57 (22.8%) and slower cure over about eight days in 80 (32%). They also took 24 cases up the Jungfrau to an altitude of 10,000 ft. (3,050 metres) and kept them there three hours with results that were disappointing. There may have been a counteracting effect here of cold and other factors. A trial of low-pressure chamber treatment, however, in 65 cases taken to the equivalent of 14,000 ft. (4,270 metres) yielded "rapid cure" in 31%, "undoubted

improvement" in 50%, no improvement in 16%, and 3% were made worse. Clantour (1946), in Paris, treated 127 cases by high flying with somewhat similar results. Bergquist (1948) treated 45 children in Stockholm—20 by high flying for 45 minutes and 25 in the low-pressure chamber for 45 minutes. On the basis of this very small experience and the very short period of low-pressure treatment he condemned both methods.

Harporth (1949), in Denmark, compared 101 cases treated by high flying with 59 cases treated by decompression to the equivalent of 3,500 metres (11,500 ft.) for 90 minutes. Other smaller groups were put in the decompression chamber without adequate decompression. The difference in results obtained in the various subgroups of decompression cases was said to be negligible and on this basis he concluded that decompression *per se* had no effect. High flying, however, was thought to be effective. Lalli (1949), of the Italian Air Force, treated 476 cases with three to six flights of 20 to 30 minutes' duration every three or four days for about 15 days. "This is quite a different technique from that of most other observers and the very favourable results reported are difficult to assess considering the length of time that must have elapsed from the start of treatment to the date of assessment of the results.

Discussion

The results which I report here conform reasonably well with those of Matter (1946), Baldy and Richou (1946), and Lauener and Maeder (1942), but the number of cases and the duration of the experiment have considerably exceeded those of any other observer. The method of selection of the cases, the chest radiography, the careful recording of paroxysms and vomits just before and a week after treatment, and the conservative assessment of results by two independent observers may be considered favourable points in this investigation. Nevertheless the results reported are largely derived from subjective assessment. The subjective element in the assessment of results of whooping-cough cannot be wholly avoided but it should be limited, if possible, by the use of controls. I have failed, however, to find a way of conducting a controlled investigation and I see no present prospect of achieving this aim.

It would be quite possible to make controls of each alternate batch of patients by running the motor without producing decompression of any significant amount. The patients might thus be deceived into thinking that they had had the treatment. But such deception would be unlikely to remain long undiscovered. The entire absence of ear symptoms in whole batches of patients would almost certainly arouse suspicion. The net effect would probably be to spoil the existing good relationship with patients and doctors and to stop the flow of patients to the clinic. It might also be possible to conduct a controlled experiment in the same way but with the knowledge and consent of doctors and patients. However, the local practitioners when consulted did not favour this suggestion. All hope of a controlled experiment with the present set-up had therefore to be reluctantly abandoned; and this applied also to in-patients, relatively few of whom are suitable for decompression.

The mechanism of action of the treatment has been the subject of much speculation, but is still unexplained. The low pressure of the air breathed seems to be the essential factor, since results seem to be practically similar whether high flying or the decompression chamber is used. The deeper breathing induced may help to clear mucus from the bronchi and perhaps to aerate small collapsed areas in some yet undetermined way. It is conceivable that molecular release of blood gases may be favoured, both because of the lowered pressure of the alveolar air and because of the trend to alkalosis produced by the increased pulmonary ventilation. Blood CO₂ might thus diffuse more freely through alveolar walls and help to expand collapsed-alveoli and to loosen exudate in the bronchioles; this in turn could

render cough more productive. A study of the composition of the alveolar air combined with estimations of the blood gases, alkali reserve, blood pH, blood pressure, and urinary chlorides of patients while in the chamber might throw some light on the mechanism involved. But these matters are still undetermined largely because of the practical difficulties of obtaining the data in out-patients who are nearly all young children.

Leucocyte counts shed no light on the problem. A transfer of oxidase from neutrophils to red cells was observed by Seabra (1947) in men accustomed to flying at high altitudes. Rats which were decompressed for six days exhibited this transfer and resisted infection better than non-decompressed controls. These facts, however, seem to have little bearing on the effect of a *single* decompression.

Credit for the apparent good results has been attributed to psychological factors. Many parents certainly come with high expectations and there is a certain amount of emotion aroused in the patients by the novelty of the treatment. But after the start any excitement present soon evaporates. The children tend to become bored and the younger ones usually drop off to sleep. The mothers were warned against extravagant expectations and told categorically that the treatment had a good effect in some cases but in others had no effect at all. This warning was indeed reflected in the statement of their impressions of the result, some asserting roundly that they could see no difference after the treatment. Psychological factors in this series can, I think, be discounted.

Which cases are likely to be successful and which to be failures? It is clear that the treatment is nearly always useless at a stage of the disease earlier than two and a half weeks, that after the sixth week the percentage of apparent successes is apt to drop, and that the "acutely ill" patient is almost certain to be made worse by decompression. But when the cases are properly selected, I can answer this question no better now than I could five and a half years ago. I look upon decompression as a physical treatment which may exert a favourable influence in some unknown way on the course of the disease in a proportion of carefully selected cases. Such a favourable influence may be partially or completely counteracted by other unfavourable influences, such as "catching a cold" or poor environmental domestic circumstances. Whooping-cough not infrequently pursues an erratic course, exacerbation occurring after periods of improvement. In these circumstances the relative uniformity of the results of decompression treatment reported in the more important papers published on the subject is rather remarkable and may be thought to constitute a *prima facie* case in its favour.

A decompression clinic for whooping-cough has outstanding advantages beyond the mere question of decompression treatment. When conducted by an experienced physician it acts as a valuable centre of advice for practitioners in their difficult cases, especially those in which pulmonary collapse is found. The running costs are not high when the staff of the hospital is used, but ambulance transport may be a costly item. This has usually to be provided as a routine on grounds of the infectivity of the patient, at least in the first five weeks of the disease.

Summary

A decompression clinic for the treatment of whooping-cough by means of low air-pressures is described and incidental advantages of such a clinic are suggested.

Of 782 carefully selected and assessed cases, 28.2% were reported to show marked rapid improvement in some four to seven days following decompression, and 34.1% to show more gradual but probably significant improvement. The remainder showed no more than the expected change at that stage of the disease, or no improvement at all.

Of the children who were vomiting food more than once daily 57.7% stopped vomiting within a few days after the treatment, and in another 20% vomiting was relieved.

Decompression treatment is usually unsuccessful at a stage of the disease earlier than two and a half weeks and is harmful to the acutely ill case with pyrexia, cyanosis, or appreciable atelectasis.

The results reported are based on careful selection of cases and combined assessment by parents and doctors. An adequate controlled experiment has not yet been done but should be attempted when opportunity offers.

The mechanism of the action of decompression in whooping-cough has not been elucidated. Further trials should preferably include biochemical studies.

I thank my colleague Dr. L. J. M. Laurent for his valuable co-operation throughout, for reporting on a visit to Dr. Richou and others in Paris in 1948, for his part in the conduct of the clinic, and particularly in the assessment of the results.

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CEREBRAL CYSTICERCOSIS

COMMON BUT UNFAMILIAR MANIFESTATIONS

BY

EDWIN R. BICKERSTAFF, M.D., M.R.C.P.

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Though cerebral infestation with the larval stage of the *Taenia solium* has been recognized since the middle of the last century, it was after the extensive work of MacArthur (1934), Dixon and Smithers (1934), Brailsford (1941), and Dixon and Hargreaves (1944) that cysticercosis was given an important place among the conditions causing epilepsy. So well known is this that the diagnosis is unlikely to escape consideration in a patient suffering convulsions who has lived or served in India or the Far East.

It is the purpose of this paper to emphasize the clinical manifestations of this disease, other than epileptic convulsions, which, though both important and common, have received scant attention in this country. At the same time it will be seen that India and the Far East are not the only, nor even the main, areas where the condition may easily be acquired. Brief illustrative case histories are given, grouped under appropriate sub-headings, but, as will be evident, the same patient may show several different features.

Periods of Disordered Behaviour

This group includes a wide variety of abnormal manifestations, unassociated with any true convulsion, but occurring during periods of disturbed consciousness, accompanied sometimes by involuntary micturition, and often consisting of bizarre or violent behaviour.

Case 1.—A Polish male aged 41 was examined on May 28, 1954. Since 1945 he had been subject to frequent attacks of

violent behaviour, lasting three to five minutes, accompanied occasionally by involuntary micturition, stopping suddenly, and followed by several hours' deep sleep. The day before examination he had, without warning or provocation, attacked a friend with a chair, resisted the restraint of five men, and then suddenly passed into a deep sleep, having no memory of the incident on waking. Physical examination was negative, but a white blood count showed an eosinophilia of 800 to 950 per c.mm. Skull x-ray films were normal, but x-ray films of the thigh muscles showed typical calcified cysticerci. The attacks were greatly improved by the use of primidone.

Case 2.—This patient, a Polish boy aged 11, was born in Austria and had lived five years in the Ukraine. Since early 1954 he had been subject to attacks, usually during breakfast, in which he would make grimacing movements of the face for one minute, then sit quite still staring into space for two or three minutes, then repeat several numbers, and suddenly return to normal, though sometimes a little drowsy afterwards and with slight headache. Physical examination on September 17, 1954, was negative, but a white blood count showed a constant eosinophilia of about 1,000 per c.mm. Stools were normal. X-ray films of the thighs showed calcified cysticerci.

These probably represent attacks of psychomotor epilepsy, and it is remarkable how infrequently the standard leads of the electroencephalogram are of help in cysticercosis. It is possible that the lesions are situated in areas of the temporal lobes which would require more elaborate techniques to demonstrate.

Transient Loss of Function

The sudden loss of use of, or of sensation in, a limb, or the sudden loss of speech, with subsequent rapid recovery, is not uncommon in the early stages of a cerebral neoplasm and in cerebrovascular disease. Episodes of this type are often seen in cerebral cysticercosis, and have on occasion, in apparently healthy young soldiers, been regarded as hysterical.

Case 3.—A British man aged 20 was admitted to the Queen Elizabeth Hospital, Birmingham, on November 10, 1953, complaining of three episodes, in the previous five years, of sudden loss of use of the left hand, with numbness of the hand, rapidly recovering. One attack lasted several hours. He had in addition, and at separate times, had several episodes of unexplained loss of consciousness. He lived the first ten years of his life in India. Physical examination was negative and a full blood count normal. The cerebrospinal fluid contained two mononuclear and one polymorphonuclear cells per c.mm., with 132 mg. of protein per 100 ml., and a paretic Lange curve. The electroencephalogram showed only very occasional 5-6 c/sec. waves occurring synchronously in all leads. X-ray examination of the skull showed a number of small foci of intracerebral calcification, and x-ray films of the thigh muscles showed numerous calcified cysticerci.

Case 4.—A British ex-Regular-Army soldier aged 32 who had spent two periods of service in India and China was admitted to the Queen Elizabeth Hospital, Birmingham, on October 23, 1941, complaining of periods of sudden onset of loss of speech during the previous six years, usually lasting several hours, but on one occasion lasting three days. The most recent attack was accompanied by paralysis of the right arm and leg for several hours, recovery being very rapid. In addition, and at separate times, he had had periods of unexplained loss of consciousness, during one of which he had passed urine, and during another had fought off those who had come to his assistance. Physical examination was negative apart from two small subcutaneous nodules in the left arm and the left thigh. A full blood count and x-ray examination of the skull were normal, but x-ray films of the thigh muscles showed numerous calcified cysticerci. Biopsy showed the subcutaneous nodule from the arm to be a lipoma, but that from the thigh proved to be a cysticercus.

Acute Intermittent Obstructive Hydrocephalus

This, though one of the longest-known non-epileptic manifestations of intracranial cysticercosis, is one of the least well recognized in England. Bruns's symptom-complex (Bruns, 1906) consisted of the sudden onset of violent headache, vomiting, tinnitus, and vertigo, passing on in the more severe attacks to deep coma and even death, and often precipitated by sudden movements of the head. It was considered to be diagnostic of a solitary cysticercus in the fourth ventricle.

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widely—for example, 80% thought that they had received adequate training and were confident in draining abscesses whereas only 3% had received training and were experienced and confident in injecting haemorrhoids. No trainees were confident in all the procedures listed, even those who had been a senior house officer in surgery.

Additional surgical training is required, but at what stage in a prospective general practitioner's career should this occur? The trainee sub-committee is pressing the north west region for improvements in training in minor surgery, either in relevant hospital posts or in the training year in general practice. It seems that in our region too, as Dr Pringle and colleagues suggest, the educational potential of the post of preregistration house officer in surgery is underexploited in terms of training potential general practitioners in skills in minor surgery.

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Junior doctors, nurses, and drips

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Much is made of the fact that giving intravenous drugs would extend the role of nurses. The point many overlook is that most nurses want to be

extended. They have no desire to be relegated to the level of bedpan pushers and pill dispensers—they are professionals in their own right, and giving them the opportunity to qualify for extended roles is surely a logical way of increasing their job satisfaction as well as aiding overburdened house staff. Nurses should be encouraged to acquire "IV certificates," and there would be greater motivation to do so if their royal college and the leaders of our profession pressed for a single, nationally recognised certificate and the abolition of the often petty and unnecessarily restrictive systems currently in operation.

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Redundancies in NHS trusts: effect on junior house officers

SIR,—Recent job losses at Guy's and Lewisham Trust and at other self governing trusts have recently been in the headlines.¹ We believe that a decrease in support services will directly affect the welfare and education of junior house officers.

The University of London has outlined several duties that it believes a preregistration doctor should not do.² These include finding beds, regular administration of intravenous and cytotoxic drugs, performing portering duties, doing work more appropriately carried out by a ward clerk, regularly providing a phlebotomy service, and the routine clerking of patients for day case endoscopic procedures. The university believes that these duties interfere with training and has threatened to remove educational approval in posts where they persist. Unfortunately, whenever anyone else is unable or refuses to do these tasks it is the junior doctor who has to do them. As preregistration house officers are the cheapest form of labour in the NHS there is no incentive for hospital trusts to correct this.

With support services in NHS trusts decreasing, preregistration house officers are going to find themselves carrying out more non-clinical tasks. As a result education standards will decrease, there will be less time to sleep while on call, and the length of a normal working day will increase. With consultants holding clinical budgets some junior doctors will find it difficult to ask for payment for the extra hours they will have to put in. It is essential that the BMA acts on behalf of its junior members and opposes these cuts.

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Altitude treatment for whooping cough

SIR,—Minerva recalls hearing about children with whooping cough being taken for short flights in

light aircraft in an attempt to relieve the cough, and she asks when this belief in altitude treatment ceased and why.¹

As a doctor who holds a commercial pilot's licence and spends some of his free time working for an air taxi service that flies sightseers around the Swiss Alps, I can assure Minerva that the belief in altitude treatment is by no means dead. In the past two years I have taken three children with persistent whooping cough on flights at the request of parents who had been told by their family doctors that this procedure was often recommended in the 1930s and might be worth a try.

When I was first approached by the dispatcher to fly one of these children ("Here, you're a doctor; this sounds like a job for you") I thought it highly unlikely that any therapeutic effect would be achieved. My scepticism was reinforced by a computer search of published reports just before the first flight. The few papers I found were in obscure journals and amounted to little more than collections of anecdotes and regurgitations of long held convictions dressed up in authentic sounding medical jargon. Hard data were lacking. Partly out of medical curiosity, however, and partly because the parents were obviously desperate to try anything, I went ahead with the flights. Before doing so I made it clear that neither I nor the company could guarantee therapeutic success.

As I had only three patients and was unable to think of a suitable placebo for a second treatment arm (take them up for an hour in a flight simulator?) I was never able to establish with any scientific certainty whether the "treatment" was effective. From the moment of take off all three children were glued, bug eyed, to the windows of the aeroplane as the alpine scenery sped by. They were clearly fascinated by the sensations of flight, and they stopped coughing. Shortly after we landed they started again. They tolerated the flights well, and there were no adverse events.

Whether flights for whooping cough are clinically effective or not, I highly recommend them. There can hardly be a treatment that gives more pleasure to patient and therapist.

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Vulnerability of King's College Hospital

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Though we cannot be complacent, King's College Hospital is not vulnerable. If there are any vulnerabilities they lie with the hospitals that have low local caseloads and poor access.

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PMID 1859970

SIR,—I was intrigued by Dr P A Casey's letter about the effect of altitude on non-productive coughing after pertussis in children.¹ My experience (after 19 years of uniformed service) is that this phenomenon is widely known. I discussed the situation with my senior colleagues and can report that we in the Royal Air Force medical branch have been using this particular mode of treatment for many years—over 40 to my knowledge.

Our standard approach is to decompress victims to 3000-3350 m above sea level, after which disappearance of the cough is the norm. The pathophysiology of this remains enigmatic. What is without doubt is that the treatment works. Our only difficulty has been to obtain suitable insurance cover for the decompression run, given that the "victim" has almost invariably been a civilian. Fortunately, I am not aware of any complications occasioned thereby.

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¹ Casey PA. Altitude treatment for whooping cough. *BMJ* 1991; 302:1212. (18 May.)

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