I have to thank Colonel P. E. D. Pank, Officer Commanding B.M.H., Poona, for permission to forward this article, and Lieutenant-Colonel T. A. Munro, Adviser in Psychiatry in India, for encouragement and valuable help.

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SULPHONAMIDE ANURIA.

BY

Lieutenant-Colonel J. A. VERE NICOLL, F.R.C.S.Ed.,
Royal Army Medical Corps,
O.C. Surgical Division of a General Hospital.
B.C.O.F. Japan.

[*Received July* 28, 1947.]

THE dangers of crystallization of sulphonamide drugs within the urinary track are well known. That the danger of anuria is materially increased in a patient with kidneys already damaged by disease is demonstrated here; and an opinion as to the site of the obstruction within the urinary track is discussed.

Recently four cases of sulphamerazine anuria, one of sulphanilamide anuria and one of sulphathiazole anuria have been treated in this hospital. All except one of these were healthy soldiers who had been injudiciously, or illegally, treated for venereal disease; all but this one responded to medical treatment alone. One was a patient while under treatment for *B. coli pyelitis* of a hydronephrotic kidney.

The routine treatment adopted is as follows:—

On admission: the patient is kept strictly in bed and placed on an intake and output fluid chart. One pint of 3 per cent sodium citrate solution is given by fast drip intravenously followed by intravenous normal saline or glucose saline by drip. The blood urea is estimated and all specimens passed *per urethram* are sent for full laboratory examination. In addition four-hourly mist sodii cit. grains 20 to the ounce is given by mouth, and the diet is fluids only. A careful watch is maintained for any signs of alkalosis manifested by vomiting or tetany.

If no urine is passed after several hours, sodii sulph. 4½ per cent one pint is given, followed by further salines. In all but two of this series, urination was established again after twenty-four hours and normal output progressively returned.

In the first case the patient, an Australian, had been taking sulphathiazole for an unspecified time, without supervision, for urethritis.

14.9.46: He was admitted complaining of acute pain in the right loin and flank, colicky in nature and passing dark bloody urine a few ounces at a time only. The urine was found full of R.B.C.s and sulphathiazole crystals and the blood urea was 78·1 mg.

per cent. Accordingly treatment was commenced with sodii citrate 3 per cent 1 pint followed by i.v. salines 6 pints per day and fluids by mouth.

16.9.46 : He showed no signs of uræmia, although passing no urine at all. Hypertonic sodii sulph. 1 pint was given among the alkalines.

17.9.46 : 6 oz. dark bloody alkaline urine with no crystals was passed.

18.9.46 : Sodii sulph i.v. one pint again given and he passed further 10 oz. bloody alkaline urine.

19.9.46 : Passed 78 oz. of urine.

20.9.46 : Blood urea was 31·2 per cent urine still contained R.B.C.s and albumen++.

30.9.46 : Urine was clear and patient was allowed up.

2.10.46 : Discharged from hospital fit and well.

It will be noted that this man went for two and a half days without passing any urine with no signs of impending uræmia, and urination was finally fully established by medical treatment alone—nearly five days after the first signs of anuria.

Contrasted with the above is the following case complicated by hydronephrosis which presented unusual symptoms and progressed from bad to worse under medical treatment.

A Case of Sulphamerazine Anuria Complicating Hydronephrosis.

A Gurkha N.C.O., aged 22, had an attack of fever in August, 1946, lasting for about a week, and developed pain on moving his right hip-joint. Pain and limitation of movement gradually increased and he was admitted on October 10, 1946, as a case of arthritis of the right hip.

On admission the patient was afebrile, anæmic, with flexion and external rotation deformity of the right hip-joint, wasting of right thigh by 1½ in. There was marked tenderness on the medial aspect of ascending pubic ramus and rectal examination showed marked tenderness on the right side and a tender enlarged right seminal vesicle with a nodule.

X-ray : Hip Joint N.A.D. Slight rarefaction ascending pubic ramus.

The patient developed a swinging temperature a few days after admission. W.B.C. count was 11,800. Urine acid : Deposit a few W.B.C.s and pus cells. It was provisionally diagnosed as a case of seminal vesiculitis with adjacent pelvic cellulitis causing psoas spasm. Accordingly the patient was put on a course of penicillin 40,000 units three-hourly, and urinary investigation was started. Temperature settled down to normal. Psoas spasm passed off, and rectal tenderness subsided.

Six specimens of twenty-four hours urine : negative for acid fast bacilli ; two specimens of midstream urine on culture showed a heavy growth of *B. coli* organisms. Intravenous pyelogram revealed two opacities in the left renal shadow and marked hydronephrosis of the left kidney, intrarenal in type.

On November 7, 1946, the patient was put on a course of sulphamerazine 8 tablets stat., and 4 tablets six-hourly with mist. alk. diuretica six-hourly, and 8 pints of water a day.

On November 9, 1946, the patient developed severe lumbar pain, vomiting and hæmaturia after having had 22 grammes of sulphamerazine. No urine was passed after passing 1 oz. of dark blood stained urine at 1330 hours, full of crystals.

Sulphamerazine was stopped, patient put on two-hourly mist. alkaline, plenty of fluids by mouth. One pint of 3 per cent sod. citrate followed by 2 pints of glucose saline by i.v. drip had no effect. A further 1 pint sod. citrate was given and i.v. salines continued.

Late on November 10, 1946, the patient developed uræmic symptoms ; was drowsy, vomiting frequently, hiccough and slight puffiness face. B.P. 160/90. One pint of 4·7 per cent sod. sulphate followed by isotonic saline by i.v. slow drip did not relieve the anuria.

On November 11, the patient developed tetanic convulsions due to alkalosis. Carpopedal spasm and facial nerve irritability were present, also generalized œdema ;

B.P. 130/70. Blood urea 136 mg. per cent. Vomited several times. Passed 2½ oz. dark urine. I.V. drip was discontinued and patient taken to theatre.

On cystoscopy there was marked bullous œdema of the bladder especially around the ureteric orifices. The right ureteric orifice was blocked with crystals, and there were sheafs of crystals on the bladder wall and the left ureteric orifice could not be found in the bullous œdema obscuring it. Ureteric catheters could not be passed.

On November 12, the general condition of the patient was poor and deteriorating. Operation was therefore decided upon under unilateral spinal anæsthesia by Major Allan Brown. The good right kidney was exposed by an oblique incision and the kidney was found tense and enlarged. Through a small incision on the convex margin of the kidney the renal pelvis was entered and 10 oz. of urine drained into the wound. A malecot catheter was tied into the renal pelvis. During the first twenty-four hours after nephrostomy 12 pints of urine drained from the tube. Fourteen hours after operation patient started passing clear urine *per urethram* and passed 4 pints in twenty-four hours.

The general condition showed a remarkable improvement and the patient made a complete recovery. The nephrostomy tube was removed on the fourth day.

November 18: Blood urea: 55 mg. per cent. Urine culture: Sterile.

November 29: I.V.P. repeated. Condition same. No urinary or other symptoms present.

Discussion.

All observers are agreed that crystallization cannot occur if the intake of fluid is sufficient and the urine is kept alkaline. These factors may, however, be difficult to maintain, especially in a tropical climate, unless very close supervision is constantly exerted. The actual site of the blockage by crystals is held by many to be within the tubules of the kidney, whereas other observers say that the ureters become blocked. From my own observation of the case of this Gurkha N.C.O. I can confidently say that in his case the main blockage was in the ureters. The ureteric orifices were completely blocked by œdema and sheafs of crystals. The kidney operated upon was distended to twice its normal size and, on establishing drainage between its pelvis and the outside, it collapsed to nearly normal size with urine flowing from the nephrostomy tube.

After twenty-four hours of drainage all the œdema had disappeared, and urine was being passed by the urethra from the other hydronephrotic kidney, which quickly began to function again. In this case œdema must have aggravated the obstruction and it is possible that a more restricted fluid intake should have been maintained and hypertonic sodii sulph. administered earlier with probable benefit.

However, œdema had never been a noticeable feature in any of the previous cases and this man would undoubtedly have died had nephrostomy not been performed.

Summary.

(1) An outline of treatment in cases of sulphonamide anuria occurring in healthy individuals has been given.

(2) Anuria in a Gurkha soldier with hydronephrosis has been described in detail.

(3) The site of blockage by crystals has been shown to be primarily ureteric in the one case operated upon.

(4) Though medical treatment will cure the vast majority of sulphonamide anuria cases, there will always be the odd case where surgery may be necessary to save life.

IN CONCLUSION.

My thanks are due to Major John Patterson, R.A.M.C., our pathologist who has had extensive experience of this condition in Burma, for his advice and help in the medical treatment of many of these cases, and to the D.D.M.S. Brigadier C. Scales, *M.C.*, for his permission to forward this article.

A NOTE ON SICKLING AND FLYING.

BY

G. M. FINDLAY, E. A. BOULTER, and C. B. MACGIBBON.

[*Received July* 22, 1947.]

DURING the past war Africans, in common with other people, found it necessary to fly. Africans served in the R.A.F. while a West African Air Corps took the place of European ground personnel for service in certain tropical areas. Examination of 5,500 West Africans showed that 12·4 per cent had red blood corpuscles which sickled *in vitro* when the oxygen tension was reduced (Findlay, Robertson and Zacharias, 1946). The question, therefore, arose whether sudden sickling would occur *in vivo* when Africans were exposed to a reduced oxygen tension by flying, thus giving rise to an acute and highly dangerous emergency which may end in death (Robertson and Findlay, 1947).

In order to examine this question experiments were carried out in West Africa in 1944 by observing the behaviour of the red cells of Africans with the sickling trait when flying at heights up to 15,000 feet above sea level.

The same problem arose in the United States of America where those of African origin also flew. Henderson and Thornell (1946) found that among negro cadets and combat pilots the incidence of sickling was 7·37 per cent. No evidence was available to suggest that there was an increased elimination of cadets because of the sickling trait. In America the effect of reduced oxygen tension was tested in a low pressure chamber on four subjects with sicklæmia. Two of these had had previous experience of the low pressure chamber. In addition one patient with active sickle-cell anæmia volunteered for a simulated flight while four negroes without sickling were used as controls. All except three subjects were given oxygen at 15,000 feet, while two, taken up to 16,000 feet in the low pressure chamber, were given oxygen after five minutes.

In the patient with sickle-cell anæmia there was a suggestive increase in intravascular sickling as the number of red cells sickled *in vivo* increased from 8 to 15 per cent but the patient himself showed no evidence of oxygen want at 15,000 feet: the three negroes with the sickle-cell trait showed no significant increase in sickling. The icterus index and the urinary urobilinogen remained normal throughout.

In the investigations carried out independently in West Africa the experimental conditions were those of an actual rather than a simulated flight.