Postgraduate Medical Journal (February 1978) **54**, 127–128.

Acute renal failure from the use of acetazolamide (Diamox)

TIM HIGENBOTTAM
B.Sc., M.B., M.R.C.P.

C. S. OGG
M.D., B.Sc., F.R.C.P.

H. M. SAXTON
F.R.C.P., F.R.C.R.

Guy's Hospital, London, SE1

Summary

The clinical histories of two patients are presented, who both developed haemorrhagic anuria after a short course of therapy with the carbonic anhydrase inhibitor, acetazolamide (Diamox). The clinical findings, in particular the radiological changes, are illustrated in this potentially fatal condition. The therapeutic success of immediate relief of the ureteric obstruction is emphasized and it is hoped that this report will act as a reminder of the importance of this agent as a cause of anuria.

Introduction

The carbonic anhydrase inhibitor, acetazolamide (Diamox), is widely used to reduce intra-ocular pressure in acute glaucoma and after cataract extraction. In addition, it has been recently advocated as a prophylactic in acute mountain sickness (Hackett, Drummond and Levine, 1976) and has occasionally been used in the treatment of refractory epilepsy.

Acute haemorrhagic anuria occurs uncommonly as a complication of this therapy but has resulted in fatalities (Leopold, 1968; Howlett, 1975). The case histories are now reported of two such patients exhibiting the characteristic radiographic appearances of ureteric obstruction, who responded completely to relief of this obstruction.

Case no. 1

A 62-year-old man of previous good health developed backache and vomiting four days after a successful unilateral cataract extraction. He had received acetazolamide, 250 mg 4 times/day, postoperatively. Within two days he was delirious and haematuria was noted. The serum urea was 72 mmol/l; bicarbonate 13 mmol/l; serum sodium 129 mmol/l and serum potassium 5·5 mmol/l.

Although his condition improved with intravenous saline (0·57 mmol/l), he became anuric. The high dose urogram revealed a dilated renal pelvis and calyces which contained radiolucent filling defects (Fig. 1), which suggested retained clots of blood; little contrast entered the ureters. The cystoscopy was normal, ureteric catheters enabled a diuresis to occur which lasted two days. The patient then made a full recovery with a normal intravenous urogam one month later.

Case no. 2

A 46-year-old man, epileptic, had required

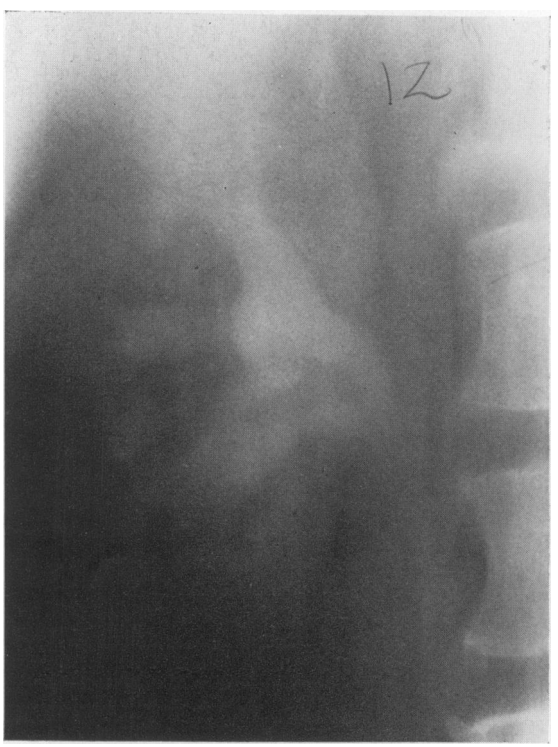

FIG. 1. The high dose intravenous urogram of patient 1 showing the left kidney with a radiolucent filling defect in the renal pelvis.

acetazolamide, 0·5 g daily for three weeks, in addition to his usual anticonvulsant therapy of phenobarbital and phenytoin to control his refractory epilepsy.

After a seven-day history of loin pain and haematuria, he presented with anuria. He was delirious and serum urea was 32 mmol/l; bicarbonate 18 mmol/l; sodium 132 mmol/l, and potassium 5 mmol/l.

The high-dose intravenous urogram revealed bilateral dilated calyces with little contrast in the ureters. The cystoscopy was normal, but it was impossible to pass ureteric catheters. A left-sided needle nephrostomy was performed to enable urinary drainage. Contrast injected through the catheter showed ureteric mucosal irregularity (Fig. 2). A diuresis via the nephrostomy catheter was followed by complete recovery, and with a normal intravenous urogram after one month.

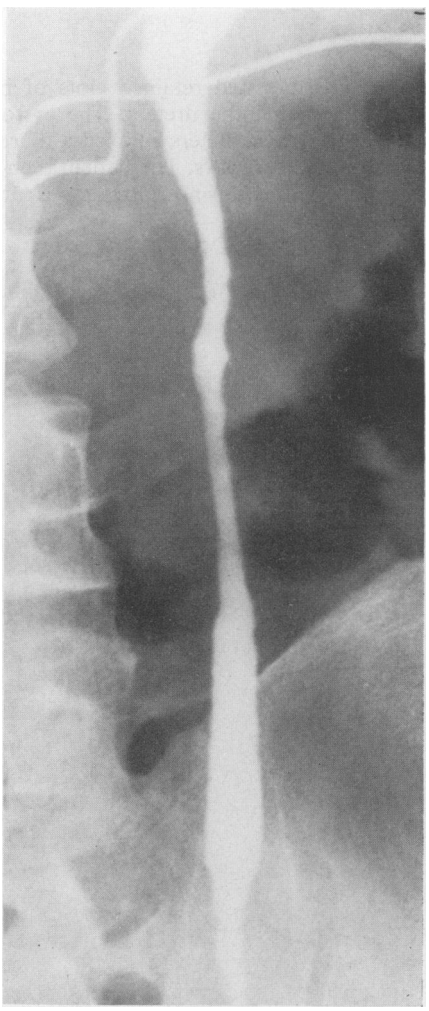

FIG. 2. The antegrade urogram through the nephrostomy tube in patient 2, showing the right ureter with marked irregularity, suggesting mucosal swelling.

Discussion

After a short course of acetazolamide both patients developed anuria which was preceded by the symptoms of back pain and haematuria. The radiographic appearances in both suggest that clot retention and/or mucosal swelling led to an obstructive anuria. This is supported by the complete recovery that both patients made after the diuresis, which followed the early relief of the obstruction, using ureteric catheters in one patient and a unilateral needle nephrostomy in the other.

A similar clinical picture is well described by Arneil (1958) in a case of acute sulphonamide crystalluria, indeed, acetazolamide is a heterocyclic sulphonamide which is excreted unchanged in the urine. Furthermore, with a pKa of 7·2, it is rendered particularly insoluble in acid urine. Acetazolamide-like crystals have also been found in the renal tubules in one fatal case of anuria following this therapy (Bertino, Rodman and Myerson, 1957).

The authors would like to emphasize, therefore, the need to ensure a high fluid intake in patients on acetazolamide to reduce the chance of crystalluria, particularly in circumstances associated with an acid urine and the need for the early relief of ureteric obstruction, if this complication occurs. Above all to remember that acetazolamide (Diamox) remains a cause of haemorrhagic anuria.

Acknowledgments

We would like to thank Dr C. Hardwick for permission to report one of his patients.

References

ARNEIL, G.C. (1958) Twenty-nine children with sulphonamide haematuria. *Lancet*, **i**, 826.

BERTINO, J.R., RODMAN, T. & MYERSON, R.M. (1957) Thrombocytopenia and renal lesions associated with acetazolamide (Diamox) therapy. *Archives of Internal Medicine*, **99**, 1006.

HACKETT, P.H., DRUMMOND, R. & LEVINE, H.D. (1976) The incidence, importance and prophylaxis of acute mountain sickness. *Lancet*, **ii**, 1149.

HOWLETT, S.A. (1975) Renal failure associated with acetazolamide therapy for glaucoma. *Southern Medical Journal*, **68**, 504.

LEOPOLD, I.H. (1968) Ureteric calculi due to long-term use of carbonic anhydrase inhibitors. *Journal of the American Medical Association*, **208**, 538.