Reversible renal failure associated with ibuprofen in a child

A case report

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Summary

The clinical presentation and management of a young boy with acute non-oliguric renal failure associated with a non-steroidal anti-inflammatory drug (NSAID), ibuprofen, prescribed for the relief of pain is described. Deterioration of renal function developed unexpectedly but fortunately withdrawal of the drug and appropriate management resulted in spontaneous recovery. All NSAIDs have the ability to interfere with renal function and their administration should probably be avoided in children with pre-existing dehydration or with conditions that predispose to an increased risk of renal insufficiency.

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In adults chronic renal failure requiring renal transplantation is not an infrequent complication of prolonged intake of (particularly combinations of) analgesic drugs and there have recently been a number of reports on this.[1,2]

Fortunately, there are few indications for long-term administration of such drugs in children. However, in view of the high frequency of common viral and other infections accompanied by fever a variety of preparations are in general use for pain and pyrexia in children. This may occasionally result in acute toxicity of differing degrees. A possible association between Reye's syndrome and aspirin administration has been reported. This association has probably promoted the use of several other non-steroidal anti-inflammatory drugs (NSAIDs) that are also not without toxic reactions and sequelae in children. The following report is a case in point.

Case report

A 10-year-old boy was admitted to a neighbouring hospital in September 1987 after having been assaulted the previous night. He was fully conscious and able to give a history. According to reports, he had a large sub-aponeurotic haematoma on the head, bluish discolouration peri-orbitally, but no evidence of other soft-tissue trauma or injuries. He appeared anaemic, had a tachycardia of 120/min, but his blood pressure was normal. Neurological examination as well as the rest of the clinical examination yielded normal results. The haemoglobin level was 9 g/dl and routine urinalysis was normal. Radiography of the skull did not reveal any fractures.

One unit of blood was transfused. An NSAID (ibuprofen 200 mg 8-hourly) was prescribed for the headache. The child improved and after the blood transfusion, intravenous fluids were stopped. Five days later he developed progressive oedema and became oliguric and confused. After another 24 hours, generalised tonic-clonic convulsions occurred and he was transferred to H. F. Verwoerd Hospital for a brain scan.

On admission to this hospital the patient was in a coma (grade III) and grossly oedematous. The blood pressure, measured in the right upper arm, was 200/130 mmHg. There were brisk tendon reflexes in all four extremities and bilateral Babinski responses. There was no papilloedema or hypertensive retinopathy present. Besides a bluish peri-orbital discolouration, no other abnormal clinical signs were present. Urine output had been 1,5 litres during the preceding 24 hours. Serum biochemical values were as follows: sodium 135 mmol/l, potassium 5,5 mmol/l, chloride 100 mmol/l, urea 57 mmol/l, creatinine 1 120 μmol/l, total calcium 2,0 mmol/l and phosphate 2,3 mmol/l. The haemoglobin level was 12,7 g/dl, total white blood cell count 10,6 x 10^9/l and platelet count 477 x 10^9/l. Urine microscopy revealed 5 pus cells per high-power field and a few granular casts. There was evidence of cerebral oedema on the brain scan. Ultrasonography revealed symmetrically enlarged kidneys with increased echogenicity of the cortices.

A diagnosis of acute non-oliguric renal failure was made. Ibuprofen had already been discontinued on admission to this unit. Supportive treatment for renal failure was started, mannitol was administered for the cerebral oedema and the blood pressure was controlled. The patient improved gradually over the next 48 hours, regained consciousness and the urine output increased to 4 litres per 24 hours. The serum urea and creatinine values returned to normal after 2 weeks. A renal biopsy was not considered necessary in view of his rapid improvement after discontinuation of the ibuprofen and supportive therapy.

The patient was discharged after another week and has been followed up in the outpatient department. He appears clinically well. Urinalysis and serum biochemistry remain completely normal.

Discussion

Acute renal failure may result from a multitude of diverse functional and anatomical disturbances. In the case described deterioration of renal function was of acute onset but fortunately reversible. The main contributing factors appeared to have been pre-existing volume depletion (large sub-aponeurotic bleeding with anaemia) and intake of the NSAID. The deterioration of renal function in this patient is similar to that reported previously after intake of ibuprofen or other NSAIDs (e.g. acute, reversible renal failure probably related to ischaemic changes).[3,4] The effects of different NSAIDs on renal function are not necessarily identical. The pathophysiological mechanisms of renal compromise related to NSAIDs fall into three basic groups. In the first, there is an abnormality of circulatory homeostasis, namely volume depletion with renal hypoperfusion. During this period normal kidney perfusion is dependent on prostaglandin-mediated vasodilation. When this is prevented by NSAIDs, acute tubular necrosis or even cortical necrosis may develop.[5] The second mechanism of damage is

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related to a hypersensitivity response that manifests as acute interstitial nephritis, nephrotic syndrome or minimal change glomerulonephritis. The third mechanism of injury is direct cellular toxicity caused by the NSAIDs or their metabolites, resulting in interstitial nephritis and papillary necrosis.

A common characteristic of acute renal failure caused by NSAIDs is its rapid reversibility, often within days after discontinuation of the drug.[3] Many patients may not be as fortunate, however, and may need short-term dialysis, while in others chronic renal failure may develop.

The number of NSAIDs has increased considerably and so have the indications for their use. Similarly, the number of serious side-effects has risen, many of them unrecognised by clinicians. It remains the responsibility of every doctor to contemplate seriously whether any prescribed drug is really necessary and whether the benefits outweigh the risks involved. A proper history should be obtained from mothers, giving special attention to drugs that have been given to their children.

Many NSAIDs are obtainable without prescription and they are becoming more popular for a wide variety of ill-defined complaints. Clinicians (and pharmacists) should be more aware of their side-effects and of their cumulative contribution to serious disease. It remains our duty and responsibility to educate and inform the general public about commonly used drugs which could be harmful (especially to infants and children).

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