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ANAEMIA IN PATIENTS WITH TRAUMATIC SPINAL CORD INJURY*

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We investigated the haemoglobin levels and causes of anaemia in 65 male patients with traumatic spinal cord injury of 1 month to 41 years' duration and level of injury C4 to L1, ranging in age from 18 to 62 years. Diagnosis of mild anaemia and follow-up of therapy presented a special difficulty in these patients because the haematocrit fluctuated unpredictably due to plasma volume variations following loss of vasomotor activity (Bidart & Mowry, 1973; Nafatchi *et al.*, 1978). A change of as much as 9 per cent did not reflect either haemorrhage, haemolysis or response to therapy but simply volume change. A mean value of haemoglobin or haematocrit, from 2 or more different days, when evaluated in conjunction with the overall condition of the patient provided a practical assessment. Patients with a haemoglobin level of 13·6 g/dl or less were considered to be anaemic.

With the above criteria mild to moderate anaemia was observed in 52·3 per cent patients. The anaemia was normocytic normochromic in 32 per cent, normocytic hypochromic in 56 per cent, and microcytic hypochromic in 12 per cent patients. The age, duration, and level of injury had no correlation with the incidence and type of anaemia.

In the majority of the anaemic patients an overlap of multiple factors was present in everchanging proportions. These included decubitus ulcer in 83·3 per cent, urinary tract infection in 41 per cent, acute blood loss (post-injury and postoperative) in 20 per cent, chronic blood loss (haematuria mostly microscopic associated with severe infection or catheterisation, bleeding per rectum from haemorrhoids and during manual manipulations of bowel, bleeding peptic ulcer) in 29 per cent patients and chronic bone or joint lesions in 8·8 per cent patients.

The single most important type was anaemia of chronic disorder (criteria for diagnosis—Cartwright & Lee, 1971) associated with either decubitus ulcers or urinary tract infection or both. Chronic recurrent or severe urinary tract infection was invariably associated with anaemia. There was no correlation between the haemoglobin level and the extent of the urinary tract infection whether restricted to the lower tract, or, extending to the upper tract as indicated by the vesico-ureteral reflux, or associated with renal pathology (kidney stone, hydronephrosis, and focal pyelonephritis). All patients with large and deep decubiti involving bone were anaemic, but those with small or superficial ulcers were not. Decubiti were significantly absent in non-anaemic patients. Twenty-one patients who had both anaemia and decubiti had a low serum iron and serum iron binding capacity. On the other hand 11 of the 13 anaemic patients without decubiti had normal serum iron.

Since anaemia of chronic disorder mimics iron deficiency anaemia in presenta-

* Abstract of Paper.

tion, the uninvestigated patients were frequently treated with iron without benefit. The estimation of serum iron, serum iron binding capacity and marrow stainable iron or ferritin assay was sufficient to differentiate the two (Bentley & Williams, 1974). However, when the two conditions co-existed the anaemia of chronic disorder could only be defined when iron deficiency was corrected. In two patients secondary polycythemia (one with respiratory insufficiency following quadriplegia, the other a chronic heavy smoker) maintained the haemoglobin at a level higher than expected in view of the iron status consistent with the anaemia of chronic disorder. Presumably the bone marrow responds to the hypoxia despite the presence of chronic lesions (Cartwright & Lee, 1971).

Renal failure can be an important cause of anaemia in spinal cord injury patients, but as screened by creatinine clearance was not present in our patients. Nutritional folic acid deficiency in five anaemic patients was associated with poor eating habits resulting from inadequate social environment, alcohol or drug abuse and psychiatric complications.

Many patients including those with long-term injury had a normal haemoglobin level and the presumption that the lower haemoglobin level may be an adaptation to the decreased overall activity (Knutson *et al.*, 1973; Strohhofer, 1964) did not appear to be correct. When anaemia was present more often than not it was true anaemia and was corrected when the cause was removed.

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