

Cerebral cortical atrophy and central nervous system (CNS) symptoms in a steroid-treated child with asthma

William Spiegel, MD, Stephen J. McGeady, MD, and
Herbert C. Mansmann, Jr., MD Philadelphia, Pa.

GCSs have proven to be potent antiasthma medications; however, long-term use may cause side effects involving multiple organ systems.¹ Among these side effects, CNS disturbances, including mood and memory changes, seizures, manic states, and psychosis, have been reported.^{2,3} Although it is unknown how the CNS is affected by GCS to cause these disturbances, cerebral cortical atrophy has been reported during high-dose therapy.^{4,5}

We report a patient receiving high-dose GCS therapy for severe asthma who developed a psychotic episode and was found to have cerebral cortical atrophy on CT scan.

CASE REPORT

A 13-year-old black male child was hospitalized for residential care of intractable asthma. He responded poorly to maximum bronchodilator therapy, and high-dose oral GCS therapy was begun in the hope of reversing his disease. During a 6-month period, he received a cumulative dose of 8.3 gm of prednisone (mean, 46 mg/day or 1 mg/kg/day). The patient then demonstrated bizarre behavior, progressing from mood swings to delusions and hallucinations. He became disoriented to person, place, and time, and was eventually unable to recognize familiar people or to follow simple commands.

Routine laboratory studies and spinal fluid examination were within the normal range, and toxicology screen was unrevealing. A CT scan revealed marked generalized cerebral cortical atrophy (Fig. 1). All antiasthma drugs known to have psychotropic potential were withdrawn from the patient, prednisone was reduced from 40 mg/day to 10 mg/day, and thioridazine (Mellaril; Sandoz Pharmaceutical Co., East Hanover, N.J.), 25 mg four times a day, was administered. During 7 days, the symptoms of psychosis and organic brain dysfunction resolved, and the patient regained his previous mental status. A repeat CT scan, 5

Abbreviations used

GCS: Glucocorticosteroid
CT: Computed tomography
CNS: Central nervous system

months after this reaction, demonstrated recovery of normal cerebral architecture (Fig. 1).

Before initiation of GCS therapy, the patient had undergone complete psychologic assessment, including a Wide-Range Achievement Test, R2 (Jastak Associates, Inc., Wilmington, Del.). A repeat of this test late in the psychotic episode revealed no loss of cognitive skills.

DISCUSSION

Cerebral cortical atrophy has been observed in Cushing's syndrome and during GCS therapy for a variety of diseases, including nephrotic syndrome, infantile spasms, collagen vascular diseases, and sarcoidosis.^{4,5} Although the mechanism is uncertain, CNS protein catabolism and fluid shifts caused by water loss have been suggested.^{4,5} Cortical atrophy during GCS therapy has been related to medication dose; in contrast to other causes of cerebral cortical atrophy, this form is reversible when GCSs are reduced or stopped.⁴

There are numerous reports in the literature of both psychosis and less severe CNS disturbances during GCS therapy.²⁻⁴ Most psychoses are believed to be dose related, occurring at or above doses of 40 mg/day of prednisone (or equivalent) and are reported to appear early in therapy, usually in patients with a personal or family history of psychiatric illness. The prevalence of GCS-associated psychosis is variably reported but may be as high as 18.4% during high-dose GCS therapy.¹ Some authors have not observed psychosis despite therapy with GCS at these dosages.²

This study affirms several perceptions of GCS-related psychosis. The disturbance occurred during high-dose GCS therapy and was readily reversible on decreasing GCS dosage. The case differs from earlier studies insofar as symptoms occurred after 6 months

From the Jefferson Medical College, Thomas Jefferson University, Children's Rehabilitation Hospital, Philadelphia, Pa.

Reprint requests: Stephen J. McGeady, MD, 233 S. 10th St., Suite 550, Philadelphia, PA 19107.

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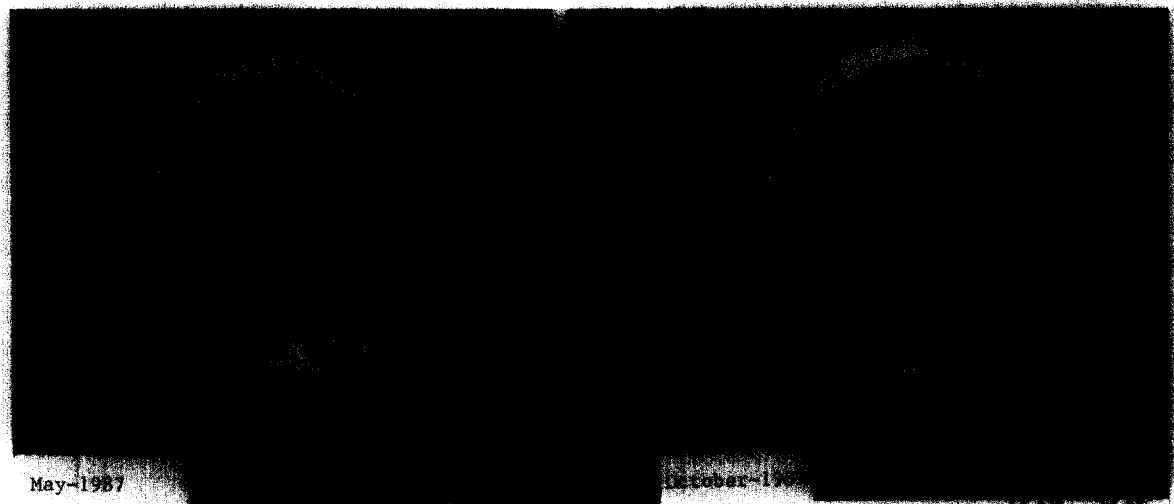


FIG. 1. CT scan of brain.

of therapy and in the absence of a personal or family history of psychiatric problems.

This case also permits some new observations regarding GCS-related psychosis. First, the association of psychosis with cerebral cortical atrophy in the absence of coexisting CNS disease has not been reported previously. Second, earlier studies of GCS-associated psychosis have almost always been in patients with collagen vascular disease, which may itself affect CNS function.⁴ Our patient's asthma alone is unlikely to have affected CNS function in this manner, leaving little doubt that the GCSs alone were responsible. A third observation is that psychologic testing, while the patient remained delusional, revealed intact memory and mathematical skills at a time when higher integrative thought processes remained impaired. GCS may sequentially affect various cerebral functions with impairment of some while other functions are preserved. Eventually, even the most basic cerebral functions were altered in this case. Recovery appeared to occur in reverse, with memory and cognitive func-

tions being regained, whereas thought processes remained impaired.

This case documents another complication of systemic GCS therapy in bronchial asthma. The need for clinicians to carefully weigh the risks and benefits of systemic GCS therapy in subjects with asthma is emphasized by recognition of this complication.

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