

Rigidity and Pulmonary Edema after Innovar in a Patient on Levodopa Therapy: Report of a Case

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Levodopa has been used to control the rigidity and tremor of Parkinson's disease for more than ten years.¹ Recently, it has been approved for limited clinical use by the Food and Drug Administration. With increasing frequency, parkinsonian patients who need surgical procedures will be maintained on high doses of levodopa. We report the neurologic and cardiovascular disturbances observed in such a patient anesthetized with Innovar.‡

REPORT OF A CASE

A 65-year-old Caucasian man was admitted to the hospital after having sustained a fracture of the left hip on the morning of admission.

The patient had initially been evaluated by the Parkinsonian Research Group at this center in September 1968. He was being treated with levodopa. The daily dose was gradually increased to 6.25 g/day, with alleviation of the tremor and rigidity.

In May 1969, the patient underwent diagnostic cystoscopy, followed by transurethral resection of the prostate 11 days later. For the cystoscopy he received thiopental, nitrous oxide, and succinylcholine. Subsequently, he was anesthetized with halothane and nitrous oxide by mask. Transient hypotension occurred during the course of both anesthetics. However, recovery was uneventful.

In October 1969, the patient returned to the Parkinsonian Clinic complaining of hallucinations. The dose of levodopa was reduced to 3.0 g/day. Increased rigidity followed.

On admission, the patient was confused and unable to provide an accurate history. Blood pressure was 130/70 torr, pulse 88 beats/min, and respirations 22/min. Examination of the heart

and lungs disclosed no abnormalities. The abdomen was distended and tympanitic. The left leg was shortened and externally rotated. Hemoglobin was 8.8 g/100 ml; hematocrit, 28 per cent. Serum bilirubin was 2.0 mg/100 ml; LDH, 260 mU/ml; SCOT, 79 mU/ml. An electrocardiogram showed left axis deviation, sinus tachycardia, and minor ST-T wave abnormalities. The patient received 500 ml whole blood and 250 ml packed cells on the day before operation. The last dose of levodopa was given 20 hours prior to induction of anesthesia.

The patient was premedicated with atropine, 0.5 mg, and meperidine, 75 mg, and brought to the operating room for open reduction and internal fixation of his fractured hip.

Anesthesia was induced with Innovar, 2.0 ml, and thiopental, 200 mg, iv. Succinylcholine, 100 mg, was given to facilitate endotracheal intubation. Anesthesia was maintained with nitrous oxide and oxygen at 4 and 2 l/min, supplemented with Innovar, 2.5 ml, fentanyl, 0.15 mg, and thiopental, 200 mg, iv.

During the operation, which lasted 170 minutes, the patient received 1,000 ml balanced salt solution and 1,000 ml whole blood. The estimated blood loss was 1,000 ml. Vital signs remained within normal limits until the last part of the procedure, when the pulse rate increased from 90 to 125 beats/min. Immediately after extubation the patient was found to be cyanotic. The skin was cold and moist. Scattered wheezes were heard throughout both lung fields. There was marked rigidity involving the trunk and extremities. In the recovery room the temperature was 102.4 F, blood pressure 170/80 torr, pulse 120 beats/min, and respirations 25/min and labored. Respiratory excursion appeared to be restricted by generalized rigidity. Wheezes and moist rales were heard throughout the chest. Chest x-ray showed pulmonary vascular engorgement. The electrocardiogram was unchanged from the preoperative tracing. Analysis of arterial blood gases showed pH 7.45, Pa_o 60 torr, Pa_{co} 25 torr, with spontaneous respirations and nasal oxygen at 6 l/min. There was no evidence of a blood group incompatibility. Pulmonary edema was diagnosed, and furosemide, 40 mg, iv, produced marked diuresis. Central venous pressure, measured at this time, was 10 cm H₂O. Repeat blood-gas analysis showed Pa_o 158

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torr and Pao₂ 30 torr, with the patient breathing oxygen with a face mask and reservoir bag. The basilar rales persisted. Congestive heart failure was considered a likely diagnosis. Digoxin, 0.5 mg initially and 0.125 mg three hours later, was given iv.

By the second postoperative day, the central venous pressure had fallen to 3 cm H₂O, but the basilar rales and marked rigidity persisted. During the subsequent six weeks of hospitalization digitalis therapy was continued. The patient's cardiovascular status improved slowly. He had periods of marked mental confusion and lethargy.

Discussion

Levodopa is an amino acid intermediate in the synthesis of dopamine and norepinephrine in the adrenergic neurons of the central and autonomic nervous system.² Since it crosses the blood-brain barrier, levodopa is given to increase the availability of dopamine in the basal ganglia of patients with Parkinson's disease. Although the clinical responses are variable, levodopa may entirely eliminate tremor and rigidity in these patients.^{1, 3, 4}

Caution in preparing these patients for elective surgery has been advised, since levodopa may produce orthostatic hypotension, arrhythmias, and occasional hypertension.⁵

Dopamine, synthesized from levodopa, produces mainly beta-adrenergic effects on the heart.⁶⁻⁸ In the cat, during anesthesia with agents known to sensitize the heart to catecholamines, large doses of dopamine produce ventricular arrhythmias which may be abolished by beta-adrenergic blocking agents. The arrhythmogenic activity of dopamine is approximately 1/75 that of norepinephrine.⁹ Dopamine also has specific vasodilating effects on the renal and splanchnic beds.¹⁰ Haloperidol antagonizes the vasodilating action of dopamine in these areas.¹¹ It also blocks dopaminergic activity in the basal ganglia.¹² Haloperidol, a butyrophenone, is related to phenothiazines and neuroleptic agents such as droperidol.

The degree of rigidity observed in our patient exceeded that existing prior to levodopa therapy and probably resulted from dopaminergic antagonism by droperidol.

The occurrence of acute pulmonary edema in this patient is difficult to explain on the basis of fluid overload. Primary myocardial

failure may have resulted from sudden withdrawal of dopa therapy. Studies in rats have shown that dopamine disappears from the heart within 4 to 6 hours after an intraperitoneal injection of levodopa.¹³ In man, the peak serum concentration of levodopa occurs 1 to 3 hours after oral administration, with a calculated half-life of 0.6 hours.^{14, 15} Suppression of catecholamine synthesis by decreased tyrosine hydroxylase activity¹⁶ or droperidol antagonism of dopamine in the peripheral vasculature¹⁷ may be considered as possible factors.

Our experience with this case suggests that Innovar, specifically droperidol, should be avoided in the anesthetic management of patients on levodopa therapy. Droperidol, a butyrophenone derivative, could antagonize the action of dopamine in the basal ganglia, causing recurrence of parkinsonism symptoms. For the same reason, the use of haloperidol (Haldol) in treating these patients would seem not inadvisable.

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The Intraoperative Hazard of Acrylic Bone Cement: Report of a Case

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A fatal cardiac arrest occurred following the experimental use of acrylic bone cement. At least nine cases of operative cardiac arrest (four successfully resuscitated) following the use of intramedullary methyl methacrylate have been reported in the British literature,¹⁻⁴ but a review of the American literature failed to reveal any such cases. The following is a case report of a patient who died following insertion of a Tronzo femoral prosthesis and bone cement and whose lungs, at autopsy, contained fat and bone marrow emboli and a yet-unidentified foreign material which may be acrylic emboli.

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Received from the Department of Anesthesia, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania. Supported in part by USPHS Grants 5-T1-CM-215-13 and 5-P01-CM-15430-04 from the National Institute of General Medical Sciences, National Institutes of Health, and a Research Career Development Award to Dr. Smith, 3-K3-34,906-06.

REPORT OF A CASE

The patient, a 64-year-old obese woman in good general health, came to the hospital with a dislocated Austin-Moore prosthesis. Preoperatively, cardiorespiratory history and physical examination, and ECG, were normal; blood pressure was in the high-normal range, and roentgenogram of the chest revealed tortuosity of the aorta with calcification of the aortic arch.

After premedication with 2 ml Innovar, im, we injected a hypobaric solution of tetracaine via a subarachnoid catheter at the L3-4 interspace with the patient in the right lateral decubitus position with the head slightly down. The operation began at 9:25 AM and proceeded uneventfully for about 90 minutes. At 11:00 AM the acetabular prosthesis was cemented into the pelvis without incident. At 11:15 AM the surgeon forced the femoral prosthesis and bone cement into the femur. At this time the patient was alert and moved herself into a more comfortable position because of discomfort in the right shoulder. Two to three minutes later she groaned loudly for several seconds, became unresponsive and pulseless, but continued breathing. The ECG showed sinus bradycardia and QRS complexes of diminished amplitude. Ephedrine (20 mg, iv) was given