What Respiratory Abnormalities Result From Neuroleptics and Levodopa?

To the Editor:

I read with interest the excellent review by Drs. Rich and Radwany concerning respiratory dyskinesias, which appeared in the June, 1994, issue (CHEST 1994; 105:1826-32). In 1990, my colleagues and I reported about two patients who met the criteria by Rich and Radwany for respiratory dyskinesia associated with levodopa therapy.1 We could not conclude from our data that this phenomenon was a true respiratory dyskinesia, and our article does not appear in literature searches using that description.

Both of our patients had Parkinson's disease, received long-term maintenance therapy with levodopa/carbidopa, and presented with episodes of dyspnea associated with either orobuccal or upper extremity dyskinesias. We studied both patients by measuring conventional spirometric parameters and peak inspiratory and expiratory mouth pressures and by monitoring ventilatory pattern using respiratory inductive plethysmography. These determinations were done before an oral dose of levodopa/carbidopa and then repeated periodically until the action of the drug waned. In the first patient, respiratory inductive plethysmography revealed a pattern of rapid breathing, followed by respiration of irregular rate and depth at the peak of levodopa effect. The other patient exhibited only the rapid rate before monitoring was discontinued at his request. Neither patient exhibited chest vs. abdominal paradox nor respiratory alternans (varying contributions from chest and abdomen between one breath and another) during levodopa-induced respiratory dysfunction.

Because of the temporal association between dyskinetic movements of other muscle groups and the appearance of respiratory symptoms and signs, the respiratory abnormality induced by levodopa has been assumed to represent a dyskinesia of the ventilatory muscles. The dyskinesia affecting other muscle groups is usually described as choreiform in nature: continuous, disorganized, and characterized by contractions of abnormal combinations of muscles, including agonist and antagonist muscles.2 A true chorea of the respiratory muscles should therefore be manifest as chest vs. abdominal paradoxical movements or, perhaps, as respiratory alternans. Respiratory inductive plethysmography allows quantitative assessment of the contribution to tidal volume of the chest and abdominal compartments separately, and indeed, when used to monitor respiratory pattern in a patient with neuroleptic-induced respiratory dyskinesia, paradoxic motion of the chest and abdomen was shown.3

Since the patients reported by my colleagues and I did not show these findings, we questioned whether the phenomenon observed was a respiratory dyskinesia of the choreiform type. Other authors reporting levodopa-induced respiratory dysfunction have, in fact, suggested that the rapid or irregular breathing represents an abnormality of ventilatory pattern generation in medullary respiratory centers.4,5 Levodopa-induced dyskinesia of nonrespiratory muscles is thought to represent "denervation hypersensitivity" of dopaminergic neurons in the basal ganglia; there are also dopaminergic cells in areas of the medulla responsible for respiratory rhythm generation, which may be affected by the same process.

Thus, the respiratory dysfunction induced by levodopa may not be identical to that associated with neuroleptic use, and in some cases may not actually represent a dyskinesia at all. The distinction could be important clinically, and further studies seem warranted to clarify this issue.

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REFERENCES


To the Editor:

We thank Dr. Brown for his comments and appreciate the opportunity to respond. He has astutely observed that the respiratory abnormalities induced by neuroleptics are not clinically identical to those abnormalities induced by levodopa. He also questions whether the respiratory dysfunction caused by levodopa should even be classified as a true dyskinesia but for reasons we do not support.

Dr. Brown proposes that because tardive dyskinesia is usually choreiform, respiratory dyskinesia should manifest as paradoxical motion of the abdominal vs. thoracic muscles, a phenomenon observed frequently in neuroleptic-induced respiratory dyskinesia but not in levodopa-induced respiratory dyskinesia. Recent studies, however, have shown that stereotypic, not chorea, is the most common movement abnormality occurring in tardive dyskinesia.1 Moreover, Dr. Brown supports his theory by citing a case in which neuroleptic-induced respiratory dyskinesia was marked by paradoxical movements between the chest and abdomen. He attributes these movements to chorea when, more likely, they resulted from laryngeal dyskinesia. Kuna and Awan (CHEST 1986; 90:779-81) have proposed that vocal cord closure causes "braked expirations [that] could produce an inward movement of the abdomen in concert with an outward movement of the rib cage accounting for the paradoxical movements of rib cage and abdomen." Laryngeal involvement appears to be common in respiratory dyskinesia caused by neuroleptics but not in respiratory dyskinesia caused by levodopa. Laryngeal involvement may explain why neuroleptic-induced respiratory dyskinesia is accompanied frequently by gasping and grunting as well as complicated by aspiration and respiratory insufficiency. Indeed, laryngeal dysfunction occurs frequently in neuroleptic-induced respiratory dyskinesia but has not been described in levodopa-induced tardive dyskinesia.2,3 Whether this clinical difference is due to differences in neuropathology or merely represents a difference in severity is conjecture.

In summary, we agree with Dr. Brown's observation that clinical differences exist between respiratory dyskinesia due to neuroleptics and respiratory dyskinesia due to levodopa. We disagree, however, with his explanations for these differences. We believe, instead, that these differences are due to the fact that laryngeal