Correspondence

USE OF INHALATIONS OF CARBON DIOXIDE TO PREVENT POSTOPERATIVE PULMONARY COMPLICATIONS

To the Editor:—Less than five years ago Coryllos and Birnbaum, on the basis chiefly of experimental observations, announced the exceedingly important and illuminating doctrine that obstruction of the bronchi is the condition that commonly induces postoperative pulmonary complications. From clinical observations at about the same time Scott and Cutler reported that hyperventilation with carbon dioxide after operations, as recommended by Henderson, Haggard and Coburn, greatly diminishes pulmonary complications. It is this and other clinical demonstrations of the fact that clearing the bronchi tends to prevent subsequent complications which establishes the critical importance of bronchial obstruction. Without this therapeutic or prophylactic benefit, that doctrine would be merely a brilliant hypothesis.

There appears to be at present a general acceptance of this doctrine, combined illogically with a failure to realize that doctrine and evidence stand or fall together. This confusion is shown in a paper in THE JOURNAL, January 7, from the Massachusetts General Hospital, by Dr. D. S. King.

Dr. King starts out in his paper to test the efficiency of carbon dioxide as a preventive of postoperative pulmonary complications. In his first series of observations during four months, the number of complications in the treated cases was far below that for the untreated cases. It then occurred to him that, as the purpose of carbon dioxide inhalation is to clear the bronchi and inflate the lungs, perhaps the production of bronchial drainage by frequent change of posture would also be effective. From then on for several months all of the so-called control subjects were given the benefit of postural change. The result was that the treated cases and the "untreated" controls showed nearly similar results. Although "no amount of study has been able to explain" away the first and only well controlled series of cases, the practical conclusion, based apparently on the second series, is that: "In the Massachusetts General Hospital, therefore, the routine use of carbon dioxide as a preventive measure against postoperative pulmonary complications has been discontinued and the search for a more effective method is still being pursued." Whether the equally effective, or ineffective, method of postural change has also been discontinued is not stated. Support is, however, expressed for the view that immediate postoperative deetherization with carbon dioxide may "cause a deeper inhalation of bronchial secretion and so perhaps do harm": a conception offered wholly without evidence, and contrary to practically the entire weight of the experience of all competent anesthetists.

Obviously the evidence from the second series of cases "controlled" by other cases, in which bronchial drainage was promoted by frequent postural changes, proves little or nothing regarding the ostensible object of the investigation. The underlying assumption involved in the discussion is, however, of great importance. It is that obstruction of the bronchi is the common cause of postoperative pulmonary complications. This doctrine is evidently assumed to be so well established and so obvious as to be sufficiently tested by camparison of two procedures, both of which are based on this doctrine. Yet Dr. King, on the basis of his tests, rejects one of these procedures and does not indicate that the other is any better.

It is certainly to be hoped that Dr. King succeeds in his "pursuit of a more effective method" of applying this doctrine than either of those now available. But, as that pursuit may perhaps take him some time, why reject such means as are now available and such as Dr. King's own observations in his first series of experiments show to be effective, for clearing the bronchi, inflating the lungs, inducing drainage and preventing postoperative pulmonary complications?

It is at least evidence of the enormous progress during the past five years in this field, in which there was formerly a considerable mortality, that surgeons now face responsibility for the postoperative period: a responsibility that was quite ineffective so long as such developments as postoperative pulmonary complications were entirely obscure and their outcome therefore wholly "in the hands of God."

YANDELL HENDERSON, PH.D., New Haven, Conn.

[A copy of Dr. Henderson's communication was sent to Dr. King, who replies:]

To the Editor.—In reply to Dr. Yandell Henderson's comment on my paper on the use of carbon dioxide as a preventive of postoperative pulmonary complications, I should like to restate my position as follows.

1. I have no desire to minimize the importance of adequate postoperative bronchial drainage. I believe that the concept of bronchial obstruction and atelectasis answers many, though by no means all, of the questions arising in connection with postoperative pulmonary complications.

2. I conclude from my series that bronchial drainage by either postural change or carbon dioxide inhalation prevents a certain proportion of complications, and that one method is no more effective than the other, but that since postural change is easier and less expensive it is the method of choice. It is still being used at the Massachusetts General Hospital.

3. So far as the use of carbon dioxide is concerned, I disagree with Dr. Henderson as to what constitutes clinical evidence of its value. In my paper I analyzed all the articles quoted by him as proving its usefulness. In my opinion, none of these authors present satisfactory evidence in the form of an adequately controlled series.

4. Dr. Henderson fails to note that the point that "no amount of study has been able to explain" is the record for one month only, February, and if it were not for this one month there would be little evidence in my series of the value of carbon dioxide, even when the controls were not having postural change. The month of February was also one in which the treated group received very little hyperventilation.

5. As to the use of carbon dioxide for deetherization in the operating room, it should be noted that we had used this method for seven months previous to the study under discussion. During this period, pulmonary complications developed in 13.1 per cent of the laparotomies and herniorrhaphies, a higher figure than we had ever recorded before. We therefore had a right to fear that this procedure might be doing harm.

DONALD S. KING, M.D., Boston.

ETIOLOGY OF WHOOPING COUGH

To the Editor: The present communication was inspired by the appearance in your editorial columns during the past six weeks of two comments on the etiology of whooping cough (THE JOURNAL, Nov. 26, 1932, p. 1866 and Dec. 17, p. 2115). Most of our knowledge of the bacteriology and serology of whooping cough has come from Europe, yet in your columns, widely read in Europe, such foreign data are not mentioned.

Thorvald Madsen (*Boston M. & S. J.* **192**:50 [Jan. 8] 1924) summarized the work of his staff at the Danish National Serum Institute in the Cutler Lecture given at Harvard University Medical School in 1924. He described the results obtained with the "cough plate" of Chievitz and Meyer (*Ann. de l'Inst. Pasteur* **30**:503 [Oct.] 1916), which has now been used for sixteen years as a routine diagnostic procedure in Denmark.