

Bronchial Provocation with Methacholine

A Literature Review of Safety

A concern associated with methacholine challenge testing is the safety profile of the test procedure. Challenge testing with methacholine has been performed for well over 30 years. Multiple studies and publications have reviewed the expected protocol for performance, safety, and interpretation of the results. In 1999, the American Thoracic Society (ATS) published a Guideline for Methacholine and Exercise Challenge Testing. This guideline is currently under revision by a group representing both the ATS and European Respiratory Society (ERS).

Early studies published by Townly, et al in 1979, found that in over 1500 patients, there were no initial or delayed severe reactions that required hospitalization. Pratter and colleagues reported similar results in 1984 in over 1000 completed methacholine challenge tests. Another study published in 1993 by Pratter and colleagues reported on issues of safety and bronchodilator reversibility in a prospective study of 62 cases. The mean baseline FEV₁ was 2.60 L (93 + 13 percent of predicted). The authors found both bronchospasm and symptoms

reversed with administration of albuterol delivered by MDI and a spacer. All patients returned to acceptable baseline levels within 30 minutes of administration of the albuterol. Physician intervention was not required in any of the cases. Their conclusion was that methacholine challenge testing did not need to be confined to the hospital.

In 1997, a study by R. Martin, et al. investigated the safety of methacholine challenge testing in a retrospective analysis of 88 patients with a baseline FEV₁ less than 60% (ranging from 22 to 59%) of predicted. Only 4 patients did not return to greater than 90% of the baseline FEV₁ following administration of a poststudy beta-agonist treatment. A second poststudy beta-agonist treatment returned the final four patients to the baseline FEV₁. None of the patients suffered any adverse events. An earlier study in 1982 by Ramsdell and colleagues revealed the safety of methacholine challenge testing in markedly obstructed patients. (baseline FEV₁ 0.45 to 1.66 L)

The Childhood Asthma Management Program (CAMP) evaluated the safety of methacholine

provocation testing performed serially over an 11-year period. The baseline FEV₁ was greater than 70% of predicted in this study. More than 8000 challenges were performed in children with mild to moderate asthma using a standardized protocol. Only 0.4% of the patients did not return to > 90% of the baseline FEV₁.

The Lung Health Study has resulted in large numbers of methacholine challenge tests in patients with mild to moderate airflow obstruction (>5000) These results confirmed the safety of the test procedure in large-scale epidemiologic studies.

Although methacholine challenge testing has been found to be safe even in patients with a lower FEV₁, testing should be approached and completed with a standard operating procedure in adherence to the current standards of care. All testing sites should have a standardized approach to testing and the ability to respond quickly and appropriately to adverse events.

References

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