Lung function testing in adults with preferential nasal breathing

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Abstract

Three adult patients with asthma with preferential nasal breathing were found to have a typical pattern of lung function test results with substantial between test variation. This condition can be identified as a cause of unsatisfactory performance in respiratory tests by observing the patient's reaction after the nostrils have been occluded.

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Most adults can breathe through either nose or mouth.[1] Recently we have observed preferential nasal breathing in an adult asthmatic patient who was unable to use metered dose inhalers (unpublished findings). We describe here three adult patients with preferential nasal breathing and report the abnormalities identified by lung function testing.

Methods

The observations were made on three asthmatic patients—two women aged 63 and 68 and a man aged 64. None complained of difficulty with mouth breathing. Their preferential nasal breathing was noticed during observation either of their metered dose inhaler technique or of their performance in pulmonary function tests.

Breathing patterns were demonstrated by using an inductive plethysmograph (Glasgow Test, PK Morgan). In the absence of breathing the stylus returns to the neutral position. The nose was pinched gently between finger and thumb to show the effect of nasal obstruction. Flow-volume loops were obtained in the standing position with a dry spirometer (Transfer Test, PK Morgan).

Results

All three subjects breathed quietly through their nose. When their nose was gently pinched they tended to stop breathing (for 1–20 seconds) and then tried to breathe through their nose despite the obstruction. At that stage the patient often terminated the procedure or tried to breathe through the mouth. Most oral breathing was jerky and noisy, often being done through almost closed but loose lips. Distress was usually obvious. Figure 1 shows the change in tidal volume by means of breathing pattern tracings. The bottom tracing shows that almost normal oral breathing can occasionally be established.

Figure 2 shows groups of flow-volume loops for each of the subjects. They show great variability in shape within each patient, ranging from very small volumes to an almost normal shape.

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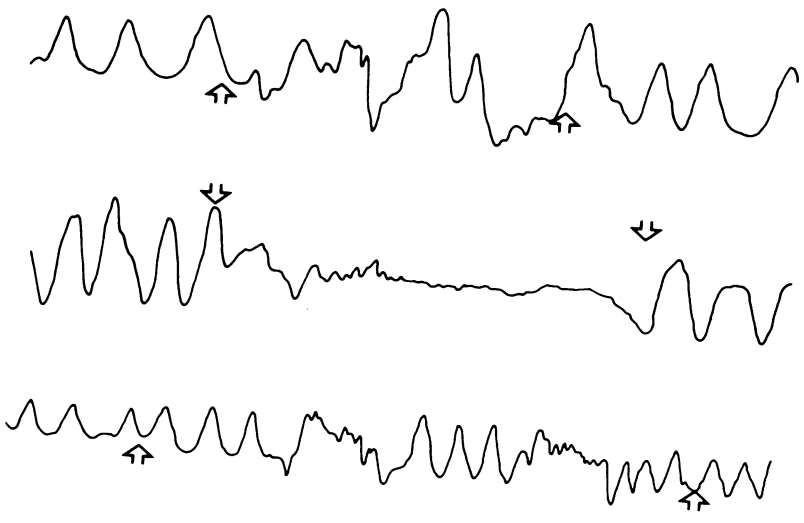

Figure 1 Three spirometric tidal volume tracings from patients with preferential nasal breathing. The arrows indicate the beginning and end of nasal obstruction.

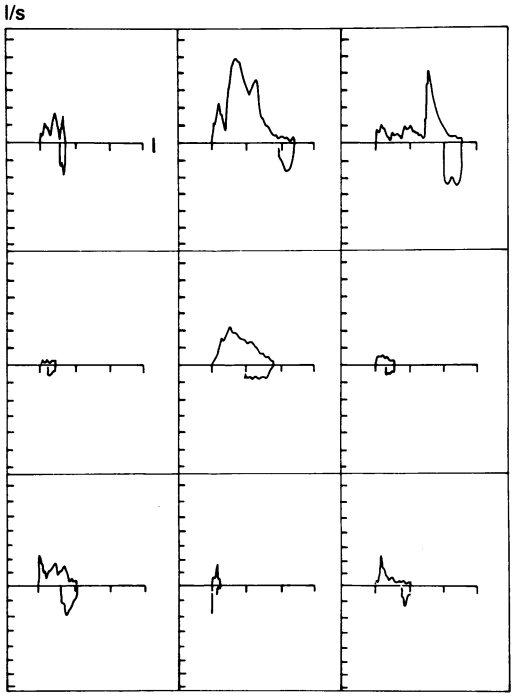

Figure 2 Flow-volume loops for three patients with preferential nasal breathing. Each horizontal row represents a single patient.

Discussion

In most pulmonary laboratories the coefficient of variation between forced expiratory volumes is about 5% in normal subjects and 12–15% in those with chronic lung disease.[2] Within the variability the general shape of the flow-volume curve is the same once the patient has been taught the method and feels at ease. Patients not uncommonly start the expiratory process slowly, put their tongue in the mouthpiece, or do a double breath. These faults can be corrected by an experienced technician or doctor. Some hysterical patients or those applying for compensation frequently show substantial between test variability. Occasionally patients with asthma get increasing airflow obstruction with each forced expiratory manoeuvre, but the pattern of the obstruction is classical and the expiratory loop smooth. Patients with neuromuscular disease may also show variability between tests.[3]

In obstructive sleep apnoea[4] and Parkinson's disease[5] a "sawtooth" pattern in the flow-volume loops may be observed but the FEV_1 is reproducible between loops. In variable intrathoracic and extrathoracic localised obstruction[6] and the floppy airways of tracheobronchopathia osteochondroplastica[7] the shape and volume of the loops vary little between consecutive tests.

Even when we allow for low intelligence, there remains a small group of patients who do not seem able to perform lung function tests. The present results show that preferential nasal breathing in the adult patient is one cause of this difficulty. These patients subconsciously are preferentially nasal breathers but can with difficulty breathe through their mouth. The condition can usually be diagnosed by simply pinching the nose and observing them for a few seconds. As in the present patients, the pattern may be that of either arrest of breathing or acute distress. We would suggest that this simple test should be used on patients who have difficulty in complying with the instructions given in the lung function laboratory or who have large between test variability.

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