EDITORIAL

LUNG FUNCTION IN PRESCHOOL CHILDREN

In children with prolonged or recurrent processes suspicious for bronchopulmonary disease, respiratory function, including not only basal state but also bronchial reactivity, must be investigated through bronchoconstrictors (histamine, methacholine) or bronchodilators (salbutamol). These tests are essential to differentiate asthma from other processes provoking similar symptoms. In the case of asthma, they also serve to evaluate the current situation and the severity of the process, given that the word of parents and older children on the intensity or frequency of symptoms or the use of bronchodilators, which are influenced by subjective factors, cannot be taken at face value[1].

Simple spirometry, which gives the flow-volume curve, is a useful method that is simple to perform in cooperative children aged 6 years old or older. The information provided is sufficient, although in special cases it can be complemented by plethysmography. Spirometry provides information on the current status of lung function and is essential both when evaluating the patient for the first time and to gain better information on the course of the process over time. Because of their diagnostic and prognostic value, bronchodynamic tests should be performed at least in the initial consultation.

However, the greatest problem is posed in the first years of life, when the diagnostic possibilities in children with prolonged or recurrent difficulty in breathing are numerous, ranging from the onset of asthma to wheezy bronchitis and many other pulmonary and extrapulmonary diseases that, although less frequent, require very different management (cystic fibrosis, gastroesophageal reflux, bronchopulmonary dysplasia, ciliary dyskinesia, malformations, and vascular rings, among others). In general, the greater the diagnostic dilemma, the greater the need for lung function tests which are often the determining factor in reaching a diagnosis[2].

The difficulties in these children are caused by their inability to collaborate in the performance of tests and consequently procedures that require complex apparatus and experienced users must be carried out. In addition, before some procedures can be performed, the child must be sedated, thus necessitating hospital admission. Currently there are several tests that require meticulous observation of a series of premises related to the characteristics of the equipment and instruments, calibration, patient handling and evaluation of the data obtained[3]*. In children aged less than two years, two techniques are used. The first is the* tidal volume thoracoabdominal compression technique*, in which an inflatable*

jacket is wrapped around the child's thorax; the jacket is inflated at the end of normal, unforced, inspiration, thus provoking forced expiration and providing the maximal flow at functional residual capacity (V_{max}FRC). A more recent variation is the raised volume rapid thoracoabdominal technique*, which consists of provoking deep inspiration by inflating the child's lung through a mask covering the nose and mouth connected to a compressor; when a maximal pressure of 30 cm H_20 is achieved, forced expiration is produced by rapidly pressurizing the inflatable jacket. Using this procedure, parameters equivalent to those of spirometry (FEV_1, FEV_1/FVC, FEF_{25-75}, etc) can be obtained. In the present edition of* Allergologia et Immunopathologia[4]*, Malliol et al report a study of variability in this technique in 102 children aged less than two years old with recurrent wheezing. These authors conclude that variability is low, thus supporting the utility of the procedure.*

In older children, airway resistance *is evaluated using the* interrupter technique *(Rint), in which the airway is momentarily interrupted during normal respiration; pressure is measured in the buccal cavity before interruption and during the normal respiratory cycle, using a pneumotachograph. This procedure is useful and easy to use since the child is only required to breathe normally. Another easy to use procedure is the* forced oscillation technique*, which is based on the application of oscillations in pressure and, therefore, in airflow. Resistance is then measured as the ratio between both factors. A more recent variant, which produces better results, is* impulse oscillometry *(IOS), in which controlled deviation of a loudspeaker adapted to a mouthpiece excites the air flow, generating pressure pulses and enabling the resistance of the central airways and pulmonary elasticity to be deduced. Lastly,* plethysmography*, a technique with a long tradition, can also be used to determine airway resistance values, among other data, but requires the use of a cabin specially adapted to the anatomical characteristics of young children.*

In addition to the difficulties of some of these techniques, another problem is the lack of reliable data on normal values of the parameters obtained according to age, weight, height and sex – variants that can be related to normality – hence the advisability of each service obtaining its own values according to the apparatus available[5]. The above-mentioned study by Mallol et al provides valuable data on this matter[4].

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