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CORRESPONDENCE

A comprehensive Graphic approach to peak flow "traffic light system" -interpretation

To the Editor:

The clinical value of regular peak flow (PF) monitoring of asthmatics is still subject to debate [1, 2]. A recent editorial in the European Respiratory Journal recommended PF control in patients with severe and brittle asthma [3]. This view is supported by the paper of D'Souza [4] demonstrating that self management based on PF monitoring and a credit card plan is effective. On the other hand, UWYYED and co-workers [5] did not consider PF monitoring to be advantageous to the use of clinical indices of asthma. Physicians can base their judgement on clinical indices. In contrast, patients may prefer objective parameters that are not influenced by their personal worries. With the use of long-acting beta-agonists, judgement of asthma severity on the basis of clinical indices might become more difficult. Rescue bronchodilator consumption, nocturnal asthma and morning dipping, formerly good predictors of unstable asthma, will occur less often. A slow deterioration of airway inflammation might become clinically apparent only after a prolonged delay. PF measurement should reveal sooner any obstruction persisting after bronchodilation with beta-agonists.

If the method itself seems to be good, but does not give convincing results, the method of interpreting PF results must be questioned. Interpretation of PF values has been simplified with the "traffic light system" [6, 7]. Nevertheless, national guidelines are very inconsistent in this respect. For example, recommendations from British authors are based on the early morning PF values [8], whereas Australians rely on postbronchodilator values [9]. Combining both adds significant information. Low early morning values normalizing due to medication, or spontaneously during daytime indicate a high PF variability which correlates with bronchial hyperreactivity [10]. Postbronchodilator PF values analysed in relation to the "personal best peak flow" enable physicians to judge the need for steroids [11].

The system of PF interpretation presented here (Fig. 1) has proved to be valuable in my own practice, but should be evaluated on a larger scale. It allows the patient to understand easily both the differences between constriction by spasm of bronchial muscle and mucosal thickening due to inflammation, and the differences between appropriate therapy for both conditions. For this new system, with threshold percentages indicating the ranges "red", "yellow" or "green", neither the English nor the Australian guidelines can be adopted totally. The values given here are only a proposal and need to be adapted to the clinical status of every new patient, as well as to the drug dose in an individually tailored self-management plan. The following system is based on the assessment of PF reversibility. This means that beta-agonists should be inhaled at least once daily as soon as the early morning value drops under 90% of the personal best PF value and does not rise spontaneously in the course of the same day.

Green zone

PF values are in a range of 90% or more of the "personal best value". Occasional drops not falling below 80% are tolerated. PF variability should not exceed 10% most of the time.

Green zone means optimal control of asthma. There is no significant spasm of bronchial muscle or mucosal thickening. Medication should be continued or might even be reduced slowly if this condition is stable for a long period.

Yellow zone

PF variability is increasing but postbronchodilator values have not fallen under 90% of the personal best value. Reasons for exacerbations should be investigated (allergen exposure, viral respiratory tract infection, gastroesophageal reflux).

Yellow zone means increase of bronchial hyperreactivity. Bronchoconstriction is due to spasm of bronchial muscle and quickly reversible to inhaled beta-agonists such as albuterol. Depending on the amount of PF drop the dose of inhaled steroids may be doubled transiently [8]. Short-acting beta-agonists can be taken on a regular basis or, preferably, long-acting beta-agonists may be introduced [12].

Red zone

Even after bronchodilatation with beta-agonists significant flow limitation persists due to inflammatory mucosal thickening with a consecutive decrease of the internal diameter of the airways.

An acute drop of the postbronchodilator value below 50% within hours means an emergency situation. Patients should take available steroid tablets according to a written action plan and consult their practitioner or an emergency room immediately. A less severe and less rapid drop may require an augmentation of inhaled steroids or a short course of oral steroid treatment, according to the individual self management plan.

Systemic steroids might be discontinued after an exacerbation as soon as postbronchodilator values exceed the 90% threshold (yellow zone). To treat the residual bronchial hyperreactivity an increased inhaled steroid dose should be maintained until the early morning values have come back to the green zone.

Different studies have shown that patient perception of obstruction is poor, especially in patients with severe obstruction and increased bronchial hyperreactivity [13]. According to my experience, without the aid of a PF meter many asthmatics are not capable of differentiating reliably

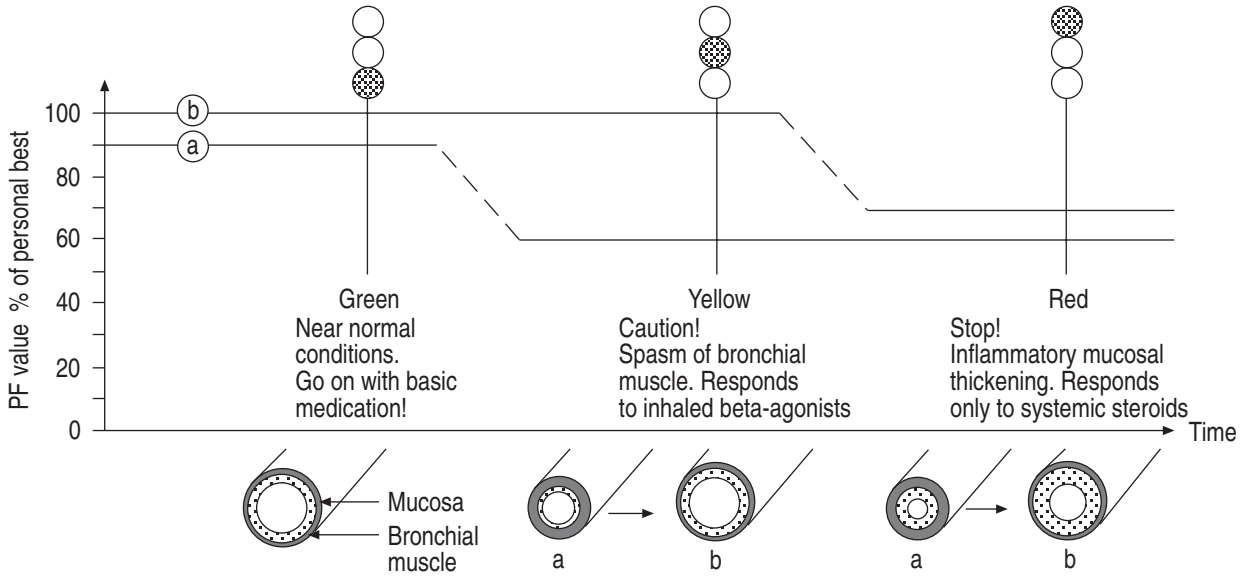

Fig. 1. – Comprehensive scheme of peak flow (PF) interpretation on the basis of the traffic light system. a: prior to use of bronchodilator; b: after bronchodilator.

between the yellow and red zone when the prebronchodilator PF values in both conditions are comparable. In contrast, the action to be taken differs considerably. PF interpretation with the presented scheme should facilitate self assessment and might be superior to a "symptoms only" score system. Moreover, the graphic approach helps the patient to understand what is going on in his/her airways and what causes changes of PF values.

Unfortunately, PF has a lower sensitivity in the identification of bronchial obstruction than forced expiratory volume in one second (FEV_1). Moreover, the mini Wright PF meter under-reads at low and high flows and over-reads in the middle range [14]. Measuring FEV_1 with a turbine pocket spirometer, as being practised in lung transplantation patients [15], might be a better alternative to PF-meters in severe asthmatics. FEV_1 could be used for a self-management plan in the same way as PF. On the German and Swiss market a new electronic device (Jaeger, Würzburg, Germany and Vitalograph, Birmingham, UK) is available to measure PF and FEV_1. Data are displayed and stored so that they can be transmitted to the practitioners personal computer. A flow volume curve of each measurement can be plotted. This allows assessment of quality of each manoeuvre and prevents the "invention" of PF values by patients with dissatisfactory compliance [16]. Hopefully, prices will decrease for these devices allowing a more efficient method of asthma monitoring.

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