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The percent $\dot{V}$ increase upon doubling ΔP

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The correlation between the symptoms of nasal obstruction and rhinomanometry is difficult for two reasons:

1. The patient's grading of his nasal respiration is often uncertain, making comparisons of methods almost impossible.
2. There is no consensus about suitable measuring units. The basis of all measuring units are pairs of ΔP *and* $\dot{V}$. Polar co-ordinates are only geometrically defined.

For this reason polar comparisons have several disadvantages: Because of changing values of ΔP and flow the polar co-ordinates often lie in areas which are not physically comparable, and with low resistance polar co-ordinates only cover the laminar part of the curve.

In addition, the calculation of the resistance of the total nose requires a mathematical model.

No model can be correct for both the normal and the atypical shapes of curves and the mathematical defined units are not generally understandable.

Measuring units must be clinically oriented so they can answer the following three questions:

1. How much increase is there in the laminar part of the curve?
2. What is the degree of curvature in the turbulent part?
3. How much resistance is there in the total nose?

An answer can be given easily and sufficiently exactly by using rectangular co-ordinates with a constant ΔP. These units are defined physically exactly. Two pairs of values are sufficient (Figure 1):

1. The flow at $\Delta P = 150$ Pascal characterizes the initial laminar part. $\dot{V}_{150}$ is sufficient for normal curves and for statistical use.
2. The turbulent part of the curve is measured by the percent flow increase upon the doubling of ΔP. To calculate this value, $\dot{V}_{300}$ is divided by $\dot{V}_{150}$. The size of $\Delta \dot{V}$ (the percent flow increase) allows a differentiation of the shape of the curve by comparing it with the turbulent flow.

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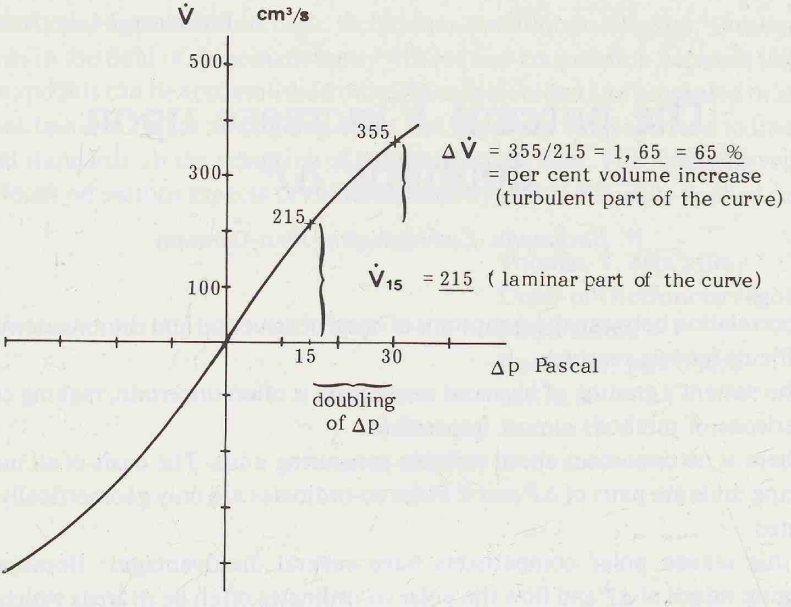

Figure 1. Calculation of the per cent volume increase upon doubling of ΔP.

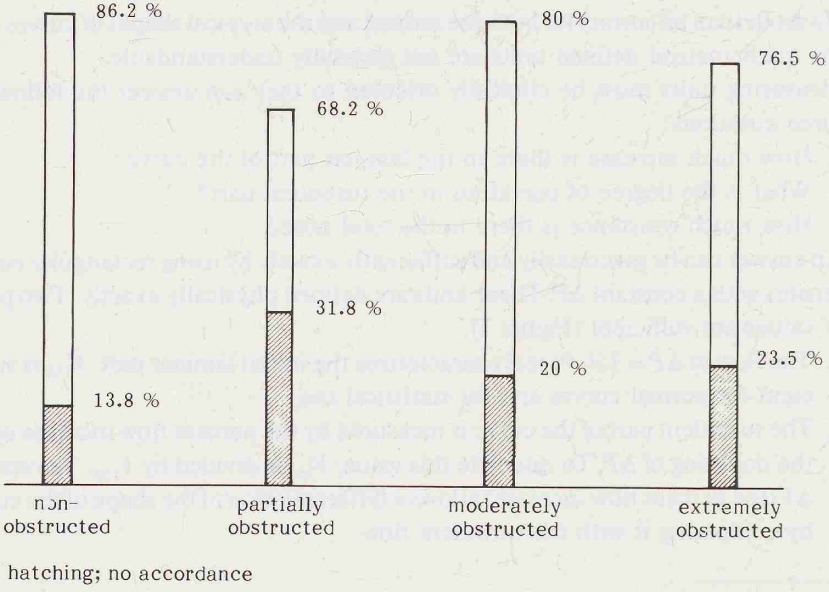

Figure 2. Accordance between anamnesis and rhinomanometry ($u = 200$).

The $\Delta\dot{V}$ is interpreted as follows:

1. Flow increase over 41 percent shows normal curve.
2. Flow increase between 41 and 25 percent shows increasingly worse aerodynamics.
3. Flow increase below 25 percent shows alar collapse.

For the grading of the obstructed nasal respiration we used the following $\dot{V}_{150}$ values: $0\text{–}500 \pm 35$ ccm/sec = extremely obstructed $500\text{–}700 \pm 35$ ccm/sec = moderately obstructed $700\text{–}870 \pm 35$ ccm/sec = partially obstructed over 870 ± 35 ccm/sec = nonobstructed. Moreover, a higher grade of obstruction was determined with side differences over 50 percent and/or with flows increase values below 25 percent. Considering the wide range of symptomatic data, Figure 2 shows a satisfactory correlation between nasal obstructive symptoms. $\dot{V}_{150}$ and $\Delta\dot{V}$ are easily to be calculated and understandable. They permit quantitative analyses of the rhinomanometric curve with good correlation to symptomatic data.

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