angle $\beta$, however valuable, has a major shortcoming in that it does
not distinguish between the various shapes that are determined by
the same relationship between the three determinants of angle $\beta$
(the vital capacity, peak expiratory flow and mid-vital capacity
forced expiratory flow). This is illustrated in the Figure, where
completely different and realistic maximal expiratory flow-volume
(MEFV) curve shapes will yield similar values for the angle $\beta$. The
same problem exists for previous attempts at quantifying the
complex MEFV curve shape by a single variable such as the index
proposed by Green et al. or Landau et al.'s mid-vital capacity
curvilinearity score. In my opinion, adequate quantification of the
MEFV curve shape requires a more complex analysis such as Mead's
slope-ratio-volume relationship that analyzes the curve on a point-
by-point basis, or a method that quantifies various segments of the
curve rather than its overall contour, such as the chord slope analysis
I proposed previously. It nevertheless is encouraging to see that,
with other authors, Kapp et al point to the usefulness of the analysis
of the configurational aspects of the MEFV curve, showing that
configurational parameters may contribute to the clinical utility of
this test.

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To the Editor:

Dr. Vincken raises interesting observations which deserve further
comment. We agree with his statement that “the difficulty is in
expressing configurational information, which is readily available by
visual inspection of the shape of the flow-volume loop, in numerical
indices to be able to quantify and compare various shapes.” The
approach which we chose was to reduce this configuration to a
single index (angle $\beta$) which could be easily derived from available
parameters (in this case peak flow, Vmax50 and FVC). This index
has intuitive geometric meaning and our analysis has shown that it
is useful in documenting or defining individual and group respiratory
abnormalities.

The specific criticism that Dr. Vincken raises is eminently
plausible although its actual importance remains to be tested.
Certainly we do not mean to argue that characterizing the configura-
tion of the MEFV curve by a single index uniquely characterizes
the shape of the MEFV curve. Clearly, such a characterization
would have to take into account many more (if not all points) on
the MEFV curve, as does chord slope analysis. What we hoped to avoid
in selecting a single parameter was an analysis so cumbersome as
to discourage its usefulness. After all, FEV, does not characterize
all flow rates on the MEFV curve yet its determination and study
has proven empirically quite useful in measuring respiratory
function. While Dr. Vincken’s figure suggests that a given angle $\beta$
would, in fact, characterize a number of curves with dissimilar
shapes, we would like to qualify this criticism. For a given individual

Catheter Complications

To the Editor:

We read with great interest Scott’s review of “Complications
Associated with Central Venous Catheters, A Survey” (Chest 1988;
94:1221-24). Recently we reported a very unusual complication of
CVCs—namely bronchovascular fistula. This occurred six months
after insertion of a Hickman catheter for systemic chemotherapy.
The patient suffered transient episodes of hemoptysis after removal
of catheter, but this rapidly disappeared and she subsequently
required no major intervention.

Although Scott’s findings indicate “that complications were pri-
marily health professional technique-related”, we believe that our
case illustrates that a complication may develop as a result of the
infusate through the CVC itself.

In addition, we seriously question the findings that infection is
not a reported complication of CVCs. Those of us who insert and
utilize these devices on a regular basis know that everything from
simple insertion-site cellulitis to full-blown septic shock can occur.
In this regard the MDR system seems to have failed.

Clearly the benefits of CVC use for a variety of diagnostic and
therapeutic procedures are obvious. Although complications do exist
in both short- and long-term central venous catheterization, we
believe that this should not deter their use in clinical practice.

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CHEST / 97 / 5 / MAY, 1990 1271
Nasal Mechanical Ventilation (NMV) as an Alternative to Continuous Positive Airway Pressure (CPAP) in Sleep Apnea

To the Editor:

A proportion of patients with obstructive sleep apnea, perhaps as many as 15 percent, fail to respond to nasal CPAP. This may be due to one of several problems including intolerance of the tight-fitting nose mask or the discomfort induced by continuous positive pressure. In addition, some fail because the tendency of the airway to close exceeds the ability of nasal CPAP to act as a pneumatic splint. We wish to report one such patient, a 35-year-old Hispanic man, who was subsequently successfully treated using NMV delivered by the same nasal mask and substituting a pressure respirator (Bird Mark 7) for the blower motor (Fig 1). The patient presented with hypersomnolence which had caused him to lose successive jobs. Polysomnography confirmed the presence of severe obstructive sleep apnea (apnea index 57/hr with a mean duration of 22.1±11.7 s, minimum oxygen saturation 75 percent). Evaluation of his nose and pharynx revealed no correctable abnormality and efficacy of conventional nasal CPAP was assessed in a separate sleep study. A maximum pressure of 15 cm H2O was only partially successful (apnea index 37/hr with a mean duration of 17.3±10.4 s); when used regularly there was no relief of his disabling symptoms.

<table>
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<tr>
<th>SATURATION %</th>
<th>CHEST WALL</th>
<th>HEART RATE</th>
<th>APNEA</th>
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<tr>
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<td>30</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>90</td>
<td>NO CPAP</td>
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Typical cyclical desaturations
Typical variation in heart rate
Repetitive apneas

NMV introduced

Figure 1