and pressure measurements were obtained before giving
the frusemide intravenously and the changes were
followed over a six-hour period in 20 patients.
Measurement of dead space–tidal volume ratio and
venous admixture was made in 11 patients. Changes
in gas exchange were correlated with change in cardiac
output.

Frusemide initially produced a large diuresis and a
small but significant fall in arterial oxygen tension.
This correlated with a fall in cardiac output and was
associated with an increase in venous admixture. Four
and six hours after frusemide, when the patients had a
large negative fluid balance, there was no significant
difference from pretreatment values in arterial oxygen
tension, carbon dioxide tension, dead space–tidal
volume ratio or venous admixture. It is suggested that
frusemide does not cause a rapid reduction in the
volume of pulmonary oedema, and that the changes
observed acutely are not due to change in pulmonary
oedema but to alteration in the haemodynamic state.

MEASUREMENT OF MYOCARDIAL CONTRACTILITY

M. I. M. NOBLE This communication summarizes a
half-day meeting held by the Royal Society of Medicine
on 28 June 1971. For the purposes of this meeting a
change of myocardial contractility was defined as a
change in the mechanical performance of the heart
which is not due to a change in the length of the muscle
fibres (Frank-Starling mechanism) and is not directly
due to a change in the load on the muscle.

B. R. Jewell explained why valid measurement of
this property of the myocardium has not proved possible
in isolated heart muscle, the major problems being (1) the lack of agreement on the correct model
to be adopted for heart muscle, and (2) the dependence
of contractility on time during the contraction.

K. B. Saunders explained why any attempt to apply
concepts derived from isolated heart muscle to the
intact heart was bedevilled by the inexactitude of the
geometric interrelationship between force and ven-
tricular pressure, velocity of shortening and blood
flow, muscle length and ventricular volume. However,
if end-diastolic volume and aortic pressure are con-
trolled by right heart bypass and aortic resisters, it was
shown by J. H. Mitchell that changes in contractility
could be demonstrated by determining the relationship
to end-diastolic volume of stroke volume, stroke work
or ejection fraction. This solution of the problem
appeared attractive to physiologists but not to cli-
cians who need to assess contractility in the intact
animal. It was for this reason that a number of 'indices
of contractility' had been advocated. These were
reviewed by G. van den Bos, who pointed out that
while the maximum rate of rise of left ventricular
pressure (LV dp/dt max) and the maximum acceler-
tion of blood from the left ventricle had proved useful
in the hands of some authors, neither these nor any
other indices had been shown to be valid in all cir-
cumstances. There were a number of contributions
describing efforts to assess myocardial contractility
in animals and patients, but the general consensus
of the meeting was that, at the present time, the
problems in the measurement of myocardial contrac-
tility are far from being solved.

RADIOGRAPHIC CENTILES OF LUNG AND HEART GROWTH

Patterns of Growth

G. SIMON and J. M. TANNER Standard centiles for lung
width, lung length, and heart transverse diameter
have been constructed for boys and girls from age
6 to 19 based on serial chest radiographs taken
annually on 84 boys and 78 girls. Mean velocity
curves for these dimensions are also presented. The
age at peak velocity for lung width and heart diameter
coincides with age at peak height velocity; peak
velocity for lung length occurs some six months later.
The lungs are exceptional in that the adolescent
growth spurt is of the same magnitude in both sexes
and the girls' mean values do not exceed the boys'
even in adolescence. At age 6 heart diameter is 80% of
its adult value whereas lung width is 66% and
lung length 63%.

Use of Lung Centile Charts in Asthma

NICOLA CONNOLLY Changes in measurements in the
chest radiographs of a series of 97 children with asthma
are shown. The children were divided into three
groups on the basis of their chest radiographs: normal
(78%), simple overinflation with normal vessels (11%),
and overinflation with large hilar vessels relative to
the intrapulmonary vessels (10%). In the last two
groups the lung length was increased in relation to
the centile charts of the normal children. In the third
group the ratio of lung length to lung width was
greater than 1:0 in 60%, a finding uncommon in
normal children.

The relation of respiratory function tests and clini-
cal features to the x-ray appearances is shown. Apart
from a tendency for the very severe cases to fall into
the third radiological group, correlation was poor and
some of the worst cases had a normal chest radi-
ograph.

Use of Lung Centile Charts in Cystic Fibrosis

M. B. MEARNS A series of patients with cystic fibrosis
seen at the age of 5 years or more and followed up for
a minimum of five years was studied, and measure-
ments were made on the annual radiographs as de-
scribed above. These measurements were then plotted
on the lung centile charts of the normal children to
try to detect any abnormalities of lung growth asso-
ciated with or due to the disease. Patients were
grouped on combined clinical and radiological criteria
as described by Jackson and Young. The height and
lung percentiles were correlated with the clinical
course. Changes in serial measurements of ventilatory
capacity over a minimum period of five years are
also correlated with the lung centile changes, and the
pattern of change is discussed.
Use of lung centile charts in asthma.

N Connolly

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