

He refers to a chemical engineers' handbook — "two-phase cocurrent upflow" and "Mist flow, in which liquid is carried as fine drops by the gas phase. Data indicate that this probably occurs for superficial gas velocities over about 70 ft./sec. (> 2 500 cm/sec.)." De Kock (1976),⁶ on the other hand, feels that the two narrower bronchi joining to form a larger bore trachea make for the all important and necessary acceleration and increased velocity with respect to gas exit and coughing.

In addition Leith (1968),⁵ reminds us of the mucociliary clearance system which extends to the remotest parts of the lungs as well as two other clearance mechanisms of the lung, viz. phagocytosis and lymphatic drainage. He also draws our attention to one more interesting possibility. The alveolar lining's surface tension falls to very low values when the area is decreasing, i.e. with expiration. This low-tension surface is thus drawn upwards and might possibly also be a clearance mechanism. Sighing and slow relaxed expiration could therefore possibly be of great significance to the physiotherapist.

Thus it would seem that primary requisites for efficient coughing are:

1. A mechanically sound anatomy, patent trachea and airways, ensuring dynamic compression. Muscle contraction must literally squeeze the lungs. The role the abdominal muscles can play in aiding breathing and lung clearance, albeit reflex, must be acknowledged. Bethune (1975).⁶
2. Velocity sufficient to create "mist-pumping". Raising the intrathoracic pressure can lead to an increased expulsive gas phase which would carry secretions from the trachea to the exterior.

With all these factors in mind one must now apply them to specific pathologies and one can easily see that specific techniques must be evolved for the various pathologies.

Firstly, let us look at the patient on the respirator. Opie and Spalding (1958),⁷ have shown that the life-saving benefits of physiotherapy for patients receiving intermittent positive-pressure respiration are due to direct squeezing of the lung beneath the hands, and are not due to the rate of expiratory flow. These patients still need to be suctioned; increased expiratory flow with physiotherapy is not capable of expelling loose secretions through the tracheostome.

Secondly, coughing in the unconscious patient may be reflexly evoked by applying sustained stretch to the abdominal muscles, Bethune (1975).⁶ This is an extremely useful technique with which to be acquainted.

Thirdly, the routine post-operative accumulation of increased mucous secretions can be effectively removed by coughing after maximum inspiration, whereas, if there is any evidence of diffuse obstructive airways syndrome where the equal pressure point moves proximally, it would seem wise to cough on a lesser volume of inspired air.

Fourthly, patients who suffer from diffuse obstructive airways syndrome should be instructed to cough with their necks in an extended position. This position withdraws the affected trachea from the thorax, "stretches it out" so to speak, facilitating expectoration, De Kock (1976).⁴ Clinically this is a most effective manoeuvre.

Finally the value of postural drainage and gentle diaphragmatic breathing emphasising the expiratory phase in aiding the flow of secretions to the area of the cough reflex should be neither under-estimated nor forgotten.

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BOOK REVIEW

Respiratory Physiotherapy and Pulmonary Care, by Ulla Ingwersen (Munksgaard, Copenhagen, 1976), John Wiley and Sons, New York/London/Sydney/Toronto. Price—Danish kroner 60,00.

In his foreword to this book Prof. H. Anderson, Surgeon-in-Chief of the Thoracic Surgical Department, Copenhagen County Hospital in Gentofte, Hellerup, said: "Respiratory physical therapy is a comparatively new speciality in Denmark. It was first used by thoracic surgeons, who now regard this speciality as indispensable, later by chest specialists and most recently by orthopaedists, who still have not yet begun to use it sufficiently."

Ulla Ingwersen describes the various techniques employed, fully and in good detail. It is a pity that there is no mention of the mechanical aids such as I.P.P.B. and ultra-sonic nebulizers that can be of great value in the physiotherapy treatment of some selected cases.

A lot of emphasis is placed on huffing — "a long, powerful expiration with open vocal cords by means of which the patient, so to speak, "rolls" the secretions up without any great effort and without an actual cough. Huffing should be considered the most important point in the treatment of patients with pulmonary secretions." I feel that this method has got some value in patients with a tension pneumothorax, severe air trapping and some thoracic surgical conditions but certainly the most effective way of removing secretions from the lung is by coughing. Huffing may cause pronounced increased bronchospasm.

The section on treatment of patients in Intensive Care Units is not adequately covered and no mention is made of the treatment of chest conditions of children in medical intensive care units.

From the point of view of physiotherapists in South Africa, we employ a much more advanced and sophisticated level of respiratory therapy.

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CORRECTION:

Contents of S.A.S.P. Journals 1975 and 1976
JUNE 1976

Management of Amputees, a Team Approach
Bernice Kegel,
B.Sc.Physio.(Rand), R.P.T.

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