PREVENTION OF ATELECTASIS AFTER UPPER ABDOMINAL OPERATIONS

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Introduction. Atelectasis and pneumonia are frequent postoperative prob-
lems. Continuous positive airway pressure (CPAP) administered with a mask at
intervals throughout the day and incentive spirometry (IS) were compared with a
regimen of coughing and deep breathing (CDB) to determine the best prophyl-
axis against pulmonary complications after upper abdominal operations.

Methods. Preoperatively, 65 consenting adults were assigned randomly to
one of three treatment groups. All patients performed spirometry and multiple
breath N₂ washout to determine functional residual capacity (FRC). All
underwent physical and roentgenographic examination of the chest. Postoperative-
ly, volumetric incentive spirometers (Bartlett-Edwards) were used to deliver
IS (N=22). A mask was used to deliver 7.5 cm H₂O CPAP (N=23). Twenty patients
received the CDB regimen. All treatments were supervised by physicians or trained
therapists, lasted 15 min, and were delivered every 2 h during waking hours from
the fourth to the seventy-second h postoperatively. Spirometry, FRC determina-
tions, and physical examinations were performed at the bedside 4, 24, 48, and
72 h postoperatively. Oral temperatures were recorded every 6 h. Chest roentgen-
ograms taken 24 and 72 h after operation were interpreted by radiologists unaware
of the treatments assigned. The ratio of postoperative FRC at 24, 48, and 72 h to
that at 4 h was used to minimize inter-patient variability. A probability less
than 0.05 that differences occurred by chance was considered significant.

Results. The mean FRC of the groups did not differ statistically preoperatively or 4 and 24 h postoperatively.
The FRC of all but one patient decreased postoperatively, but only 2 patients
developed pneumonia (3.1%). The 48 h FRC ratio of patients receiving CPAP
(1.8 ± 1.0; X ± S.D.) was greater than that of those receiving CDB (1.2 ± 0.4)
(figure). The latter value did not differ from that of patients receiving IS
(1.6 ± 0.7). Similarly, the 72 h:4 h ratio of the CPAP group (1.9 ± 1.0) was
greater than that of the CDB group (1.4 ± 0.4), which was statistically equivalent to the IS value (1.6 ± 0.8).
The proportion of patients with roentgenographic evidence of atelectasis 72 h
after operation was significantly less with CPAP (23%) than with CDB (45%),
which was not different from IS (41%). There were no differences in oral
temperature or physical examination among or between the groups.

Discussion. Although the incidence of pneumonia was low in all groups (none
in the CPAP group), recovery of FRC after upper abdominal operation was significant-
ly faster and more complete after CPAP delivered at intervals than after conser-
vative CDB regimen. Incentive spirometry offered no advantage over the CDB therapy.