Continuous monitoring of respiration is practised infrequently in the period after operation. Respiration is usually monitored by intermittent visual assessment in contrast to cardiovascular function, which is often monitored closely with sophisticated electronic equipment. The reasons for this disparity are unclear, since respiratory problems are common in the postoperative period. A general assumption exists that if deterioration occurs it will be sufficiently gradual to be detected before any harm results. However, recent trends in anaesthetic techniques and new observations of respiratory problems in a variety of clinical situations, suggest that this assumption may be incorrect.

In attempts to produce “stress-free” anaesthesia and to minimize the use of volatile agents, potent synthetic narcotic analgesics such as fentanyl have been used in increasing doses (Editorial, 1979). Fentanyl is generally regarded as a short-acting drug, although sensitive tests of respiratory function have shown that a modest dose of 100 μg depresses respiration to the same degree and duration as an equi-analgesic dose of morphine (Rigg and Goldsmith, 1976). Of greater concern is the observation of a “biphasic” effect with early recovery and later depression, occasionally requiring resuscitation (Adams and Pybus, 1976). Those patients likely to develop late respiratory depression are impossible to identify clinically.

The discovery of opiate receptors in the spinal cord and the analgesia provided by extradural and intrathecal narcotic analgesics, offers an interesting new dimension in the management of postoperative pain (Spence, 1980). However, as with many new techniques, the hazards soon became apparent. Delayed respiratory depression, often many hours after administration, was reported after both extradural (Christensen, 1980; Reiz and Westberg, 1980) and intrathecal use (Sidi et al., 1981). It would appear that, as with fentanyl, although the likelihood of respiratory depression is increased by a large dose or the simultaneous administration of other narcotics, susceptible patients cannot be readily identified. These techniques are often most useful in patients with pre-existing respiratory disease which may increase the hazards of any respiratory depression.

Apnoea, defined as cessation of airflow for at least 10 s, is a normal accompaniment of sleep. A normal man has between one and 25 episodes per night and a normal woman only none to five episodes. The apnoea may be of central or obstructive origin (Guilleminault, van den Hoed and Mitler, 1978). Such periods of apnoea are harmless in the majority of normal individuals, whether they occur in normal or drug-induced sleep. However, if hypoxia is present as a result of hypoventilation, lung collapse or chronic lung disease, then a profound but usually transient (and thus undetected) decrease in arterial oxygen saturation may result. Such an episode could well be a precipitating factor in postoperative myocardial infarction. The experimental evidence for this hypothesis is now emerging.

Catling and her colleagues (1980) demonstrated hypoventilation and periods of apnoea in patients receiving papaveretum, whether given by the i.m. or the i.v. route. The same group has recently demonstrated that the periods of apnoea and hypoventilation may result in a reduction in arterial oxygen saturation to less than 80% (Catley et al., 1982).

It would appear that some individuals do not respond in a normal fashion to hypoxia (Cormack,
Cunningham and Gee, 1957; Hirsham et al., 1975), hypercarbia and inspiratory loading (Schifman et al., 1980). These findings have been shown to be of relevance in the “cot-death” syndrome (Editorial, 1980) and may also be important in the late stages of chronic bronchitis and emphysema. Flennor and his colleagues (Douglas et al., 1979) have suggested that the traditional classifications of “pink-puffers” and “blue-bloaters” may be related to differing responses to hypoxia. “Blue-bloaters” have episodes of nocturnal arterial desaturation which can be both profound and prolonged, in contrast to “pink-puffers” who have no similar episodes. The frequency of blunted respiratory reflexes in the population is unknown, but the probable relevance to respiratory problems in the period following surgery is self-evident.

Snoring, the audible indication of partial upper airway obstruction during sleep, is a frequent source of humour. However, it may not be as harmless as is commonly supposed. Persistent snoring afflicts 53% of men and 38% of women at some time. The studies of Lugaressi, Coccagna and Cirignotta (1978) show that systemic and pulmonary arterial pressures increase with deepening sleep, not to the extent seen in patients with the “sleep apnoea syndrome”, but in clear contrast to non-snorers. Snoring may be caused by abnormal relaxation of the pharyngeal musculature or anatomical abnormalities. The particular problem of adenoidal and tonsillar hypertrophy in children has been highlighted recently (Wilkinson et al., 1981). Again, the relevance of these observations to the postoperative period is undetermined. It would be instructive to investigate the correlation between a history of snoring and postoperative airway obstruction.

There is thus circumstantial evidence to suggest that transient respiratory disturbances may be common in the late postoperative period. Some of the new anaesthetic techniques may increase the frequency of occurrence and, in addition, some individuals may be less able to compensate for such disturbances.

How can we detect these disturbances? Hypoventilation and apnoea of either central or obstructive origin can be detected reliably (Hanning and Spence, 1982). The impedance technique is widely available and has the merit of simplicity. However, the signal is not quantitative and studies in infants show that apnoea may not be reliably detected (Southall et al., 1980). Methods which detect airflow at the mouth, such as a thermistor or capnometer, are preferable since both central and obstructive apnoea are detected. However, they are not very well tolerated and only provide a qualitative signal.

The most promising new transducer is the inductance plethysmograph (Hanning, Smith and Ledingham, 1978; Sackner, 1979). The signal is quantitative and central and obstructive apnoea can be detected. At present its use has been confined to respiratory research, but a clinical version is under development.

The purpose of monitoring should be threefold. To ensure patient safety; to determine the influence of abnormal respiratory control on the events of the postoperative period and to identify the anaesthetic and analgesic techniques which minimize respiratory disturbances.

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REFERENCES


