PROLONGED POSTOPERATIVE OXYGEN THERAPY

The value of oxygen therapy in the immediate postoperative period during recovery from anaesthesia has been recognized for many years. Administration of oxygen during this period is generally straightforward and patient compliance is rarely a problem. Recovery ward staff are trained in the necessity of oxygen therapy, supervised closely by anaesthetic staff, and their enthusiasm is reinforced by the use of pulse oximetry which demonstrates hypoxaemia that cannot be detected by clinical observation. In contrast, the administration of oxygen thereafter is less certain and the need, compliance and means of administration deserve consideration.

In recent years, several papers in British Journal of Anaesthesia [1-6], and elsewhere [7-9], have shown that hypoxaemia is common during the later postoperative period, particularly during sleep, and that oxygen therapy may be beneficial. The episodes of hypoxaemia have been shown to be related temporally to hypertension, tachycardia, myocardial ischaemia, cardiac arrhythmias and increased production of catecholamines. It seems reasonable to propose that some episodes of postoperative myocardial infarction and heart failure are caused by hypoxaemia in susceptible patients. Confusion, memory difficulties and personality changes appear to be common after surgery in the elderly. “Grandad’s never been the same since his operation” is reported to surgeons and physicians but rarely, if ever, fed back to the anaesthetist. A recent multidisciplinary workshop organized by the Age Anaesthesia Association and the charity, Research into Ageing, highlighted these changes as a major source of concern and proposed that research should be directed towards this area [Research into Ageing Update, May 1991].

Part of the Danish study on the intraoperative value of pulse oximetry [10] examined the early and late psychological changes in an unselected group of adult patients undergoing non-cancer surgery [Moller, personal communication]. Twenty-four of 358 patients (7%) monitored with pulse oximetry complained of difficulty with recent memory compared with 41 of 378 patients (11%) whose anaesthetic was not monitored. The difference was not statistically significant ($P < 0.07$) but the results suggest that the avoidance of intraoperative hypoxaemia is beneficial, at least in some groups. Further studies are indicated to examine the role of age, severity of surgery and postoperative oxygenation on psychological outcome. Given the ubiquity of pulse oximetry in the developed world, such studies may be difficult or impossible, at least in relation to intraoperative factors.

The studies outlined above suggest that prolonged postoperative oxygen therapy is indicated in some patients, particularly at night, although the groups who may benefit remain to be determined clearly. A significant practical consideration is the compliance of the nursing staff and the patient with the prescription of oxygen. Nolan and colleagues, in this issue of British Journal of Anaesthesia [11], used a video camera to monitor compliance during an 8-h period on the first night after operation in 20 patients on a surgical ward in a major teaching hospital. The oxygen mask was removed a total of 64 times, of which 19 (30%) were related to patient activity and 45 (70%) to nursing activities. The duration of removal ranged from a few seconds to almost the entire study period. Oxygen was administered for a mean duration of 86% of the study time (range 3-100%) and its efficacy in preventing hypoxaemia was confirmed. The nursing staff were unaware of the purpose of the study, although they were aware that oxygenation was being monitored with an oximeter and they were asked to replace the probe if necessary. The oximeter readings were not available to them. It is probable that the compliance could have been improved by reinforcing the value of oxygen therapy to the nursing staff. However, it can be assumed that the results obtained represent the highest compliance attainable with present training and equipment and that the results in the later postoperative period and on wards with less commitment to surgical care would have been much worse. Reeder and colleagues reported that even when nursing staff were motivated to encourage patients to accept oxygen as a result of their knowledge of their oxygen saturation, 35% of patients failed to keep their oxygen masks in place overnight [6].

Education of medical and nursing staff, and patients on the value of oxygen therapy is clearly important and anaesthetists must take the lead in this respect. Well constructed, controlled trials showing a clear benefit of oxygen therapy are a necessary prerequisite if the message is to be heard and agreed. It is clear that our prescriptions for oxygen therapy are frequently ignored or countermanded and we must be sure of our ground if we are to insist on strict adherence. Recent evidence that poor oxygenation may impede wound healing and promote bacterial infection [12-14] may help our case, at least on surgical wards. The lack of satisfaction with currently available oxygen delivery...
systems is also clear and further development is necessary.

The relative merits of the different oxygen delivery systems have been described previously [15]. The majority of postoperative patients do not need close control of oxygen concentration and there is no need for fixed concentration, air entraining devices which are often unacceptably noisy. The simple oxygen mask is satisfactory but many patients dislike the "claustrophobic" feeling and the warmth and humidity may also be unpleasant if the oxygen flow is low. Nasal delivery systems offer an advantage in this respect, are as efficacious as a mask [16] and humidification is unnecessary [17], but the currently available devices are far from ideal. The material used in the "nasal spectacles" may be hard and painful to the nasal openings and the method of securing uncomfortable when lying supine. The diameter of the nasal cannulae themselves is often large in proportion to the nasal aperture. This area of the nasal passage is commonly the area of greatest resistance to air flow [18] and it is possible that the cannulae may partially obstruct the nasal airway which is unpleasant [19]. The same stricture may apply to the nasal catheter with a securing foam cuff used widely in Europe. Nasal spectacles of softer material, and with oxygen conserving reservoirs, have been developed for patients with chronic lung disease [20] but have not been used widely in anaesthesia. The reservoir is largely unnecessary in hospital practice and is required only if oxygen is delivered from cylinders or concentrators when pursed lips flow devices may have a place [21]. Intratracheal catheters have been used in some centres for long-term therapy and are more acceptable to some patients than nasal spectacles [22, 23] although they are not without hazard [24]. The prophylactic insertion of a mini-tracheostomy has been suggested for patients with severe sputum production [25] and the same route may be necessary if oxygen administration must be assured. Nasopharyngeal catheters have been used successfully in neonates [26] and modifications of this route may be acceptable in adults. No oxygen delivery device can be regarded as ideal and further research and development is needed if long term oxygen therapy in the postoperative period is to become a reality.

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REFERENCES