The technique of high dose fentanyl anaesthesia is common in adult cardiac surgery because of its minimal effects on haemodynamic variables. The counterpart of this technique is the prolonged postoperative ventilatory depression which requires the institution of artificial ventilation for several hours. It is generally considered that nasal tracheal tubes are tolerated better than oral in these circumstances, and this belief explains why, in about 50% of all the patients undergoing open heart surgery in France, the nasal route was used during anaesthesia and in the postoperative period (Depoix, Desmonts and Tiret, 1984). However, specific complications related to the nasal route have been reported: nasal bleeding and post-intubation nasal discomfort (Fletcher et al., 1984), a higher incidence of bacteraemia (Berry, Blankenbaker and Ball, 1973) and acute maxillary sinusitis (Arens, Lejeune and Webre, 1974; Gallagher and Civetta, 1976; Willats and Cochrane, 1985).

The aims of this prospective study were to compare oral and nasal intubation in adult cardiac surgery, using the following criteria: time to achieve intubation, incidence of mechanical complications, occurrence of bacteraemia following intubation, and the assessment of postoperative comfort.

**PATIENTS AND METHODS**

One hundred adult patients undergoing open heart surgery were randomly allocated to undergo tracheal intubation via the nasal (N) or oral (O) route; 97 reports were analysed, 44 from group O and 53 from group N. Exclusion criteria included: age under 15 yr, subjects having a specific contraindication to nasal intubation, patients from group N in whom nasal intubation could not be performed, requirement for intubation of more than 72 h. Indices analysed during the stay in the operating theatre were:

1. Time to achieve intubation (interval of time from the last inflation through the facial mask and the placement of the tube in the trachea).
2. Technical problems and mechanical complications: nasal bleeding, difficulties in passing the tube either through the nose or through the glottis, rupture of the cuff.
3. Occurrence of bacteraemia—assessed by two venous blood cultures performed, initially, before induction of anaesthesia and, then, 5 min after tracheal intubation. No prophylactic antibiotics were administered before the study.

The indices taken into account in the intensive care unit were the occurrence of acute sinusitis and of pulmonary atelectasis requiring antibiotic
treatment for 8 days following tracheal intubation, trauma to the nostrils, assessment of the comfort of the patient 3 days after operation (by an interview performed by the same anaesthetist) and the presence of dysphonia, dyspnoea, dysphagia, and pain in the nose.

Results are expressed as mean ± SD. Blood cultures were compared using Chi-square test and t test for unpaired data was used for other comparisons.

RESULTS

Both groups were similar in regard to age (45 ± 19 yr in group O v. 47 ± 17 yr in group N), type of cardiac disease, duration of intubation including the duration of surgery (35.8 ± 17.7 h in group O v. 40.7 ± 18.4 h in group N). As expected, the time for the placement of the tube into the trachea was significantly shorter for the oral than the nasal route: 26 ± 30 s v. 62 ± 41 s.

Nasal bleeding was observed in 45.3% of group N patients during heparinization. Progress of the tube through the glottis was considered difficult in 17% of patients in group N v. 6.8% in group O—but the difference was not significant. In 13.2% of the patients selected for the nasal route, intubation could not be performed and the oral route had to be used. All blood cultures were negative before intubation in every patient. More patients in group N exhibited positive cultures after intubation (9.4%); 2.3% of patients from group O had positive cultures. However, this difference was not significant. The bacteria isolated were those usually present in nose, mouth and throat (table I). Several bacteria were isolated from the same blood culture in three patients. Thirteen patients (six from group O and seven from group N) underwent radiological examination of the maxillary sinus before, and 8 days after, operation. Sinusitis was found in only one patient (group N). No difference regarding pulmonary infection was found between the two groups. With respect to immediate postoperative discomfort in the ICU, there was no difference between oral or nasal intubation. However, 29.4% of patients from group N complained of pain in the nose for several days after extubation.

DISCUSSION

The results do not indicate any advantage of the nasal route compared with the oral route for intubation in adult cardiac surgery. The time required for the placement of tube into the trachea was 2.5 times longer when the nasal route was used. This point could be clinically relevant in some critically ill cardiac patients. In addition, intubation via the nose could not be performed in 13.2% of patients. This finding is in agreement with the report of Fletcher and colleagues (1984), who observed that nasal intubation was impossible in 17.3% of patients. Trauma to the nasal mucosa predisposes to bleeding during heparinization, and the placement of the naso-tracheal tube at the beginning of the operation was questioned in the light of this possibility.

Although bacteraemia was more frequent after nasal intubation, the difference was not significant. It is possible that a larger study would demonstrate more significant differences. Entry of bacteria to the blood stream after intubation by either the oral or nasal route may be potentially deleterious, especially in patients with valvular heart diseases. The aetiology of the bacteraemia is thought to be related either to the trauma of nasal or pharyngeal mucosa or to the transfer of the normal flow of mucus of the nasopharynx into the trachea. The species of bacteria identified in this study, and in a previous study (Berry, Blankenbaker and Ball, 1973), indicate that the bacteraemia was caused by nasal flora (alpha-haemolytic streptococci, Corynebacterium species and coagulase-negative staphylococci). These organisms have been isolated in patients with heart disease as those which cause subacute bacterial endocarditis—a point which should be taken into account in cardiac surgery. From these findings, it could be recommended that prophylactic antibiotic therapy start before intubation in adult cardiac surgery. In contrast, postoperative maxillary sinusitis was uncommon in our patients, although only a few patients could be investigated radiologically. In addition, the incidence of postoperative pulmonary complications was not different between the two groups. In regard to the discomfort caused by prolonged intubation, no difference was found between the
two routes when the patients were interviewed in the postoperative period. Postextubation nasal pain was frequent, since it was reported by about 30% of patients intubated via the nose. These results are in accordance with the study of Fletcher and colleagues (1984), in which the patients were reintubated via the nose at the end of operation.

We conclude that nasal tracheal intubation carries no advantage over oral tracheal intubation in adult cardiac surgery. The occurrence of bacteraemia is not uncommon and should lead to a recommendation that prophylactic antibiotic therapy be instituted before the induction of anaesthesia in surgical patients having vascular or cardiac prosthesis, and valvular heart disease.

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