Thorax, 1977, **32**, 346–348

Selective tracheobronchial aspiration

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Scott, A. A., Sandham, G., and Rebuck, A. S. (1977). *Thorax*, **32**, 346–348. **Selective tracheobronchial aspiration.** Eighty attempts at placing suction catheters in the left main bronchus were analysed by studying chest radiographs. When angled catheters were used via a tracheostomy tube the success rate was 75%; the rate fell to 15% when straight tubes were used through an orotracheal tube. Assessment and control of the tube length was found to be important to avoid kinking and subsequent obstruction of the catheters.

A proper aspiration technique applied to the tracheobronchial tree is an important part of the care of patients with endotracheal or tracheostomy tubes, but aspiration of the left main bronchus is particularly difficult. Opie and Smith (1959) found that an angulated catheter entered the left main bronchus through a tracheostomy tube far more readily than a straight catheter. Straight plastic catheters seldom entered the left bronchus regardless of the patient's head position (Kirimli *et al.*, 1970). Even in infants, in whom the left and right main bronchi diverge from the trachea at almost equal angles, Bush (1963) observed that a straight catheter entered the right main bronchus far more commonly than the left. Haberman *et al.* (1973) have developed some practical guidelines that maximise the change of aspirating the left main bronchus. They recommended the use of angle-tipped catheters that had been packed straight rather than coiled, and that orotracheal rather than nasotracheal tubes be used. They also suggested that the patient's head should be turned to the right during catheter insertion. In 24 patients they had a 46% success rate in entering the left main bronchus, their successes increasing to over 60% in those patients with tracheostomies.

We have used many of the guidelines suggested by Haberman *et al.* (1973) for catheterising the left main bronchus in a large number of patients. Our success rate was similar to that in previous studies and our experience has encouraged us to propose a further recommendation related to the length of catheters.

Material and methods

Forty-one patients in the Respiratory Intensive Care Unit were studied, 15 with tracheostomies and 26 with orotracheal tubes. The catheters were washed through with a radio-opaque solution, Lipiodol-Lafay (Denver Laboratories (Canada Limited)) for visualisation on the chest film. A total of 40 insertions was made on each group of patients, 20 with straight catheters and 20 with angled catheters.

Intensive care unit nurses performed the aspirations. Specific attempts were made to place the catheter in the left main bronchus using catheter manipulation. In view of the minimal improvement reported by Haberman when turning the head to the contralateral side, this procedure was not followed. Initially the catheter was advanced until a resistance was met. A chest radiograph was then taken to determine the position of the catheter. All patients tolerated the procedure well.

Results

In 80 attempts to introduce a catheter into the left main bronchus the overall success rate was 30%. When angled catheters were used 20 placements through tracheostomy tubes had a 75% success rate. However, when placements were made through an orotracheal tube the success rate was only 20% (Table).

Table *Success rates of 80 attempted catheter insertions in the left main bronchus*

	Type of catheter	
	Straight plastic	*Angled plastic*
Tracheostomy	2/20 (10%)	15/20 (75%)
Oral endotracheal tubes	3/20 (15%)	4/20 (20%)
Average distance distal to carina	8·5 cm	6·8 cm

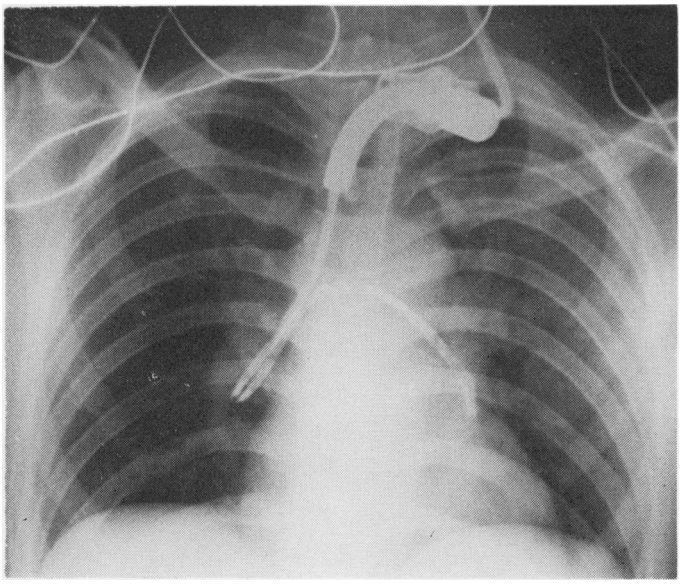

Figure *Suction catheter passed into right main bronchus has become kinked. The catheter tip has entered the left main bronchus.*

In three patients, at the beginning of the study, the chest radiograph showed that the catheter had entered the right main bronchus and become kinked and that its tip had been displaced into the left main bronchus (Figure). This complication was not recognised at the time of catheter insertion and was detected only on later inspection of the radiograph. For the remainder of the study we marked the catheters aseptically at 10 cm intervals before filling them with the radio-opaque solution. The nursing staff were asked to insert the catheters no further than 20 cm for tracheostomy tubes and 35 cm for orotracheal tubes. Catheter kinking and displacement then ceased to be a problem.

Discussion

This study draws attention to the difficulties that may be encountered in selective endobronchial suction. Our results are comparable with those of Haberman *et al.* (1973). The study also draws attention to the importance of controlling the length of catheter inserted to avoid kinking.

It is possible that kinking of suction catheters occurs far more commonly than has been previously recognised. In the present study the nurse reported that when withdrawing the kinked catheters suction was at first unsuccessful but during withdrawal of the catheter secretions were suddenly encountered. This phenomenon is frequently attributed to secretions being inspissated in the suction catheter rather than to occlusion of the catheter due to kinking. This complication has not been reported before and may have come to light because of the large number of patients studied here.

When the shank of a catheter is rotated after its insertion into an artificial airway a predictable change in the direction of the tip is seldom produced. This deficiency in catheter design may be explained by the less than ideal torque properties of most suction catheters. Haberman *et al.* (1973) have already indicated that repositioning failures are due to the inability of the operator to apply controlled torque to the catheter. Perhaps the increased torque control that ideally should be designed into catheters would guard against the potential hazard of kinking. During this study we adopted the policy of marking catheters at 10 cm intervals and taking care not to insert them further than 35 cm for orotracheal tube aspiration or 20 cm for tracheostomy tube aspiration. Following this procedure we found in 80 catheter insertions that the length of catheter passed beyond the carina, as measured in the chest radiograph, was never greater than 11·5 cm (mean= 7·6 SD $\pm$3·84).

We wish to thank the nurses in the Respiratory Intensive Care Unit for their assistance in this study.

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