FIGURE 2 Distal end of catheter.

the bedside with use of continuous ECG and pressure monitoring. Percutaneous insertion can be achieved through the subclavian, internal jugular, external jugular, femoral, or antecubital veins. The highest success rates are associated with the internal jugular route, particularly the right internal jugular vein.⁸

Knot formation is related to vascular anatomy and the catheter's warming, making it more compliant. A long insertion time will increase the catheter's compliance, due to warming.⁸ The left brachiocephalic vein presents a downstream oblique path, forming an obtuse angle with the superior vena cava, while the right subclavian vein forms an acute angle with the superior vena cava and with the right internal jugular vein (Pirogoff's angle).⁹ Most incidents of knotting occur in the right cardiac chambers and in the pulmonary artery.

We believe the initial right internal jugular vein cannulation occurred due to use of the Seldinger technique for insertion of the introducer. No correct successive pressure record was obtained, and no ventricular pressure was ever noted. Rhythm disturbances never occurred during the insertion procedure. We therefore suspect that the guide-wire, and subsequently the introducer, were placed in the right internal jugular vein. The patient's weight and slight build suggest that the introducer would have been longer than the distance between the puncture site and Pirogoff's angle, making internal jugular vein positioning possible. Another possibility (less probable)

would be the coiling of the catheter in the right brachiocephalic vein or atrium and migration into the right internal jugular vein.

This complication, encountered by an experienced anaesthetist, points out the difficulty in avoiding such unusual complications when inserting Swan-Ganz catheters. We wish to remind readers that for anatomical reasons the right internal jugular vein should be the route of choice for inserting Swan-Ganz catheters when fluoroscopy is not being used. The second choice is the left subclavian vein. Finally, the guide-wire for insertion of the introducer should be inserted the shortest distance possible in order to avoid unintended collateral venous cannulation.

J.L. Aguilar DEAA MD
V. Mazo MD
J.M. Mata MD
F. Vidal Lopez MD
Servicio de Anestesiología y
Reanimación and the
Servicio de Radiología y Medicina
Nuclear (JMM)
Hospital de Badalona
"Germans Trias i Pujol"
Apartat de Correus 72
Badalona, Barcelona
Spain

Mucopolysaccharidoses and anaesthesia

To the Editor:

We read with interest the report by Herrick and Rhine¹ of their experience with patients with mucopolysaccharidoses. The paper confirms our own experiences with these diseases.²

The authors commented that we reported the use of tracheostomy under local anaesthesia in a patient with Hurler's syndrome. We did note, however, that the girl was later reclassified as having the less severe Maroteaux-Lamy variation and, as such, lived longer and had normal intelligence. The task of performing a tracheostomy under local anaesthesia in a younger, mentally retarded child with Hurler's syndrome would be considerably more difficult than in this patient. We would not advocate that such a procedure be carried out without thorough consideration of alternative management.

It is important that the potential for disaster due to the airway problems associated with the mucopolysaccharidoses be brought to the attention of anaesthetists.

David Baines
John Keneally
Department of Anaesthesia
The Children's Hospital
Camperdown
Pyrmont Bridge Road
Camperdown
Sydney 2050
Australia

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- 2 Baines DB, Keneally JP. Anaesthetic implications of the mucopolysaccharidoses: a fifteen year experience in a children's hospital. *Anaesth Intensive Care* 1983; 11: 198-202.

REPLY

We appreciate the comments of Drs. Baines and Keneally regarding our reference to their report of a tracheostomy performed under local anaesthesia in a patient with the Hurler syndrome. We note, after reexamination of their paper, that at the end of the discussion the patient's diagnosis was indeed reclassified from the Hurler syndrome to the Maroteaux-Lamy syndrome. We apologize for not recognizing this change and stand corrected.

We reported no experience with patients with the Maroteaux-Lamy syndrome but agree that performance of tracheostomy under local anaesthesia would potentially be more difficult in a patient with the Hurler syndrome. It is worth emphasizing, however, as clearly illustrated in the paper by Baines and Keneally, that the successful establishment of a tracheostomy does not necessarily assure a satisfactorily patent airway, even in patients with the typically less severe Maroteaux-Lamy syndrome.

Based on our experience, which is consistent with the experience reported by the respondents, we have attempted to emphasize the potential hazards associated with airway management and the induction of anaesthesia in patients with the mucopolysaccharidosis syndromes. In patients with significant somatic involvement, we have clearly advocated preferential consideration of an inhalation induction technique and emphasized the importance of maintaining spontaneous ventilation until the ability to establish an adequate airway can be confirmed. We have also attempted to non-judgementally discuss options, including consideration of tracheostomy under local anaesthesia, for circumstances in which the preferred method is not feasible. We have not preferentially advocated this technique nor have we in any way implied the unqualified endorsement of Drs. Baines and Keneally. We agree that tracheostomy under local anaesthesia is not a procedure to be carried out without thorough consideration of all the options but we do believe that it merits inclusion as an option for consideration.

Provided that the potential hazards and available options are recognized, we believe that the anaesthetist dealing with these complex patients, regardless of the specific syndrome, will

utilize experience and judgement to choose the technique that best meets the clinical situation.

Ian A. Herrick BSc MD
Department of Anaesthesia
Queen's University
Kingston, Ontario
K7L 3N6

Elliot J. Rhine MD CHB FRCPC
Department of Anaesthesia
Children's Hospital of Eastern Ontario
University of Ottawa
Ottawa, Ontario
K1H 8L1

Hazards associated with passage of nasogastric tubes into the trachea

To the Editor:

The passage of nasogastric tubes in anaesthetised patients is a common request during surgery. Insertion of the nasogastric tube may not be straightforward and the presence of an endotracheal tube may compound the problem. In addition, a tube in the trachea is no guarantee that a nasogastric tube will pass into the oesophagus; it may just as easily enter the trachea. We have encountered three cases where this occurred and describe one in detail in this report.

The patient was undergoing abdominal surgery under general anaesthesia and the trachea was intubated with a cuffed endotracheal tube (Mallinckrodt Critical Care - Intermediate 'Hi-Lo' cuffed Murphy eye) with mechanical ventilation by intermittent positive pressure. Monitoring included ventilator pressure, polarographic oxygen circuit analyser, pulse oximetry and end-tidal carbon dioxide concentration by capnography.

Following a request to pass a nasogastric tube, an 18 French gauge tube (Medovations Inc.) was inserted blindly and appeared to enter the oesophagus without difficulty. However, when the anaesthetist applied suction to the nasogastric tube there was a dramatic peal of alarms from the ventilator, pulse oximeter, oxygen circuit analyser and capnograph. Manual ventilation was instituted, but it was not possible to adequately ventilate the patient due to an insufficient supply of fresh gas. Even with the oxygen bypass activated, until the suction was discontinued and the nasogastric tube was removed from the trachea, satisfactory ventilation could not be achieved.

It is an accepted hazard in conscious patients that nasogastric tubes may pass into the trachea and it is usual to check the placement before administering fluids in order to avoid pulmonary damage. However, during general