activity in man following administration of glycopyrrolate or atropine.

Twenty-six adult patients of both sexes on no medication and without any medical disorder likely to affect plasma cholinesterase activity were studied after obtaining their consent and the Hospital Ethical Committee's approval. No premedication was administered. The patients were divided into four groups, two receiving glycopyrrolate 7.5 $\mu g \cdot kg^{-1}$ IV (Group A, n = 7) or atropine 15 $\mu g \cdot kg^{-1}$ (Group B, n = 7) prior to induction of anaesthesia and two receiving glycopyrrolate 10 $\mu g \cdot kg^{-1}$ (Group C, n = 6) or atropine 20 $\mu g \cdot kg^{-1}$ IV (Group D, n = 6) prior to neostigmine administration for antagonism of nondepolarising neuromuscular block. Venous blood samples were taken before the anticholinergic drug administration and 1, 2, 5, 10, 20 and 30 minutes later in groups A and B and 1, 2, 5, 10 and 15 minutes later but prior to the administration of neostigmine in groups C and D. Plasma was separated within 30 minutes and cholinesterase activity was estimated using a colorimetric method[3] with butyrylthiocholine as the substrate. A 2 µl sample was diluted with 300 µl of the reagent and was incubated for 120 seconds. Statistical analysis of the data was carried out using analysis of variance.

Plasma cholinesterase activity in the four groups is given in the Table. Analysis of variance showed that there was no significant difference in plasma cholinesterase activity in any group over the period of study.

Our results make it unlikely that routinely used doses of glycopyrrolate or atropine have no clinically important effect on plasma cholinesterase activity. Interpolation made from the *in vitro* low anticholinesterase effect and minimal changes in plasma cholinesterase activity measured in man leads to the conclusion that either anticholinergic drug is unlikely to interfere with the hydrolysis of succinylcholine or ester-type local anaesthetics in patients.

TABLE Plasma cholinesterase activity ($I.U. \cdot ml^{-1}$) following glycopyrrolate and atropine administration (mean ± SD)

Minutes after drug admin.	*0*	*1*	*2*	*5*
Group A	5.65	5.49	5.41	5.51
n = 7	±1.81	±1.86	±1.85	±1.78
Group B	5.49	5.34	5.43	5.51
n = 7	±1.09	±1.00	±0.96	±1.01
Group C	5.44	5.38	5.57	5.82
n = 6	±1.43	±1.11	±1.37	±1.45
Group D	5.16	5.07	5.05	5.04
n = 6	±1.03	±1.20	±1.28	±1.20

Minutes after drug admin.	*10*	*15*	*20*	*30*
Group A	5.42		5.31	5.34
n = 7	±1.78		±1.77	±1.80
Group B	5.43		5.40	5.34
n = 7	±1.08		±1.05	±1.00
Group C	5.62	5.79		
n = 6	±1.41	±1.39		
Group D	5.11	5.41		
n = 6	±1.21	±0.88		

R.K. Mirakhur MD PHD FFARCS
Department of Clinical Anaesthesia
Royal Victoria Hospital
Belfast
Northern Ireland
C.J. Jones B PHARM MPS
A.H. Robins Co. Ltd.
Horsham, England

REFERENCES

1 *Zsigmond EK, Winnie AP, Barabas E, Wang XY.* The inhibitory effect of glycopyrrolate on human plasma-cholinesterase. Can Anaesth Soc J 1985; 32: 20–2.
2 *Mirakhur RK.* Glycopyrrolate and human plasma cholinesterase. Can Anaesth Soc J 1985; 32: 683.
3 *Ellman GL, Courtney KD, Andres VJ, Featherstone RM.* A new and rapid colorimetric determination of acetylcholinesterase activity. Biochem Pharmacol 1961; 7: 88–95.

Percutaneous sheath introducer shaft-hub disconnection during pulmonary artery catheterization

To the Editor:

We wish to report a recent problem which occurred during the insertion of a pulmonary artery catheter using an Arrow® Percutaneous Sheath Introducer Set, SI-09800.

Our patient was a 29-year-old man weighing 90 kg, scheduled for an elective aorto-coronary bypass graft. The right internal jugular vein was used for percutaneous cannulation by the Seldinger technique, and the catheter sheath inserted without difficulty and connected to the haemostasis valve with side port adapter. The balloon-tipped pulmonary artery catheter passed easily down the catheter sheath to approximately 25 cm at which time, while watching the monitor screen, the anaesthetist felt the separation of the shaft of the catheter sheath from the hub (Figure 1). As the anaesthetist was holding the shaft-hub junction, he was able to prevent the shaft from advancing into the neck. The hub and pulmonary artery

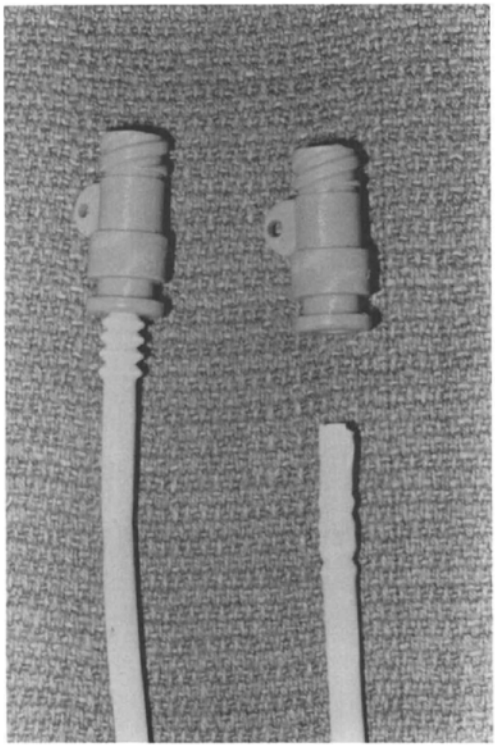

FIGURE 1 Percutaneous sheath introducers: intact unit on left. Note the shaft-hub separation of the sheath used in our patient (right).

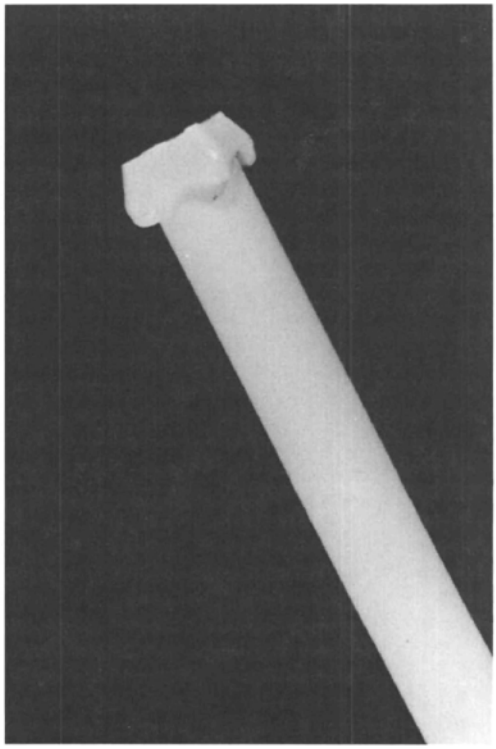

FIGURE 2 Catheter sheath shaft showing lug at upper end.

catheter were removed without incident. A "J-wire" was inserted through the catheter sheath which was then removed intact. Thereafter, a new catheter sheath was introduced over the wire and successful pulmonary artery catheterization was achieved.

Careful study of the original catheter sheath confirmed its disconnection at the catheter shaft-hub junction (Figure 1). There was no evidence of any disruption at the flexible corrugation area of the sheath as previously reported[1] nor was there any evidence of trauma to the device.

Rapid perception of the problem and its management are necessary to prevent catheter embolization, air embolization and haemorrhage.[2,3] In this instance, this was facilitated by the tactile stimulus provided by holding the catheter sheath at the junction of the hub and shaft which permitted immediate recognition of the separation. Carlon[4] suggested that if hub-shaft separation occurs and the sheath disappears into the vein, the complication may be minimized by not removing the pulmonary artery catheter from the vein *but* inflating the balloon to permit the withdrawal of the pulmonary artery catheter and the sheath to a level superficial enough that they could be retrieved by a small cutdown.

Mechanical problems may be an important source of hazard in patients undergoing percutaneous venous cannulation. A problem similar to ours has been previously described during use of a different sheath introducer set, which resulted in that patient undergoing a right cervicotomy to retrieve the shaft of the sheath from the internal jugular vein.[4] The importance of the shaft-hub unit was discussed in a Technical Report to the U.S.A. Department of Health and Human Services.[2]

The shaft-hub unit used in our case was examined by the manufacturer and their letter states in part: "our examination of the returned product indicates the sheath was defective because it did not have the proper lug used to bond the sheath to the hub."[5] The lug is a projection of the upper part of the shaft that is bonded into the hub to form a single unit (Figure 2).

Shaft-hub disconnection of a percutaneous sheath introducer set for pulmonary artery catheterization is an extremely rare event according to the literature. Our hospital utilizes about one thousand Arrow sets a year, and this is the only disconnection that we have ever encountered. We would like to express our thanks to Arrow International Inc. for their rapid and thorough investigation of the cause of the shaft-hub separation.

This communication should serve to reinforce an awareness of potential shaft-hub disconnection, its early recognition and appropriate management during pulmonary artery catheterization.

Bernard M. Braude MB BCH DA(SA) FFA(SA)
John S. McLean MD FRCPC
Department of Anaesthesia
St. Michael's Hospital
30 Bond Street
Toronto, Ontario M5B 1W8

REFERENCES

1 Arrow International, Inc. – Letter. Device Correction – Canada, Arrow Percutaneous Sheath Introducer, April 7, 1986.
2 *Rashkind WJ, Wagner, H.* Technical report: vascular catheter devices: a study of safety and performance. Franklin Research Centre, Philadelphia, Pennsylvania. Chapter 20 Catheter Hubs. 1981.
3 *Peters JL.* Current problems in central venous catheter systems. Intensive Care Med 1982; 8: 205–8.
4 *Carlon GC, Howland WS, Kahn RC, Turnbull AD, Makowsky M.* Unusual complications during pulmonary artery catheterization. Crit Care Med 1978; 6: 364–5.
5 *McGregor PJ.* Arrow International, Inc. Reading Pennsylvania Letter, August 21, 1986.