Silastic catheters for antibiotics in cystic fibrosis

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SUMMARY A randomised comparison of percutaneous Silastic catheters and conventional intravenous cannulae for giving intravenous antibiotics in patients with cystic fibrosis showed that Silastic catheters were favoured by the patient, lasted longer, and had fewer complications.

Repeated courses of intravenous antibiotics in patients with cystic fibrosis have led to an improved prognosis,[1] but they can cause frequent problems with venous access.

Our practice in the management of lung infection in cystic fibrosis is to give intravenous antibiotics early, as soon as there is evidence of deterioration—as suggested by an increase in symptoms or signs, deterioration in lung function or *x* ray pictures, poor weight gain, or growth failure—rather than on a regular basis. Although the frequency of intravenous courses tends to increase after colonisation with *Pseudomonas aeruginosa,* the need is very variable with some patients requiring only one course a year or less. This makes the use of permanent indwelling lines for treatment in cystic fibrosis inappropriate in most cases.

The aim of this study was to compare a 'short' Silastic catheter with a conventional intravenous cannula for giving intravenous antibiotics in patients with cystic fibrosis.

Patients and methods

Twenty children with cystic fibrosis with a median age of 13 years (range 5 to 16 years) admitted for intravenous antibiotics between October 1986 and March 1987 participated in the study. This was the first admission for six patients and no patient had received a previous course of treatment through a Silastic catheter. They were allocated by random numbers to receive antibiotics by either a Silastic catheter or a conventional intravenous cannula; there were 10 patients in each group.

The catheter or cannula was inserted by one of three doctors experienced in the techniques. Fifteen centimetres of Silastic catheter (internal diameter 0·3 mm; Dow Corning) was inserted into the brachial vein by a 19 gauge butterfly needle (Abbott), so that the tip was in a large calibre vein. The butterfly needle was then removed and the line connected to a 25 gauge butterfly needle. This method is almost identical to that described by Shaw[2] and is commonly used for neonatal parenteral feeding.[3] Practical hints for inserting a line are summarised in table 1. Intravenous cannulae (Venflon: size 20 or 22 guage) were inserted into a vein in the hand or forearm in the conventional manner. No local anaesthetic was used for any patient.

Intravenous heparinised saline (1 µ/ml) was given continuously at 1 ml per hour by a portable battery operated pump (Grazeby Medical). Intravenous antibiotics: tobramycin, either alone or together with azlocillin, ceftazidime, or cefuroxime, were given at the manufacturers recommended dilution by slow bolus over 10 minutes and the course continued until clinical improvement had occurred and lung function improved.

After insertion all lines were left undisturbed except in the event of possible complications when the line was inspected under aseptic conditions and the problem resolved or the line replaced.

The patient's opinion of the mode of venous access was sought using a visual analogue scale (0=awful; 10=excellent). Patients were allowed to continue intravenous treatment at home if conditions were felt to be suitable. Parental consent was obtained for all patients.

Results were analysed using the Wilcoxon Rank Sum test.

Table 1 *Practical hints*

When inserting a line:

(1) Always blunt the tip of the 25 gauge butterfly needle before threading it into the Silastic catheter to reduce the risk of puncturing the line.
(2) Aim to thread the whole length of the needle into the catheter to prevent the line 'blowing' apart when in use.
(3) Always remember to thread the plastic needle guard over the catheter before inserting the needle to help to prevent leakage.
(4) Use 'Luer lock' syringes in the pump.

Faulty lines:

(1) The commonest problems occur at the butterfly/catheter connection.
(2) When flushing a line examine this connection while flushing. Leaks may otherwise be missed.
(3) Beware blockage in the butterfly needle. Always try changing the butterfly before giving up!

Table 2 *Comparison of the Silastic catheter and cannula for the administration of antibiotics in children with cystic fibrosis. Results are mean (SD)*

	Silastic catheter (n=10)	*Cannula (n=10)*	*p Value*
Line life (days)	8·4 (4·5)	4·0 (2·1)	0·001
Lines/patient	1·8 (0·42)	2·9 (1·1)	<0·05
Length of intravenous course (days)	15·2 (4·6)	11·7 (1·9)	NS
Patient opinion	8·8 (1·7)	5·7 (2·4)	<0·01
Patient opinion (excluding first admissions)	9·4 (1·0)	6·1 (2·5)	0·01

Results

Line life for Silastic catheters was twice that of cannulae and the number of venepunctures required for venous access was halved. For this latter reason patient opinion was strongly in favour of Silastic catheters. Patients also found that much less or no pain was experienced when antibiotics were given through a Silastic catheter. The results are summarised in table 2.

Cannulae were associated with more complications, but none was serious. The most common problem for Silastic catheters was occlusion of the line (seven episodes) and for intravenous cannulae it was fluid leaking into the tissues (21 episodes). Thrombophlebitis occurred more commonly with intravenous cannulae (three episodes) than for Silastic catheters (one episode). The incidence was not related to the antibiotic combination used. There were no episodes of major sepsis.

Domiciliary treatment was possible in only four patients (three with Silastic catheters, one with a cannula) for a mean period of 6·75 days. All other patients were considered unsuitable for a variety of reasons including other medical or social problems, poor treatment compliance, first hospital admission, or preference to stay in hospital.

Discussion

These results confirm that the use of 'short' Silastic catheters improve quality of life for this group of patients, allowing them to continue a more normal and mobile pattern of life than previously. Some patients have continued to attend school and work during treatment.

Since this study, Silastic catheters have been used electively for over 40 courses of intravenous antibiotics. Most have required only one line for the whole course of treatment. Mean line life has increased considerably to 12·4 days and more than half the patients have been able to continue intravenous treatment at home.

Undoubtedly more experience in the care of these lines has increased their value. Domiciliary treatment has been made more easily available for patients because of the reduction in number of lines required for each course of antibiotics. Many of our patients travel over 50 miles to hospital and returning to hospital for a new line would be extremely inconvenient. It should also be remembered that domiciliary treatment relieves pressure on hospital beds allowing their more efficient use.

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