

for nine days. The vocal cords were unaffected. Throughout this period resolution was monitored by serial endoscopies. The trachea and bronchi produced greatly increased amounts of mucus and were irrigated regularly with saline. Persistent aspiration due to neuromuscular incoordination prevented oral feeding for eight weeks. He was discharged after three months and subsequently remained well.

### Comment

Sterilising tablets are 16 mm in diameter, and the severity of the reaction in case 2 was probably due to the tablet sticking in the supraglottis. Hawkins *et al* stated that solid caustic agents produce a higher incidence of oesophageal burns than liquids.<sup>3</sup>

The changes in the bronchi were probably due to inhalation of chlorine gas, which is generated when sodium dichloroisocyanurate is dissolved in water. Sodium dichloroisocyanurate is the active component of sterilising tablets, and the solution it produces is of about neutral pH. The mechanism of injury is assumed to be the oxidation of proteins, as it is after ingestion of liquid chlorine bleaches.<sup>1</sup>

As the ingestion of sterilising tablets is relatively common and the consequences potentially fatal it would be prudent to package the tablets in childproof containers like other medications.

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1 Adam JS, Birck HG. Paediatric caustic ingestion. *Ann Otol Rhinol Laryngol* 1982;**91**:656-8.

2 Yarrington CT. The experimental causticity of sodium hypochlorite in the oesophagus. *Ann Otol Rhinol Laryngol* 1970;**79**:895-9.

3 Hawkins DB, Demeter MJ, Barnett TE. Caustic ingestion: controversies in management. A review of 214 cases. *Laryngoscope* 1980;**90**:98-109.

4 Weeks RS, Ravitch MM. The pathology of experimental injury to the cat oesophagus by liquid chlorine bleach. *Laryngoscope* 1971;**81**:1532-41.

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## Is repeated flushing of Hickman catheters necessary?

The successful management of many malignant diseases requires safe and frequent venous access for administering cytotoxic drugs, checking blood counts, performing biochemical analysis, and providing blood products. Venous access may be initially difficult in some patients and subsequently difficult in others, substantially impairing normal access and jeopardising treatment. The Hickman catheter has proved successful in this situation.<sup>1</sup> A Silastic catheter, it is inserted under a short anaesthetic into a central vein and brought through a subcutaneous tunnel to an exit site on the anterior wall of the chest. These catheters may be kept in position for many months. Conventional recommendations for their maintenance include daily or even twice daily "flushing," which is onerous and may give rise to complications in this often immunocompromised group. This report describes our experience with these catheters using minimal maintenance.

### Patients, methods, and results

In one department between November 1979 and March 1983, 49 Hickman catheters were placed in 44 patients with malignant disease, of whom 33 had lymphomas, aged from 15 to 67 years (median age was 44.5 years). Patients were advised to shower briefly rather than bathe but no other restriction was placed on their activities. Two patients flushed their catheters once weekly at home, but the remainder carried out no maintenance at all. All routine blood sampling, cytotoxic therapy, or transfusions were performed using the catheter, after which all but two catheters were flushed with 5-10 ml of sterile physiological saline. Two patients insisted on sterile water as they experienced nausea and malaise after saline: these symptoms were unexplained but the use of water did not cause any problems.

Heparin was *not* added to the flush. Any sign of local infection at the insertion site was treated with 5% povidone-iodine (Betadine) spray twice daily and a dry dressing. Blocked catheters were treated with urokinase 5000 units in 2 ml sterile water, which was left in the catheter from 30 minutes to two hours after which irrigation was attempted.

The catheters were in place for a median of 187 days (range 4-786 days). In four patients catheters were replaced (twice in one patient) due to relapse,<sup>1</sup> malposition, accidental dislodgment, and kinking.

The mean interval between flushing the catheter was 21 days (range 1-56 days). The amount of access through the catheter was considerable: for each catheter a mean of 23 blood samples were obtained and 8.3 cycles of chemotherapy administered. Additionally, 63 whole blood transfusions were given to 24 patients and 88 platelet transfusions were administered to 10 patients.

Infections were classified as: Exit site (one or both of clinical and bacteriological evidence of infection at the exit site on the chest wall). Subcutaneous tunnel (similar evidence of infection along the subcutaneous track of the catheter). Exit site + septicaemia; subcutaneous tunnel + septicaemia (the occurrence of either in combination with systemic infection and positive blood cultures).

### Catheter related complications

	No	Percentage of all 49 catheters
Infection		
Exit site	28*	57*
(Exit site and septicaemia)	(3)	(6)
Subcutaneous tunnel	2	4
(Subcutaneous tunnel and septicaemia)	(1)	(2)
Blockage	7	14

\*Occurring in 15 patients with 15 catheters (34% of patients).

Thirty infective episodes related to the catheter occurred in a total of 9685 days of catheter function, giving a rate of one episode for 333 days of use. Most of these infections were limited to the catheter exit site on the wall of the chest (see table). In 29 of these 30 episodes the patient was neutropenic with a neutrophil white cell count  $<0.8 \times 10^9/l$ . All but two exit site infections and both subcutaneous tunnel infections resolved with antibiotic treatment. In only two cases did infection necessitate catheter removal. Blockage occurred in seven catheters and patency was restored in six. In the remaining case, unflushed for 56 days, the catheter was removed.

### Comment

The median duration of insertion (187 days) in this study is the longest so far reported for patients with malignant disease. Nevertheless, the complication rate in this largely immunosuppressed group of patients was similar to that reported by others who have emphasised the need for daily cleansing of the exit site, and daily or twice daily flushing, often with heparin.<sup>2-4</sup>

Our results suggest that this frequency of attention, in addition to being troublesome for younger patients and difficult for solitary, elderly patients, is unnecessary. The catheters are safe and reliable and their wider and earlier use may prevent the great anxiety about venous access which many patients have.

1 Hickman RO, Buckner CD, Clift RA, *et al*. A modified right arterial catheter for access to the venous system in marrow transplant recipients. *Surg Gynecol Obstet* 1979;**148**:871-5.

2 Reed WP, Newman KA, de Jongh C, *et al*. Prolonged venous access for chemotherapy by means of the Hickman catheter. *Cancer* 1983;**52**:185-92.

3 Reilly JJ, Steed DL, Ritter PS. Indwelling venous access catheters in patients with acute leukemia. *Cancer* 1984;**53**:219-23.

4 Blacklock HA, Hill RS, Clarke AG, *et al*. Use of modified subcutaneous right arterial catheter for venous access in leukaemic patients. *Lancet* 1980;**i**:993-4.

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