criteria or one major and two minor criteria. Major criteria were fever as defined by an oral or rectal temperature greater than 38°C or 38.5°C, respectively, and a new or increasing cough. Minor criteria were acute change in mental state, resolution of pulmonary infiltration after antibiotic treatment, and a predominant pathogen in a culture of sputum. Sera were tested by microenzyme linked immunosorbent assay for IgG antibodies to heat killed, soluble antigens of *Legionella pneumophila* (serogroups one to six) and Pittsburgh pneumonia agent (PPA: *Tatlockia micdadei*, *Legionella micdadei*). Water samples from five to six hot water tanks and swabs from 26 distal sites were obtained monthly and processed directly on to selective media containing dye.¹

During the 10 month study 185 cases of nosocomial pneumonia were diagnosed. All patients had a new pulmonary infiltrate visible in a chest radiograph. In addition, 141/185 (76%) had fever, 105/185 (57%) had new or increasing cough, and 81/185 (43%) had abnormal changes in mental state. The serological results showed that 26/185 (14%) patients had legionella pneumonia; 13 showed a fourfold rise in antibody titre to $\geq 1/320$ (confirmed cases) and the other 13 a single raised titre of $\geq 1/320$ (presumptive cases). The presumptive cases did not have a baseline titre for comparison. Of the 26 patients with legionella pneumonia, 16 had antibodies to PPA and *L. pneumophila* (serogroups one or three) while 10 had antibodies to PPA alone.

The patients with legionella pneumonia were significantly more likely to have higher fevers ($\geq 39.5^\circ\text{C}$) and to have had previous antibiotic treatment than patients with other causes for their pneumonia ($p < 0.05$, Fisher's exact test). Vomiting and being bedridden were more common in patients with legionella pneumonia, but this difference was not significant. The incidence of diarrhoea and changes in mental state were not significantly different between the two groups. Erythromycin treatment was not associated with an improved outcome, but this analysis was confounded by severely ill patients being given erythromycin empirically. Most of the 185 patients had multiple underlying diseases, including cerebrovascular disease (59), organic brain syndrome or encephalopathy (59), arteriosclerotic heart disease (44), and chronic obstructive pulmonary disease (33). No significant difference in the prevalence of these diseases was seen for legionella versus non-legionella pneumonia.

L. pneumophila was consistently isolated from the water distribution system of the hospital. The overall rate was 50% of hot water tanks (range 33-66% within a given month) and 45% of distal sites (range 35-58% within a given month). *L. pneumophila* serogroup one was recovered from 71% of the cultures, serogroup three from 9%, and both serogroups from 20%. PPA was never isolated. The temperature in the tanks ranged from 110 to 120°C and the chlorine concentration in the cold water from 0.5 to 1.0 ppm. There were no cooling towers in the vicinity of the hospital, and air conditioning was not working during the study.

Comment

Virtually all of the many outbreaks of nosocomial legionnaires' disease reported have occurred in acute hospitals. But for every acute hospital there are several long stay establishments, including hospitals and nursing homes. A precise diagnosis of the causes of pneumonia in long stay hospitals is difficult because there is usually no microbiology laboratory; in most nursing homes even a Gram stain of sputum is not immediately available. Sputum cultures often show oropharyngeal colonisations with many bacteria, and diagnosis of legionnaires' disease solely on clinical criteria is unreliable as the symptoms, signs, and radiological findings are not specific.^{2,3}

In the hospital that we studied for 10 months we found that 13 (7%) patients had confirmed legionella pneumonia. Although *L. pneumophila* was consistently isolated from the water supply, its mode of transmission remained undefined: aspiration, airborne carriage, and dissemination through respiratory devices are possibilities.^{4,5} This population of patients was particularly prone to infection by aspiration because of advancing age, level of consciousness, and the use of feeding tubes and tracheotomies.

We thank Robert R Muder, Joyce Korvick, Guodong Fang, and Janet E Stout for their critical review, and Shirley Brinker for preparing the manuscript.

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(Accepted 24 April 1987)

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Device to permit recapping of syringes without risk of infection

The avoidance of needlestick injuries has become of paramount importance. We have developed a simple device that permits the safe replacement of the original sheath on a syringe needle while eliminating the danger of needlestick injury.

The device

The device consists of a cylinder of hard plastic (Delrin acetal resin) about 5 cm in diameter and 5 cm long. It has three vertical holes (figure) to accommodate

Device in use to recap syringe needle.

needle sheaths of all commonly used sizes of disposable needle. Although they securely support the sheaths by tapering at the base, the holes are drilled right through to help in cleaning by chemical disinfection or steam sterilisation. The sheaths project above the top of the device, making it easier to put the needle in. The device forms part of the equipment for giving intravenous injections or sampling blood.

For giving injections the sheath is removed from the syringe needle and put in an appropriate hole in the device with the open end pointing vertically upwards. After the injection has been given the needle is re-engaged with its sheath in the device (figure) by downward pressure, which locks the needle into position. Only one hand is needed, and there is no possibility of needlestick injury. The syringe may be left in the device until a convenient time for disposal. After a sample of blood has been obtained the resheathed needle is safely held in the device with one (gloved) hand while the syringe is disconnected with a twist before the blood is transferred to a sample tube. After it has been emptied the syringe can be sealed to prevent any spills of blood by simply reconnecting it with the sheathed needle. As pressure on the device is always vertical it will not slide, even on smooth surfaces.

Five of these devices have been used for 18 months in a busy nuclear medicine department and have gained ready acceptance by staff, who consider them to be an essential part of the equipment for giving injections.

Comment

In a report on 89 hospital staff in England and Wales who were accidentally exposed to the blood or body fluids of patients infected with human immunodeficiency virus 43 sustained needlestick or other sharp injuries.¹ Resheathing needles is a common cause of such injuries: 52 of 286 needlestick incidents reported during 29 months at a major teaching hospital were a result of this.²

Recent advice is not to resheath needles.³ If, however, blood samples are transferred to sample tubes with the needle still in place there is a severe risk of needlestick injury. Also, leaving the needle in place is an unacceptable haematological practice owing to mechanical haemolysis of the red blood cells and other effects. The device we have developed permits safe "parking" of a syringe and needle before and after a blood sample is taken.

If needles are not resheathed before disposal the problem of injury to porters and domestic staff is exacerbated.⁴ When uncapped needles are discarded into sharps boxes penetration of the box may occur⁵ even if these containers meet the relevant specifications of the Department of Health and Social Security. In the study of Neuberger *et al* housekeeping staff suffered 44 of the 286 needlestick injuries by brushing against a box of needles or handling rubbish,² which casts serious doubt on the wisdom of advising that needles should be left uncapped. There is also the risk of injury when putting sharps in a box that is already filled with unsheathed needles.

Our device eliminates the hazards of uncapped needles: contamination spread when the needles are laid on foil trays and other less suitable surfaces, and needlestick injuries caused by inadvertent contact before disposal. It is simple in design and inexpensive to produce, and it can be used as a standard part of the clinical trolley or tray.

The device is called Safe T Cap and information on commercial availability should be addressed to the corresponding author.

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(Accepted 24 April 1987)

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Right atrial thrombus: a complication of total parenteral nutrition in an adult

Complications of total parenteral nutrition include sepsis, thrombosis, and metabolic abnormalities. Although several cases of right atrial thrombosis as a complication of total parenteral nutrition have been described in premature infants,¹⁻⁴ it has not, to our knowledge, been described in adults. We report such a case in an adult.

Case report

A 17 year old youth was admitted with a suspected infection of his central venous feeding line. From June 1983 he had received home parenteral nutrition after resection of virtually all his small intestine because of gangrene caused by a volvulus. He had been well until two days before his admission, when he developed a fever and rigors. On examination he was feverish with a temperature of 38°C. His heart sounds were normal and his chest clear. Blood cultures grew *Staphylococcus epidermidis* and he was treated with flucloxacillin. His fever resolved and he restarted intravenous feeding.

He was readmitted two weeks later with a sudden onset of dyspnoea, fever, and dry cough. On examination he was feverish with a temperature of 39.7°C. His pulse rate was 130/min and his heart sounds were normal. He had bilateral basal crepitations. An electrocardiogram showed sinus tachycardia and a chest x ray film showed a decreased vascularity in the right, mid, and lower zones. A perfusion-ventilation scan showed a perfusion defect in the right lower zone that was suggestive of a pulmonary embolus. His feeding line was removed and two

dimensional echocardiography was performed. It showed a large mass in the right atrium (figure) attached to the base of the atrium with a long tail protruding intermittently through the tricuspid valve into the right ventricle. The right atrium and ventricle were moderately dilated. Blood cultures grew *Staph epidermidis* and he was treated with antibiotics and heparin.

He was referred for surgery. A right sternotomy was performed, which showed that the right side of the heart was moderately dilated. In the right atrium was a fairly large clot attached with a wide base to the right atrial wall. It had a long tail with a bulbous end protruding through the tricuspid valve into the right ventricle. Most of the right atrial wall was thickened. The clot was excised together with a large section of the right atrial wall. The wall was repaired with a patch of bovine pericardium. Histological examination showed that the mass was composed of fibrin, and no organisms were grown. He made an excellent recovery. The antibiotics were discontinued and he was given oral anticoagulation treatment. A Broviac feeding line was inserted and at the time of writing he was continuing with total parenteral feeding.

Comment

Although the exact incidence of right atrial thrombosis as a complication of total parenteral nutrition is not known, several cases have been reported in premature infants. Pliam *et al* described the first case after prolonged central venous feeding in a premature infant.¹ Since then 10 additional cases have been reported, all in premature infants²⁻⁴; most presented with features of superior vena caval obstruction.^{2,3}

Our patient presented with clinical features of pulmonary embolus and suspected sepsis of his catheter. Right atrial thrombus was diagnosed from clinical presentation, a ventilation-perfusion scan, and an echocardiogram without the need for a ventriculoangiogram. Recently Wolfe *et al* studied 1617 patients, none of whom were infants and 95% of whom were adults. Not one case of clinically manifested pulmonary embolus was identified, and right atrial thrombus was not reported.⁵ Right atrial thrombi secondary to cardiac disease have been reported in adults,⁴ but to our knowledge ours is the first case of right atrial thrombus complicating total parenteral nutrition in an adult.

Surveillance of central venous catheters with two dimensional echocardiography should be a priority for detecting thrombi or vegetations; early diagnosis of intracardiac thrombi may prevent massive pulmonary emboli.

We thank Mr Ali N Rahman for his help and Ms J Rostron for her secretarial help.

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(Accepted 24 April 1987)

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Two dimensional echocardiogram: apical view of four chambers showing thrombus (Th) in right atrium. RV=right ventricle, LV=left ventricle, LA=left atrium, and TV=tricuspid valve.

National survey of use of the Angelchik antireflux prosthesis

The Angelchik antireflux prosthesis is a silicone prosthetic implant shaped like a horseshoe that is tied around the distal oesophagus beneath the diaphragm. It has been used in the United Kingdom for a little over five years. Its insertion has been claimed to be technically uncomplicated and associated with few complications,¹ and it has been reported to achieve good control of reflux.² Several serious complications have been reported,^{3,5} but only a small number of patients have been studied so it is difficult to assess the true incidence of complications. The aim of this study was to investigate the experience of general surgeons using the Angelchik antireflux prosthesis in the United Kingdom and to determine the incidence and nature of serious complications and the rate of removal.