Comment

The prevalence (60%) of echocardiographic abnormalities in every sixth case with left atrial or ventricular thrombi in this comparatively young patient sample was high. Given that three quarters of all patients under 50 in our catchment area who suffered from ischaemic strokes were included in the study, the figures may be regarded as fairly representative of this age group. The association of echocardiographic abnormalities with the predictors used seems proved. The presence of two or more predictors meant a 90% probability of an abnormal echocardiogram. On the other hand, 11 of the 34 patients without a predictor had an unexpectedly abnormal echocardiogram, one in five showing a left atrial or ventricular thrombus. In contrast with earlier findings,³ the carotid angiograms had no predictive value.

We conclude that echocardiography is worth while in ischaemic cerebrovascular disease. Because of the low incidence of cerebral ischaemia in patients aged under 50 (around 10 cases/100 000 a year) all these patients may be examined without undue demands on resources. Older patients may be selected for examination by using the predictors listed above. Echocardiography may be a decisive factor in choosing treatment, though the place of anticoagulants remains controversial.

- Bergeron GA, Shah PM. Echocardiography unwarranted in patients with cerebral ischemic events. *N Engl J Med* 1981;304:489.
- Bogousslavsky J, Hachinski VC, Boughner DR, Fox AJ, Vinuela F, Barnett HJM. Cardiac and arterial lesions in carotid transient ischemic attacks. *Arch Neurol* 1986;43:223-8.
- Gagliardi R, Benvenuti L, Frosini F, Ammannati F, Barletta GA, Fantini F. Frequency of echocardiographic abnormalities in patients with ischaemia of the carotid territory—a preliminary report. *Stroke* 1983;16:118-20.
- Sahn DJ, DeMaria A, Kisslo J, Weyman A. Recommendations regarding quantitation in M-mode echocardiography: results of a survey of echocardiographic measurements. *Circulation* 1978;58:1072.

(Accepted 15 April 1987)

Departments of Neurology and Medicine, Central Hospital of Central Finland, 40620 Jyväskylä, Finland

RAINER FOGELHOLM, MD, neurologist

JOHN MELIN, MD, internist

Correspondence to: Dr Fogelholm.

Transcutaneous electrical stimulation for ischaemic pain at rest

Patients with critically ischaemic legs often develop severe continuous pain at rest. Pain relief is often provided with intramuscular injections of opiates, which can lead to excessive drowsiness and respiratory problems before major surgery. Transcutaneous electrical stimulation can provide effective relief in several chronic pain syndromes¹; furthermore, electrical stimulation of the nervous system may affect blood flow to the extremities.² We report our initial findings of electrical stimulation on pain in patients with severe peripheral vascular disease.

Patients, methods, and results

Twenty consecutive patients who had had two weeks' continuous severe pain at rest in a critically ischaemic foot were allocated randomly (from a table of random numbers) to one of two groups within two hours of admission. One group received transcutaneous electrical stimulation for 48 hours and the other received sham stimulation. Both groups had equal access to intramuscular morphine 10 mg on demand if pain relief was inadequate. An index of ankle brachial systolic arterial pressure was measured with a Doppler probe before treatment. Pain was assessed every 12 hours on a standard 100 mm linear analogue scale³; patients were asked to record the average amount of pain experienced over each 12 hour period, and morphine requirements were noted. Two pregelled six inch electrodes were applied longitudinally to the thigh of the ischaemic leg, and transcutaneous stimulation was provided by a Wright Care transcutaneous electrical stimulation system (Dow Corning Wright, Berkshire). All patients had a short demonstration on the use of the device and were told that they might experience a tingling sensation. The light indicator on the stimulation device was covered by an opaque material, and the polarity of the batteries in the device was reversed for the patients receiving sham treatment.

Ten patients (mean age 64, range 44-75) received sham treatment and 10 (mean age 68, range 62-82) transcutaneous stimulation. There were four men and nine smokers in the control group and six men and seven smokers in the treatment group. Four patients in each group had had vascular surgery. In the control group (mean pressure index 0.16, range 0.0-0.54) eight patients had severe ischaemic changes in the feet while seven patients in the stimulated group had ulceration of

Mean (range) linear analogue pain scores in millimetres

	Initial	12 h	24 h	36 h	48 h
Sham group	70(30-100)	53(15-100)	58(20-99)	52(12-83)	49(10-91)
Stimulated group	72(43-100)	44(27-71)	29(5-55)	35(10-55)	30(3-48)
Mann-Whitney U test	NS	NS	p<0.02	p<0.05	NS

the toes or gangrene (mean pressure index 0.29, range 0.0-0.54; no significant difference). There was no significant difference in mean analogue scores for pain before randomisation (table). The mean of the four pain scores for each patient during treatment was 52.9 mm (range 15.5-82) in the sham group compared with 34.3 mm (range 11.3-53.5) in the stimulated group ($p=0.06$, Student's *t* test; 95% confidence interval -1.2 to 38.4). Patients receiving stimulation showed a trend towards lower linear analogue scores, which was significant at 24 and 36 hours (table). Six patients in the sham group compared with two in the stimulated group required supplementary analgesia ($p=0.1698$, Fisher's exact test). The mean morphine requirements were 3 mg (range 0-20 mg) in the group receiving stimulation compared with a mean of 23 mg morphine (range 0-60 mg) in the control group ($0.05<p<0.06$, Mann-Whitney U test). No untoward side effects were noted. All patients underwent arteriography at the end of the study and reconstructive surgery during their admission.

Comment

Urgent revascularisation is essential in patients with critically ischaemic feet. While they are awaiting angiography and assessment of fitness for vascular reconstruction pain relief is often provided by the intramuscular injection of opiates, with the attendant risks of respiratory depression, drowsiness, and bronchopneumonia. Alternative methods of providing analgesia without these side effects—for example, epidural morphine⁴—have not gained widespread acceptance because of the technical skill that is often required. In our study transcutaneous stimulation was found to be simple, safe, non-invasive, and acceptable to both patients and nurses. It may be of value in the treatment of rest pain, producing good pain relief and reducing narcotic requirements for patients awaiting reconstructive surgery.

We thank Messrs D P Leiberman and D G Gilmour for allowing us to study patients under their care. Dr Gordon Murray, Lecturer in Medical Statistics, University of Glasgow, kindly gave statistical advice.

- Miles J. Electrical stimulation for relief of pain. *Ann R Coll Surg Engl* 1984;66:108-12.
- Dooley DM, Kasprak M. Modification of blood flow to the extremities by electrical stimulation of the nervous system. *South Med J* 1976;69:1309-11.
- Huskisson EC. Measurement of pain. *Lancet* 1974;ii:1127-31.
- Lemberger RJ, Layfield DJ, Hopkinson BR, Makin GS. Epidural morphine for ischaemic rest pain. *Br J Surg* 1981;68:367.

(Accepted 29 April 1987)

Peripheral Vascular Unit, Royal Infirmary, Glasgow G31 2ER

R J CUSCHIERI, CHM, FRCS, senior registrar

C G MORRAN, MB, FRCS, lecturer

J G POLLOCK, MB, FRCS, consultant in administrative charge

Correspondence to: Mr Cuschieri.

Discovery of occult legionella pneumonia in a long stay hospital: results of prospective serological survey

Pneumonia is the most common infection associated with death in the elderly, and legionellae are known to be a common cause. Legionnaires' disease was diagnosed by sputum culture and antibody seroconversion in a patient with acute pneumonia, who had been transferred to our hospital from a long stay hospital. As a result we initiated a prospective serological survey of all patients with nosocomial pneumonia in that hospital to determine whether legionella pneumonia was present but undiagnosed.

Methods and results

The study was performed from September 1984 to June 1985 in a 432 bed hospital for the long term care of elderly people, mostly men. Patients with fever or respiratory symptoms were sought daily. They were considered to have pneumonia if, in addition to a new pulmonary infiltrate, they fulfilled two major

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.

1 Yu VL, Beam TR, Lumish R, et al. Routine culturing for legionella in the hospital environment may be a good idea. *Am J Med Sci* 1987 (in press).

2 Yu VL, Kroboth FJ, Shonnard J, Brown A, McDearman S, Magnussen M. Legionnaires' disease: new clinical perspective from a prospective pneumonia study. *Am J Med* 1982;73:357-61.

3 Kroboth FJ, Yu VL, Reddy S, Yu AC. Clinicoradiographic correlations with the extent of legionnaires' disease. *AJR* 1983;141:263-8.

4 Woo AH, Yu VL, Goetz A. Potential in-hospital mode of transmission for *Legionella pneumophila*: demonstration experiments for dissemination by showers. *Am J Med* 1986;80:567-73.

5 Muder R, Yu VL, Woo A. Mode of transmission of *L. pneumophila*: a critical review. *Arch Intern Med* 1986;146:1607-12.

(Accepted 24 April 1987)

VA Medical Center and University of Pittsburgh, Pittsburgh, PA 15240

CAROLE BRENNEN, RN, MSN, infection control practitioner

RICHARD M VICKERS, BS, supervisor, special pathogens laboratory

VICTOR L YU, MD, FACP, chief, infectious disease section and professor of medicine

ANTHONY PUNTERERI, MD, chief of staff

YING C YEE, MS, microbiologist

Correspondence to: Dr Yu.

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.

1 Communicable Disease Surveillance Centre. Surveillance of house care workers with accidental parenteral or mucosal exposure to blood or body fluids of patients infected with HTLV-III. *Communicable Disease Report*. 1985;No 52.