SHORT REPORTS

Value of booster immunisation with influenza vaccine in patients undergoing haemodialysis

The public health authorities of most Western countries recommend annual influenza vaccination for some patients, including those with end stage renal disease.[1] Patients on haemodialysis, however, show impaired antibody responses after a single influenza vaccination, which may result in insufficient protection.[2] These patients also respond poorly to hepatitis B vaccine, but a booster immunisation will produce protective antibody titres.[3] In a large group of patients on haemodialysis we therefore attempted to induce adequate protection against influenza by performing a booster vaccination.

Patients, methods, and results

Ninety eight patients in a stable condition who were undergoing long term intermittent haemodialysis took part. They were aged 17 to 76 (median 57) years and had been undergoing haemodialysis for one month to 13 years (median two years). None had received steroids or immunosuppressive drugs for at least six months. Twenty nine healthy volunteers aged 19 to 69 (median 27) years served as controls. A commercially available trivalent split virus vaccine (Alorbat, Asta Werken, Bielefeld, Federal Republic of Germany) containing 15 μg haemagglutinin of A/Philippines/2/82 (H_3N_2), A/Chile/1/83 (H_1N_1), and B/USSR/100/83 was administered by intramuscular injection in the upper arm on day 0 and day 30 (booster immunisation). Serum was obtained on days 0, 30, and 60. The study took place in the autumn of 1985. Antibody titres were determined twice in paired sera by the haemagglutination inhibition technique, and geometric mean titres were calculated. A fourfold or more rise in titre was considered to be a satisfactory response, and protection was defined by titres of ≥ 100 against influenza A and ≥ 200 against ether treated influenza B.[4]

Before vaccination geometric mean titres against the three virus strains did not differ between the groups (table). After the first injection the patients undergoing dialysis had significantly lower geometric mean titres than the controls for all viruses tested ($p<0.001$, Wilcoxon rank test). Booster vaccination did not influence the final titres reached.

Among the initially unprotected patients and controls significantly fewer of the patients showed a more than fourfold rise in titre against the three viruses (H_3N_2 and B $p<0.05$, H_1N_1 $p<0.001$; χ^2 test) after the first injection (table). Booster immunisation produced greater than fourfold rises in titres against H_3N_2, H_1N_1, and B in, respectively, a further 14%, 8%, and 0% of the patients and 5%, 8%, and 4% of the controls. The seroconversion rate to protective titres against H_3N_2 and B was also significantly lower among the patients after the first injection than among the controls ($p<0.001$, χ^2 test). Booster immunisation increased the seroconversion rate among the patients but not significantly so. Together the first and second vaccinations induced adequate protective antibody titres in 81 (83%) of the patients for H_3N_2, 37 (38%) for H_1N_1, and 47 (48%) for B. The statistical significance of the results measured as geometric mean titres, more than fourfold rises in titres, and seroconversion rates was maintained when controls were compared with age and sex matched patients undergoing dialysis.

Comment

In patients undergoing haemodialysis vaccination with an influenza vaccine was significantly less effective than in the controls for all three viruses. The better conversion rate to protective titres against H_3N_2 in the patients can be explained by a "priming" effect, as the H_3N_2 strains have circulated for over 10 years and have caused several epidemics in the Netherlands. Booster immunisation only marginally improved the efficacy of vaccination against the three influenza viruses in both the patients and the controls. Only a small minority of the 98 patients developed protective titres as a result of the second immunisation: seven for H_3N_2, five for H_1N_1, and nine for B. Therefore we cannot recommend a booster immunisation with influenza vaccine in patients undergoing dialysis. Prophylactic amantadine therapy, which protects against influenza A viruses but not against influenza B, may be considered for these patients if an epidemic is imminent.[5]

Effects of first injection and booster vaccination with influenza vaccine on mean log geometric mean titre against influenza viruses H_3N_2, H_1N_1, and B in patients undergoing haemodialysis and controls, and greater than fourfold rises in titres and seroconversion rates to protective titres in individuals with unprotective prevaccination titres

	Patients (n=98)			Controls (n=29)		
	H_3N_2	H_1N_1	B	H_3N_2	H_1N_1	B
Mean log geometric mean titre:						
Before first injection	1·10	1·07	1·28	1·14	1·12	1·14
After first injection	2·21	1·66	2·05	2·93	2·39	2·63
After booster vaccination	2·30	1·68	2·05	3·01	2·47	2·62
No (%) with non-protective titres before vaccination	71 (72)	88 (90)	82 (84)	20 (69)	25 (86)	25 (86)
No (%) with ≥fourfold rise in titre:						
After first injection	49 (69)	39 (44)	47 (57)	19 (95)	21 (84)	20 (80)
After second injection	59 (83)	46 (52)	47 (57)	20 (100)	23 (92)	21 (84)
Seroconversion rate (No (%)):						
After first injection	47 (66)	22 (25)	22 (27)	17 (85)	21 (84)	19 (76)
After booster vaccination	54 (76)	27 (31)	31 (38)	18 (90)	22 (88)	20 (80)

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University Hospital Rotterdam-Dijkzigt, 3015 GD Rotterdam, The Netherlands
D J VERSLUIS, MD, senior resident internal medicine
W E P BEYER, MD, virologist
N MASUREL, MD, professor of virology
W WEIMAR, MD, senior registrar internal medicine

St Clara Hospital, Rotterdam, The Netherlands
P KRAMER, MD, nephrologist

St Franciscus Hospital, Rotterdam, The Netherlands
PH P N M DIDERICH, MD, nephrologist

Correspondence to: Dr Versluis.

Neuropathy of the feet due to running on cold surfaces

After running a race in bare feet on a day when the temperature was below freezing several runners presented to hospital with injuries to their feet. Such injuries have not been reported before.

Patients and findings

In February 1986, 160 runners took part in a sponsored five mile run; all had to run in bare feet. The participants were members of a karate club, and most of them had run in bare feet on previous occasions without any problems. The course was along paths in a park in Leicester; at the start of the race the ambient temperature was −5°C and the ground temperature −9°C (United Kingdom Meteorological Office, personal communication). All the runners finished the event without any problems. Shortly afterwards, however, 25 participants presented to the accident and emergency department with almost identical injuries to their feet.

All the patients complained of severe pain in their feet, which had developed shortly after they finished the race. On examination the weightbearing surfaces of the soles of their feet were bright red and deeply ingrained with dirt. The areas affected resembled partial thickness burns. Large tense blisters were also found in several patients; debridement of these showed partial thickness skin loss (figure).

Comment

Most of the patients had taken part in similar runs before but never on a freezing day. In the past they had experienced pain in their feet during the run and on finding blistering had stopped. On this particular day pain had been absent during the event and the skin damage had not become apparent until some time afterwards.