SHORT REPORTS

Safety and efficacy of nimodipine in resuscitation of patients outside hospital

The extent of brain injury after cardiac arrest depends not only on the duration of the arrest but also on the time taken until the circulation is fully restored. Postischaemic hypoperfusion may contribute to brain damage after cerebral ischaemia,[1] and there is no treatment to protect the brain against anoxic-ischaemic injury.

We investigated the safety and efficacy of the calcium entry blocker nimodipine in cardiopulmonary resuscitation after cardiac arrest due to ventricular fibrillation outside hospital.

Patients, methods, and results

The group treated with nimodipine consisted of 22 patients with arrhythmias and the control group of matched historical controls with arrhythmias resuscitated one year earlier by the mobile intensive care unit in Helsinki. Age and sex distribution and characteristics of cardiac arrest were similar in both groups. Nimodipine was given to the first six patients in increasing doses of 0·125-0·5 μg/kg body weight/minute for 24 hours. The next five patients received a continuous infusion of 0·5 μg/kg body weight/minute for 24 hours. The remaining 11 patients received a bolus dose of 10 μg/kg body weight in one minute within 30 minutes of cardiac arrest, immediately followed by a continuous infusion of 0·5 μg nimodipine/kg/minute for 24 hours. Fisher's exact test was used for statistical comparisons.

The table shows that there were more survivors in the whole nimodipine group (including three patients with primary pulseless rhythms other than ventricular fibrillation) ($p<0·05$) and in the nimodipine group with true ventricular fibrillation ($p<0·01$). All patients with pulseless rhythms (electromechanical dissociation or slow ventricular rhythm) died. More patients in the true ventricular fibrillation group receiving nimodipine recovered normal consciousness within 24 hours than in the control group ($p<0·05$). More patients with ventricular fibrillation who received nimodipine were discharged home than controls ($p<0·05$).

No serious side effects were detected. After the bolus injection three patients showed a transient drop of 40 mm Hg in mean arterial pressure lasting less than two minutes. One patient showed facial flushing during infusion of 0·5 μg nimodipine/kg/minute.

Outcome in patients resuscitated after cardiac arrest outside hospital

	Group treated with nimodipine			Controls		
	All (n=22)	Patients with ventricular fibrillation (n=19)	Patients given bolus dose (n=11)	All (n=22)	Of patients with ventricular fibrillation (n=19)	Of patients given bolus dose (n=11)
No who survived	14*	14**	9*	7	5	4
Normal consciousness at 24 h	13	13*	7*	7	5	2
Discharged home	12	12*	7	7	5	3

*p<0·05 for difference between treated group and controls; **p<0·01.

Comment

Animal studies suggest that calcium entry blockers may be effective in patients with cerebral ischaemia.[2,3] There are no previous human studies of nimodipine or any prospective studies of other calcium blocking drugs in cerebral resuscitation. Calcium entry blockers have several possible mechanisms of beneficial action in patients with neuronal anoxia.[1] Calcium is suggested to be the final common pathway in ischaemic cell death,[4] and calcium entry blockers may inhibit calcium influx into ischaemic neurons, producing a cytoprotective effect. Another mechanism may be their ability to prevent the postischaemic hypoperfusion after global ischaemia. Many of the calcium entry blockers seem to have a cerebroprotective effect when given before global ischaemia. The beneficial effect on neurological recovery in animals has been documented for nimodipine and lidoflazine when given after global ischaemia.[3] Nimodipine reduces reperfusion impairment after global ischaemia in cats and dogs, as does flunarizine in dogs.[2] Nimodipine is one of the most potent inhibitors of cerebral vasospasm but is less likely to cause peripheral vasodilatation and hypotonia.[5] Steen *et al* recently reported that intravenous nimodipine treatment improved neurological outcome and histopathological findings in primates in a study resembling resuscitation in man.[3] The authors recommended controlled clinical trials in patients resuscitated after cardiac arrest.

Our study provides the first human data on safety and efficacy of nimodipine in cerebral resuscitation outside hospital. The treatment was well tolerated, and the results suggest that there may be more survivors when nimodipine is used. We have started a randomised double blind clinical trial to investigate the use of nimodipine in resuscitation from cardiac arrest outside hospital.

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Poverty and teenage pregnancy

Maternal and child welfare has long been a cause for concern, and particular attention has recently been focused on teenage mothers.[1] In Britain although the number of babies born to teenage mothers aged 15-19 decreased from 96 109 in 1966 to 60 750 in 1984, the number of illegitimate babies born to mothers in this age group has increased from 22 305 (23·2%) to 36 544 (60%),[2,3] yet virtually no routinely collected information about the socioeconomic circumstances of this group is available. We present data relating to nulliparous teenage women collected as part of a detailed study of the provision of antenatal care in the east end of Glasgow.

Subjects, methods, and results

Our sample consisted of 911 nulliparous women, including 283 teenagers, who booked for delivery at Glasgow Royal Maternity Hospital between February 1984 and May 1985 and who lived in the east end of Glasgow. Information about the women's demographic and socioeconomic characteristics was included in a questionnaire administered by midwives at antenatal clinics.

The table shows that single parenthood, unemployment, and reliance on state benefits were high among all nulliparous women but increasingly so in younger women. Forty two per cent of all the women studied were wholly reliant on state benefits, but this figure rose to 71% for women aged less than 20. Of all the employed teenage women, 59% said that their income was adequate, compared with only 32% of those receiving state benefits.