

Table 1 Number of patients according to the speciality of the referring consultant, type of neurological disorder diagnosed, and number of patients whose diagnosis was changed by neurologists

Speciality of the referring consultant	Number of patients	Type of neurological disorder diagnosed	Total number of patients	Number of patients in each category in whom diagnosis was changed by neurologists	Number of patients in each category in whom diagnosis was made by neurologists (no pre-existing diagnosis)
General medicine	38	Cerebrovascular	29	6	3
Medical subspecialties		Neuromuscular	26	4	5
Cardiac	8	Metabolic/toxic encephalopathy	17	4	3
Renal	8	Infection	15		1
Liver	8	Movement disorder	12	2	1
Respiratory	2	Migraine/tension headache	9		5
HIV/AIDS	31	Epilepsy	5		
General surgery	16	Spinal pathology	5	1	3
Surgical subspecialties		Cerebral malignancy	4		
Neurosurgery	6	Other	4		3
Orthopaedic	5	Non-neurological	11	4	
Urology	4	Non-organic	9	9	1
Otolaryngology	1	Uncertain	23		
Ophthalmology	1				
Care of the elderly	13				
Obstetrics/gynaecology	9				
Rheumatology	8				
Haematology/oncology	8				
Dermatology	2				
Psychiatry	1				

(one patient), and from Parkinson's disease to other causes (cerebrovascular disease and corticobasal degeneration, one patient each). A new diagnosis was made in 25 patients (15%) in whom there had been no pre-existing diagnosis (table). In 14% of the patients the diagnosis remained unclear even after neurological assessment. Neurological consultation led directly to a change in management in 52 patients (31%). In most patients this was a change in drug treatment. However, there were instances of emergency medical treatment as a direct result of the neurological opinion—for example, two patients with Wernicke's encephalopathy. Two others required urgent neurosurgical intervention, one for hydrocephalus, the second for spinal cord compression.

With six to seven new inpatients being referred each week, providing an opinion constituted a significant "hidden" component of the neurologists' work. Translated to the practice of a single handed neurologist in a district general hospital, it is about equivalent to one additional outpatient clinic weekly.

Despite this, the impact of a neurological opinion on inpatients in a general hospital has not previously been investigated separately. One study of admissions to a district general hospital¹ suggested that 19% of patients had a neurological complaint as the primary diagnosis, with a further 2% having a neurological disorder contributing to their need for admission. This pilot study indicates that neurologists have a role in the management of a significant proportion of these inpatients, and is a useful preliminary analysis for a more systematic cost effectiveness analysis of a neurologist's workload. In particular, the traditional image of the neurologist as a pure diagnostician is belied by the fact that neurological consultation led directly to a change in the management of almost one third of cases.

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1 Morrow JJ, Patterson VH. The neurological practice of a district general hospital. *J Neurol Neurosurg Psychiatry* 1987;50:1397-401.

Incidence and outcome of self inflicted gunshot wounds to the head in peace and war: a retrospective survey

We have compared the incidence of self inflicted gunshot wounds to the head identified either as attempted suicide, self inflicted accidents, or deaths at the scene (thereafter transported to forensic medicine) between the four year periods of 1987-90 and 1991-4 in the north eastern region of Croatia, which includes the residents of Osijek (total population about 500 000). During the second time period, Croatia was involved in homeland war. During 1991 and 1992, the population was reduced by one tenth. There was about a fourfold increase in self inflicted gunshot wounds to the head during wartime.

All gunshot injuries to the head were considered for active surgical management based on the principles of debridement of the missile tracts, and evacuation of haematomas but with a less radical approach to removal of penetrating bone fragments¹—that is, only if readily accessible based on accurate localisation with ultrasonography. Autologous dural grafts, antibiotic prophylaxis (penicillin G, aminoglycosides, metranidazole) and antiseizure medication were used.² Enhanced CT was performed postoperatively if there was any suspicion of intracranial infection.

Of the 29 admissions during 1991-94, 20 died, seven made a good recovery, and two were left severely disabled. Mortality in the accidental group (n = 4; one death) was lower than in the suicidal group (n = 25; 19 deaths). Mortality after admission among the self inflicted injuries (69%) was higher than in the war inflicted (46%; $\chi^2 = 4.797$; $P = 0.03$) but numbers were insufficient for detailed comparison of risk factors.

In conclusion, the stress of war was associated with a fourfold increase in self inflicted gunshot wounds to the head, with

Self inflicted gunshot wounds in north eastern Croatia

	Admissions	Death at scene	Total
1991-4	29*	23	52
1987-90	7	7	14

$\chi^2 = 21.88$, $P < 0.001$; *25 attempted suicides; four self inflicted; age range 15-78 years; 26 males; 3 females.

a high mortality of 69% in those admitted to hospital despite conventional active management.

Only two of 21 patients with a Glasgow coma score ≤ 6 survived whereas seven of the nine survivors had a Glasgow coma score of 8-15 at presentation. Nineteen of the 20 deaths had a Glasgow coma score of 3-6 on admission. Our practice concurs with that in other countries where experienced surgeons would be prepared to treat comatose gunshot wounds who were not posturing (Glasgow coma score 6-8) and certainly all patients who are not comatose preoperatively.³

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Reversible hyperperfusion of the right medial temporal lobe in transient global amnesia

Transient global amnesia is a clinical syndrome characterised by a sudden onset of anterograde and retrograde amnesia in the absence of other neurological signs and symptoms, resolving within 24 hours. Its aetiology remains unknown although transient ischaemic attacks, epilepsy, or migraine have been proposed as possible causes.¹ Functional imaging studies performed during the amnesia should provide a better understanding of the pathogenesis.

We report a 72 year old right handed woman with transient global amnesia. Her medical history was uneventful except for

recurrent tension type headaches and epigastric pain. Because of the epigastric pain she underwent gastroscopy under lidocaine spray anaesthesia without further premedication. Thirty minutes later she suddenly became disoriented and started to ask the same questions repetitively and two hours later she was referred to our department. On arrival she continued to repeat the same questions. She was alert and her comprehension, verbal expression, and fluency were normal. She was oriented with reference to person but not to time and place. There was a complete anterograde amnesia. On informal questioning, she was unable to remember life events of the past two years. Twelve hours after onset of transient global amnesia, anterograde amnesia was still present but retrograde amnesia had recovered. Twenty hours after onset, the anterograde memory disturbance had also recovered but a memory gap for part of the previous day remained. Doppler and duplex sonography of extracranial and intracranial cerebral arteries, EEG, and MRI of the brain were normal. A follow up clinical examination two months after transient global amnesia was normal without recurrence of similar episodes.

The first SPECT study was performed during the ongoing amnesic episode four hours after onset, the second at three weeks, and the third at three months after transient

global amnesia. Acquisition was performed one hour after injection of 900 MBq ^{99m}Tc -ECD (NEUROLITETM, Du Pont Pharma) on a triple head gamma camera (Picker PRISM 3000). After visual interpretation, lesion specific rectangular regions of interest were placed over the focus of interest and over the corresponding contralateral region in the hippocampal slices with calculation of the right to left ratio (normal range 0.9–1.1). Visual appraisal of the first SPECT study showed a focus of increased activity in the posterior caudal region of the right temporal lobe (figure) with a right to left ratio of 1.27 on quantification of the lesion specific region of interest. The second study visually disclosed a slightly decreased activity uptake in the same region with a right to left ratio of 0.90. In addition, decreased activity uptake was detected in the left temporal lobe. In the third study, no asymmetry was detected visually or by quantification.

The patient fulfilled all proposed criteria of transient global amnesia.¹ During transient global amnesia, SPECT showed increased activity uptake in the posterior caudal region of the right medial temporal lobe. After the event, a reverse pattern was seen, with a slight relative hypoperfusion in this region which resolved completely after three months. We therefore conclude that the time course of the reversible hyperperfusion makes it most probable that this feature is associated with the pathophysiology of the reported transient global amnesia. By contrast, the impaired left temporal perfusion three weeks afterwards was documented long after the patient's amnesic symptoms had recovered and might therefore not be a direct phenomenon.

Few functional imaging studies performed during transient global amnesia have been reported. The findings include unilateral reduction of regional cerebral blood flow (rCBF) in the left medial temporal lobe² and bilaterally decreased rCBF in the postero-medial part of both temporal lobes³ or thalamus.⁴ An even more pronounced divergence could be found after the attack. Some patients displayed persistently decreased activity uptake in the temporal lobe, whereas a normal pattern was present in others, and one study reported transient hyperperfusion in the left medial temporal lobe.⁵

The pathogenesis of the functional changes leading to transient global amnesia remains controversial. All SPECT studies performed during it have shown hypoperfusion in memory relevant brain structures, suggesting a primary diminution of rCBF due to functional vascular changes or a secondary diminution due to decreased neuronal activity. Our present report, however, shows a transient global amnesia accompanied by increased perfusion of the right medial temporal lobe, suggesting increased neuronal activity in this region.

The discrepancy between the results of the functional imaging studies may be due to different timing of the SPECT examinations in respect to the chronology of each individual attack. On the other hand, transient global amnesia presumably represents a clinical entity with variable pathogenesis.¹ Dynamic changes in rCBF have been measured during migraine attacks, showing a significant increase during headache. An increased rCBF was also found in epileptic foci during complex partial seizures. Amnesia may be a symptom of complex partial seizures and up to 7% of patients with transient global amnesia develop epilepsy

within less than a year. Patients with transient global amnesia who go on to develop epilepsy, however, typically have recurrent attacks of less than one hour in duration.¹ Pure amnesic seizures, furthermore, are usually accompanied by additional types of seizures and features such as automatisms, altered consciousness, and behavioural abnormalities. In our patient no such features were found during an attack that lasted 20 hours, and she never had epileptic seizures. Due to this and as she reported a history of headache, we suggest that the hyperperfusion seen during this transient global amnesia attack might be due to dynamic phenomena similar to those seen in migraine attacks.

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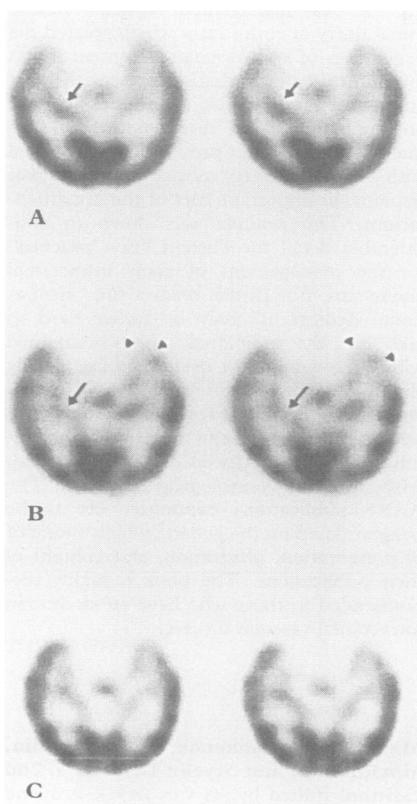
Prevalence of serum antibodies to hepatitis C virus is not increased in patients with multiple sclerosis

In multiple sclerosis there is a significant association with other autoimmune diseases and autoantibodies.¹ Hepatitis C virus (HCV) has been associated with immunological disorders such as Hashimoto's thyroiditis, uveitis, type II cryoglobulinaemia, and membranoproliferative glomerulonephritis.²

We tested serum from 249 consecutive patients with definite multiple sclerosis seen at our clinic in 1992 and 1993 for HCV antibodies.

We used two third generation enzyme linked immunosorbent assays (ELISAs; Monolisa, anti-HCV Pasteur and anti-HCV, Abbott). Samples yielding positive results on one or both of the tests were retested with a second generation recombinant immunoblot assay (RIBA II, Orthodiagnostic systems, Chiron, USA). One patient whose result remained undetermined was positive on a third generation recombinant immunoblot assay and on polymerase chain reaction. As controls 107 members of the patients' families were tested.

Eight patients with multiple sclerosis (3.2%) and six controls (5.6%) had a positive result on ELISA. Two patients with secondary progressive multiple sclerosis (0.8%)



Hippocampal slices. (A) First SPECT study during the transient global amnesia attack, disclosing a focus of increased activity uptake in the posterior caudal region of the right medial temporal lobe (arrow). (B) Second SPECT study three weeks after transient global amnesia, disclosing slightly decreased activity uptake in the region of the previously demonstrated increased uptake (arrow) and, in addition, decreased activity uptake in the region of the left temporal lobe pole (arrowhead). (C) Third SPECT study three months after transient global amnesia, showing symmetric activity uptake.