—— KUIPERS, L., BERKOWITZ, R., EBERLAIN-VRIES, R. & STURGEON, D. (1982) A controlled trial of social intervention in the families of schizophrenic patients. *British Journal of Psychiatry*, **141**, 121–34.

STURGEON, D., KUIPERS, L., BERKOWITZ, R., TURPIN, G. & LEFF, J. P. (1981) Psychophysiological responses of schizophrenic patients to high and low expressed emotion relatives. *British Journal of Psychiatry*, **138**, 40–5.

TARRIER, N., COOKE, E. C. & LADER, M. H. (1978a) Electrodermal and heart rate measurements in chronic and partially remitted schizophrenic patients. *Acta Psychiatrica Scandinavia*, **57**, 369–76.

—— —— —— (1978b) The EEG's of chronic schizophrenic patients in hospital and the community. *Electroencephalography and Clinical Neurophysiology*, **44**, 669–73.

—— VAUGHN, C., LADER, M. H. & LEFF, J. P. (1979) Bodily reactions to people and events in schizophrenics. *Archives of General Psychiatry*, **36**, 311–5.

VAUGHN, C. & LEFF, J. P. (1976a) The influence of family and social factors on the course of psychiatric illness. *British Journal of Psychiatry*, **129**, 125–37.

—— —— (1976b) The measurement of expressed emotion in the families of psychiatric patients. *British Journal of Social and Clinical Psychology*, **15**, 157–65.

—— SNYDER, K. S., FREEMAN, W., JONES, F., FALLOON, I. R. H. & LIBERMAN, R. P. (1982) Family factors in schizophrenic relapse. *Schizoprenic Bulletin*, **8**, 425–6.

*Nicholas Tarrier, B.Sc., M.Sc., Ph.D., A.B.Ps.S., *Clinical Psychologist*

Christine Barrowclough, B.Sc., M.Sc., *Clinical Psychologist*

District Department of Psychology, Salford Health Authority, Prestwich Hospital, Manchester

*Correspondence.

(Revised 1 November 1983)

Mental Changes Resulting from Subdural Haematoma

DONALD W. BLACK

Summary: A retrospective study was carried out of 79 patients with subacute or chronic subdural haematomata. Forty-six (58.2%) had mental changes at admission which were categorised using DSM-III criteria. Delirium was the most frequent mental change, followed by dementia and coma. Three cases of organic affective syndrome were found. In those with mental changes, delirium was significant in older patients ($P < .05$) and coma in young patients ($P < .001$). Dementia was more common in the elderly. These findings confirm the presence of common mental syndromes in patients with subdural and haematomata and substantiate time-honoured clinical stereotypes.

Altered mental function is among the most common features of subdural haematoma (SDH) (Luxon & Harrison, 1979; Cameron, 1978; Fogelholm *et al*, 1975). The typical patient with this condition is well described by Bedford (1958):

> *The usual clinical picture is that of a mentally confused old person with some impairment of intellectual capacity (which may be slight, moderate, or profound) who may be somewhat or deeply drowsy . . .*

Major medical (Becker, 1982; Astran *et al*, 1980) and neurology (Merritt, 1979) texts echo this description with minor variations. However, despite this relative unanimity of opinion, the literature provides little in the way of accurate description of mental changes or of their incidence among such patients. A

https://doi.org/10.1192/bjp.145.2.200 Published online by Cambridge University Press

survey of the English language literature yields only ten reports that refer to incidence (Luxon & Harrison, 1979; Cameron, 1978; Fogelholm *et al*, 1975; McKissock *et al*, 1960; Stuteville & Welch, 1958; Voris, 1946; Wortis *et al*, 1945; Kunkel & Dandy, 1939; McKenzie, 1932; Jelsma, 1930). Fewer still provide a description (Wortis *et al*, 1945) of these changes. The incidence ranges from 18% (McKenzie, 1932) to 100% (Wortis *et al*, 1945). Each author bases his figures on his personal conception of the mental changes, which few define.

For example, Voris (1946) chooses to include patients with 'altered states of consciousness" among those with "mental disturbances," whereas McKissock *et al* (1960) elects to separate "alterations of consciousness" from "psychic disturbances." This lack of uniformity makes it impossible to draw reliable conclusions regarding incidence, except for what we anecdotally (and clinically) know as valid; Bedford was right. The patients concerned are, in general, older, enfeebled, and less than alert.

This study is approached with the following questions in mind: Does SDH produce mental changes? If so, what are those changes? How common are those changes? and Which groups are prone to developing those changes?

Method

University of Iowa Hospital records of patients discharged with a diagnosis of SDH between 1976 and 1980 were examined. Patients proven to have a subdural haematoma at operation, or by CT scanning were included. Those with a history of less than 72 hours were excluded, as were those under ten years of age.

Data were extracted regarding presenting signs and symptoms, history of injury, investigation, and treatment. Particular attention was made to references of mental status of admission. Both medical and nursing notes were used.

All patients exhibiting mental changes were then classified according to DSM-III (American Psychiatric Association, 1980) criteria for organic mental disorders, excepting coma, which was defined for the purposes of this study as unresponsiveness to verbal stimuli.

In all, 79 patients were included in the study. The data were analysed by chi square with Yates correction.

Results

There were 79 cases available for review, with ages ranging from 13 to 86 years and 57% between the ages of 61 and 80. There were 53 males and 26 females.

Patients were divided into two groups, based on duration of symptoms or lengths of time from injury, using McKissock's *et al* criteria (1960). Of the 79 patients, 45 (56.9%) were chronic (a history of greater than three weeks) while 25 (31.6%) were subacute, (a history less than three weeks but greater than 72 hours). Nine (11.2%) were not classifiable, although they were not acute (within 72 hours).

Mental changes were the initial symptoms for 16 patients (20%), though 46 (58.2%) had developed them admission. Of the 46, 24 (52.2%) had delirium, seven (15.2%) dementia, three (6.5%) an organic affective syndrome, while six (13.0%) were comatose (Table I). Six (13.0%) were classified as 'mixed' because of descriptions suggesting both delirium and dementia. Those with a delirium invariably demonstrated a clouded sensorium, and were described as "lethargic," having a "fluctuating level of consciousness," or "drifting in and out." They also demonstrated disorientation and memory impairment, and at least two of the following: incoherence, perceptual disturbance, sleep-wake cycle disturbances, or altered psychomotor activity. In those with dementia, impairment of memory and intellect, sufficient to interfere with social or occupational functioning were accompanied by an intact sensorium. They also demonstrated at least one of the following: personality changes, impairment of higher cortical function (i.e. aphasia), impaired abstract thinking, or impaired judgement. Recent research provides validation for the dementia/delirium distinction (Rabins & Folstein, 1982).

TABLE I

Mental change	*n*	%
Delirum	24	52.2
Dementia	7	15.2
Coma	6	13.0
Organic affective	3	6.5
Mixed	6	13.0
Total	46	100.0

Three patients met the criteria for organic affective syndrome—a category encompassing affective symptoms with minimal changes in sensorium or intellect. One was clearly depressed; another, though denying depression, exhibited weight loss, lack of energy, anorexia, and frequent crying spells; the third patient exhibited a pervasive loss of interest and motivation. In two patients, the changes seemed temporally related to head injury. Each of this group had neurological signs, and all three were cured by burr-hole evacuation.

Of the 14 subacute patients with mental changes, five (35.7%) were delirious and four (28.9%) were comatose; three (21.4%) were demented, and the other two were mixed. Of the 25 patients with a chronic course, 13 (52%) were delirious, three (12.0%) were demented and three (12.0%) had an organic affective syndrome; two (8.0%) were comatose and four (16%) had a mixed organic picture.

Of those with mental changes, eight (17.4%) were younger than 60 years of age, while 38 (82.6%) were 60 or older. On a percentage basis, of all subdural patients under 60, eight (34.7%) developed mental changes, while 38 (67.9%) over 60 did so.

The incidence of mental changes among different groups was analysed. Mental changes were significant among those over 60. Among specific changes, coma was significant in younger patients, i.e. those less than 60, ($P < .001$) while delirium was significant in older patients, i.e. older than 60, ($P < .05$). Dementia was more common in older patients (there were no patients with dementia under 60), but this did not reach significance (Table II).

https://doi.org/10.1192/bjp.145.2.200 Published online by Cambridge University Press

TABLE II
Mental changes by age

Mental changes	Age-Groups	
	<60 (n=23)	≥60 (n=56)
Delirium	1 (12.5%)	23 (60.5%)*
Dementia	0 (0%)	7 (18.4%)
Coma	5 (62.5%)	1 (2.5%)***
Organic Affective	2 (25.0%)	1 (2.6%)
Mixed	0 (0%)	6 (15.8%)
Total	8 (100%)	38 (100%)**

*P <.05
**P <.01
***P <.001

No particular diagnosis was found to be associated with a subacute or chronic presentation, although delirium was more common among those with a chronic course, and coma among those with a subacute course.

Discussion

The results confirm the stereotype of the enfeebled, drowsy patient with SDH. Indeed, 58% of the sample demonstrated mental changes. As expected, delirium and dementia were the common presentations of psychiatric abnormality, together comprising 67% of patients exhibiting alterations of mental state. If those labeled as mixed are added, the percentage rises to 80.

Other psychic manifestations are uncommon with the condition. In this series, an organic affective syndrome with depressive symptoms was present in three patients. In the only paper to consider individual psychiatric symptoms in detail, Wortis *et al* (1945) found depression, euphoria, hallucinations, and delusions to comprise two, six, ten, and eight percent of his sample respectively. There were no patients in the present series with euphoria, hallucinations, or delusions, although several delirious patients had perceptual disturbances that could have been misinterpreted as hallucinations.

Unusual manifestations reported in the literature and attributed to SDH include a post-traumatic stress disorder (Abbott *et al* 1943), a schizophreniform psychosis (Singh, 1950), a manic-depressive psychosis (Fleiss, 1945), catatonia (Woods, 1980), and personality disorder (Abbott *et al*, 1943; Linnel, 1940). A number of other psychiatric presentations have been reported, but review of these cases suggest that they are actually delirium (Olkan, 1938; Furlow, 1936; Micheels, 1953).

The data confirm that the elderly are subject to a disproportionate share of SDH, and that they are more likely to develop mental changes than younger patients. Fogelholm *et al* (1975) attributed this to a "tendency of some old people to overreact to a variety of internal and external stimuli"; they ascribed the high incidence of headache and papilloedema in younger groups to age-dependent brain size and intracranial free space. That is, the young have larger brains, so that as a haematoma forms, pressure increases rapidly, since there is less free space available to fill. On the other hand, the aged have smaller brains, so that a greater volume of haematoma may accumulate, and compress a greater cortical area before an increase in intracranial pressure is evident. This could well explain the high incidence of mental changes in older patients, and coma in younger patient; such changes may be dependent upon the surface area of cortex compressed.

The purpose of this investigation was to determine the incidence of mental changes of SDH and to classify patients using DSM-III criteria. Of 79 patients, a majority developed mental changes, most commonly delirium and dementia, which together accounted for over 80% of those with changes of this kind. Mental changes were found to be significant in the elderly (those over 60), but all those with mental changes, coma was significantly more frequent in the young (those 60 or younger). Dementia was evenly distributed among subacute and chronic courses, and did not vary significantly with age. Delirium was significantly more common in the elderly. In short, if mental changes develop, the young become comatose, and the elderly become delirious. This may be due to age-dependent brain size.

Although delirium and dementia are the most common mental changes produced, they are non-specific, and SDH remains a diagnosis of exclusion. Clinicians should be alert to the possibility that SDH can mimic other psychiatric disorders, such as depression, which are unlikely to be recognised as having a potentially reversible organic basis, in the absence of neurological signs.

References

ABBOTT, W. D., DOE, F. O. & NOSIK, W. A. (1943) Psychiatric diagnosis of subdural hematoma and effusion from blast. *American Journal of Psychiatry*, **100**, 98–107.

AMERICAN PSYCHIATRIC ASSOCIATION (1980) *Diagnostic and Statistical Manual of Mental Disorders*, 3rd Edition. Washington D.C.: American Psychiatric Association.

ASTRAN, K. E., VANDER, E., ECKEN, H. & ADAMS, R. D. (1980) Traumatic disease of the brain. In *Harrison's Principles of Internal Medicine*, 9th Edition, (eds. K. J. Isselbacker, R. D. Adams *et al*) New York: McGraw-Hill.

BECKER, D. (1982) Injuries to the head. In: Wyngaarden, J. B. and Smith, L. H. eds. *Cecil Textbook of Medicine*, 16th ed. Philadelphia: Saunders.

https://doi.org/10.1192/bjp.145.2.200 Published online by Cambridge University Press

BEDFORD, P. D. (1958) Discussion: Intracranial hemorrhage-diagnosis and treatment. *Proceedings of the Royal Society of Medicine*, **15**, 202–206.

CAMERON, M. (1978) Chronic subdural hematoma. *Journal of Neurology, Neurosurgery and Psychiatry*, **41**, 834–839.

FLEISS, A. N. (1945) Psychiatric manifestation of chronic subdural hematoma. *Psychiatric Quarterly*, **19**, 187–194.

FOGELHOLM, R., HEISKANEN, O. & WALTIMO, O. (1975) Chronic subdural hematoma in adult. *Journal of Neurosurgery*, **42**, 43–46.

FURLOW, C. T. (1936) Subdural hematoma. *Archives of Surgery*, **32**, 688–708.

JELSMA, F. (1930) Chronic subdural hematoma. *Archives of Surgery*, **21**, 128–144.

KUNKEL, P. A. & DANDY, W. E. (1939) Subdural hematoma: diagnosis and treatment. *Archives of Surgery*, **38**, 24–54.

LINNEL, E. A. (1940) Late effects of subdural hemorrhage. *Lancet*, **ii**, 514–516.

LUXON, L. M. & HARRISON, M. J. G. (1979) Chronic subdural hematoma. *Quarterly Journal of Medicine*, **48**, 43–53.

MCKENZIE, K. G. (1932) A surgical and clinical study of nine cases of chronic subdural hematoma. *Canadian Medical Association Journal*, **26**, 534–544.

MCKISSOCK, W., RICHARDSON, A. & BLOOM, W. H. (1960) Subdural hematoma: a review of 389 cases. *Lancet*, **1**, 1365–1369.

MERRITT, H. H. (1979) Trauma. In *Textbook of Neurology*, 6th Edition (ed. H. H. Merritt) Philadelphia: Lea and Febiger.

MICHEELS, L. J. (1953) Catatonic syndrome in a case of subdural hematoma. *Journal of Nervous and Mental Diseases*, **117**, 123–129.

OLKAN, D. M. (1938) A case of chronic subdural hematoma with acute manifestations. *Archives of Neurology and Psychiatry*, **39**, 1102–1104.

RABINS, P. V. & FOLSTEIN, M. F. (1982) Delirium and dementia: diagnostic criteria and fatality rates. *British Journal of Psychiatry*, **140**, 149–153.

SINGH, K. (1950) Chronic subdural hemorrhage associated with schizophrenic reaction. *British Medical Journal*, **ii**, 562.

STUTEVILLE, P. & WELCH, K. (1958) Subdural hematoma in the elderly. *Journal of the American Medical Association*, **168**, 1445–1449.

VORIS, H. C. (1946) Subdural hematoma. *Journal of the American Medical Association*, **132**, 686–692.

WOODS, S. W. (1980) Catatonia in a patient with subdural hematoma. *American Journal of Psychiatry*, **137**, 983–984.

WORTIS, B. M., HERMANN, M. & LONDON, J. (1945) Mental changes in patients with subdural hematomas. Research Publications. In: *Trauma of the Central Nervous System*. Baltimore: Williams & Wilkins.

Donald W. Black, M.D., *Resident, Department of Psychiatry, University of Iowa Hospitals and Clinics, 500 Newton Road, Iowa City, IA 52242, USA*

(Received 24 August 1983)

https://doi.org/10.1192/bjp.145.2.200 Published online by Cambridge University Press