

PAPERS AND ORIGINALS

Who Cares for Head Injuries?*

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Patterns of management for head injury in the acute and late stages are reviewed in respect of both mild and severe injuries. Because so many disciplines are involved, continuity of care is often difficult to achieve; and no one discipline is concerned with planning for the care of head injuries in a strategic way. The needs of head-injured patients are defined and suggestions made for improving care by the reorganization of existing facilities. What is most needed is to concentrate on patients with head injuries, both in the acute and in the late stages. Only then can medical, nursing, and paramedical personnel become skilled in dealing with the many problems which such patients present.

Head injury is a common cause of mortality, morbidity, and misery. Head injuries can account for half of all acute paediatric surgical admissions, a quarter of adult male general surgical admissions, and over a third of admissions to accident units. Probably four or five times as many patients attend casualty departments as are admitted. But after the acute stage many head-injured patients continue to require the attention of one or more components of the health services, sometimes for a long time. The management of head injuries therefore has implications not only for acute facilities but also for family practice, for rehabilitation and social services, and for mental and long-stay hospitals. Because so many disciplines are involved, either for different types of injury or at various stages of the same injury, no one of them regards this problem as wholly its responsibility. No one, therefore, focuses attention on the strategy of head injury care in continuity; consequently the needs of such patients are apt to be misunderstood and inadequately met.

An address on "Planning for Head Injuries" given 15 years ago to the section of accident surgery of the B.M.A.'s annual

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meeting was based on the assumption that major accident units would emerge all over the country.¹ The recommendation that a relationship between these accident units and regional neurosurgical units might result in a nationwide version of the arrangements evolved in Oxford was a reasonable one. The evolution of accident services, however, has been slow and patchy, while Lewin's forecast that neurosurgical units would soon be able to take over the management of most severe head injuries has not been realized. With the reorganization of the health service there is again discussion on the accident and emergency services as well as about the relationship between the hospital and the community. It is timely, therefore, to reconsider the strategy of head injury care, and once again an invitation has provided a neurosurgeon with the opportunity to speak about this problem to accident surgeons. Though the needs of patients in the acute stage and during recovery are quite different, and are best reviewed separately, the need for continuity of care is the theme of this paper.

Management of the Acute Stage: Present Patterns of Care

The crux of the problem at the acute stage is which mildly injured patients should be admitted to hospital and to which wards both they and the more severely injured should go. Management in the casualty departments depends on the local admission policy, and several of these are outlined below. They naturally reflect regional differences in facilities, but it is instructive to review existing methods to discover whether lessons learnt in one place might be useful in another.

GENERAL SURGICAL WARD

Care by primary surgeons with secondary referral to neurosurgeons is the system, if it deserves the name, which operates in most British (and indeed European) centres. The primary surgeon is normally a general surgeon but the presence of other major skeletal injuries will usually result in admission to an orthopaedic ward. Head-injured patients are therefore often scattered around many wards, and neither surgical nor nursing staff have the opportunity to develop particular expertise or interest in their problems. The degree of involvement of neurosurgeons varies, usually inversely with distance from the regional unit. In their own hospital the neurosurgical staff may visit all head-injured patients in other wards and may even give advice

in the casualty department. More often, consultation is limited to certain cases, as happens for head injuries in other hospitals. Shortage of beds is a feature of most neurosurgical units, which tends to make for rigorous selection of those transferred; this is usually limited to those with suspected intracranial compression or with depressed fracture of the vault. Though the proportion of neurosurgical beds per 1000 population varies widely between three Scottish cities, the percentage of hospitalized head injury cases which reach the neurosurgical unit is exactly the same in all three cities (4%).² Whether this is a proper proportion of head injuries for the neurosurgeon to accept and whether the patients referred are those who most need the facilities of a neurosurgical unit are open questions.

ACCIDENT SERVICE

The Radcliffe Infirmary in Oxford is the only hospital admitting accident cases for a wide area and it also contains the regional neurosurgical unit. Conditions were therefore ideal for the development of an accident service (with some 60 beds) managed by orthopaedic surgeons and neurosurgeons, together with a 24-hour service from chest, plastic, and general surgeons. About 30% of the admissions are for head injury alone but another 10% are for patients with additional injuries, usually skeletal.³ The presence of the neurosurgical unit in the same hospital allows the secondment of junior neurosurgical staff both to the casualty department and to the accident wards. Over the first 10 years one in eight head-injured patients had been transferred from another regional hospital to Oxford; a third of these had compound depressed fractures of the skull, a third suspected cerebral compression (which was confirmed in half), and a third uncomplicated severe injuries.¹

A variation of this approach has evolved in Bristol and might be more widely applicable in cities which have a neurosurgical unit. Head-injured patients are admitted to the accident service of the Royal Infirmary, where, under the supervision of consultant neurosurgeons based elsewhere in the city, an accident department registrar is responsible for their care. An essential prerequisite for such a system is preliminary training of the accident service registrars, who spend some weeks in the regional neurosurgical unit. As a result patients do not need to be transferred to the neurosurgical unit for elevation of a depressed fracture, for evacuation of an intracranial haematoma, or even for anterior fossa repair; all are managed within the accident service, which is adequately equipped. Both nursing staff and accident service personnel become familiar with the care of acute head injuries; as most of them will subsequently work in areas more remote from neurosurgical support this is of benefit to them.

NEUROSURGICAL UNIT

As in Oxford, one hospital in Edinburgh (Royal Infirmary) receives all the accident cases, but all patients with head injuries are referred to one ward which is managed solely by the neurosurgeons; this is separate from the non-traumatic neurosurgical unit, which is in another hospital. Many trivial injuries pass through this ward, and whether this is a proper deployment of neurosurgical facilities may be questioned. Another disadvantage is that those training in other surgical specialties are deprived of the experience of looking after head injuries, in contrast to the educational and training possibilities which an accident service system provides. The neurosurgical unit at Newcastle General Hospital likewise has a ward set aside for the management of head injuries, both mild and severe, with neurosurgical staff (including consultants) allocated to it.

ACCIDENT HOSPITAL

The feasibility of undertaking the care of most head-injured patients without neurosurgical facilities or support has been

clearly shown by the Birmingham accident surgeons. They deal with all degrees of head injury, including depressed fractures and intracranial haematomas, as well as cases of prolonged unconsciousness. There is no access to cerebral angiography and neurosurgeons are called in only for exceptional acute injuries and for subacute problems such as persisting cerebrospinal fluid rhinorrhoea.

Needs of the Mildly Injured

Over half of all patients with head injuries admitted to Scottish hospitals are discharged within 48 hours⁴; in a general hospital in Glasgow (Western Infirmary) 75% are discharged within 48 hours and only 3% stay more than a week.⁵ To this must be added the many patients who attend the casualty department and are not admitted. Immediate concern centres on the few who develop serious complications; these are of three main kinds.

An *intracranial haematoma* may develop over a period of hours and the only hope of survival lies in its immediate surgical evacuation. Because it can occur after relatively mild injury, when there has been a lucid interval, most clinicians fear that this may happen in any of the patients he sees. Every year thousands of patients with a mild head injury are admitted to hospital for observation in the hope that this will lead to earlier recognition of the complication and to the initiation of treatment in good time. This hope may be based more on wishful thinking than on fact; of 200 patients with intracranial haematomas transferred to the neurosurgical unit in Glasgow over a third had been deteriorating for more than 12 hours in another hospital before arriving in the neurosurgical department.⁵ So few of the many patients admitted to general surgical and orthopaedic wards ever develop complications that it is difficult for staff there to maintain a high state of vigilance; consequently when a complication does develop it may be overlooked. Careful analysis of the characteristics of patients who subsequently develop a haematoma should make it possible to calculate the probability that an individual patient in the casualty department will develop this complication. Preliminary results of such an investigation suggest that an adult without a skull fracture who is fully conscious in the casualty department with no neurological signs is very unlikely to develop a haematoma.⁶ If this is confirmed in a still larger series it might be possible to recommend a more selective admission policy for head injuries.

Intracranial infection is commonly due to a compound depressed fracture of the vault and can be prevented by formal debridement and closure of the wound. Unfortunately the true nature of these injuries is sometimes overlooked because patients are often fully conscious. They may not therefore be x-rayed before having a suture in the casualty department. The infection rate for this injury in Glasgow is considerably higher than for gunshot wounds of the head in the battlefields of Korea and Vietnam (or for depressed fractures in the Birmingham Accident Hospital).⁷ Meningitis from fractures into the air sinuses or middle ear or from penetrating wounds of the orbit is less common, but these injuries are even more easily overlooked.

Epilepsy occurs in about 5% of head injuries in the first week after injury, more than half of the affected patients having a fit within the first 24 hours. It is particularly common after mild injuries in children and is a frequent cause of admission to hospital. The immediate significance is not great, unless status epilepticus develops, but it does have significance for the development of epilepsy in the future.⁸

The primary care needed for mild injuries requires facilities for the assessment of conscious level, for x-ray examination of the skull, for suture of scalp lacerations, and, when deemed necessary, for continuing observation. It should, perhaps, be more honestly accepted that the real reason why so many patients with mild injuries are admitted to hospital at present is the inability to organize an accident and emergency service with these modest provisions. The matter is partly one of logistics, because considerable numbers are involved, particularly at certain times of the day and certain days of the week in large cities. Many of these patients have recently taken alcohol; Galbraith *et al.*⁹ showed that this was so for over 80% of male admissions for head injury to the Western Infirmary. This presents a social problem for the casualty department and may also complicate the assessment of the conscious level. It is some-

times argued that medicolegal considerations require the admission of patients with mild injuries regardless of medical requirements. But lawyers can argue only on the basis of what is reasonable medical practice, and it is for doctors to inform lawyers what good practice should be. In most European countries and even in North America, where litigation is a continuing threat, it is customary to send many mildly head-injured patients home provided that a relative can be informed about the possibility of complications; instructions for informing the hospital immediately if certain symptoms develop are issued in writing. It may even be argued that observation by caring relatives may be more effective than that of overworked nurses and medical staff in a busy surgical ward.

Needs of the More Severely Injured

Patients who are not fully conscious when presenting for medical care must always be admitted to hospital, and discussion centres on the most suitable department for them. Those who are deeply unconscious now commonly gain admission to a general intensive care unit, where their respiratory problems and nutritional needs are well cared for. It was the evolution of intensive care which made a pronounced impact on the mortality of severe head injury in the late 1950s. Where such units have developed there is now less urgency to refer patients to neurosurgeons, but the question arises whether adequate monitoring of the intracranial condition is possible without the facilities of a neurosurgical unit.

Skull radiography and echoencephalography are the only tools available for general use, but neurosurgical units now often use carotid angiography and some of them intracranial pressure monitoring; more recently the E.M.I. scanner has come on the scene, one of the most useful applications of which may be for acutely head-injured patients. The availability of these special investigations, both for detecting intracranial complications and for monitoring the effect of treatment (particularly of measures which aim to reduce raised intracranial pressure), emphasizes a role for the neurosurgeon quite apart from operating on the skull. None the less, in many cities neurosurgical beds are so restricted that there is a tendency to accept for transfer only the most severe cases or those with obvious complications; many of these patients turn out to be too severely injured or with complications too far advanced to benefit from the advantages of the neurosurgical unit. It is difficult to determine how much benefit less severely injured patients might gain from management in a special unit. What is known is that a third of the patients who die in neurosurgical units have talked at some time after the injury, and some must be regarded as preventable deaths.¹⁰ Only if a proportion of such patients are managed throughout the acute stage in neurosurgical units can new techniques for the treatment of such cases be devised and adequately investigated and tested.

Reorganization of Acute Care

The logistics in the United Kingdom make it improbable that neurosurgeons will ever be able to undertake the total management of more than a small proportion of head-injured patients admitted to hospital. There is, therefore, need for more continuing collaboration between neurosurgeons and surgeons responsible for accident cases. Together they should work out defined procedures for the care of the mildly injured, both in the casualty department and after admission to the wards; this should include the definition of a clear-cut admission policy and well-defined reasons for referral of patients to the neurosurgeon. These reasons may differ from one region to another, but if most severely injured patients in Britain are to receive optimal modern management, then probably a greater proportion than at present should be under continuous neurosurgical supervision, for the first few days at least. This would be possible only if there was an appropriate allocation of beds and staff between the surgical specialties concerned. The emergence of specializa-

tion has made surgeons more dependent on each other, but facilities are not always provided to allow for rational redistribution of patients among recently established specialties. If the number of patients with mild injuries admitted to hospital could be substantially reduced, then some of the acute beds which become available could perhaps be used for the management of severe injuries by neurosurgeons in the acute stage.

Both the patients and the staff in the primary hospital would benefit if cases of head injury were concentrated in a single ward, whether one used for accidents or one used for general surgery. This would provide an opportunity for medical and nursing staff to gain expertise in the care of these patients, and it would make it practicable for regional neurosurgeons to give more realistic support by visiting such a ward regularly. An essential component of closer collaboration between neurosurgeons and primary surgeons should be the provision of training in head injury care for a greater proportion of primary surgeons. Though all neurosurgeons have had considerable experience of surgery in general, including accident work, only a few primary surgeons at present rotate to neurosurgical units during training. Registrars in units designated to receive head injury cases should have a short period of training in a neurosurgical unit which deals with head injuries; and consultants whose responsibilities include casualty and accident departments but whose training has not included neurosurgery should be required to gain experience in this field before taking up such an appointment.

Management in the Recovery Stage: Present Patterns of Care

It is again helpful to distinguish different types of injury because the problems of mild and severe injuries are quite different. Most patients with less than 24 hours of post-traumatic amnesia are back at work within eight weeks, many of them sooner. How many suffer from headache, loss of confidence, poor concentration, and postural giddiness, and for how long, is not known. This is the post-traumatic (post-concussional) syndrome, which was once thought to be largely psychological in origin but is now usually regarded as a reflection of damage in specific structures, including the eighth-nerve system. While most patients complain of such symptoms for a few days or weeks some develop a neurosis which results in symptoms being more disabling and continuing for longer. The origin of this neurosis is a matter of dispute and doubtless derives from many factors. It was shown during the second world war that the degree and duration of complaints of this kind were considerably reduced by a more active approach to the mild injury during the acute stage, including reassurance and a graded return to activity. Probably a similar impact could be made now, and another reason advanced for admitting cases of mild injury to hospital is that sympathetic management at this stage might have beneficial results in this respect. In practice, however, few head-injured patients admitted for brief periods to hospital get much attention, nor are they followed up and given the kind of support which has been shown to be helpful. Many of these patients almost certainly suffer more than they need, not least because they cannot find anyone who understands their problem and can give confident advice.

The post-concussional syndrome has been with us for a long time, but we now face new problems due to the increasing survival rate after severe injury, which has resulted from the application of intensive care techniques. Some of these patients make a good recovery but many remain disabled, some of them severely so. It has been estimated that 1200 patients leave hospital in Britain every year with permanent brain damage from head injury, half of them never to work again;¹¹ most are under the age of 30 and some face a lifetime of disablement. No adequate arrangements exist for the progressive care of such patients when they no longer need intensive care. Return to an acute general surgical or orthopaedic ward is inappropriate but that is what usually happens. To the team who saved his life the

patient's progress may give grounds for hope of further recovery, but those who inherit the severely handicapped patient may barely conceal their view that his survival is a misfortune, which is a poor basis for enthusiastic rehabilitation. Nor is an acute surgical ward the place for long-term rehabilitation.

Nevertheless, transfer too early to a conventional rehabilitation centre attuned to the needs of patients recovering from musculo-skeletal injury or surgery, can be equally unfortunate. The expectation there is too great, the pace is too fast, and insufficient allowance is made for the problems of communication and the emotional and intellectual handicaps of the head-injured patient. Within a week or two many patients either take their own discharge or are dismissed because either they or their doctors realize that their placement is inappropriate. More severely disabled victims may be sent to accommodation for the young chronic sick or even to geriatric wards, where the expectations are too limited and the association with conditions which are static or deteriorating makes an unsuitable environment for further recovery. Some such patients have made good progress only when their relatives, in desperation, have insisted on taking them home. If mental symptoms are prominent the patient may be sent to a mental hospital, and provided the psychiatrist uses drugs minimally and recognizes the potential for recovery this can be beneficial in the short term. Once home the patient is usually left to his own devices and it is difficult then to arrange further rehabilitation, occupational therapy, or retraining. It is difficult to escape the conclusion that the tremendous efforts expended on intensive treatment in the early weeks after injury are often largely wasted by the failure to provide the means whereby the full potential for recovery can be achieved during the later stages.

Needs of the Brain-damaged Survivor

These patients suffer a combination of mental and physical handicaps which combine to make for considerable difficulties, not only for the patient but for his family and for those concerned to assist his recovery. Either the mental or the physical component of the handicap might be coped with alone, but the coping strategy is seriously undermined by the double disability. The physical disabilities (hemiparesis, dysphasia, ataxia) usually resolve to a large extent but the time scale of recovery is measured in months rather than weeks. Mental features are more consistent and more persistent than physical disabilities, and they contribute more significantly to the overall social handicap.¹² Yet they are often overlooked by surgical staff in the course of brief follow-up visits, and there may be failure to appreciate the severe family disruption which can result from one of its members sustaining severe brain damage. It remains to be shown what part rehabilitation has to offer either in accelerating the speed of recovery or in assuring a better ultimate degree of recovery. What does seem likely is that physical rehabilitation alone is unlikely to succeed unless there is also prophylactic and ongoing psychosocial counselling of the patient and the family. Indeed these may influence outcome more significantly than physical rehabilitation.

Reorganization of Post-primary Care

As in the acute stage the need is for the designation of a limited number of locations where these patients can be cared for and where medical and paramedical staff may gain experience in dealing with the problem. The first need is for second-line beds in the neighbourhood of existing acute units, where medical supervision can be continued by those who were responsible for the acute phase of treatment. This should cover a period of two to three months, during which initial rehabilitation is carried out and by the end of which it should be possible to recognize three groups of patients and so determine what kind of continuing care is appropriate. Some will already be independent and

requiring progressive resettlement into the community. There will be others who are likely to remain permanently handicapped but whose disability and dependence should be minimized by continuing progressive care. And there will be those likely to need permanent care by reason of continuing mental and physical disability which makes them dependent. At the next stage rehabilitation units should also be designated for the acceptance of head injury cases; and even for long-term care it would be helpful if a few mental hospitals and some units for the young chronic sick were to have small units for the care of these particular patients. Many could probably be managed later on the basis of five-day accommodation or day hospital facilities. The concentration of at least a proportion of head-injured patients in a limited number of centres would provide an opportunity for assessing the potential and feasibility of providing care of various kinds and for undertaking research into the process of recovery after brain damage.

The needs of the next stage would again be best met by the designation of wards in certain rehabilitation units—young chronic sick, mental, and other long-stay hospitals—for the acceptance of head-injured patients; many could probably be managed eventually in five-day beds or on a day hospital basis. Those asked to accept head-injured patients in this post-primary phase should be given clear indications of the prospects for future recovery; studies on the prediction of outcome indicate that more precise prognosis should be possible.¹³ The failure to distinguish between patients being actively rehabilitated with the prospect of social and economic independence and those likely to remain permanently in need of care can make it difficult to set realistic goals and to achieve appropriate placement of patients at this stage. Sometimes the suspicion arises that any placement at all is acceptable as an alternative to the patient continuing to occupy an acute bed or to create intolerable pressures at home.

Conclusions

This paper aims to provoke discussion of a controversial topic. Some doctors may consider their local arrangements to be already satisfactory and that an unduly pessimistic picture has been painted. Similar pleas about the inadequacy of care for head injuries, particularly for the post-primary care of the more severely injured patients, have, however, been made by others. Certainly there is no evidence on a national scale by which to estimate the size of the problem, and without such data it is difficult to judge all the implications of the reorganization suggested. It seems unlikely, however, that reliable data about what happens to head-injured patients will become available on a wide scale until there is some reorganization because the problem is so dispersed. In such a situation solutions seem most likely to arise from careful assessment of such methods as have already emerged in certain places due to local initiative, together with an estimate of which combination of these is best suited to other places.

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