If I Had...

If my son had a head injury

BRYAN JENNETT

British Medical Journal, 1978, 1, 1601-1603

An implicit assumption of these articles is that in some circumstances doctors might deal differently with themselves and their own than they deal with most of their patients. The admission of such a double standard might at first sight seem to betray a deep dishonesty in the doctor's mind. Rather it is an honest admission that few doctors, in any country, can do for all of their patients all of the time all that they would wish. Differences between how a physician heals himself and how he deals with others may therefore disclose something about the practical constraints under which he works. But even without such constraints, to expect that doctors should always themselves agree to be managed in exactly the way which they recommend for most of their patients is to deny their special position, not of privilege but of knowledge. Previous contributors have mostly been admitting that they might not wish themselves to submit to some of the more elaborate investigations or therapies which they often recommend to their patients because they know the hazards, the discomforts, and the limited benefits which are associated with these procedures.

I shall make the opposite plea, in regard to a *mild* head injury in my family—my hope being that this will be investigated *more* thoroughly, and be taken *more* seriously, than is usually recommended by neurosurgeons. There is another difference between head injury and the other diseases which the Editor has invited each of us as doctors to face as a personal dilemma. Altered consciousness would often remove the doctor himself, if he were the victim, from participating in discussion about his disposal; and would likewise insulate him, in the early stages at least, from concern about himself—a central feature of previous essayists in this series. Therefore I propose to consider a head injury happening to a member of my family, so that I can agonise about the prospects of complications or future disability, as Hugh Dudley did about the future of his bowels, and Harold Ellis did about the welfare of his wife.

Mild injury

Most of the million patients who come to accident and emergency departments in Britain every year after head injury have been only mildly injured, and most recover rapidly, however little is done for them. But among these patients, who are talking and walking when they reach hospital, a few will develop intracranial haematoma or infection or brain swelling. Too often these complications are dealt with too late to avoid disability or even death, because once secondary processes begin to occur events may move rapidly. About 30% of patients who

die in neurosurgical units after head injury have recovered sufficiently to have talked at some time, evidence that damage to the brain at the time of impact was not overwhelming.¹ In over half of these patients one or more avoidable factors may be identified which contributed to death.² I should wish to avoid contributing to the statistics of those who "talk and die" after head injury; nor would I want my son to talk and then nearly to die, only to survive with brain damage because decompression, or débridement of an open injury, had been delayed.

Why does this happen? Neurosurgical facilities are limited, although no more so in Britain than in other Western European countries. Because of this, the benefits of experienced clinical observation, of neuroradiological investigation, and of immediately available neurosurgical skill are offered only to those patients with more serious head injury (and to the mildly injured only when brain damage has become serious owing to complications). There is no denying the arithmetic of the neurosurgeons: in most of Scotland only 4% of patients admitted to hospital after head injury come to a neurosurgical unit, and most of them are secondarily transferred from primary surgical wards³; in an English region surveyed the proportion was even smaller. At present head injuries make up only 10-15% of admissions to most regional neurosurgical units, and neurosurgeons are therefore right in claiming that if they relaxed their rules about selective admission of patients with head injuries too far they would soon have few other patients in their beds. As only 1% of patients with head injuries admitted to hospital require an intracranial operation this would not be, most would agree, a proper deployment of the special investigational and surgical facilities provided in regional units.

Selection is therefore inevitable. The question I must answer, in the context of this series, is whether I would allow my son with a head injury to be submitted to the current practice of selection for initial admission to a primary surgical ward, and for secondary transfer to the neurosurgical unit. Would I seek to influence what happens, or would I agree with Harold Ellis that "accidents happen when special patients get special treatment"? I have to admit that my knowledge of how often preventable accidents happen to patients with head injuries after they reach hospital^{2,4} would undoubtedly lead me to try to bend the rules. Or at least I would make sure that someone else was going to do so for me, as I unashamedly do myself whenever a medical colleague consults me after a mild head injury in his family.

Selective admission

What are the present rules, and how is the game played according to them? Admission to hospital is usual for all patients who have altered consciousness when seen in the accident and emergency department and for those in whom a skull fracture has been found; also for all patients who have recovered from a brief period of unconsciousness, whether actually witnessed or only deduced from the patient's being amnesic for a few minutes after the injury. A survey of primary surgical ward admissions in Scotland showed that 80% of patients had neither altered

University Department of Neurosurgery, Institute of Neurological Sciences, Glasgow G51 4TF

BRYAN JENNETT, MD, FRCS, professor

consciousness nor a skull fracture when seen in the accident department⁵; almost all these patients were discharged next day. Is it really necessary to admit tens of thousands of such patients to hard-pressed surgical wards every year in the hope that this will reduce the risk of delayed recognition of a serious complication? I think not. Indeed, there is good evidence that this policy may be counter-productive—because complications are so very rare in such patients that they are seldom encountered by doctors and nurses dealing with large numbers of these patients. Inevitably vigilance becomes blunted, and the admission of patients with mild head injuries may seem to these staff to be a waste of their time and facilities. What is more important is that when a patient who *is* at risk is admitted he is apt to be as casually observed as all the others; when a complication does develop it is often not recognised as soon as it should be, and appropriate action is delayed.

Are the complications really unpredictable and capricious, and do they really happen with such alarming speed as sometimes appears? Review of patients transferred to one neurosurgical unit after deterioration from intracranial haematoma,⁶ or with established infection from open injuries,⁷ indicates that most could have been predicted. The most important clue is a fractured skull—present in 90% of extradural haematoma, 75% of intradural haematoma, and in all cases of open injury. If good skull radiographs were more often obtained soon after injury the management of patients with mild head injuries could be more rationally based. Many of the patients who at present are admitted could safely be sent home, saving them and their families unnecessary inconvenience and concern—and leaving acute surgical beds available for more effective use. And the few patients who are really at risk could be identified, and could then be more appropriately managed than they are at present.

So I would want my son (if he was fully conscious) to have good skull x-ray films; and if a fracture were excluded I would not want him admitted. But could someone whose dad was not a neurosurgeon be safely sent home, if he had been briefly unconscious, had now recovered, had not got severe headache, and had no obvious neurological signs? I believe he could, provided a relative or friend were available and sufficiently responsible to instruct and to trust to report back to hospital should untoward symptoms develop. The instructions should be on a printed sheet, as is usual in the USA, where this is common practice in spite of the litigious atmosphere surrounding medicine in that country.

Primary surgical or neurosurgical ward?

If a linear skull fracture were shown, or if my son had definitely altered consciousness, would I regard a busy general surgical unit, miles from the regional neurosurgical centre and its EMI scanner, as a safe place to wait for complications to develop or for the danger to pass? I doubt if my nerves could stand it; but that is what we recommend every day of the week. Some neurosurgeons, however, do take directly into their own units all the patients with head injuries (even minor concussions) who come to their own hospital—which is usually the major teaching hospital in the city; but the more distant hospitals in their region they deal with, like the rest of us, by telephone consultation. That has always seemed to me illogical. The safest general surgical or accident wards to be in with a head injury are those which are situated in the same hospital as the regional neurosurgical unit. For patients in these wards there is no risk of the delay and hazard of ambulance transfer after deterioration has occurred; moreover, nurses and junior staff in such wards can be instructed by the neurosurgeons in the same hospital about how to observe and manage these patients. So I would not insist on my son taking precious space in the neurosurgical unit if I were satisfied that the primary surgical ward to which he was admitted was close to the neurosurgical unit, had nursing and junior staff properly trained in the care of head-injured

patients, and had a clearly defined agreement with the neurosurgeons about the criteria for transfer to the neurosurgical unit.

Until recently it could reasonably be claimed that neurosurgeons could do little more for most patients with head injuries than was possible in a good primary surgical ward, or in a general intensive care unit. Now that we have the EMI scanner it is different: not only does this diagnose and localise intracranial haematoma accurately and reliably in patients suspected of having this complication, but it will show up a clot in some patients who have not yet developed clinical evidence of cerebral compression. Obviously every patient with a head injury cannot be scanned, but it is becoming clear that arrangements will soon have to be made for many more patients to have a scan than are currently admitted to neurosurgical units on traditional criteria. Perhaps patients should be "bussed" to the local scanner; if the scan excludes a haematoma they could then be returned to the primary surgical ward to avoid blocking neurosurgical beds—unless a sizable number of accident beds were transferred to the neurosurgery department. The double ambulance journey would have to be balanced against the value of an EMI scan. As general body scanners are established in general hospitals these could be used for screening some patients with head injuries, most of whom present after normal working hours, when elective scans would not be occupying the machine.

Transfer to the neurosurgical unit

If my son still had altered consciousness several hours after injury, and certainly if he also had a fracture, there is no doubt in my mind that I would want him moved to the neurosurgical unit, partly to have an EMI scan, but also for appropriate management and monitoring if no haematoma was disclosed. But before he was moved I would have two concerns. One would be to have a good accident surgeon exclude an associated injury: it is all too easy to be mesmerised by the head injury and to overlook another injury which may cost the patient his life, or may cause hypotension, which can secondarily damage the brain. My other concern would be that arrangements were made to ensure that his airway was adequately maintained during the ambulance journey—by some form of mechanical airway, the availability of portable suction, and the provision of an escort who knew what to do.

If a haematoma were discovered I would be more concerned to know that an experienced neuroanaesthetist was going to be available than to fuss about which neurosurgeon would operate. Once a haematoma had been evacuated or excluded I would leave further decisions in the hands of a neurosurgeon whom I trusted. In the event of continuing coma I hope that he would not employ controlled ventilation or tracheostomy unless the indications were indisputable. Each carries its own hazard and neither has proved to be of benefit except in very limited and clearly defined circumstances.

Continued coma

If my son remained in coma I would naturally become increasingly concerned about his chances of recovery. Should the question of brain death arise I should trust in the Royal College's criteria,⁸ and would want ventilation to be discontinued without undue delay once these were satisfied. Given that he was breathing on his own the question in my mind would be the probability that he would recover to become an independent person again. I would want to take advantage of the predictive criteria now available from computer-based data banks.⁹ If calculations based on these indicated that my son would survive at best only in a vegetative or severely disabled state, I would expect to be told, and to participate in the decision to discontinue active treatment. In the initial treatment and subsequent hospital management of a severe head injury I am therefore asking that my son be treated as we deal with all such patients.

Rehabilitation

Should my son survive with some disability then I would expect the family to plan with the remedial therapists and psychologists a rehabilitation programme. I would hope that a psychiatrist skilled in the problems which face the young disabled and their families would be available to counsel both us and him; and not just in broad general terms but in dealing with the frustration and crises which I know would arise. Together we would hopefully analyse the eventual disability and capability, and teach him how to adapt physically and mentally to it; and then to adjust our present lives and our expectations for the future to take account of the changes.

Epilogue

Not all those invited to contribute to this series have been willing to do so. None of us who have done so have found our task easy. Contemplation of personal disaster is no more attractive to doctors than to others; and prediction of how one will

react to hypothetical circumstances is notoriously unreliable. But the value of submitting to the discipline of marshalling thoughts on issues such as these is that it may lead to a re-appraisal of current practice. I suspect that in the future some of us may find ourselves confronted with our own prescriptions for good care. And we may be asked whether we are indeed now endeavouring to ensure that as many of our patients as possible are being dealt with as we have said we would ourselves wish.

References

- ¹ Reilly, P L, *et al*, *Lancet*, 1975, **2**, 375.
- ² Rose, J, Valtonen, S, and Jennett, B, *British Medical Journal*, 1977, **2**, 615.
- ³ Jennett, B, *British Medical Journal*, 1975, **2**, 267.
- ⁴ Jennett, B, and Carlin, J, *Injury*, in press.
- ⁵ Strang, I, *et al*, *Injury*, in press.
- ⁶ Galbraith, S, *British Medical Journal*, 1976, **1**, 1438.
- ⁷ Miller, J D, and Jennett, B, *Lancet*, 1968, **2**, 991.
- ⁸ Conference of Royal Colleges and Faculties of the United Kingdom, *Lancet*, 1976, **2**, 1069.
- ⁹ Jennett, B, *et al*, *Lancet*, 1976, **1**, 1031.

Today's Treatment

Use of antibiotics

Surgical infections

M R B KEIGHLEY

British Medical Journal, 1978, **1**, 1603-1606

Most infections in general surgical practice result from micro-organisms in the intestinal or respiratory tracts. Intestinal infections may present as a complication of underlying gastrointestinal disease. Alternatively, intestinal or respiratory sepsis may occur as a complication of surgical treatment. Postoperative sepsis is responsible for most bacterial infections on surgical wards, of which the most important are respiratory and wound sepsis, septicaemia, and abscess. (Urinary infections are dealt with elsewhere in this series.)

Postoperative sepsis has important medical and financial implications: the stay in hospital is longer, which is expensive, reduces turnover, and may adversely affect surgical waiting lists. It may be associated with serious metabolic and thromboembolic complications. Subsequent operations may be necessary, such as drainage of an abscess, resuturing a wound, or closure of a fistula. All of these factors contribute to increased mortality.

Unlike established surgical infections, many acquired hospital infections (postoperative sepsis) can be prevented either by attention to preoperative management and operative technique or by prophylactic antimicrobials. Reduction of postoperative sepsis may therefore profoundly influence morbidity, mortality, and the efficiency of a surgical service.

Intestinal and respiratory flora

The oesophagus usually contains only a few oral commensals, and acid gastric contents are usually sterile. Any condition that is associated with an increase in the pH of gastric contents is commonly accompanied by bacterial overgrowth. The organisms may include *Streptococcus viridans*, *Streptococcus faecalis*, *Escherichia coli*, and occasionally faecal anaerobes. Most of these bacteria are sensitive to the cephalosporins or the newer semi-synthetic penicillins. Many pathogenic organisms are isolated from gastric juice in patients with pernicious anaemia or gastro-oesophageal carcinoma and from some patients with gastric ulcer. Bile is usually sterile, but many *E coli*, *Klebsiella aerogenes*, *Strep faecalis*, and *Clostridium welchii* are present, mixed or alone, in 30% of patients with biliary disease. Most of the bacteria in bile are sensitive to cephalosporins or a combination of a penicillin with an aminoglycoside. Infection is particularly common in acute cholecystitis and choledocholithiasis, and in patients with non-malignant jaundice.

The jejunum and ileum normally contain only a few enterobacteriaceae and faecal anaerobes. The counts of these bacteria are greatly increased in patients with acute intestinal obstruction and small intestinal Crohn's disease. Even in the absence of disease, there are vast numbers of organisms in the colon (up to 10^{11} /g). Here the numbers of anaerobic species such as bacteroides, bifidobacteria, clostridia, and peptostreptococci exceed the numbers of aerobic bacteria (coliforms, lactobacilli, and enterococci) by a factor of 10 000-100 000.¹ The faecal anaerobes are resistant to most antibiotics except for chloramphenicol, rifampicin, clindamycin, and metronidazole. Of these, metronidazole is the least toxic and should probably be the only antimicrobial used for prophylaxis against these organisms.