The Treatment of Head Injuries*

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A DISCUSSION ON the treatment of cases of cerebral trauma gives one a very wide scope, as it will include the measures to be taken for the actual head injury itself, and the measures to be adopted to maintain the well-being of the patient generally. These aspects of the case are complementary to each other and if either is neglected it will be to the detriment of the patient.

When I first became interested in the problems associated with the treatment of head injuries, I quickly realized that here was a perfect example of where team work is essential. Good nursing and strict observation are two points which cannot be overlooked in any form of surgery, but especially so in the case of patients with cerebral injuries.

Head injury patients are frequently troublesome and noisy, but if their problems are understood, much can be done to restore tranquillity and hasten recovery. To illustrate this point; if the attending nurse is told that the patient's restlessness is due to blood in the cerebro-spinal fluid irritating the nerve roots, she will be much more likely to be tolerant about the patient's seemingly outrageous behaviour.

In the management of these cases, a high standard of nursing skill is required, and the attending doctor must be in a position to instruct, encourage and supervise.

The most serious complications which occur in patients surviving long enough to reach hospital following a head injury are those associated with the chest.

Blood and vomitus are frequently aspirated into the trachea and bronchi soon after the accident, when the patient is deeply unconscious as a result of a fracture involving the base of the skull. Apart from this there may be an injury to the chest itself, and it will be appreciated how dangerous to life these two conditions can be when they exist together.

To minimize chest complications the unconscious patient should be transported and nursed on his side, and as soon as he reaches hospital suction should be available to keep the main airways clear of secretions. If this is not adequately done, areas of pulmonary collapse will occur reducing an already hampered pulmonary reserve. Assuming that the main airways are kept clear of vomitus and secretions, a state of pulmonary oedema may still persist because of brain-stem compression secondary to raised intracranial pressure caused by an expanding intracranial lesion. This state of affairs will require the appropriate surgery to deal with such conditions as an extradural or subdural haemorrhage. It is quite remarkable how quickly the patient's chest condition will improve as soon as the intracranial pressure has been dealt with.

The toilet of the main airways is best carried out by suction applied through a rubber catheter, still maintaining the patient on his side or in the semi-prone position.

Sometimes the services of a skilled anaesthetist will be required to complete the toilet of the bronchial tree.

If it should happen that suction, no matter how often repeated, fails to maintain an airway, an endotracheal tube will have to be left in position. It is not wise to leave a tube in situ for more than twelve hours and if it is still considered to be necessary at the end of this period a tracheotomy will be indicated.

In addition to the measures I have already outlined, the patient should be turned from side to side at hourly intervals, and be put in the extreme Trendelenberg position occasionally to assist the other procedures in keeping the airways clear.

Oxygen, of course, should be available and given if there is any evidence of cyanosis, as well as the usual antibiotics.

A tracheotomy will only be indicated if there is respiratory embarrassment in cases which have got over their initial shock, but who appear as though they will remain comatose for many days and in which other measures to keep a clear airway have failed.

The treatment of shock following cerebral trauma presents some additional considerations to those found in other traumatic cases.

It is very easy to overheat these patients, producing excessive sweating and hyperthermia, because the heat regulating mechanisms of the brain have been temporarily upset.

The patient may look cold and, in fact, feel cold but it is wise to take the temperature rectally,
in order to be quite sure that in the endeavour
to combat shock the patient is not being
overheated. If the rectal temperature is rising
and certainly if it reaches 102°F a tepid sponge-
ing and the giving of ten to twenty grains of
aspirin rectally, or by a Ryle’s gastric tube will
be indicated.

Unfortunately, it will frequently happen that
in spite of all the measures taken, the temperature
continues to rise, as in cases of severe trauma to
the hypothalamus, but on the whole it is easier
to try and prevent the temperature rising than
to bring it down once it has done so.

One should be careful in these cases not
to judge the book by the cover and not apply
excessive heat to the apparently shocked case of
cerebral trauma.

Blood loss is not usually a feature of closed
head injuries and on this account blood trans-
fusion is not often indicated. As a rule, as long
as the systolic blood pressure remains above 100
mgs. of Hg. the giving of blood is best avoided.
Of course, if surgery is contemplated, the patient
should be typed and blood should be available
if necessary.

In cases of multiple injuries, including the head,
treatment of blood loss may well become an
urgent matter and cannot be overlooked.

The feeding of a patient following a head in-
jury is extremely important and I regret to say,
frequently overlooked. Patients are often left
many days without any attempt being made to
give them a diet suitable even for basal require-
ments. In all except the comatose or semi-coma-
tose, feeding is usually possible by the oral route.
During the first twenty-four hours, at least one
ounce of glucose and water hourly is necessary
and this should be increased so that the total in-
take is within the region of two pints during the
second twenty-four hours.

On the third day protein in some form should
be added to the diet, as otherwise the patient will
begin to lose weight. Protein can be easily sup-
plied by giving junket, egg custard or milk pudd-
ings or by giving some of the high protein prepa-
rations which are at present available.

If the patient is not too restless a Ryle’s tube
can be left in position for as long as necessary,
and the attending nurse can give him a feed as
often as indicated. Sometimes a patient is too
restless to tolerate an indwelling gastric tube and
in these cases a tube of larger calibre will have
to be passed at least at eight hourly intervals to
supply the necessary amount of nourishment.

One becomes readily impressed by the value of
feeding these comatose or semi-comatose patients
in the manner which I have described. Three-
tube feeds per day of between one to one-and-a
half pints each are usually sufficient for basal
requirements. In addition, there is a large group
of patients who will take some nourishment vol-
untarily but not enough to prevent their general
condition deteriorating, and such cases will be
found to benefit from one or two supplementary
feeds daily.

The dangers of dehydration, because of the in-
ability to administer fluids in sufficient quantities
to an unconscious patient, cannot be over-empha-
sized.

In other centres, studies have been made of the
metabolic disturbances following head trauma
and transient changes in the levels of the blood
sugar, blood urea and plasma proteins have been
reported, but they are, on the whole, of little
importance from the therapeutic point of view
except when they are very marked.

It should be possible in most hospitals to ar-
range for tube feeding facilities in cases of head
injuries, and this aspect of the treatment need not
be considered to be the sole preserve of a neuro-
surgical department.

Restlessness is always a difficult problem in
cases of head injury, particularly in the early
stages when excessive sedation would be danger-
ous because of the possibility of masking signs
which might indicate the onset of complications.

Morphia is best avoided and it is generally
possible to keep the patient reasonably quiet by
the use of soluble luminal (three grains) combined
with one of the milder analgesic drugs such as
aspirin.

Forcible restraint should be avoided as it often
makes the patient quite unmanageable. Padded
side boards which can be easily attached to most
hospital beds are very useful and allow the patient
a considerable amount of freedom with safety.
Every hospital should be equipped with these side
boards and they will be found useful in cases
other than of cerebral trauma.

The bowels are best kept open by enemeta as
this method facilitates nursing by preventing rec-
tal incontinence. For this reason aperients are
best avoided until the patient regains control of
his faculties.

The skin, mouth and eyes will require the usual
nursing measures given to any comatose or semi-
comatose patient.

It will, of course, be appreciated that a patient
with a head injury may have other lesions which
will modify the treatment I have mentioned as
regards feeding and nursing. For example, if
there is an associated abdominal injury the pa-
tient’s diet will have to be regulated accordingly.

In general, it is advisable not to delay unnec-
essarily the treatment of other injuries merely
because the case is primarily one of a head injury,
but in the early stages it is prudent to minimize
such procedures as much as possible and in this
way reduce the degree of shock and the possibility
of infection.

I do not consider that a lumbar puncture is
essential in the treatment of an acute head injury,
and I would say that on the whole it should be
avoided until all danger of the development of
an intracranial expanding lesion has passed.

So far, I have confined my remarks mainly to
the nursing complications following a head injury
and the importance of their correct treatment.

I have purposely simplified the routine measures
adopted for feeding these patients as facilities are
usually not readily available for carrying out the more elaborate biochemical investigations around the clock.

Surgery, of course, has a very definite place in the treatment of head injuries and I now propose to outline the more usual surgical procedures and the type of case in which they can be usefully employed.

Head injuries are usually classified into three groups:

1. A series of cases which, when first seen have fully recovered from the effects of the injury; these cases, as a rule, only require a period of observation.

2. A series of cases which have been profoundly unconscious from the moment of the accident and tend to remain so.

3. A series of cases in which the patient has either regained consciousness for some time following the accident, or has become drowsy and later unconscious following an accident not associated with any initial coma.

The second group carries a high mortality and emergency surgery is not often indicated. However, if they should survive twelve hours or so without any further deterioration, exploratory burr holes should be made under local anaesthesia in the hope of finding an extra cerebral condition such as an extradural or subdural haematoma which is embarrassing the brain. It is in this group that the maximum damage is to the brain itself, which is the real cause of the high mortality rate.

The last group is the most fruitful from the surgical point of view because in it will be found the extradural haemorrhages, subdural haematomas etc.

The first intracranial complication which springs to every doctor's mind is that of an extradural haemorrhage from a ruptured middle meningeal artery.

We were taught that in such cases there was a sequence of concussion, complete recovery from concussion and then a gradual lapse into coma. This appeared to us as students to be a satisfactory description which could be easily remembered and applied when necessary. However, any of us who have had to deal with cases of cerebral trauma will be only too well aware that this is not the whole story and that there are several clinical pictures associated with the development of an extradural haemorrhage.

A pure extradural haemorrhage can occur in a patient who has never been unconscious and who has not sustained concussion of the brain. Professor McConnell has, on several occasions, drawn attention to this point in the literature, so as to dispel the erroneous impression given by some of the standard textbooks.

In the neurosurgical department in which I work there have been numerous cases of extradural haemorrhages especially in children in which there has been no initial coma, but a gradual development of neurological signs leading to coma following a short latent interval following the injury.

Clinically it is usually possible to lateralize the extradural haemorrhage. A plain X-ray is frequently of value particularly if it should demonstrate a fracture crossing a meningeal groove on the skull, and in this way will help in determining the site of the initial burr hole or trephine opening.

The details of the surgical technique do not concern us here except to say that they must be applied early as the brain cannot stand up to rapid compression for very long. The mortality rate in cases of extradural haemorrhage is unfortunately very high either because of delay in treatment or because the patient has other severe intracranial damage in addition to the extradural clot.

The occurrence of a subdural haematoma is a frequent complication following a head injury. They are usually considered to be acute if they occur within fourteen days from the date of the accident and chronic if they occur or manifest themselves later than this.

These collections of blood in the subdural space are usually caused by the rupture of a vein or veins passing between the cerebral cortex and the large venous sinuses. An acute subdural haematoma may occur so rapidly so as to be confused symptomatically with an extradural bleeding, but the exploratory operation which is indicated will decide this academic point.

The finding and removal of a subdural clot often only deals with a part of the intra cranial pathology present. Clots are frequently bilateral and associated with varying degrees of cerebral lacerations. However, their early recognition is valuable so as to leave the brain in an optimum condition to recover.

Pressure effects may also arise from the presence of fluid in the subdural space. Normally there is no appreciable amount of fluid in this space and the fluid which collects in these traumatic cases is cerebro-spinal fluid which has leaked in by way of a tear or puncture in the arachnoid membrane.

The opening in the arachnoid is frequently valve-like and may, in time, seal itself off, but not before a large amount of fluid has collected in the subdural space. This subdural fluid will remain encysted as no absorption can take place.

Subdural fluid can behave in the same way as subdural blood and if it causes any neurological signs or persistent symptoms (headaches, confusion etc.) will require drainage via trephine openings or burr holes.

In this brief outline of the treatment of head injuries I have tried to cover the essentials of the management of these cases. The emergency surgery for cases of head injury is not usually elaborate and should be well within the scope of the general surgeon, and the nursing measures can be carried out by any enthusiastic personnel. As in all branches of surgery, the neurosurgeon and his team should always be available to advise and if necessary take over the care of the patient, should extra difficulties arise.