

PRIORITIES IN THE MANAGEMENT OF ROAD TRAFFIC ACCIDENTS

J. ATTARD

M.D., F.R.C.S., F.R.C.S.E.

It has been the experience of every casualty officer in a receiving station to be faced with problems not only related to one casualty presenting with multiple injuries but to a number of casualties with varying injuries, single or multiple. It is my purpose to establish certain guidelines in selecting the patients requiring immediate treatment, and in selecting the individual injuries that take precedence over any others. The immediate mortality of a R.T.A. depends entirely on the state of circulatory or respiratory collapse. Hence one's efforts must be initially directed to the restoration of these primary bodily functions.

A. Circulatory Collapse

Resuscitation must be timely, massive yet precise. There is no room for wishful thinking or masterly inactivity. The hypovolaemic circulation must be augmented quickly and effectively. For intravenous infusions, needles are discarded in favour of large cannulas. The medical officer chooses a vein with a large lumen proximal to the elbow or knee, or threads a cannula up to reach such a vein which will allow the rapid introduction of a large quantity of fluid and avoids spasm. The choice of fluid depends on its rheological property and the reactivity of the recipient vein. Cold blood is thick and slow, warm ringer lactate free and fast. Every clinician has experienced difficulties in producing a satisfactory flow even with warm blood introduced into a large vein, and has had to set up two drips. Blood may not be immediately available in the quantity which is desired to make good hypotension and hypoxia. Ringer lactate can be administered at a rate of 1.5 to 2 lit-

tres in 10 minutes to restore circulating volume and available oxygen. A surgical operation can thus be commenced to stop the source of haemorrhage, internal or external. By the time the intravenous fluid has escaped into the extra-vascular spaces, blood will have become available. Surgeons and anaesthetists will accept, prior to surgery, a haemodilution of 8 G. %, a level which is tolerated without transgressing a level of available oxygen 1.5 to 2 times the basal requirement. The only unacceptable situation is a fall of oxygen to a level at or close to oxygen needs.

B. Respiratory Collapse

Respiratory embarrassment may follow injury to the head, the air passages in the neck, or chest including the chest wall or diaphragm. Immediate endotracheal intubation with a cuffed tube and I.P.P. ventilation, or tracheostomy may be life saving in the first instance. The airway is of vital importance in a head injury, where anoxia and hypercapnia add greatly to the seriousness of the damage through the development of cerebral oedema. Hence estimation of blood gases is essential. If the level of PO_2 is less than 80 mm. of mercury or that of PCO_2 more than 50 mm. of mercury, ventilatory assistance is mandatory.

C. Assessment of injuries

It is obvious that once the resuscitation of severely injured persons has got under way, a rapid but careful assessment is done of who requires intensive care and who will take precedence over the others in the emergency theatre. If possible, an accurate history is taken of the situation at the scene of the accident. A driver may have been crushed in his seat if wearing a

safety belt. If not so protected, he is liable to sustain a steering wheel injury which may produce a stove-in chest with paradoxical respiration and possible pneumo or haemopericardium, retroperitoneal injuries like rupture of the duodenum or pancreas. His side passenger may have suffered a severe head injury by being propelled through the windscreen. If wearing an ill-fitting safety belt, he may bear the marks of the belt on his body indicating the line of possible internal injuries, or else he may suffer from the effects of deceleration with avulsion of internal organs. Back seat passengers will have been propelled forwards and suffered damage by hitting various objects in the car or by deceleration, or by being forcibly projected outside the car on to the road. Witnesses at the scene of the accident are of help in dealing with unconscious patients, on whom certain important guidelines can be adopted. If an unconscious patient has respiratory embarrassment, he is more likely to be suffering from a severe head injury than a chest lesion, unless he happens to be old and suffering from chronic bronchitis and emphysema, in which hypercapnia can soon reach a high enough level to produce loss of consciousness. An unconscious patient with a rapid pulse and hypotension is suffering from a life threatening internal haemorrhage in addition to head injury. The dangerous signs of a head injury are bradycardia and systemic hypertension. Haemopericardium will produce a rapid pulse and hypertension through a fall in cardiac output and cardiac compression. A needle puncture of the pericardium will elicit the diagnosis and relieve the pressure on the heart.

The next step is a full physical examination on the naked patient, starting at the skull and finishing at the toes, not forgetting the back of the victim. Penetrating injuries, particularly of the head, neck, chest or abdomen require immediate attention. Fractures open and less so closed, are not urgent in the presence of other internal lesions in the same patient, or in the presence of other more severely injured patients who take priority in the emergency theatre, except if the fractures are compli-

cated by vascular lesions in the form of profuse haemorrhage or limb ischaemia. A patient's life is more important than his or anybody else's limb.

Certain types of injury are associated with possible life-threatening ruptures of organs. Crush fractures or ribs can be complicated by tears of the lung, pericardium, spleen, liver or kidney. A fractured pelvis must arouse a suspicion of contusion or rupture of the lower urinary system. Immediate drainage for a pneumothorax or haemothorax may save a patient's life. The presence of a continuing massive haemorrhage will necessitate immediate thoracotomy. So will a rapidly spreading surgical emphysema with failure of relief from intercostal release of a tension pneumothorax when a thoracotomy should be carried out to repair a ruptured bronchus or oesophagus. Deceleration injuries from a high speed accident may not be so obvious. A chest radiograph, urgent I.V.P., chest and abdominal taps are all immediate aids to diagnosis. A chest radiograph may show pneumothorax, haemothorax, haemopericardium, aortic arch rupture which may be clinically masked. Urgent I.V.P., will confirm the presence of a tear in the kidney and establish guidelines as to the possibility of preserving the kidney by conservative management or surgical repair in preference to ablating the severely damaged organ.

Increased awareness of possible overt retroperitoneal injuries has lessened and will further diminish their morbidity and mortality. This naturally applies particularly to rupture of the pancreas or duodenum. An experienced clinician will submit to surgery a child or an adult that presents with vague, generalized tenderness in the abdomen and a rapid pulse, particularly if blood stained fluid is drawn off an abdominal tap. It is dangerous to wait for a catastrophic situation to develop several hours later when the chances of survival will be very slim.

Apart from depressed fractures and penetrating wounds, head injuries do not require immediate surgical exploration at the time of the accident. One's attention is directed mainly to respiratory support;

cerebral compression can develop and be dealt with later. Orthopaedic injuries take priority only in so far as they are accompanied by damage to vital organs or life threatening complications. The presence of associated injuries which are far too common in the era of high speed accidents taxes the clinical acumen of the experienced receiving officer. By taking a quick relevant history and thoroughly examining a victim, a procedure then should take no more than two or three minutes, one will be able not only to assess the obvious but become aware of the not so obvious lesions requiring equally urgent attention. Subjecting a patient to urgent

thoracotomy or laparotomy will be far more relevant than the accurate setting of his or his neighbour's fractured leg. Fractures will benefit from splinting and blood replacement while the more seriously injured patients are given priority attention in the operating theatre.

References

- ATTARD, J. (1971), *Br. J. Surg.*, 58, 55.
DUDLEY, H.A.F. (1973), *Ann. Roy. Coll. Surg. Edin*, 18, 65.
NUNN, J.F. and FREEMAN, J. (1964). *Anaesthesia*, 19, 206.