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# **HEAD INJURIES**

## **AN INTRODUCTION TO THE CARE OF THE HEAD INJURY FOR FIREFIGHTERS**

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# HEAD INJURIES

## OBJECTIVES

- **TO BE ABLE TO SURVEY THE SCENE OF AN INCIDENT.**
- **DETERMINE THE POSSIBLE EXTENT OF INJURIES ASSOCIATED WITH HEAD TRAUMA.**
- **TO HAVE A KNOWLEDGE OF THE CORRECT TREATMENT FOR HEAD INJURIES**

## INTRODUCTION

Firefighters, at times, are the first to arrive at incidents involving casualties who have suffered major traumatic injuries and in the first few moments of these incidents, their expertise can make the difference between life and death. The firefighter is often called upon to fill the “vacuum” between the occurrence of injury and the arrival of the paramedic or medical help.

Below is an article which may help firefighters and first attendee's be more aware of the signs and symptoms of the head injury patient.

Around 5,000 people die of head injuries every year, and many others are permanently disabled.

In the U.K. nearly one million people are seen by accident and emergency departments every year. Of those one hundred thousand are admitted for treatment. A further ten thousand are transferred to specialist neurosurgical units.

Those who care for the head injury patient from the first responder to the hospital environment carry a heavy burden of responsibility. This is from the first initial treatment. Knowing what to do, or not to do, can have a significant outcome.

## KEY TO SUCCESS

Adequate oxygenation and perfusion of the brain with blood, is the key to success. This will help with reducing the onset of a secondary brain injury.

For continued brain function, continuous perfusion with well-oxygenated blood is required. If this is interrupted for any length of time, permanent damage will result.

**PERFUSION**—fluid passing through an organ or a part of the body. The surrounding of and bathing of a tissue or cell with blood, or fluid parts of the blood.

Victims of head injuries are commonly young adults who have been involved in a motor vehicle accident.

They may also be under the influence of drugs and alcohol.

Because the head injury patient may be unconscious at the scene, vital information can be obtained from bystanders and visual assessment of the scene. Skilled rapid care at this point can mean the difference between recovery and serious neurological deficits or death.

### **SURVEYING THE SCENE**

Damage to the surrounding environment that may have been caused by the patient's head, should indicate a high index of suspicion for a head injury.

Look at the dash and windscreen, for the presence of deformation. This will indicate if the occupant was wearing a seatbelt or restrained by the deployment of an airbag.

Scene assessment, including vehicle damage is an important aid to receiving hospital staff.

It is a good practice to record this information, for passing on to the attending medical unit.



A BULL'S-EYE FRACTURE OF THE WINDSCREEN IS THE MAJOR INDICATION THAT THERE HAS BEEN A SKULL IMPACT

### **INJURIES ASSOCIATED WITH HEAD TRAUMA**

#### **UNCONCIOUSNESS**

This stems from either an injury to the cerebral cortex. (Part of the brain responsible for consciousness, memory, thought, and is responsible for initiating voluntary activity.)

Or an injury to the brain stem's reticular activating system. (A network of nerve pathways throughout the brainstem.)

An increase in intracranial pressure and a decrease in the blood flow to the brain regardless of the cause can depress the level of consciousness.

## **INTRACRANIAL PRESSURE**

Intracranial pressure is the build up in pressure within the skull or cranium. This can be the result of cerebral edema (fluid), swelling of the brain or bleeding.

Increases in intracranial pressure will cause alterations in the patient's level of consciousness. As the pressure increases, cerebral hypoxia (lack of oxygen to the brain), leading to unconsciousness, deficits in vital functions and finally brain death.

After a severe head injury the patient may drift into a coma with around 70% of casualty's with raised intracranial pressure.

This is obviously life threatening, and early recognition of this is vital.

In the field environment this is recognized by:

- 1. A reduced level of consciousness.**
- 2. Development of a fixed dilated pupil.**
- 3. Cardiovascular and respiratory problems.**

## **SKULL FRACTURES**

When the head strikes or is struck by an object, there may be deformity of the skull at the site of the impact that can result in a skull fracture.

Most fractures are linear in nature. If the impact is powerful enough, the area may be depressed, with bony fragments being driven into the brain tissue.

Base of the skull fractures is associated with the patient falling from a height onto their feet, and the force transmitted to the base of the skull.

An indication of this would be a straw-coloured discharge from the nose or ears.

This fluid is known as **CEREBRAL SPINAL FLUID OR CSF.**

## **CEREBRAL CONCUSSION, CONTUSION, AND LACERATION**

It is not the skull fracture itself that leads to morbidity and death following head injury, but damage to the underlying structures.

### **CEREBRAL CONCUSSION**

A concussion can be thought as a shaking up of the brain within the skull.

There may be a temporary loss of consciousness with an associated memory loss.

There is usually no long-term adverse brain damage.

## CEREBRAL CONTUSION (BRUISE)

When severe acceleration and deceleration forces are applied to the head, the brain is driven into or over the sharp bony outcroppings in the cranial vault. This motion can cause soft tissue and vascular damage to the brain.

When a large area of the brain tissue is contused, there can be a significant rise in intracranial pressure.

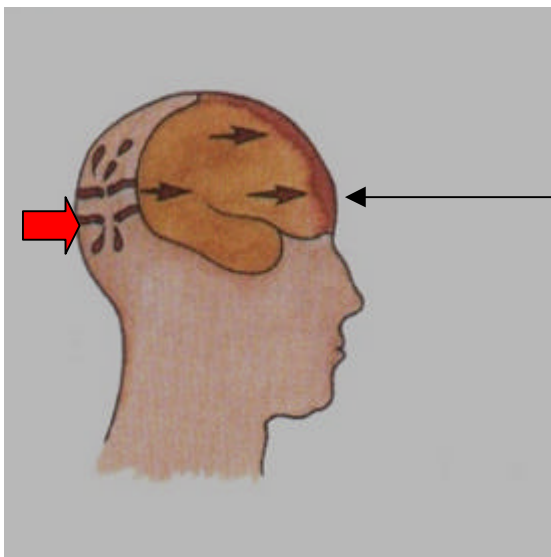
With a contusion of the brain, unconsciousness can last from 5 mins. up to an hour.

Persistent vomiting may occur.

It is important that information on the patient's level and loss of consciousness, neurological status, and memory deficits, that you observe are passed on to the attending ambulance or doctor.

## CEREBRAL LACERATION.

A laceration of the brain is much more severe than a concussion or contusion. Depending on what part of the brain is involved the symptoms will differ, it is most often associated with major hemorrhage, mass effect, and unresponsiveness. This injury is very severe.



AS THE SKULL STOPS ITS FORWARD MOTION, THE BRAIN DOES NOT AND CONTINUES TO MOVE FORWARD.

THE PART OF THE BRAIN NEAREST THE IMPACT IS COMPRESSED, BRUISED, AND LACERATED. THE PORTION FURTHEST AWAY FROM THE IMPACT IS SEPARATED FROM THE SKULL, WITH TEARING AND LACERATION OF THE BLOOD VESSELS.

## ADVANCED TRAUMA LIFE SUPPORT

**ATLS** is the standard approach to managing trauma.

This program of training is based on a sequence of priorities of care with the aim of identifying and treating potentially life-threatening injuries.

This set of priorities is the **A.B.C.D.E.**

On approach to an incident we use the **SAFE** approach.

<b>S</b>	<b>SHOUT FOR HELP</b>
<b>A</b>	<b>APPROACH WITH CARE</b>
<b>F</b>	<b>FREE FROM ANY DANGER</b>
<b>E</b>	<b>EVALUATE THE A.B.C.D.E.</b>

<b>A</b>	<b>AIRWAY MAINTENANCE AND CONTROL OF THE CERVICAL SPINE.</b>
<b>B</b>	<b>BREATHING AND VENTILATION.</b>
<b>C</b>	<b>CIRCULATION WITH HAEMORRAGE CONTROL.</b>
<b>D</b>	<b>DISABILITY I.E.: ASSESSMENT OF NEUROLOGICAL STATE.</b>
<b>E</b>	<b>EXPOSURE AND ENVIRONMENTAL CONTROL.</b>

### **AIRWAY MAINTENANCE AND CONTROL OF THE CERVICAL SPINE**

Anyone who approaches a casualty who is suspected of head injuries should take measures to protect the cervical spine at once. By addressing the casualty from the front one hand should be placed on the patients forehead to steady it, and a slight movement of the shoulders asking are you all right. This should ascertain if the patient is conscious and has a clear airway.

If more than one rescuer is available one should take hold of the head from the rear as illustrated below.



Once the head is immobilized in this manner a second rescuer can ascertain if the patients airway is clear

**THE IMMEDIATE. PRIORITY IS TO :**

**OPEN THE AIRWAY BY MEANS OF A JAW THRUST**

**CLEAR THE AIRWAY OF ANY OBSTRUCTIONS**

**AND SECURE THE AIRWAY BY USE OF ORAL AIRWAYS IF POSSIBLE**

**BREATHING AND VENTILATION**

Serious head and chest injuries occurring together are associated with a poor prognosis (outcome) and adequacy of breathing must be assessed carefully.

**THE IMMEDIATE PRIORITY IS TO**

**LOOK FOR THE CHEST RISING AND EQUAL.**

**LISTEN FOR SOUNDS OF BREATHING.**

**FEEL FOR ANY BREATH ON YOUR FACE.**

A good position for this is to put your face close to the casualty's face and look down an exposed chest.

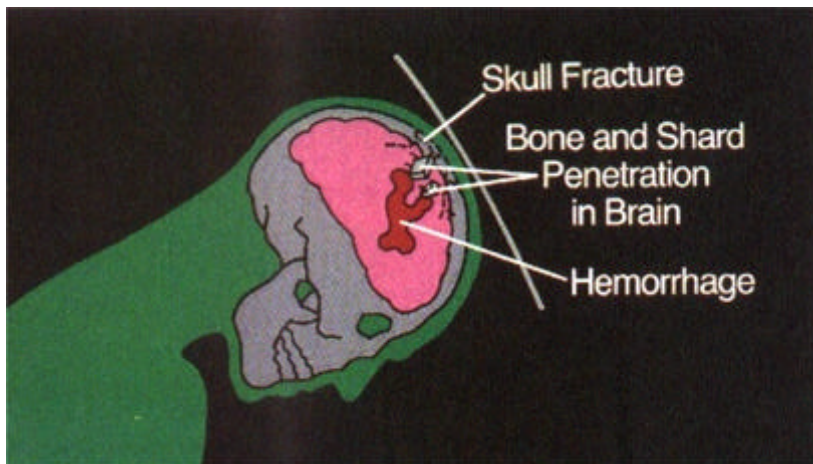
If the patients breathing is inadequate or absent rapid intervention should take place.

Ventilate by means of a resuscitator and always provide supplementary oxygen to a head-injured patient.

Agitation is common in patients that have received in injury to the head. This may be due to a lack of O<sub>2</sub>, a brain injury or pain.

A semi rigid collar should be provided to the patient until they are capable to tolerate full spinal immobilization

Once the head and neck are manually stabilized, the airway controlled and adequate ventilation established, bleeding can be controlled and circulation established.



The scalp is highly vascular, and uncontrolled bleeding from a laceration may result in significant blood loss.

## **CIRCULATION AND HAEMORRHAGE CONTROL**

Bleeding scalp vessels are easily compressed by gentle, continuous pressure. If there is obvious deformation or instability of the structure the bleeding can be controlled by compressing the area around the wound, taking care to press on an area which is stable. The patient may be bleeding from the nose or ears.

Although excessive blood loss needs to be stemmed there is a possibility that if the patient's intracranial pressure (pressure between the brain and inside of the skull) can increase and cause further brain damage. These areas should be covered with a light dressing and allowed to leak slightly.

## **DISABILITY THE ASSESSMENT OF NEUROLOGICAL STATE**

**LEVEL OF CONSCIOUSNESS OF THE PATIENT IN THE HEAD TRAUMA PATIENT SHOULD BE MEASURED BY THE PNEUMONIC AVPU.**

**A IS THE PATIENT ALERT.**

**V DOES THE PATIENT RESPOND TO VOICE.**

**P DOES THE PATIENT RESPOND TO PAIN (PINCHING OF THE EYELID).**

**U THE PATIENT IS UNRESPONSIVE TO THE ABOVE.**

## **PUPIL SIZE MUST ALSO BE CONSIDERED**

THIS IS DONE BY THE PNEUMONIC **PEARL**.

**PUPILS EQUAL AND REACTIVE TO LIGHT.**

If they are not equal and don't react when a beam of light is shone into them will indicate a possibility of a build-up of intracranial pressure. Rapid extrication from their environment and removal to hospital is the desired outcome.

**NOTE USE OF PEARL CAN BE CLOUDED IF THE CASUALTY IS UNDER THE INFLUENCE OF ALCOHOL OR DRUGS.**

## **EXPOSURE TO THE ENVIRONMENT**

As with any trauma it is important to protect the patient from the extremities of the weather.

It is possible that following a head injury the onset of **hyperthermia** may manifest itself.

**HYPERTHERMIA** -The rise in the core body temperature,  
In the case of the head injury patient, this is brought on by the disturbance of the temperature control center.



## **SUMMARY**

- 1. Optimum management of the head injury patient requires the prompt evaluation of the degree of damage and the areas involved.**
- 2. Stabilization of the head, necks, and control of the airway.**
- 3. Delivery of a high concentration of oxygen for good perfusion of the brain.**
- 4. The patient's head should be in an elevated position if possible.**
- 5. Transportation should be done rapidly to the closest facility capable of providing neurological care.**