

Die Versorgung des eingeklemmten Notfallpatienten durch den Hubschrauberarzt

Air medical scene response to the entrapped trauma patient

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The entrapped trauma patient presents the first responder team with a special challenge. There is no option of scoop and run in these circumstances and the medical team is forced to stay and play.

If the patient is severely injured, then the team may need to use advanced treatment modalities normally seen in the controlled environment of the Trauma receiving room. The hospital must come to the patient.

To provide optimal care in these challenging circumstances, the Team must be able to deliver advanced diagnostic and therapeutic skills in an unpredictable and challenging environment. Experience and flexibility are the keys.

Equipment must be comprehensively capable, yet compact and robust. The transport platform must be agile and swift, yet large enough to accommodate the patient with all treatment modalities in place.

Of the entrapment cases managed by Careflight between 1987 and 1995 most were due to motor vehicle accidents, with the remainder largely due to industrial or building site accidents.

Five cases managed by Careflight will be used to illustrate some of the problems encountered when dealing with trapped trauma patients.

CASE 1

History:

34 year old female. Driver in Tarago vs. Train MVA. Trapped upside-down in vehicle, and partially impaled.

Assessment:

Decreasing LOC and clinical fractured femur, hypovolaemia, airway at risk.

Treatment:

Elective intubation with C spine precautions. Blood and colloid transfusion. Hyperventilation.

Outcome:

C.T. scan normal. Eventual full recovery.

Comment:

The ability to control the airway and transfuse prevented further serious morbidity.

CASE 2

History:

31 year old male, pinned across chest by a fallen log. Just being freed at time of medical team arrival.

Assessment:

Severe respiratory distress with flail chest and clinical right haemothorax. Hypoxic SaO₂ 85% on high flow O₂ by mask. HR 120 and BP 80 systolic.

Treatment:

Additional IV access and transfusion with blood. Intubated and ventilated, then R-chest drain inserted with drainage of > 500 ml of blood.

Transport:

Continued improvement enroute.

Outcome:

Ventilated for 5 days. No thyroctomy required. Full recovery.

CASE 3

History:

33 year old male, pinned under collapsed building across pelvis. Initially unconscious but later conscious.

Assessment:

HR 130 and BP 120 with multiple VEBs and peaking of the T-waves, despite HCO₃ and lignocaine. Severe pain unrelieved by entonox. Chest clear.

Treatment:

CaCl₂ with resolution of ECG signs. Trial of morphine. Elective intubation and hyperventilation. Central venous line insertion.

On release further CaCl₂, HCO₃, blood and placed in a PASG. Mannitol commenced.

Transport:

Stable

Outcome:

Prolonged and stormy course. ICU stay >5 weeks. Eventual rehabilitation to a partial recovery.

Comment:

Airway control with ECG guided IV-therapy preventing possible onsite arrest.

CASE 4

History:

65 year old female, involved in MVA. Car hit a pole and split in half. Patient trapped in the left half with multiple injuries including an amputated right arm.

Assessment:

Conscious with unrecordable BP despite PASG with bleeding from right stump uncontrolled by pressure.

Treatment:

Clip and ligate the right subclavian artery. Cx collar. Intubated and ventilated. Bilateral chest drains placed. Massive transfusion of blood and colloid.

Transport:

Stable with continued ventilation and transfusion.

Outcome:

Massive injuries complicated by myocardial infarction and multiorgan failure. Died after one week.

Comment:

Advanced haemostatic technique, airway control and transfusion onsite allowing survival to hospital admission.

CASE 5

History:

23 year old male, involved in an industrial accident with leg trapped in concrete pourer and partially amputated.

Assessment:

Conscious with severe pain despite high dose morphine. Leg trapped and severely mutilated. Amputation complete except for 10 sq cm of muscle tissue. Distally devitalized.

Treatment:

Femoral and lateral cutaneous nerve blocks followed by completion of the amputation. Minimal stump bleeding controlled with pressure.

Transport:

Uneventful and stable with fluids and monitoring only.

Outcome:

Progressed to above knee amputation. No complications.

Comment:

Combination of surgical and anaesthetic techniques allowed stable extraction and transport.

Summary of therapeutic modalitiesAirway-Management

Closed head injury is often part of the injury scenario of the entrapped patient.

The reduced levels of consciousness and subsequent loss of airway reflexes are frequently the most immediate threat to the patients life.

The retrievalist faced with this situation must be experienced in the full range of airway maintenance manoeuvres and flexible enough to perform them making allowances for:

- other organ system compromise,
- badly soiled and distorted airways,
- intubation from unusual positions,
- untrained assistants.

It is well documented that timely control of the airway and ventilation are the prehospital interventions offering the greatest potential to reduce morbidity and mortality.

Clearly this is where the emergency physician, as part of the retrieval team, has much to offer.

Ventilation

Adequate oxygenation and control of PaCO₂ in severely injured in the first hour after injury will reduce morbidity.

Possessing the experience and technology to optimize ventilation will be of particular benefit to the trapped patient.

The addition of PEEP may improve the oxygenation of the patient in certain circumstances.

Pleural Drainage

An experienced physician is required to:

- Diagnose the requirement for intercostal drains.
- Safely insert the drains.
- Monitor the effectiveness of the drains while the patient is trapped and in transport.

Haemorrhage control

Arresting bleeding is fundamental, especially, where the patient cannot immediately be moved to an operating theater. Advanced techniques of bleeding control may be life saving in the trapped patient.

Advanced venous access techniques

Normal venous access points may be damaged or inaccessible, and central venous access or cut-down may be necessary to allow adequate volume resuscitation.

Blood Transfusion

The ability to carry and use blood on scene is vital where the trapped patient has suffered severe haemorrhage.

ECG guided cardiac protection

On release of the trapped limb, a massive release of potassium may cause cardiac compromise.

ECG guided therapy and advanced resuscitation may be required once the patient is released.

Anaesthetic techniques

Regional and general anaesthetic techniques may allow pain relief and surgical procedures to be applied to the patient in the field.

Nerve blocks and Ketamine anaesthesia/analgesia are particularly applicable in these circumstances.

Surgical techniques

Amputation and other basic surgical techniques may be required to stabilize or release the patient.

Advanced triage and communications

Knowledge of the patients injuries and conditions allows early communication and optimal choice of destination hospital.

Clearly a broad range of diagnostic and therapeutic skills, as well as the ability to function in suboptimal environment while working harmoniously with a multidisciplinary team, is required to achieve the best outcome in the trapped patient.

At Careflight, a team approach combining the skills of the Flight Paramedic and the Flight Physician, has provided the flexibility and range of skills require to handle these difficult situations.

In summary

Entrapped patients are at special risk as comparatively minor injuries can be fatal if not managed on site.

However, even major injuries need not be fatal if an adequately experienced and equipped team can institute therapy on site.