

Practical Methods in Resuscitation of Multiple Trauma Victims*

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Introduction

THE ANATOMICAL PATTERN OF multiple trauma in a victim is governed by the trauma inflicted. Obviously various parts of the body and various organs can be involved in any one victim. Resuscitation will depend on the injuries sustained and the resulting dangers to life.

A useful classification of multiple trauma patients is adapted from Pizzi (1968) and from Kennedy (1963). See Table 1.

Table 1
Showing a classification of Multiple Trauma Patients (Pizzi, W.F. 1968. *Journal of Trauma* 8, No. 1, 91-103, Kennedy, R.H. 1963. *Maryland State Med. J.* 12: 94-100).

- Type I — **Multiple Tissue Trauma**
— Crushed forearm and hand.
— Fracture of femur.
— Open fracture of tibia and fibula.
- Type II — **Trunk Fractures: Genito-urinary Tract Trauma with Additional Injury.**
— Concussion of brain.
— Fracture of clavicle.
— Vertebral fracture.
— Bladder rupture.
— Pelvic fracture.
— Pelvic fracture.
— Fracture of femur.
- Type III — **Central Nervour System Trauma with obvious additional injury.**
— Fracture of skull with laceration of brain.
— Fracture of radius and ulna.
— Open fracture of femur.

- Type IV — **Central Nervour System Trauma with Hidden Additional Injury**
— Brain concussion.
— Ruptured spleen.
— Ruptured kidney.
— Open fracture of tibia into knee.
- Type V — **Embarrassment of Respiration plus Other Trauma**
— Multiple rib fractures with lung laceration, tension pneumothorax — Crushed chest.
— Divided flexor tendons.
— Open fracture of femur.
- Type VI — **Ruptured Abdominal Viscus with Additional Injury**
— Mild concussion.
— Ruptured jejunum.
— Bladder contusion.
— Fracture of carpal navicular.
— Fracture pelvis with telescoping of femur into acetabulum.
— Bilateral of Calcis fracture.

Resuscitation (Pizzi, 1968) is broadly geared to deal with

1. Asphyxia
2. Shock
3. Coma
4. Haemorrhage.

Resuscitation depends on the facilities available and can be classified according to the site where it is carried out (See Table 2).

Table 2
Classification of Resuscitation according to site where it is carried out.

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1. **Outside the confines of a hospital**
(No hospital facilities available).
 - in the house
 - by the roadside
 - site of air or rail crash.

2. **Within the confines of a hospital**
(Hospital facilities available).
 - Accident/Emergency Unit
 - Resuscitation Room.

Resuscitation of Multiple Trauma Victims

I. Without hospital facilities (Delilkan 1970).

A basic underlying principle should be followed — minimal interference and speedy transport to the nearest hospital where adequate facilities exist.

Asphyxia and unconsciousness are tremendous problems. Clearance of the mouth and pharynx of blood, broken teeth, regurgitated food debris, etc. might have to be done. Positioning into the lateral, slight head-down position with chin support can be life-saving and should be maintained during transportation. Mouth-to-mouth expired air ventilation might be required if respiration has ceased but it is vital to make sure that the mouth and pharynx are first free of any obstructing foreign matter. In the extreme situation a crico-thyroid membrane stab tracheostomy can be life-saving when upper respiratory tract obstruction cannot be otherwise relieved. Unfortunately, more often than not the Resuscitator at this site is a member of the lay public. Public education in resuscitation should be periodically carried out via television and lecture-demonstrations by medical personnel, stressing on life-saving procedures like safe positioning of the unconscious victim, jaw support, expired air ventilation and external cardiac massage.

The method of choice for arresting haemorrhage and preventing shock is by direct pressure using any available clean cloth, bandage or handkerchief. Tourniquets applied by non-medical personnel are often dangerous because of poor application or if the duration of application is not watched carefully.

There are certain habits which should be stressed against:

1. Raising the victim's head with a pillow or with some improvisation. This can worsen any hypotension present and increase the danger of lung aspiration. The intention is laudable but the consequences can be lethal.
2. Giving the victim a cup of hot, sweetened tea. This will increase the hazards of anaesthesia if required later. To the anes-

thetist a case of multiple trauma is presumed to have a full stomach because of the concomitant gastric stasis. The 2 — 6 hour stomach emptying time rule (Wright, 1971) does not hold. It can be applied to the interval between the last meal and the time of the trauma.

II. With Hospital Facilities.

Immediate management follows certain guidelines (Walker, 1969) See Table 3.

Table 3

Showing guidelines for immediate resuscitation of multiple trauma patient in Accident/Emergency Unit of a hospital. (Walker, W., The Medical and Surgical Management of Road Injuries, Ed. T. Nash, Sydney, N.S.W., E.J. Dwyer Pty Ltd. P. 34-38).

1. Institution of adequate infusion.
2. Estimation of blood and fluid deficit.
3. Assessment of nature and extent of injuries.
4. The avoidance of hypoxia.
5. The treatment of pain.

The Resuscitation Room must be adequately equipped to:

1. Re-establish and/or maintain adequate respiration (in the presence of threatening asphyxia and/or unconsciousness).
2. Re-establish and/or maintain an adequate circulatory or cardiovascular system (in the face of shock and haemorrhage).

Resuscitation of Respiratory System

Insertion of an oro-pharyngeal airway, endotracheal intubation or tracheostomy might be required for airway maintenance. If spontaneous respiration is adequate this can be allowed with oxygen enrichment. If respiration is inadequate (cyanosis, sweating, poor respiratory excursions or paradoxical breathing) or if apnoea is present, controlled ventilation must be instituted (mouth-to-airway, mouth-to-endotracheal tube, resuscitator bag-to-endotracheal tube, anaesthetic apparatus or automatic ventilator-to-endotracheal tube or via tracheostomy tube). Muscle relaxant drugs might be needed for intubation or for controlled ventilation.

Circulatory or Cardiovascular System Resuscitation.

Intravenous fluid infusion (often multiple I/V drips) must be started. Until blood is available Hartman's solution or a plasma expander (Haemacel, low molecular weight dextrans) can be used. The basic parameters to follow are pulse rate, blood pressure, skin status and urine output. A central venous pressure line is useful if possible.

Various authorities (Wylie and Churchill-Davidson, 1972; Grant and Reeve, 1951; Clarke and Fisher, 1956) advocate that a pulse rate of more than 100/min suggests a 20% deficit while a systolic blood pressure of less than 100 mmHg implies at least a 30% deficit in blood volume. If the patient is pale, sweating, cold and restless with poor capillary filling of skin and nail beds, has a thin, thready, rapid pulse, oliguria and hypotension, a serious circulatory blood volume deficit of at least 1,500 ml or 30% of normal, effective blood volume exists (Dwyer, 1969).

Hydrocortisone is empirically advocated by some on the basis of the metabolic response to trauma (Zimmermann, 1965). The anterior pituitary secretes increased amounts of ACTH in response to surgical trauma. The main effect of ACTH is to stimulate the adrenal cortex to secrete cortisol (Compound F or hydrocortisone). On this basis intravenous hydrocortisone might thus cater for any inadequacy in the body's metabolic response to multiple trauma. It is also known to produce an increase in adrenal secretion of aldosterone.

Sodium bicarbonate should be given intravenously to correct metabolic acidosis which is invariably present in such cases. If facilities are available an arterial blood gas analysis will guide this correction as well as help in the respiratory management.

Pain relief is a problem because the drugs used can complicate and confuse the picture; their absorption, if administered intramuscularly, in the presence of shock is almost nil initially. Careful intravenous administration, titrated with patient response, is more rational but is more dangerous in the hands of the less experienced.

Resuscitation of the patient with multiple trauma is primarily to save life, simultaneously to make the patient more safe, in the circumstances, for the urgent surgery under anaesthesia which invariably follows. It is essentially team work that saves lives. The resuscitator at the scene, the anaesthetist, the orthopaedic surgeon, the general

surgeon, the neuro-surgeon, the thoracic surgeon, the genito-urinary surgeon, all have a role to play. The presenting physiological disturbance is shock. Once all injuries are recognised the essential problem after resuscitation is sequence of treatment.

Summary

Multiple trauma victims and resuscitation are outlined with classifications and the problems.

Resuscitation and the problems are discussed under two groups: without and within the confines of a hospital.

Team work in resuscitation of the multiple trauma patient is stressed.

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