

Documentation of traumatic injuries – are you doing enough?

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Outline

- Documentation of trauma
- Documentation of resuscitation procedures
- Important contribution in the Coronial system

Documentation of trauma



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General

Definitions:

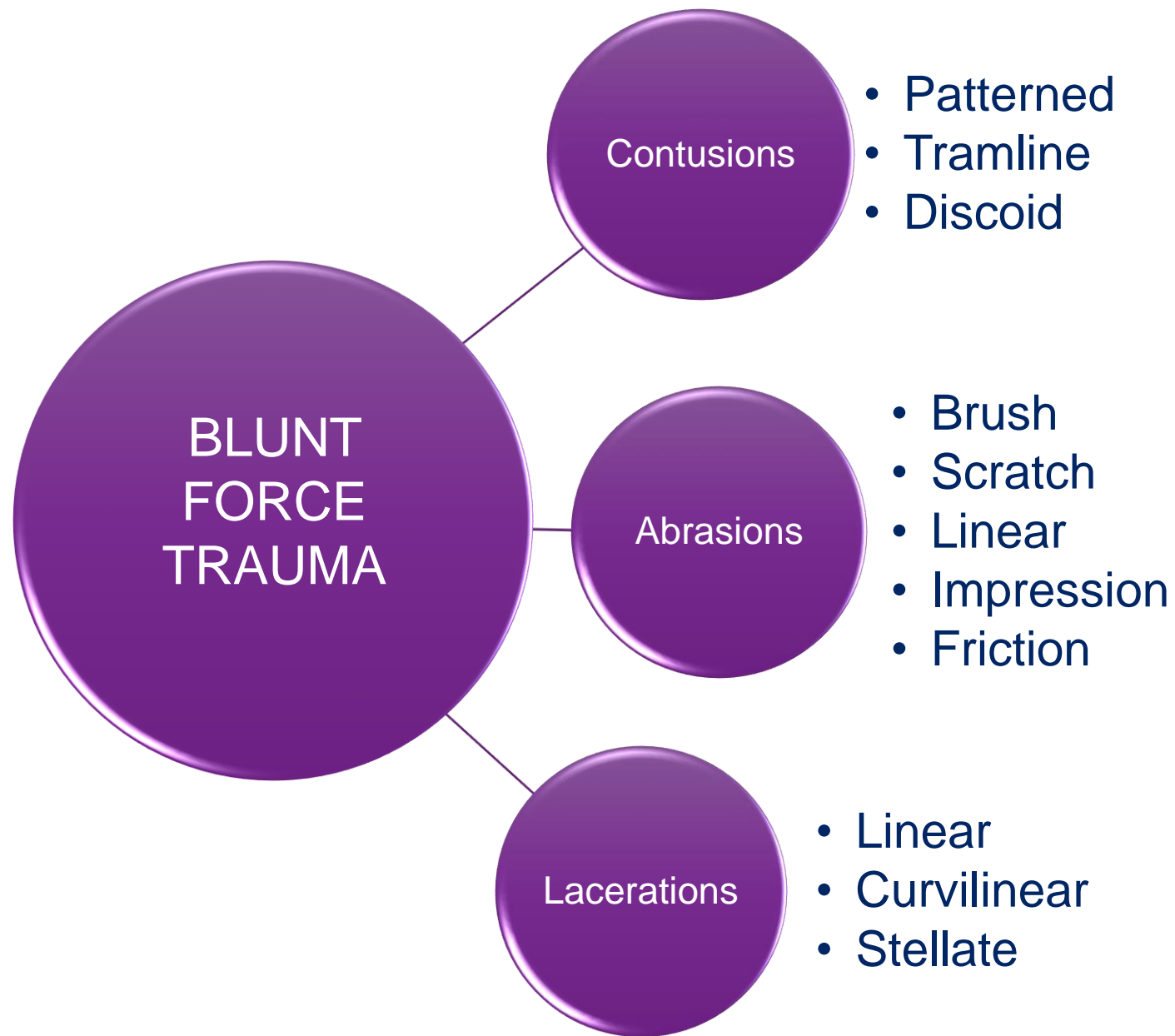
- **Trauma** = Injury to the body caused by **physical** or **chemical** factors, resulting in wounds and possible complications.
- **Wound** = Disruption of the anatomical continuity of tissue caused by the application of a force.

Traumatic injuries can be discussed with reference to:

- Anatomical position
- Physical factors
- Circumstances

Classification of injuries

- **Kinetic injuries:**
- **Blunt force injuries**
 - Abrasions
 - Contusions
 - Lacerations
- **Sharp force injuries**
 - Incised wounds
 - Stab wounds
 - Puncture wounds
 - Chop wounds
- **Firearm related injuries**
 - Rifled
 - Smooth bore
 - Range of fire (contact vs distant GSW)
- **Non-Kinetic injuries:**
- **Thermal injuries**
 - Heat / Cold injuries
- **Chemical injuries**
- **Electrical injuries**
 - High voltage
 - Low voltage
- **Barotrauma**
- **Radiation**



Abrasions

- Abrasion
 - Superficial with loss of epidermis.
 - Caused by skin coming into moving contact with a rough surface.
- Most superficial blunt force injury

Abrasions - types

- Linear or 'Scratch' abrasions
- Imprint abrasions
- Friction abrasions
- Brush/Graze/Gravel abrasion
- Dicing abrasions
- Post-mortem ant bites

Important considerations

- An abrasion in itself will not cause death
- Death due to complications (sepsis) or other severe underlying injuries

Lacerations

- Laceration
 - Irregular tear-like wound caused by blunt objects or heavy edged weapons like a hatchet
 - Full thickness of the skin



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Lacerations (types)

- Splitting of the skin
- Stretch tears
- Decollement (Degloving) – typically seen in pedestrians where leg is caught under rolling wheel
- Hook lacerations



Contusions

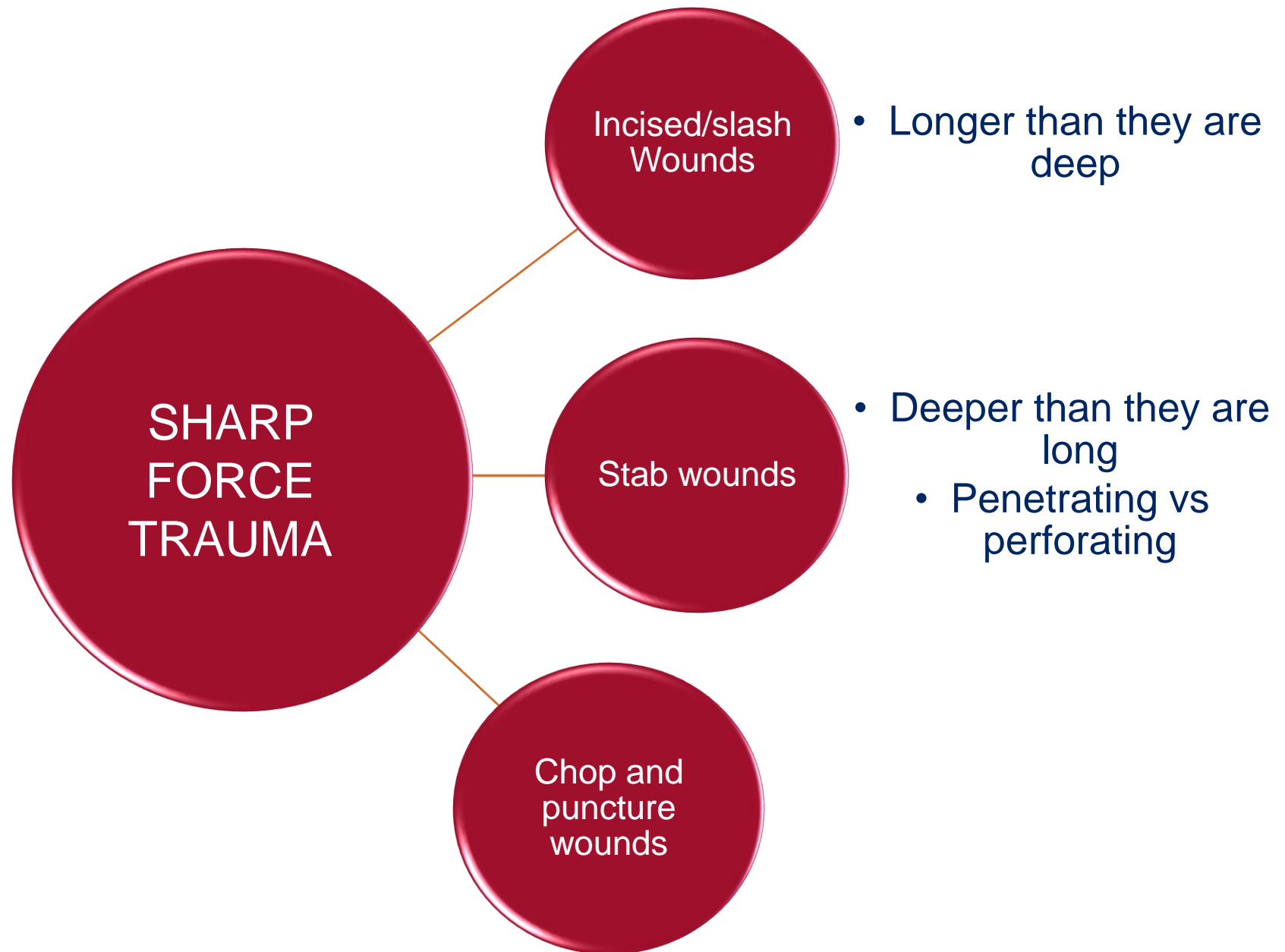
- Blunt force causes rupture of capillaries and venules with extravasation of blood into extracellular space
- Skin is intact

Contusions (Bruises)

- Intra-dermal
- Impression / imprint contusions
- Peri-Orbital contusions / haematomas
 - Direct force
 - Base of skull fracture
 - Force applied to vertex of head
- Tramline contusions
- Iatrogenic bruises (needle puncture)

Important considerations

- Colour changes over time – be very careful
- Position important
 - Neck with strangulation
 - Six penny bruises in child abuse
- Crush injury



Stab wounds

- Deeper than they are long

Incised wound

Regular margins caused by sharp edged object like knife, razor or glass

Puncture wounds

Puncture wound - Sharp thin object like a needle, nail or screwdriver puncturing skin

Chop / Slash wounds



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Defense injuries

- Passive – on the forearms
- Active – palm of hand trying to grab weapon

Importance of stab wound

- Type of weapon? Length of blade? Amount of force??
- Wound tract may be shorter than the blade (blade not inserted completely)
- Compression of tissue – depth of wound more than length of blade
- Withdrawal of blade can result in broadening of wound

Gunshot wounds

- Classification:
 - Entrance wounds
 - Exit wounds
 - Range of fire

Entrance gunshot wounds

- Central defect
- Ring of abrasion
- Smudge ring
- Ring of contusion
- Smoke discolouration
- Tattooing – in intermediate range
- Muzzle imprint – in contact entrance gunshot wounds

Exit gunshot wounds

- Irregular lacerated defect
- Everted wound edges
- Ring of abrasion
 - Shored exit

Examination of injuries

- **Number** of wounds
- **Exact** anatomical **position**
- **Size, shape, circumference** and **depth**
- Changes around or on / in wound
- **Pattern** in the shape or **distribution** of the wound
- Absence or presence of healing/complications
- Surrounding and underlying tissue
- Wound tracts

Inferences

- What caused the injury?
- How old is the wound?
- How much force was used to inflict the wound?
- Entrance vs Exit wound?
- How was the injury caused?
- Suicide, homicide or accident
- How serious are the injuries inflicted?

Inferences

- Could the development of complications have been prevented?
- Survival period?
- Ability to act?
- Would surgery/treatment have saved the person?
- Cause and mechanism of death... How did the person die?

General terms used in description of wounds

- Type of wound
- Size
- Site and location
- Colour
- Direction

Resuscitation injuries



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Case Report

Iatrogenic injuries leading to suspicion of homicide

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Abstract

Injuries produced as a result of medical intervention may lead to confusion in certain cases during investigation and postmortem examination. Proper documentation of all interventions with the injuries, if produced, is of vital importance. The present case is a rare case where the **iatrogenic injuries** produced by a medical practitioner during the course of treatment of a case of suicidal hanging resulted in a suspicion being raised as to the nature of death. The suspicion was further strengthened by the lack of proper documentation and inappropriate/improper use of terminology of medicolegal significance.

Head and Face injuries

FACE

External examination:

- Bruises and abrasions to the face and scalp:
 - Mask – soft tissue damage
 - Pinching of the nose – abrasions
 - Airway maintenance – Fingernails under jaw = scratches, abrasions and contusions

Mouth:

- Buccal mucosal injuries:
 - Lips = pressure necrosis from Guedel airway
 - Lips = lacerated/contusion from intubation
 - Teeth fracture/rupture/chipped – during intubation

Nose

- Nasopharyngeal intubation
 - Damage turbinates
 - Intrusion into cranial vault (BOS #)

- **Eyes:**

- CPR ➡ increase in retinal venous pressure - Retinal haemorrhages (children)
- Conjunctival petechial haemorrhages from CPR = no convincing evidence (only anecdotal)

- **Brain:**

- Mild basal SAH has been reported – rare

- **Oesophagus:**

- Perforation due to oesophageal intubation

Neck Injuries

- 3 main resuscitation related neck injuries :
 - **Deep muscle haemorrhage** in the neck and injury to the SCM from insertion of a CVP in internal jugular vein
 - Important to differentiate this intramuscular haemorrhage from bruising sustained from neck compression (strangulation/hanging)
 - **Laryngeal mucosal haemorrhage** and oedema related to endotracheal intubation (retropharyngeal)
 - There is some overlap in nature with haemorrhages seen in the laryngeal mucosa in cases of strangulation.
 - **Laryngeal fracture** = consequence of cricoid pressure. (Pressure applied is variable = 10-120N)
 - Rare

Thoracic injuries

- **External**

- Contusions and abrasions (Central upper chest)
- Parchment-like appearance
- Electrical burns or parchment from defibrillation

Chest injuries

- **Skeletal (Thoracic cage)**
- Most frequent injuries caused by CPR
- Rib fractures = 13-97% (Tsokos review)
- Older patients:
 - Chest wall rigidity
 - Osteopenia
- Children:
 - Rarely
 - Elasticity of chest wall

Thoracic injuries (203 non-trauma cases)	n	%
Left costal fracture (single)	40	19.7
Left pneumothorax	39	19.2
Left costal fracture (Multiple)	37	18.2
Left haemothorax	33	16.3
Left lung contusion	22	10.8
Right haemothorax	15	7.4
Right pneumothorax	11	5.4
Fracture of the sternum	10	4.9
Right lung contusion	5	2.5
Left ventricular rupture/laceration	1	0.5



Manual vs mechanical resuscitation

- Rib fractures:
 - 75.9% manual CPR
 - 91.4% mechanical CPR
- Sternal fractures
 - 54.2% manual CPR
 - 58.3% mechanical CPR
- Number of rib fractures
 - 64.6% with at least one rib fracture (manual resuscitation) versus 78.8% in the mechanical CPR
 - 7 rib fractures in the manual CP and 6 in the mechanical CPR



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Smekal D, Lindgren E, Sandler H et al. CPR-related injuries after manual or mechanical chest compressions with the LUCAS™ device: A multicentre study of victims after unsuccessful resuscitation. Resuscitation 2014;85(12):1708-1712

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The role of the clinician and accurate documentation in the Coronial process



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NSW Coroners Act

- Determine the cause of death in the least invasive method
- External examinations in the majority of trauma related cases

Role of the clinician

- Accurately document injuries as well as all resuscitation measurements
- Support subsequent legal proceedings

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