HYPOXIC BRAIN DAMAGE

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ADVANCES IN TRAUMA RESUSCITATION

PRESENTATION PLAN :

(A) INTRODUCTION

(B) TBI PATHOPHYSIOLOGY

(C) AIRWAY MANAGEMENT

(D) SHOCK MANAGEMENT

(E) RECOMMENDATIONS WITH RESPECT TO TRAUMATIC BRAIN INJURY

(A) INTRODUCTION

- Recent pre-hospital advances by trauma surgeons recognised
- Neurosurgeons have to keep pace, for the brain's perspective
- In trauma, physiology protects the brain
- Brain function becomes a good monitor
- The monitoring function is lost in TBI
- Hence physicians to protect the brain

(B) TBI PATHOPHYSIOLOGY

- TCDB … pathophysiology of TBI *(J Neurosurg 75; Nov 1991)*
- In about 80% deaths from severe TBI, evidence of cerebral ischaemia @ p.m.
- Evidence of hypoxia also abundant
- Hypotension and hypoxia recognised as causes of secondary brain damage
- Most occurred pre-hospitalisation

Pathophysio (cont.)

- ***CPP = MAP – ICP***
- Cerebral auturegulation ensures CPP stable @ 150 mmHg <MAP<150mmHg
- This ability is lost in TBI
- Therefore, physicians have to do it
- CPP has to be kept @ 60-70 mmHg
- i.e. MAP has to be kept @ 90 mmHg because ICP is 20 mmHg+

(C) AIRWAY MANAGEMENT ADVANCES

- Paramedic RSI leads to increased mortality, decrease in good outcomes ***J Trauma 2003 Mar; Cochrane Review studies from 9 USA centres***
- In TBI, intubation is advocated for GCS 8 or less, to protect the airways
- The GCS has to be assessed 6 hrs + after the trauma, not on the street!!

Airway…(cont.)

- Note the definitions…
- ***Concussion:*** l.o.c. for 0 – 6 hrs post…
- ***Mild DAI:*** l.o.c. from 6 – 24 hrs
- ***Mod DAI:*** l.o.c > 24 hrs; no posturing
- ***Sev DAI:*** l.o.c. > 24 hrs; + posturing
- Thus before 6 hrs, many patients are still concussed. RSI inappropriate and even downright dangerous!

(D) SHOCK MANAGEMENT ADV…

- Permissive hypotension or “low volume resucitation” improves tissue perfusion whilst decresing additional blood loss, avoiding haemodilution and coagulopathy. ***NEJM 1994; J Trauma 2002; J Trauma 2007***
- A drip is put up; 250ml bolusses…

Shock Mx (cont.)

- This is appropriate if no TBI (physio)
- In TBI…CPP = MAP – ICP
- If CPP . 20 mmHg; MAP has to be > 90 mmHg, for CPP to be >70 mmHg
- Permissive hypotension inappropriate
- Pre-hospital procedures increase the risk of death ***J Trauma 2007,63(1)***

(E) RECOMMENDATIONS FOR TBI

- ***<u>For Airway Management:-</u>***
- Simple patient stabilisation… ATLS
- Suction procedure necessary (clear)
- Oropharyngeal airway, Oxygen mask
- “Scoop and run” philosophy supported***(Ann Surg 2003; Lieberman et al)***

Recommendations…(cont.)

- ***<u>For Shock Management:-</u>***
- ATLS stabilisation on board
- Head-end flat… (no 30degr elevation)
- Run resuscitation fluid at set rate
- Do not tolerate radial pulse disappearing…I.e. increase rate!
- <u>Communicate</u> with patient

In conclusion…

- The situation of penetrating injuries and severing of deep-seated vessels, with bleeding to shock, is fortunately<10% of trauma cases. In >90% of cases, the regular resuscitation methods should prevail ***(Emerg Med Prac 2011)***
- Such injuries usually do not have TBI as well (isolated, or directed)

Management

- Prevention is the best management
- Prevent ischaemic hypoxia
- Prevent hypoxic hypoxia
- Give oxygen by mask
- Hypothermia no proven benefit as yet
- Rest the brain: barbiturates
- Full ventilatory suppot in the ICU

Questions?