Cranial computed tomography in the resuscitated patient with cardiac arrest

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Introduction

- Incidence of OHCA in U.S.:55/100000
- In-hospital cardiorespiratory arrests: 54.1 events
- Postresuscitation care: serum glucose control, blood pressure management,and therapeutic hypothermia.
- Another area of important postresuscitation care : use of cranial CT
- Retrospectively reviewed the charts of resuscitated patients: how often CT was done, whether abnormal were present; what changes in management.

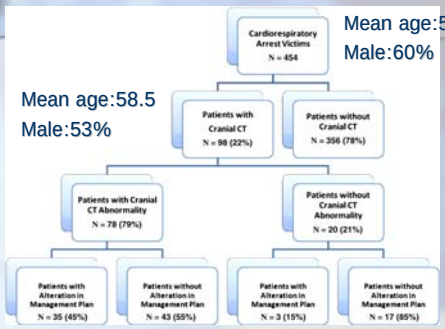
Methods

- Study design:
  - Reviewed record for patients of all age with cardiorespiratory arrest prehospital, ED, hospital.
  - Retrospective cohort analysis
  - Use of cranial CT based upon medical record
- Setting:
  - University hospital ED level1 trauma center:60000 annual patient
  - Study period: 4 years from July 1996 to June 2000

Methods

- Population:
- Medical record: hospital, ED registries
  - Cardiac arrest: pulseless and apneic, cardiopulmonary requiring resuscitation
  - Return of spontaneous circulation: pulse and blood pressure were recorded in the setting of a perfusing cardiac rhythm.
  - Excluded known traumatic mechanism

Result

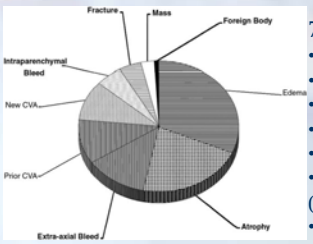


Mean age:58.3
Male:60%

Mean age:58.5
Male:53%

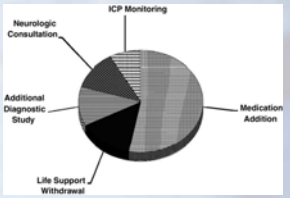
Arrest location was as follows: emergency medical services, 41 (42%); ED, 11 (11%); and hospital, 46 (47%)

Result



78(79%) CT abnormalities:
- Edema:35 (32%)
- Atrophy:24 (22%)
- Extra-axial hemorrhage14 (13%);
- old infarct12 (11%)
- new infarct 11(10%)
- Intraparenchymal hemorrhage 6 (5%)
- skull fracture5 (4%)
- mass, 3 (2%)
- foreign body, 1 (1%).

Result



Therapeutic and diagnostic alterations :38 (39%)

- 35 abnormal and 3 normal CTs.
- No patient survived to discharge.

- Medication administration:26
- Withdrawal of life support: 7
- Additional diagnostic study:6
- Neurologic consultation: 6
- Intracranial pressure monitoring:4

Discussion

- Cranial CT : infrequently after cardiorespiratory arrest→ significant number and range of abnormalities.
- Changes therapeutic plans → abnormal findings, but also small percentage normal
- Normal cranial CT → aggressive pharmacologic management after arrest.
- Abnormal CT → preclude the use of anticoagulation or even necessitate directed pharmacologic or surgical therapy

Discussion

- 1/3 → edema→ hypoxic injury: Cytotoxic edema: decreased levels of ATP from hypoperfusion and global ischemia.
- Medullary draining veins distended with blood →increased white matter density.
- Both above → IICP
- Cerebral edema and loss of gray-white matter differentiation → predicting the severity of hypoperfusion and neurologic outcome → prognostic marker for patient recovery

Discussion

- Intracranial hemorrhage, either extra-axial(13%) or intraparenchymal (5%)
- Spontaneous SAH→ arrest: 39% headache present:
  - Difficult to obtain an accurate history
  - NE →unreliable: medication, comatose
- ICH→ FFP to reverse coagulopathy, anticonvulsant, limit therapeutic hypothermia→ increase bleeding

Discussion

- Skull fracture→ trauma of the inciting arrest event; subtle closed fracture→ missed.
- Skull fracture →neurosurgical consultation and monitoring for the development of extra-axial hemorrhage, specifically epidural hematomas, in a patient whose clinical exam may be limited.
- Masses and foreign bodies → prompt subspecialty consultation.
- New cerebral mass → medical management and possible surgical intervention.

Discussion

- New infarct(10%): acute management issues (neurologic critical care) as well as long-term recovery. (Although none of our patients survived to discharge.)
- Prior ischemic infarction→overall clinical situation→ little impact on immediate management→ comorbid illnesses →influence potential recovery & rehabilitation

Limitations

- Limited, retrospective study
- Variability in the etiology of in out-of-hospital vs in-hospital patients → greater rate of known cause of arrest →CT.
- Unable to ascertain the clinical findings that prompted the performance of the cranial CT
- No survivors in this cohort, it is impossible to say whether changes in management had any impact.

Conclusion

- Cranial CT :minority of patients with cardiorespiratory arrest in our institution.
- CT abnormalities are found frequently and alterations in management are made in certain cases.

Conclusion

- It is the discretion of the treating physician whether or not to obtain neurologic imaging after successful resuscitation based on historical and clinical data.
- Further investigation →aid the physician in determining the appropriate patient population for CT.

Thanks for your attention!!!!