F03: Stroke

Marc-Andre Gessaroli

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Introduction

An acute stroke is a sudden non-traumatic ischemic or hemorrhagic insult to the brain. Transient ischemic attacks (TIAs) are events that present similarly to an acute ischemic stroke, but resolve completely and spontaneously within minutes to hours. Despite the resolution of symptoms, TIAs are important warning signs that indicate a patient is at high risk for ischemic stroke. The main goals of care include rapid and accurate recognition of stroke symptoms, establishing the time of symptom onset (or the 'last seen normal' time, as applicable), and timely conveyance to an appropriate stroke centre.

Essentials

- To minimize mortality and disability, effective stroke management involves multiple providers and a system of care. Early recognition, appropriate clinical pathway selection, and communication are all essential.
- Apply the FAST-VAN exam as part of patient assessment.
  - → Tool: FAST-VAN calculator
- Patients with suspected acute stroke and TIAs should be preferentially conveyed to stroke care centres or to an emergency department with CT imaging capabilities.
- 'Hot stroke' patients are defined as those with a positive FAST screening score and an onset of symptoms within the last six hours, or who woke up with symptoms.
- 'Hot stroke' patients whose VAN exam is positive may have a large vessel occlusion that benefits from endovascular thrombectomy (EVT). Regional guidelines or clinical pathways may direct these patients to a particular centre with EVT capabilities.
- Approximately 15% of all strokes are the result of an intracranial haemorrhage (ICH). These patients are more likely to deteriorate rapidly despite aggressive out-of-hospital care.

Additional Treatment Information

- A negative FAST-VAN exam does not exclude a stroke.
- Paramedics and EMRs/FRs should suspect a hemorrhagic stroke in patients who present with stroke symptoms and:
  - Glasgow Coma Score < 10
  - A history of severe headache
  - Nausea and vomiting
  - Bradycardia and hypertension
  - Unequal pupils
  - Abnormal respiration patterns

Referral Information

Resolved TIAs require conveyance to an appropriate stroke centre or emergency department for further evaluation. Use an appropriate clinical pathway where available:

- Fraser Health:
  - Surrey to Royal Columbian CT
  - Fraser East
- Vancouver Coastal:
  - Vancouver and Richmond
  - North Shore and Sea-to-Sky

- Island Health:
  - Victoria and South Island
  - Southern Gulf Islands
- Interior Health:
  - South Okanagan

Interventions

First Responder

- Place in a position of comfort if possible; otherwise, position as necessary for care
- Manage airway as required
  - → B01: Airway Management
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO_2 ≥ 94%
  - → A07: Oxygen Administration
- Obtain and document capillary blood glucose measurement; treat hypoglycemia with oral glucose as patient's condition permits
  - → E01: Hypoglycemia and Hyperglycemia
  - Oral 40% Glucose Gel
- Obtain and document onset of symptoms or 'last seen normal' time
- Minimize on-scene time
- Notify receiving facility while en route

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access:
  - → D03: Vascular Access and Fluid Administration
  - Select a site above the level of the wrist using a size 18 G, preferably on the right side
- Enrol in FRONTIER trial if indicated and within study area. **EPOS consultation via CliniCall is mandatory** prior to enrolling patients in FRONTIER trial (do not open medication until authorization received).

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Anesthesia:
  - Phase 1
    - Secure airway if required; use an appropriate induction strategy and intubation procedure based on patient and environment specificity
    - Call ETP prior to paralytic administration.
      - Post-call consultation permitted for RSI in emergency situations
  - Phase 2
    - Deep sedation is required; target RASS 5 without complete or burst suppression
    - Propofol is the preferred agent for phase 2 anesthesia
    - Use narcotic analgesia as required
    - Use EEG-guided anesthesia if appropriate
    - Maintain neuromuscular blockade as required
    - Call ETP prior to paralytic administration.
      - Post-call consultation permitted for RSI in emergency situations
- Manage hemodynamic instability:
  - Target MAP > 65 mmHg and systolic blood pressure > 90 mmHg

    - Crystalloid and/or vasopressor administration may be required
    - Consider short term phenyLEPHRine administration
    - For long term support, consider NORepinephrine
    - For suspected intracranial hemorrhage or subarachnoid hemorrhage in the unconscious patient, maintain blood pressure < 160 mmHg:
        - Consider LABETalol
        - Consider hydrALAzine
- Optimize cerebral venous out-flow:
    - Raise head of bed to 30° (Unless the CVA is thrombo-embolic in nature with severe carotid stenosis then keep flat and supine.)
    - Promote venous drainage (e.g., loosen cervical collars, ETT ties loose, trans-pulmonary PEEP of 0 cmH_2O, trans-pulmonary plateau pressure < 25 cmH_2O)
    - Maintain neck neutrality
    - If no esophageal balloon in place, set PEEP 5-12 cmH_2O
    - Decompress stomach if required
- Mechanical ventilation strategies:
    - BVM with PEEP valve: maintain adequate oxygenation while preserving adequate cerebral venous drainage
    - Ensure oxygenation goals are being met (SpO_2 > 97%, PaO_2 100-150 mmHg)
    - Ensure ventilation goals are being met ($EtCO_2$ 35-40 mmHg, $PaCO_2$ 35-40 mmHg)
    - Minimize Pplats while maintaining ventilation goals
- Control seizure activity:
    - Consider etiology and patient presentation when selecting appropriate agent:
        - MIDAZOLam
        - KetAMINE
        - Propofol
    - Consider the side effect of hypotension: pressors may be required to maintain hemodynamic goals
    - Consider the utility of phenyTOIN or phenobarbital for seizing and seizure prophylaxis; treat based on the etiology, patient presentation, requirement for neuromuscular blockade, and conveyance context
- Monitor for signs of raised ICP and cerebral herniation:
    - EVD monitoring
    - Call ETP for EVD consult
    - Neurological exam findings:
        - Unilateral pupillary dilation considered to be related to a rise in intracranial pressure
        - Decorticate or decerebrate posturing
        - Seizure activity
        - ONSD of < 6 mm
    - Consider osmotic therapy:
        - Hypertonic saline
        - Call ETP prior to administration of hypertonic saline.
        - Mannitol
    - Consider nimodipine for reduction in vasospasm
- Maintain capillary blood glucose between 6-10 mmol/L
- Arterial or venous blood gas analysis:
    - Adjust mechanical ventilation to ensure adequate oxygenation, appropriate ventilation, and safe ground ventilating parameters
- Consider anti-emetic administration:
    - DimenhyDRINATE
    - Metoclopramide
    - Ondansetron
- Other considerations:

- Avoid steroid use
- In the context of hemorrhagic stroke and the patient on anticoagulation
  - Consider prothrombin complex concentrate

Neurological emergencies or urgencies are time sensitive and may require immediate intervention. Minimizing scene times may have significant effects on patient outcomes.

Evidence Based Practice

Stroke-CVA-TIA

Supportive

- Advanced Notice/ Optimal Trip Destination
- Mobile Stroke unit
- Drip and ship
- HEMS
- Stroke Diagnosis Scales (any)
- Stroke scale: CPSS
- Stroke scale: LAMS
- Stroke scale: RACE
- 12-Lead ECG

Neutral

- ASA/Aspirin
- Magnesium
- Blood Glucose Control
- Hypertension Control

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]