Stable/ Unstable Tachycardia

Scene Survey
- PPE
- Scene Safety
- Mechanism of injury or illness
- Number of patients
- Need for additional resources
- Consider C-Spine precautions
- General impression

LOC

Airway
- Patency
- Protection

Breathing
- Rate
- Depth (TV)
- Supplementary O2 as needed

Circulation
- Pulse rate
- Pulse characteristic

Delegate Vitals, ECG & IV

Incoherent Medical Assessment
- Rapid Physical Assessment
- Rapid Evaluation of C/C
- Rapid Past Medical History
- Interpret Vital Signs

Coherent Medical Assessment
- Targeted Evaluation of C/C
- Targeted Past Medical History
- Targeted Physical Assessment
- Interpret Vital Signs

Unstable

Identify Rhythm & 12 lead

Differentials

H's & T's

Synchronized Cardioversion

Synchronized Cardioversion Steps
- Explain procedure & obtain consent
- Sedate to voice if needed
- Synchronize
- Choose energy: 100J -200J
- Charge
- Hold shock button

Ketamine
- Adult: 0.05mg/kg (OR: Dilute in 8cc for 100mg/ml and give in 10mg increments
- Contra: Hypersensitivity
  - Relative: Conditions where a significant elevation of BP is hazardous (uncontrolled HTN, aneurysm, acute heart failure, angina, recent MI)

OR

Fentanyl
- Adult: 1mcg/kg max 100mcg q5 (250 total)
- Contra: Hypersensitivity, SBP<90, MOA therapy in 14 days

Identify Rhythm & 12 lead

Regular

Polymorphic

Possibilities
- Torsades de Point
- Polymorphic VT

Differentials

H's and T's

Polymorphic Tx

Unknown, known or suspected prolonged QT

Mag Sulfate
- Adult: 2mg in 100cc NS over 5 min
- Contra: renal insufficency, Any type of AV block

Known Normal QT

Amiodarone
- Adult: 150mg in 100cc over 10 mins
- Contra: Hypersensitivity, Cardiogenic shock, sinus bradycardia, or 2nd/ 3rd AV block unless paced, Cardiovascular collapse, severe atrial hypotension, predisposition to intracranial pressure, acute hepatitis, thyroid dysfunction, interstitial pulmonary disease

Really wide? (QRS >200ms)

Possibilities
- Metabolic
- Tox
- Abberancy
- VT

Differentials

H's and T's

Stable Regular Really Wide Tx

Wide (HR>120 & QRS> 120)

Possibilities
- Antidromic AVRT
- SVT with Abberancy
- Sinus tach with Abberancy
- Monomorphic VT
- Paced rhythm (Prutkin, 2023)

Differentials

H's and T's

Stable Regular Wide Tx

Narrow

Possibilities
- Sinus tach
- AVNRT
- AVRT
- Focal AT
- A flutter
- Junctional Tach
- SANRT (Prutkin, 2023)

Differentials

H's & T's

Stable Regular Narrow Tx

Modified Valsavla Maneuver
- Sit pt. upright
- Blow into syringe for 15 seconds
- Press print on monitor
- Tilt torso flat and raise legs
- Sit pt. back upright

Adenosine
- Adult: 6mg, 12mg
- Contra: Hypersensitivity, 2nd/3rd degree AV block, sick sinus syndrome, symptomatic bradycardia, A-Fib/A-Fullter, Active bronchospam, severe asmtha, Taking tegretol or persanitine

Metoprolol
- Adult: 5mg x 1 SIVP
- ContraL Hypersensitivity, 2nd or 3rd AV block bradycardia, SBP<100, Severe heart failure, bronchospastic COPD, reactive airway disease, cocaine use within 24 hours, concurrent calcium channel blocker medication

OR

Diltiazem
- Adult: 0.25mg/kg IV max 20mg over 2 mins
- Contra: Hypersensitivity, VT, severe hypotension, cardiogenic shock or overt failure, untreated sick sinus syndrome, 2nd or 3rd degree heart block except the presence of a functioning ventricular pacemaker, WPW, acute MI and pulmonary edema, excessive therapy with beta-blockers and/or digoxin

Sodium Bicarb
- Adult: 1 mEq/kg
- Contra: None

Calcium Gluconate
- Adult: 3g SIVP (**OLMC)**
- Contra: Hypersensitivity, Hypercalcemia

Consider Adenosine
- Adult: 6mg, 12mg
- Contra: Hypersensitivity, 2nd/3rd degree AV block, sick sinus syndrome, symptomatic bradycardia, A-Fib/A-Fullter, Active bronchospam, severe asmtha, Taking tegretol or persanitine

Amiodarone
- Adult: 150mg in 100cc over 10 mins
- Contra: Hypersensitivity, Cardiogenic shock, sinus bradycardia, or 2nd/ 3rd AV block unless paced, Cardiovascular collapse, severe atrial hypotension, predisposition to intracranial pressure, acute hepatitis, thyroid dysfunction, interstitial pulmonary disease

Irregular

Wide

Possibilities
- A-fib , A flutter, or focal AT with abberancy
- A-fib, A flutter or focal AT with antidromic AVRT
- Polymorphic VT (Prutkin, 2023)

Differentials

H's & T's

Stable Irregular Wide Tx

Narrow

Possibilities
- A-fib
- A-fib with orthodromic WPW (diff QRS morphology)
- MAT
- A-flutter with variable conduction
- Focal AT with variable AV block (Prutkin, 2023)

Differentials

H's & T's

Irregular Narrow Tx

Signs of accessory pathway? (Differing QRS morphologies or Hx)

No

Metoprolol
- Adult: 5mg SIVP q5 min x 3
- Contra:Hypersensitivity, 2nd or 3rd AV block bradycardia, SBP<100, Severe heart failure, bronchospastic COPD, reactive airway disease, cocaine use within 24 hours, concurrent calcium channel blocker medication

OR

Diltiazem
- Adult: 0.25mg/kg IV max 20mg over 2 mins
- Contra: Hypersensitivity, VT, severe hypotension, cardiogenic shock or overt failure, untreated sick sinus syndrome, 2nd or 3rd degree heart block except the presence of a functioning ventricular pacemaker, WPW, acute MI and pulmonary edema, excessive therapy with beta-blockers and/or digoxin

Yes
- Monitor
- Consider IV fluid
- Expert consultation
- Synchronized cardioversion if unstable

H's and T's (ACLS Reversible Causes)

Condition	Common associated clinical settings / Hx. (UpToDate - Treatable conditions associated with cardiac arrest)	Pre -Cardiac Arrest findings (+ cardiac arrest findings)	Cardiac Arrest findings	treatment
Hypoxia	Upper airway obstruction, hypoventilation (CNS dysfunction, neuromuscular disease), pulmonary disease	*Abnormal lung sounds, ↓ MV with ↑ CO2 and ↓ SPO2	*Abnormal breath sounds	PPV, 100% o2, advanced airway, specific treatments
Hypovolemia (fluid losses)	Significant burns, diabetes, gastrointestinal losses, malignancy, sepsis	Compensated shock (↑ HR, ↓ B/P)	↓ CVP	Fluid boluses
Hypovolemia (Anemia)	Gastrointestinal bleeding, nutritional deficiencies, recent trauma	Compensated shock (↑ HR, ↓ B/P), conjunctival pallor	↓CVP	Fluid boluses until Blood products available
Hydrogen Ions (Acidosis)	DKA, diarrhea, drug overdose, renal dysfunction, sepsis, shock	Respiratory compensation (↑MV, ↑ HR)		Adequate Mv, NaHCO3
Hyperkalemia	severe metabolic acidosis (see above), hemolysis, rhabdomyolysis, major soft tissue injury, tumor lysis syndrome, excessive potassium intake	ECG changes: peaked T, Prolonged PR interval, AV blocks, brady arrythmias, wide QRS widening, ...		Adequate Mv, NaHCO3, Calcium gluconate
Hypokalemia	Alcohol abuse, diabetes mellitus, diuretics, drug overdose, profound gastrointestinal losses	ECG changes: Prolonged PR interval, ST depression and T wave flattening / inversion, prominent U waves, long QT interval due to fusion of T and U waves		Rapid Transfer for assessment of potassium levels
Hypothermia	Alcohol intoxication, significant burns, drowning, drug overdose, elder patient, endocrine disease, environmental exposure, spinal cord disease, trauma	Hypothermic (Mild 32-35°C, Moderate 29-32°C) ECG changes: bradyarrhythmia, Osborne waves, PVCs	Hypothermic (< 29 °C)	Warm
Toxins (Poisoning)	History of alcohol or drug abuse, altered mental status, classic toxidrome (eg, sympathomimetic), occupational exposure, psychiatric disease	See BCEHS - Toxidrome Chart Below		Specific treatment / antidotes
Tamponade - cardiac	Post-cardiac surgery, malignancy, post-myocardial infarction, pericarditis, trauma	JVD, muffled heart sounds, ECG may = low voltage, or electrical alternans	↑ CVP	IV bolus, pericardiocentesis
Tension pneumothorax	Central venous catheter, mechanical ventilation, pulmonary disease (eg, asthma, chronic obstructive pulmonary disease), recent thoracentesis, thoracic trauma	High airway pressure, JVD, asymmetric lung sounds / cx rise.	↑ CVP	Needle decompression
Thrombosis - Pulmonary embolism	Immobilized patient, recent surgical procedure (eg, orthopedic), peripartum, risk factors for thromboembolic disease, recent trauma, presentation consistent with acute pulmonary embolism	DVT, Unexplained hypoxemia, sudden onset pinpoint cx pain and SOB, lower ext. swelling (DVT), ↑ CVP ECG changes: Sinus tach (44%), RBBB (18%), R axis (16 %), Dominate R wave in V1, P pulmonal (9%), SI QIII TIII pattern (20%), atrial arrhythmias (8 %), Non-specific ST segment and T wave changes, including ST elevation and depression (50%)		O2, OMC consult re thrombolytics or Rapid transport
Thrombosis - Coronary (MI)	Cardiac arrest	ECG ischemia, or cx pain with major risk for CAD, arrhythmias, Cardiogenic shock (JVD, crackles) abnormal heart sounds		O2, OMC consult re thrombolytics or Rapid transport to cath lab

(MacLeod, 2024d)

References

1) AHS protocols. (2024, August 8). https://www.ahsems.com/public/protocols/templates/desktop/#home
2) MacLeod, M. H. (2024d). ACLS Reversible Causes – Hs & Ts.
3) Prutkin, J. M. (2023, August 31). *Overview of the acute management of tachyarrhythmias*. UpToDate. https://www.uptodate.com/contents/overview-of-the-acute-management-of-tachyarrhythmias#H1041109