

# Cervical Disk Disease (Cervical Spine Disease)

## Risk

- Incidence in USA: 12,000 deaths/y; 70 million with cervical disk disease, spondylosis, or trauma
- Disk disease a consequence of aging (3rd-5th decades)
- Present in RA, ankylosing spondylitis, and other rheumatic disorders
- Trauma, especially motor vehicle accidents
- M:F ratio: 3:2

## Perioperative Risks

- Mortality (acute) 1–5% (depending on associated injuries)
- Spinal cord damage with C-spine movement
- Difficulty intubating or reintubating postextubation
- Swelling or hematoma after neck surgery, which can cause obstruction of airway
- Steroid-induced complications

## Worry About

- Airway management; C-spine movement during or after intubation

- Exacerbating or causing spinal cord damage with neck motion
- Osteoarthritis with osteophytes impinging on nerve roots

## Overview

- Neck pain: Present in 30% of adults in USA
- Can cause radiculopathy, which can be aggravated by neck extension
- Root:
  - C3: Unusual
  - C4: Numbness rare; pain at root of neck
  - C5: Numb over shoulder to lateral aspect of upper arm (“epaulet” area)
  - C6: Second-most common radiculopathy; pain across top of neck, along biceps muscle into tips of thumb and index finger, as well as biceps muscle weakness
  - C7: Most common herniation, resulting in pain across back of shoulder triceps and into middle finger, as well as loss of triceps reflex
  - C8: Numb small finger; weak interossei

## Etiology

- Disk disease is a process of aging.
- Inflammatory arthropathy or trauma; in trauma, can have fractures, dislocations, or ligamentous damage causing spinal cord paralysis; can get swelling of soft tissues of the neck.

## Usual Treatment

- Neck should be stabilized, not forced into position; any movement can cause damage.
- In pts with atlantoaxial subluxation, avoid flexion. Pts can have superior migration of the odontoid as well as subaxial subluxation.
- Stabilization and time to heal and repair.
- Shoulder and strap muscle-strengthening exercises.
- Epidural steroids for recent disk disease.
- Steroids for acute spinal cord injury based on local recommendations.

## Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Numbness and pain in RA: Superior migration of odontoid, atlantoaxial subluxation, ADI increased (>4 mm unstable), subaxial subluxation, cricoarytenoid arthritis, airway abnormalities, trauma, swelling	Hoarseness, snoring	In RA: TMJ problems, hypoplastic mandible	In RA: Neck x-ray flexion and extension (measure ADD) Evaluate bones, ligament alignment, soft tissue swelling, motion
CV	Trauma: Possible cardiac contusion/injury spinal shock		Heart sounds distant Unstable BP	EKG, ECHO
RESP	Rheumatologic disorders: Fibrosis, honeycombing Ankylosing spondylitis: Restrictive pattern Trauma: Diaphragm function (C3–C5), pneumothorax, hemothorax, contusion, aspiration, rib fractures	SOB	In trauma: Dyspnea, paradoxical ventilation, flail chest, and breath sounds absent with pneumothorax	CXR and ABG
GI	Ulcers secondary to aspirin for RA			
HEME	RA: Anemia secondary to medications		Trauma: Look for signs of bleeding	Hgb
CNS	Vertebral artery compression: Dizziness, vertigo, nausea, blurred vision			

**Key References:** MacDonald D: Intraoperative motor evoked potential monitoring: overview and update. *J Clin Monit Comput* 20(5):347–377, 2006; Schwartz D, Sestokas A, Dormans JP, et al: Transcranial electric motor evoked potential monitoring during spine surgery: is it safe? *Spine* 36(13):1046–1049, 2011.

## Perioperative Implications

- Assess neck in disk disease, rheumatic diseases, and trauma.
- Consider intubation with neck stabilized by an assistant to avoid flexion or extension or awake fiberoptic intubation.
- Consider intubating with fiberoptic intubation, Glidescope, AirTraq, LMA, light wand, or other airway-assistance device.
- Avoid medications (e.g., midazolam), including muscle relaxants if they are used for initial intubation, that might interfere with specialized spinal cord monitoring, SSEPs, or TCMEPs.

## Monitoring

- Acute spinal cord shock may require arterial and PA cath or TEE to facilitate monitoring and treating hemodynamic disturbances.

- When using intraop TCMEPs, protect the tongue and ETT from the masseter and muscles of mastication contraction during stimulation. Remember, muscle relaxants cannot be used with TCMEPs.

## Induction

- Consider not initiating irreversible steps (e.g., muscle relaxants) until airway is secured.

## Extubation

- Consider not extubating until pt is able to maintain airway without threat of swelling or airway obstruction.

## Adjuvants

- Steroids reduce injury in acute traumatic spinal cord injury: use local recommendations.

## Postoperative Period

- Observe for neck swelling, hoarseness, and airway obstruction.
- Assess neurologic status.

## Anticipated Problems/Concerns

- Anticipate difficulty intubating pts due to abnormal anatomy or limitation of motion. Prepare pt for fiberoptic intubation.
- Associated traumatic injuries including cardiac, brain, lung, abdomen, bladder, and long bones, as well their consequences.
- ARDS from aspiration in a preop traumatic event.
- Injury to tongue or ETT from biting down because of muscle contraction from TCMEP stimulation.

# Chagas Disease

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## Risk

- 16–18 million people infected worldwide
- Rare in southern USA; chronic disease more likely in immigrants from endemic regions (South America, central Brazil prevalence 6–8%)

- More than 50,000 die each year; mortality estimated at 50% at 4 y secondary to heart failure
- Higher risk to laboratory workers and personnel exposed to blood products, travelers to endemic areas

## Perioperative Risks

- Not defined.
- Most important prognostic factor is degree of myocardial dysfunction.
- Esophageal changes due to megaesophagus and reflux.

- Associated with myasthenia gravis.
- CNS symptoms: Meningoencephalitis (particularly in immunocompromised pts).

### Worry About

- LV dysfunction and CHF: Chagas myocarditis, refractory heart failure. Most often biventricular in nature, right >left. Sudden cardiac death associated with 55–65% deaths; precipitated by exercise, VTach, VFIB, asystole, AVB.
- Conduction abnormalities (complete AV block, RBBB, LAFB)
- Ventricular arrhythmias (VT, AFIB)
- Ventricular aneurysms (posterolateral, inferior basal, apical)
- Megaesophagus, achalasia, risk of pulm aspiration
- Blood transmission and infections
- Thromboembolism, stroke

### Overview

- Acute infection mostly in pediatric population; asymptomatic in two-thirds of pts, followed by chronic disease after latency of more than 2–3 decades.
- In endemic areas, mild forms of disease are common, with a benign course.

- Pathogenesis to chronic progressive end-organ disease poorly understood; autoimmunity, microvascular dysfunction, autonomic neuropathy implicated.
- Cardiac involvement most serious end-organ manifestation; colon and esophagus also affected.
- Mechanisms proposed for cardiac involvement unclear but include neurogenic mechanisms, parasite-dependent inflammation, microvascular disease, and immune-mediated injury.
- In USA, the diagnosis is usually not considered; presentation as CAD or dilated cardiomyopathy, or with AV heart block, CHF, ECG conduction abnormalities, sustained VTach.
- Serologic test for diagnosis based on hemagglutination, immunofluorescence, ELISA, PCR; these are usually negative during first wk. Therefore Dx depends on detection of circulating parasites.
- Continues to cardiac involvement: Decapillarization of the myocardium.
- Downregulation of the nicotinic Ach receptors and associated myasthenia gravis symptomatology.

### Etiology

- Protozoan infection: *Trypanosoma cruzi*.
- Transmission to humans by reduviid bug, the “kissing bug.”

- Transmission by blood transfusion, organ transplantation, vector, lab accident, reactivation of chronic disease during immunosuppression. Recently oral chagasic infection via food contamination (sugar and acai juices) also found possible, with more severe clinical course.
- Central and South America are endemic areas.

### Usual Treatment

- Nifurtimox (limited efficacy, poor oral bioavailability) for acute disease; usefulness for indeterminate phase or chronic disease not established.
- Benzimidazole (similar efficacy as nifurtimox) second agent; not available in USA.
- Recent success with protriptyline in the acute and chronic forms.
- Allopurinol for the cutaneous form.
- No evidence that trypanocidal drug therapy cures disease.
- Other treatment related to symptomatology: Amiodarone for arrhythmias related to LV dysfunction; also sotalol. Invasive treatment modalities include surgical excision, cath ablation, aneurysmectomy, epicardial mapping.
- Pts at high risk for sudden cardiac death will have an ICD placed.
- Heart transplant, bone marrow cell transplant uncertain.

### Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Conduction abnormalities, LV dysfunction and aneurysm	Syncope, DOE, orthopnea, fatigue, atypical angina	JVD, edema, rales, cardiomegaly Murmurs, TR, MR, wide split S <sub>2</sub> , prominent diffuse apical thrust	ECG ECHO MUGA Cardiac cath CXR for possible cardiomegaly Holter electrophysiologic study, TTE, TEE
	Ventricular arrhythmias	Syncope, palpitations	Biventricular enlargement	
GI	Megaesophagus, megacolon	Dysphagia, GE reflux, constipation	Abdominal distention	Barium studies, CXR, endoscopy

**Key Reference:** Leckie RS, Leckie S, Mahmood F: Perioperative management of a patient with Chagas disease having mitral valve surgery, *J Clin Anesth* 21(4):282–285, 2009.

### Perioperative Implications

#### Preoperative Preparation

- LV function optimization with diuretics, ACE inhibitors; consider beta-blockers and Ca<sup>2+</sup>-channel blockers. Consider amiodarone in cases of VTach/VFIB.
- Prophylaxis against pulm aspiration
- Assessment of conduction abnormalities, arrhythmias.

#### Monitoring

- Dictated by degree of LV dysfunction and proposed procedure; consider PA cath or TEE. On

TEE, may see biventricular enlargement, thinning of ventricular walls, apical aneurysm, intramural thrombus.

- ECG during entire periop period. Often seen is a long QT interval, AV block, bundle branch block. Pt may have VTach/VFIB.

#### Preinduction/Induction

- Consider temporary pacing if symptomatic AV block.
- Caution with negative inotropic drugs.
- Awake or rapid-sequence intubation.
- Consider judicious use of muscle relaxants.

#### Maintenance

- Technique dictated by preferences, procedure, degree of cardiac involvement.
- Avoid hypoxemia (facilitates ischemic myocardial changes on capillary level, which can further progress to wall thinning and aneurysm formation).

#### Postoperative Period

- Continued monitoring depends on preexisting LV dysfunction and operative procedure.
- ECG monitoring for ventricular arrhythmias and AV conduction block.

## Charcot-Marie-Tooth Disease

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### Risk

- Incidence: 1:2500 people
- Peripheral disease severity varying from mild to severe autonomic, motor and sensory neuropathy

### Perioperative Risks

- Potential for postop weakness, especially following nondepolarizing neuromuscular blocking agents

### Worry About

- Resp insufficiency secondary to diaphragmatic or phrenic nerve dysfunction

- Preexisting vocal cord palsy or paralysis
- Secondary nerve entrapments or injuries with intraop positioning

### Overview

- Peripheral neuropathy is caused by peripheral demyelination (altered myelin function or production) or axonal loss (altered axonal structure or function).
- Neuropathies can be autonomic, motor, sensory, or mixed.
- Distal weakness and sensory loss typically develop in the first 2 decades of life, followed by a slowing in

disease progression with resultant skeletal deformities (more commonly in feet) and loss of DTRs.

- Most pts remain ambulatory with a normal life span, but quality of life is often affected.
- CMT is diagnosed by electrophysiologic and molecular genetic testing, occasional muscle biopsy.
- Management of the disease process is often multidisciplinary and should include neurologists, physical therapists, orthopedists, and geneticists, among others.
- Surgery aims to preserve or improve quality of life and functional independence.