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# CEREBRAL PALSY AND AUTISM



# Disclosure

- ◆ None

# Learning Objectives

- Review the pre-operative considerations for children with cerebral palsy and autism
- Review the most effective strategies for the anesthetic management

# Cerebral Palsy (CP)

- ◆ Collection of motor system disorders
- ◆ Nonprogressive neurologic disorder or insult
  - ◆ Sustained perinatally or before 2 years
- ◆ Association with cognitive impairment

# Cerebral Palsy

- ◆ 2 per 1,000 births
- ◆ Most common childhood motor disability
- ◆ Infants often have VLBW
- ◆ Impairment directly related to prematurity

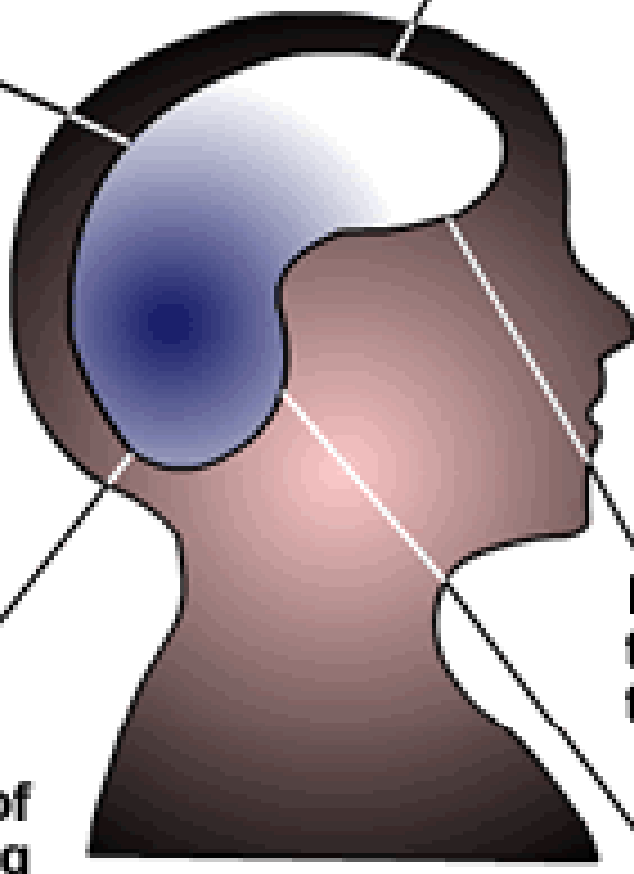
# Cerebral Palsy: Classification

- ◆ Spastic (70%)-cerebrum
  - ◆ Quadriplegia (27%), Diplegia (21%), Hemiplegia (21%)
- ◆ Dyskinetic (10%)-basal ganglia
  - Dystonia, Athetosis, Chorea
- ◆ Ataxic (10%)-cerebellum
- ◆ Mixed (10%)-cerebrum and cerebellum
  - ◆ spasticity and athetoid movement

# TYPES OF CEREBRAL PALSY

**SPASTIC-** tense, contracted muscles (most common type of CP).

**ATHETOID-** constant, uncontrolled motion of limbs, head, and eyes.



**ATAXIC-** poor sense of balance, often causing falls and stumbles

**RIGIDITY-** tight muscles that resist effort to make them move.

**TREMOR-** uncontrollable shaking, interfering with coordination.

# Cerebral Palsy-anesthetic implications

- ◆ Depends on severity of cognitive impairment and planned procedure
- ◆ Frequent visits to operating room



# CP: Pre-operative

- ◆ GI: GERD common
- ◆ Respiratory: aspiration, secretions, restrictive lung defect
- ◆ Airway: malocclusion
- ◆ CNS : epilepsy, CI
- ◆ Visual and hearing defects

# Review of Systems

System	Effect	History	PE
Respiratory	Restrictive defect Aspiration pneumonia	Cough Dyspnea	Reduced air entry wheeze
CV	Right-sided HF from restrictive lung dx	Usually normal Dyspnea	S3 or S4 JVD
GI	GERD	Poor swallowing Night waking	Dehydration Pallor
Musculoskel	Spasticity Dyskinesia	Muscle pain and spasms	Increased tone Contractures
CNS	Epilepsy (30%) Visual/hearing loss	Seizures	Visual field loss

# CP: Medications

- ◆ Anticonvulsants, antispasmodics, anticholinergics, antireflux agents, antacids, laxatives, antidepressants (Nolan, et al)
- ◆ Baclofen
  - ◆ GABA<sub>B</sub> agonist
  - ◆ Counteract excess glutamate activity
  - ◆ Decreases tremors and spasticity
- ◆ Botulinum Toxin
  - ◆ Reversible muscle denervation to temporarily decrease muscle tone
  - ◆ Assists with spasticity

# Seizure Disorders

- ◆ Commonly associated with CP
- ◆ Medications
  - ◆ Give morning dose when possible
- ◆ Most anesthetics raise seizure threshold

# CP: Intra-op

- ◆ +/- Premedication
  - ◆ Hypotonia!!!
- ◆ Parental presence is helpful
- ◆ IV induction
  - ◆ RSI if GERD is an issue
  - ◆ Extremities cold and vasoconstricted
- ◆ Careful positioning
- ◆ Temperature regulation

# CP: Intra-op Drug responses

- ◆ Lower MAC for volatile anesthetics (Frei, 1997)
- ◆ Sensitivity to Succinylcholine (Theroux, 1994)
- ◆ Resistance to Non-depolarizing MB (Hepaguslar, 1999)

# CP: Pain Management

Perceptions

These children DO experience pain

Problems with pain assessment

# CP: Pain Management

## Sensitivity to opiates

### PCA vs. PCA by Proxy study

- ◆ Cognitive impairment and opioid dose were independent predictors of adverse events—PCA proxy study (Voepel-Lewis T, 2008)
- ◆ Synergy with other meds



# CP: Pain Management

- ◆ Epidural Analgesia
  - ◆ Used with success for lower extremity procedures and rhizotomy
  - ◆ Management of post-op pain and spasm
  - ◆ Technical difficulty due to contractures and spine deformities
  - ◆ When feasible they provide excellent analgesia, reduce spasms, promote overall comfort with reduced side effects

# CP: Pain Management

- ◆ 92 children with CP received epidural bolus morphine or continuous fentanyl-bupivacaine, non-randomized
- ◆ Excellent analgesia in 91/92 children
- ◆ Morphine group experienced excessive sedation in 12.5% vs. none in fentanyl group, 2 required ICU transfer (Brenn BR et al 1998)

# CP: Epidural Morphine vs. PCA in Children Undergoing Rhizotomy

- ◆ 29 children with CP randomized to receive epidural or IV NCA morphine
- ◆ Neurosurgeon placed epidural catheters under direct visualization
- ◆ Epidural group had lower pain scores, fewer muscle spasms and improved tolerance of activity compared to PCA group
- ◆ No respiratory depression in either group (Malviya S et al 1999)

# CP: Post-op

- ◆ PACU: Awake extubation
- ◆ Temperature regulation

# References

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- ◆ Saricaoglu, F, et al The evaluation of propofol dosage for anesthesia induction in children with cerebral palsy with bispectral index (BIS) monitoring. *Pediatric Anesthesia*, 2005 15: 1048-1052
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# Autism

- ◆ Described by Kanner in 1943
- ◆ Children with impoverished or absent social relationships from 1<sup>st</sup> yr of life
- ◆ Deviant language development

# Autism: Types

- ◆ Autism Spectrum Disorder
  - ◆ Autistic Disorder
  - ◆ Pervasive developmental disorder-NOS
  - ◆ Asperger syndrome

# Autism: Essential Features

- ◆ Impaired social development
- ◆ Delayed and deviant language development
- ◆ Insistence on sameness
- ◆ Onset before 30 months



# Autism: DSM IV

- ◆ Abnormal development in social interaction and communication
- ◆ Restrictive, repetitive and stereotyped patterns of behavior, activities and interests
- ◆ Manifesting before three years

# Autism: Incidence

- ◆ 5 in 10,000 to 5 in 1000
- ◆ 4:1 male to female ratio
- ◆ All racial, ethnic and social backgrounds
- ◆ Associated with cognitive impairment  
(60% with IQ less than 50)

# Autism: Development

- ◆ Difficult during preschool years
- ◆ Improvement during school age
- ◆ Deterioration during adolescence
  - ◆ Aggressive behavior or OCD
  - ◆ Anxiety
  - ◆ Mood disturbances

# Autism: Etiology

- ◆ Abnormal serotonin levels
- ◆ Genetics
  - ◆ 8% incidence in sibs (Barbaresi, 2006)

# Autism: Treatment

- ◆ Early intervention is key
- ◆ Stimulants—Amphetamines & Methylphenidate
- ◆ Haloperidol
- ◆ SSRIs
- ◆ Antipsychotics—side effects too great
- ◆ TCA
- ◆ Seizure meds: Carbamazepine & Valproate etc

# Anesthetic Management

- ◆ Notification of upcoming case useful
- ◆ Many case reports of management
- ◆ Pre-op visits to complete work-ups

# Anesthetic Considerations

- ◆ Enlist help of parents
- ◆ Pre-op in a quiet area
- ◆ Pre-med—midazolam, ketamine or combo
  - ◆ Oral premed mixed with Dr. Pepper (Shah, 2009)
  - ◆ vs IM injection
- ◆ Mask vs IV induction
- ◆ Wake up in quiet room

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# ADD/ADHD

## ◆ Stimulants

- ◆ Adderal (XR) amphetamine
- ◆ Concerta  
(methylphenidate)
- ◆ Dexadrine
- ◆ Focalin (XR)
- ◆ Methylin
- ◆ Ritalin (methylphenidate)
- ◆ Vyvanse
- ◆ Desoxyn

## ◆ Non-stimulants

- ◆ Strattera
- ◆ Intuniv

## ◆ Others

- ◆ TCA
- ◆ Catapres
- ◆ Wellbutrin
- ◆ Effexor