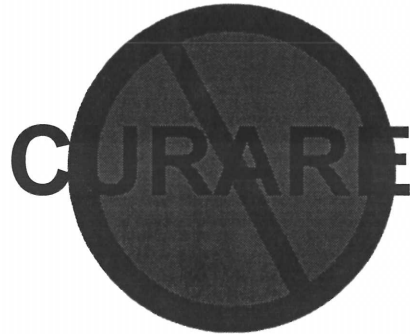


## POST-POLIO SYNDROME and ANESTHESIA

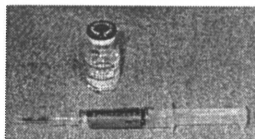
Selma Harrison Calmes, MD



- IT'S NOT THE DRUGS.....
- IT'S HOW THEY'RE USED!

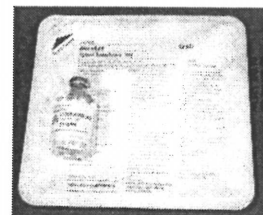
### SUCCINYLCHOLINE

- Short-acting muscle relaxant, given IV
- Helps place the breathing tube
- Can cause muscle pain postop, even in normal people
- Have good alternatives now



### LIDOCAINE (XYLOCAINE)

- Local anesthetic, multiple uses
- When used for spinal anesthesia, has probably caused neural pain and perhaps neural damage. **LOW INCIDENCE!**
- Have good alternative

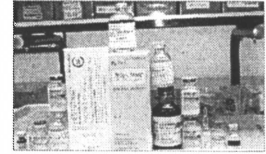


## REGLAN (METACLOPRAMIDE)

- Used to:
  - Help stomach empty
  - To decrease pH of gastric fluid
  - To decrease nausea and vomiting postop
- Can cause facial dyskinesia, even in normal people
- LOW INCIDENCE. More in post-polios?
- Alternative drugs available

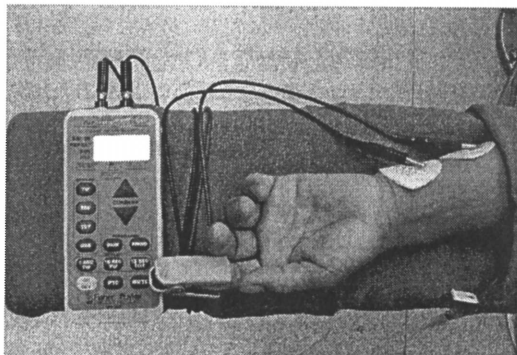
## POSSIBLE “PROBLEM DRUGS”

- Succinylcholine, lidocaine, reglan ALL:
- Are used for important reasons
- Cause their “problems” in normal patients too
- All have alternatives so they can be avoided if we want to



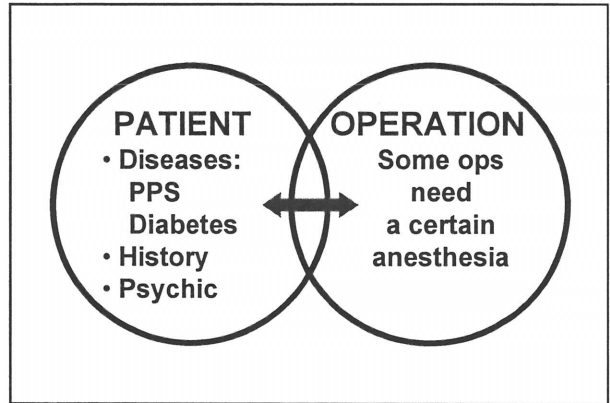
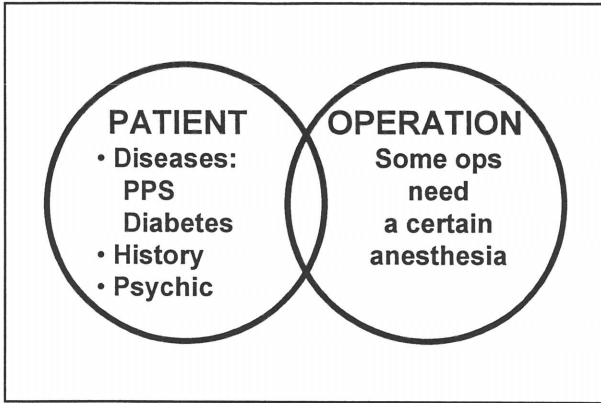
## MUSCLE RELAXANTS

- **MUSCLE RELAXANTS ARE NOT CONTRAINDICATED IN POST-POLIO PATIENTS**

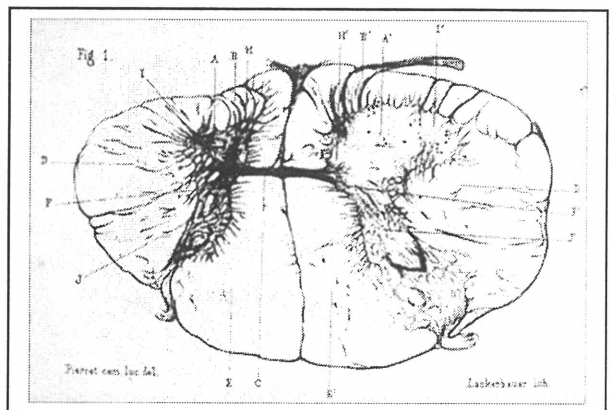
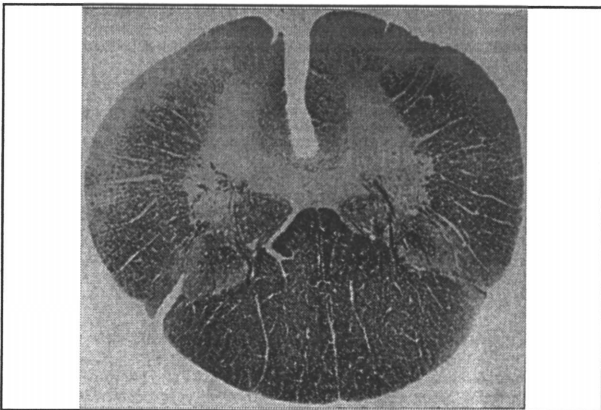
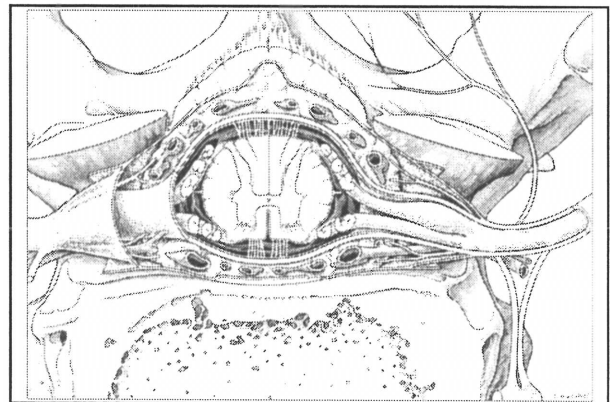


## EXCELLENT ANESTHESIA

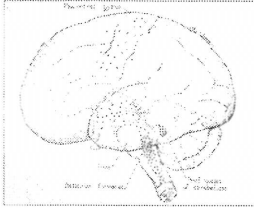
- Depends on understanding the patient's disease(s) and how they affect anesthesia
- Need an understanding of the planned operation and its requirements



**HOW MIGHT POST-POLIO SYNDROME AFFECT ANESTHESIA MANAGEMENT?**



## POLIO: CNS PATHOLOGY



- RAS lesions
- MRIs show HS in grey and white matter
- Hypothalamic lesions, decreased CRH, ACTH, cortisol

## PPS, PPMA and ANESTHESIA:

- Anatomic defects:
- Anterior horn cells → motor weakness
- Intermediolateral column “spill-over”
- Brain: Reticular activating system
- Stress hormones?
- Polio virus at NM junction

## POSSIBLE PROBLEMS FROM AUTONOMIC DYSFUNCTION:

- Stomach may not empty
- May have reflux of stomach acid into esophagus
- Blood pressure may be low
- Pain may be exaggerated, especially in affected extremities

## PPS, PPMA and ANESTHESIA:

- A TYPICAL PATIENT:
- Anxious about having anesthesia
- Obese
- Paralysis of extremities, contractures
- Pharyngeal and laryngeal weakness
- May have ventilatory muscle weakness
- Autonomic dysfunction, including reflux
- Sensitive to anesthetics (?), muscle relaxants
- Have a lot of postop pain

## TYPES OF ANESTHESIA

- GENERAL : Asleep
- REGIONAL : Only part of the body
- MAC : Monitored Anesthesia Care  
Surgeon gives local anesthesia  
We sedate and monitor

## TYPES OF ANESTHESIA

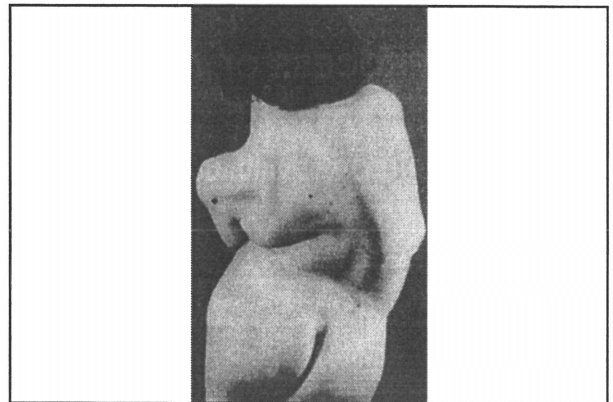
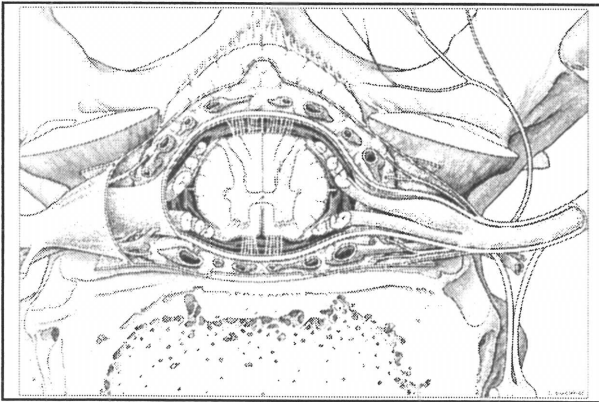
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## TYPES OF REGIONAL ANESTHESIA:

- Spinal
- Epidural
- IV block of arm
- Other arm blocks
- Ankle block



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## THE PLANNED OPERATION

- Certain surgeries need a certain kind of anesthesia: Cholecystectomy, for example, is best done with general anesthesia
- Certain surgeries can be done with just sedation and don't need general anesthesia
- Different surgeons do things differently

## COMMON OPERATIONS

- Cholecystectomy (gall bladder)
- Cataract
- Carpal tunnel
- Orthopedic
- Rectal surgery
- Urologic surgery

## THE PROCESS OF ANESTHESIA

- PREOP : Evaluation and plan
- INTRAOP
- RECOVERY
- POSTOP : How did we do?

## A PPS PATIENT'S COURSE

- 47 year old female for laparoscopic chole
- Polio at age 1 yr in Brazil, no ventilation, became ambulatory without assistance
- PPS diagnosed 1986
- Now OSA, weak arms and legs, back pain
- Hypertension, controlled on meds. Allergies
- Obese

## A PPS PATIENT'S COURSE

- Did a Vital Capacity (VC): 1.6 L, 66% of normal
- PLAN: General anesthesia, half the usual dose of muscle relaxants. Asked for a bed in observation unit, long-acting narcotic near end of case plus surgeons to infiltrate the wound with local anesthetic. PCA, Toradol as needed for postop pain.

## A PPS PATIENT'S COURSE

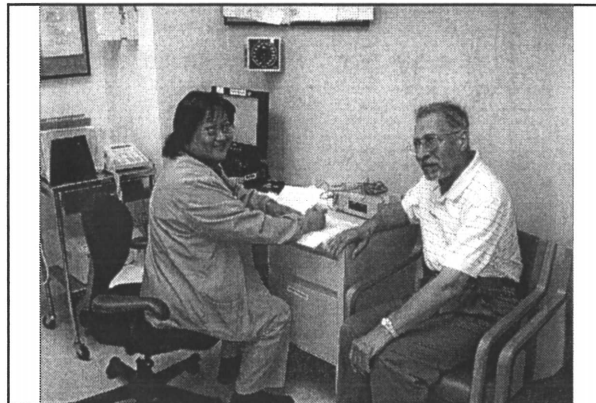
### INTRAOP:

- Muscle relaxant dose perfect
- Surgery resident ignored request to infiltrate wound with local anesthetic; 5 doses of morphine in Recovery, N&V

## A PPS PATIENT'S COURSE

### POSTOP:

- Next day: back pain!
- Discharged next day
- No more back pain when she got back to her own bed



## WHAT SHOULD YOUR ANESTHESIOLOGIST KNOW / DO?

### PREOP:

- Learn about your history
- Do a brief physical exam
- Discuss your needs/preferences
- Plan for the postop pain

## WHAT SHOULD YOUR ANESTHESIOLOGIST KNOW/DO?

### INTRAOP:

- If muscle relaxants are used,  
be cautious and monitor
- Be careful when positioning
- Expect autonomic dysfunction  
(possible low blood pressure,  
delayed stomach emptying, etc)

## WHAT SHOULD YOUR ANESTHESIOLOGIST KNOW / DO?

### POSTOP:

- RECOVERY :
  - Watch for signs of respiratory problems
  - Treat pain promptly
- LATER : make a postop visit/call

## WHAT TYPE OF ANESTHESIA IS BEST ?

### IT DEPENDS !

- Your health
- The planned operation
- Your anesthesiologist
- Your preference

- Anesthesia is very safe
- No one type is best



**WHAT SHOULD YOU DO WHEN  
SURGERY IS PLANNED ?**

- Be in the best possible shape
- No colds, bronchitis, etc.  
(6 weeks free of symptoms)
- Stop smoking !
- Keep weight down

**SHOULD A POST-POLIO PATIENT  
HAVE A SPINAL OR EPIDURAL  
ANESTHETIC ?**



## **SUMMARY OF ANESTHESIA ISSUES FOR POST-POLIO PATIENTS:**

Polio results in wide-spread neural changes, not just destruction of the spinal cord anterior horn (motor nerve) cells, and these changes can get worse as patients age. These anatomic changes affect many aspects of anesthesia care. No study of polio patients having anesthesia has been done. These recommendations are based on extensive review of the current literature and clinical experience with these patients. They may need to be adjusted for a particular patient.

1. Post-polio patients are nearly always very sensitive to sedative meds, and emergence can be prolonged. This is probably due to central neuronal changes, especially in the Reticular Activating System, from the original disease.
2. Non-depolarizing muscle relaxants cause a greater degree of block for a longer period of time in post-polio patients. The current recommendation is to start with half the usual dose of whatever you're using, adding more as needed. This is because the poliovirus actually lived at the neuromuscular junctions during the original disease, and there are extensive anatomic changes there, even in seemingly normal muscles, which make for greater sensitivity to relaxants. Also, many patients have a significant decrease in total muscle mass. Neuromuscular monitoring intraop helps prevent overdose of muscle relaxants. Overdose has been a frequent problem.
3. Succinylcholine often causes severe, generalized muscle pain postop. It's useful if this can be avoided, if possible.
4. Postop pain is often a significant issue. The anatomic changes from the original disease can affect pain pathways due to "spill-over" of the inflammatory response. Spinal cord "wind-up" of pain signals seems to occur. Proactive, multimodal postop pain control (local anesthesia at the incision plus PCA, etc) helps.
5. The autonomic nervous system is often dysfunctional, again due to anatomic changes from the original disease (the inflammation and scarring in the anterior horn "spills over" to the intermediolateral column, where sympathetic nerves travel). This can cause gastro-esophageal reflux, tachyarrhythmias and, sometimes, difficulty maintaining BP when anesthetics are given.
6. Patients who use ventilators often have worsening of ventilatory function postop, and some patients who did not need assisted ventilation have had to go onto a ventilator (including long-term use) postop. It's useful to get at least a VC preop, and full pulmonary function studies may be helpful. One group that should all have preop PFTs is those who were in iron lungs. The marker for real difficulty is thought to be a VC < 1.0 liter. Such a patient needs good pulmonary preparation preop and a plan for postop ventilatory support. Another ventilation risk is obstructive sleep apnea in the postop period. Many post-polios are turning out to have significant sleep apnea due to new weakness in their upper airway muscles as they age.
7. Laryngeal and swallowing problems due to muscle weakness are being recognized more often. Many patients have at least one paralyzed cord, and several cases of bilateral cord paralysis have occurred postop, after intubation or upper extremity blocks. ENT evaluation of the upper airway in suspicious patients would be useful.
8. Positioning can be difficult due to body asymmetry. Affected limbs are osteopenic and can be easily fractured during positioning for surgery. There seems to be greater risk for peripheral nerve damage (includes brachial plexus) during long cases, probably because nerves are not normal and also because peripheral nerves may be unprotected by the usual muscle mass or tendons.

Please feel free to call me (pager 818-529-0325, office 818-364-3019, email [scalmes@ladhs.org](mailto:scalmes@ladhs.org)) if you have any questions. This brief summary may not cover everything you want to know.

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Post-Polio Clinics Directors Network  
February 15, 2005

**Disclaimer: The following are unofficial notes which have not been read by or approved by the speaker.**

**Points of discussion:**

- Anesthesiologists know all about the different types of heart disease and can manage things during surgery by planning appropriately and know what the problems will be. That is not the case in polio. The pathologic changes from the disease are not understood by most anesthesiologists.
- The ideal would be for the anesthesiologist to see a polio patient a few days or longer before surgery, get a pulmonary test and chest x-ray and get a plan for anesthesia. But because of a shortage of anesthesiologists, the patient is usually seen right before the surgery and this is not satisfactory for the post-polio patient.
- Estimated to be a shortage of 10,000 anesthesiologists and it is predicted for the next 10 years. Anesthesiologists are aging and retiring and the input into training programs has been down for the last 10 years. Starting to pick up now but not enough to meet the needs. The move to outpatient facilities and doctor offices is taking manpower out of the hospital.
- Post-polio patients need to identify themselves to the surgeon well ahead of time and link up with the anesthesiologist well before the surgery.
- CURARE a symbol that appeared in a patient newsletter was one stimulus that caused Dr. Calmes to become interested in anesthesia for the post-polio patient.
- Some have even said you cannot use muscle relaxant and should use only one-half the dose of anesthesia for post-polio patients.
- The message is that it is not the particular drugs but how they are used.
- Succinylcholine, a short-acting muscle relaxant is used to place the breathing tube during surgery. Can cause muscle pain post-op. It is an extremely useful drug because of its very quick onset and paralysis and then it goes away. There are good alternatives to this drug but on patients with very difficult airways, this is used to place the tube. The blood potassium does increase and it is a theoretical problem in post-polio patients.
- Lidocaine is prohibitive. When using for spinal anesthesia, it is thought to cause neural changes.

- Careful studies were done on animals and it was found in animals there is pathologic changes of the nerves and this will cause pain and paralysis in some patients. It is extremely low incidence. Everyone has stopped using Lidocaine for spinal anesthesia. There are other good drugs.
- Reglan is used to help the stomach empty, to decrease pH of gastric fluid and decrease nausea and vomiting postop. Reglan has been prohibitive. There are alternative drugs that can be used instead of Reglan.
- There may be a need to use one of these drugs and the patient should not be upset. All these drugs can cause problems in normal patients and all have alternatives.
- Hysteria about drugs needs to end.
- No study of polio patients having anesthesia has been done.
- CURARE was also strongly prohibitive. It was taken to all muscle relaxants. It is not correct that muscle relaxants are contraindicated. CURARE is hardly ever used today. We have many new synthetic muscle relaxants that have very favorable profiles. The focus on that drug needs to end.
- Need an understanding of the planned operation and its requirements. Certain surgeries need a certain kind of anesthesia.
- When a patient is put to sleep, the pain is still traveling up the spine and reaching the brain and the hormones are released. At the lower pain level, if you measure these hormones, they are released with general anesthesia.
- Spinal cord "wind-up" of pain signals - a lot of people are working on trying to figure out what happens at the spinal cord level - not just post-polio but all who have chronic pain.
- General anesthesia - uses multiple drugs and less of potent inhalant anesthesia and have the patient more awake at the end of the surgery.
- Regional anesthesia - does block incoming signals and is very favorable physiologically.
- Hope to be able to use the ultra sound machine to use regional anesthesia for post-polio patients.
- Monitored Anesthesia Care (MAC) - a very safe kind of anesthesia and very satisfactory for many operations.

Should a Post-Polio Patient have a Spinal or Epidural anesthetic? At this point in time, Dr. Calmes thinks it is safe to have these used with regular anesthesia extensively. A lot of people are looking at what's happening in the spinal cord and it is possible that over time our minds may change with regard to this. Personal opinion is that it is safe to have a spinal or epidural because it is favorable physiologically because you do not have the hormones released.

A suggestion was made by Dr. DeMayo to provide this information as an aid to anesthesiologists. Dr. Calmes said the information is on the web at various patient sites. The information is also on the [Post-Polio Health International website](#). She also plans to write a review article for anesthesiologists using all the supplemental data on the nerve junction.

Dr. DeMayo said it would be interesting to do a study on postop pain coordinated with SSFP abnormalities. Dr. Calmes will check on this and report on this at the beginning of the March meeting.