



Preventing Complications in Polio Survivors Undergoing Dental Procedures

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Unfortunately, only a handful of specialists treat Post-Polio Sequelae (PPS) - the unexpected and often disabling fatigue, muscle weakness, joint pain, cold intolerance, swallowing, sleep and breathing problems - occurring in America's 1.63 million polio survivors (40 years after their acute polio).^{1,2} However, all medical professionals need to be familiar with the neurological damage done by the original poliovirus infection that today causes unnecessary discomfort, excessive physical pain and occasionally serious complications after surgery. This is a brief overview to inform patients and professionals about the cause and prevention of complications in polio survivors undergoing dental surgery.

PRE-OPERATIVE PREPARATION

The pre-operative period is the most important, since it is when polio survivors must establish communication with their dentist or oral surgeon. Patients need to ask the dentist to read this article and the references cited. Then, patients must meet with the dentist (and anesthesiologist, if one will be involved) to discuss in detail patients' complete polio and general medical histories and the problems that may arise before, during and after the procedure.

The Psychology of Polio Survivors. Polio survivors often have difficulty with any medical procedure, even dental surgery. They may have insomnia, anxiety, and even have panic attacks. These symptoms are easy to understand when it is remembered that as young children, polio survivors were ripped away from their families and underwent multiple surgeries and painful physical therapy, procedures administered often without explanation and certainly without their consent.^{2,3,4} Questions or complaints about painful and frightening procedures were not infrequently met by staff anger or even physical abuse. It is not surprising that polio survivors can be terrified of again becoming powerless patients at the mercy of medical professionals. The dental staff's appreciation of the childhood trauma polio survivors experienced, and taking a moment to actually listen and respond to the real needs of the adult post-polio patient, will go far toward making the patient feel safer and more comfortable.

Breathing and Swallowing. We recommend that all polio survivors have pulmonary function studies before surgery, especially if a gaseous anesthetic will be used.⁵ This is vital for those who had bulbar polio, which affected the respiratory centers in the brain stem, whether or not patients used a respirator or an iron lung following the acute polio. Even patients who have (or had) neck, arm or chest muscle weakness or have swallowing problems should have their lung function tested, since even these individuals may have difficulty breathing or clearing secretions (swallowing saliva) during or after the procedure. Polio survivors with a lung capacity below 70% may need respiratory therapy or even a respirator after surgery if a gaseous anesthetic was used.¹ Of course, polio survivors who use a respirator during the day or at night must discuss their respirator use in detail with their dentist, anesthesiologist, and their own pulmonologist before any surgery.⁵

It should also be noted that breathing and swallowing can be compromised in those who had bulbar polio or chest wall paralysis, not only by anesthetics, but also merely by reclining in the dental chair. Polio survivors often have difficulty breathing or swallowing saliva when reclining. A comfortable reclined position must be identified before the procedure begins. And the procedure may need to be interrupted frequently to allow the patient to breath fully and to swallow. Also, a number of polio survivors have experienced severe neck or back

pain following lengthy procedures, since their muscles spasm easily when placed in unusual or awkward positions, including hyperextension (extreme bending backward) of the neck.

Physical Assistance. Transferring to and from the dental chair are important considerations for polio survivors who have long-standing paralysis, newly weakened muscles or joint instability and pain due to PPS. Some patients may not be able to stand or pull themselves into the dental chair. Thus, polio survivors must ask for help in transferring, especially after the procedure when they are still partially anesthetized.

Polio survivors, who typically never ask anyone for help under any circumstances, need to find a phrase with which they are comfortable that will communicate their needs. Long explanations about having had polio or PPS or the specifics of which muscles are weak or paralyzed are not necessary. For example, a simple "My legs (arms) are paralyzed and I can't get into/out of that chair. I will need help" should suffice. This phrase may have to be repeated before the polio survivor will be assisted. If the professional replies, "Oh, I bet you can do it by yourself if you try!" or "Don't expect me to lift you," an appropriate response is "I cannot get into the chair. Please ask someone else to help me or let me speak to the doctor." A pleasant but steadfast refusal to do difficult or dangerous transfers is the polio survivor's best defense against injury before or after the procedure.

General Anesthetics. Polio survivors are exquisitely sensitive to anesthetic. It has been known for 50 years that the poliovirus damaged the area of the brain stem – called the reticular activating system (RAS) – that is responsible for keeping the brain awake.^{6,7} Because the RAS was damaged in those who had paralytic and non-paralytic polio, a little anesthetic goes a long way and lasts for a long time.

For example, the pre-operative medication used to "calm" patients - often a combination of Valium[®] and Demerol[®] - may by itself put polio survivors to sleep for 8 hours. Such excessive and prolonged sedation can also occur when I.V. Valium[®] is used alone. Add to a pre-operative "calming cocktail" an intravenous anesthetic (like sodium pentothal) or a gaseous anesthetic, and polio survivors have been known to sleep for several days. In addition, polio survivors with respiratory problems may have trouble clearing gaseous anesthetics. A number of our patients have awakened from anesthesia on a respirator in I.C.U. to the frightened faces of their family, surgeon and anesthesiologist several days after surgery.

Here is the first of rule of thumb - we call them "Rules of 2" - for polio survivors' having surgery:

GENERAL ANESTHETIC RULE OF 2:

Polio survivors need the typical dose of general anesthetic divided by 2.

This first "Rule of 2" is certainly not intended to dictate the dose of anesthetic, but merely to remind oral surgeons that polio survivors need much less anesthetic than do other patients. This does not mean that a given polio survivor might require less than 1/2 the typical anesthetic dose, or that another won't need more anesthetic. As always, the dose of anesthetic must be individually adjusted (for body weight, lipid space, etc.) and be adequate to keep patients under during surgery but not cause them to sleep for a week.

Nerve Blocks. Unfortunately, polio survivors also have problems with local anesthetics. While polio survivors are more sensitive to general anesthesia, they seem to require more local anesthetic. Two research studies have shown that polio survivors are twice as sensitive to pain as those who did not have polio, apparently as a result of poliovirus-damage to endogenous opiate-secreting cells in the brain (paraventricular hypothalamus and periaqueductal gray) and spinal cord (Lamina II of the dorsal cord).^{6,7,8} For outpatient surgeries, polio survivors have needed between two and *six* times the dose of xylocaine to induce local anesthesia. In dental settings where only small volumes of local anesthetics can be injected, a higher dose or longer acting agent than xylocaine should be considered.

LOCAL ANESTHETIC RULE OF 2:

Polio survivors need 2 times the typical dose of local anesthetic.

However, the injection of a local anesthetic can result in both pain-conducting and motor nerves being anesthetized. Polio survivors are very sensitive to anything that further impairs their poliovirus-damaged motor neurons, and a local anesthetic may cause facial, tongue and pharyngeal (throat) muscles to be paralyzed for many hours, impairing swallowing and breathing, especially in those who use accessory (shoulder and upper chest) muscles to assist their diaphragm in breathing.

Also, polio survivors sometimes have adverse reactions - e.g., tachycardia, panic attacks - to the epinephrine that is typically included with the local anesthetic to cause vasoconstriction (narrowing of blood vessels) to prevent the spread of the anesthetic. If additional doses of local anesthetic are required, a preparation without epinephrine may be advisable.

Regardless of whether a local or general anesthetic is used, the following applies:

POST-ANESTHETIC RULE OF 2:

Polio survivors need 2 times as long to recover from the effects of any anesthetic.

Even applying the "Anesthetic Rules of 2" polio survivors may be very sedated, if not asleep, or have their breathing and swallowing impaired for many hours after the surgery. This is one of the reasons why in-office surgery for complicated dental procedures is not advisable for polio survivors. Sleeping, excessively sedated or facially paralyzed polio survivors cannot be expected to return home and take care of themselves after surgery, since sedation-impaired coordination makes falling likely and complications may go unnoticed. In spite of insurance company pressure or usual practice, **NO POLIO SURVIVOR SHOULD HAVE IN-OFFICE OR SAME-DAY SURGERY** except for the most simple procedures that require only a small dose of local anesthetic that does not compromise breathing or swallowing.

Blood and Gut. There are yet additional concerns. Polio survivors with muscle atrophy, especially in the thigh muscles, will have a smaller blood volume than would be expected for their height or weight. Therefore, excessive bleeding during surgery may be more of a problem. Prolonged gum bleeding is also more likely since polio survivors are often taking the maximum dose of non-steroidal anti-inflammatory drugs. The dentist should be informed before the procedure of all medications the patient is taking, including over-the-counter preparations.

Also, polio survivors can be sensitive to atropine-like drugs used to dry secretions during surgery. 9 Atropine-like drugs also slow the gut, and polio survivors may be excessively constipated after surgery or, rarely, actually have their intestines stop moving (paralytic illius) for a period of time. These problems can be treated symptomatically as they would in someone who did not have polio.

POST-OPERATIVE CARE

Pain. The single most troublesome problem after surgery is pain control. A number of studies have shown that many surgical patients are under medicated for pain. Under medication is a serious problem for post-polio patients since they are twice as sensitive to pain as those who did not have polio. 8

RULE OF 2 for PAIN:

Polio survivors need 2 times the dose of pain medication for 2 times as long.

Since polio survivors are known to be extremely stoic, they are not likely to abuse or become dependent upon narcotics.

Vomiting. Another post-op problem related to brain stem damage is vomiting. As in anyone who receives a general anesthetic, polio survivors can develop nausea and vomit. However, polio survivors are more apt to faint (have vasovagal syncope and even brief asystole's) when they attempt to vomit. 9 It is very important that postoperative emetic (anti-vomiting) control be discussed and administered before the procedure and that additional medication is provided as needed post-operatively.

Choking. As has been described, polio survivors may not be able to clear secretions, may choke (or feel like they are choking) and even aspirate if they are lying on their backs, still half asleep, as the anesthetic is clearing. Polio survivors' secretions need to be monitored after the procedure and they should be positioned on their side so that secretions can drain. 10

RECOVERY

When polio survivors do awaken from a general anesthetic they may still be twice as sedated as are other patients. Since polio survivors need a very clear head to be able to control their weakened, polio-affected muscles to stand and walk, a fuzzy-headed polio survivor is at serious risk for falling. Polio survivors may also have low blood pressure after surgery that could itself cause lightheadedness, fainting and falls.

RULE OF 2 for RECOVERY:

Polio survivors need 2 times longer to recover than do other patients.

Under any circumstances, polio survivors should get up slowly after the procedure, first sitting up, then getting into a chair with assistance, then standing with assistance and finally walking with assistance and appropriate assistive devices. Polio survivors have learned to be very aware of what their bodies can and cannot do. They are the best judges of when they can move, stand and walk safely.

Post-Op PPS? The 1985 National Survey of Polio Survivors has shown that emotional stress is the second most frequent cause of PPS (physical overexertion being the first).⁴ Certainly, there are few emotional or physical stressor more potent than surgery.

So, polio survivors should expect some increase in fatigue and muscle weakness resulting from the combination of the physical and emotional effects of the surgery, anesthesia and other medications. However, patients should be reassured that only a small handful of post-polio patients permanently lose function after surgery. When either strength or endurance are lost after surgery, they are typically recovered.

Polio survivors need to remember:

RULE OF 2 for FEELING BETTER:

Polio survivors need 2 times longer to feel "back to normal" again.

CONCLUSION

All of the "Rules of 2" are suggestions for polio survivors, the dentist and oral surgeon; they are not intended as substitutes for specific information about the individual patient, communication between doctor and patient, and clinical judgment. All polio survivors must be evaluated and managed according to their individual needs.

Please take the time to read the following references so that you will be fully knowledgeable about and be able to help meet polio survivors special needs before, during and after dental procedures. Set your browser to:

<http://www.PostPolioInfo.com>

Click the menu on the left side of the page for information about the cause and treatment of PPS, including Social Security Disability information, surgical and dental precautions and The Post-Polio Library.

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POLIO SURVIVORS' DENTAL PROCEDURE CHECKLIST

From the International Centre for Polio Education

Give PPS articles to dentist and discuss:

- Pre-op lung tests and breathing problems.
- NO same day surgery!
- Medications taken and possible excessive bleeding.
- Positioning in the chair during the procedure.
- Difficulty clearing secretions during and after the procedure.
- Lower dose of pre-op calming medication.
- Lower dose of general anesthetic.
- Longer-term sedation with general anesthetic.
- Post-op anti-vomiting medication.
- Higher dose of local anesthetic.
- Paralysis of face, throat and tongue muscles with local anesthetics.
- Not standing or walking until you are fully awake and able.
- Increased dose and duration of pain medication.