



# POST POLIO MATTERS

## **POLIO PATIENTS AND SURGERY. Information for health staff.**

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**PTU** is an organisation that works to create equal conditions and quality of life for the more than 100.000 Danes how have serious injuries following an accident or an illness.

**PTU** owns and runs one of the foremost Rehabilitation Centers in Europe for people with polio.

### **Table of contents.**

- Patient polio history form [See last page of this printed version of the pamphlet]
- General information about acute polio and sequelae
- Operation and polio; pathophysiology and anatomy
- Important for Surgeons
- Important for Anaesthesia Staff
- Important for staff at the operating theatre
- Important for staff at the recovery room
- Important for staff at the wards.
- References.

### **Dear colleague**

Your patient who is to be anesthetized and undergo an operation, has had polio many years. Ago.

Even though it may not be apparent for the immediate clinical evaluation, the acute polio infection may have left a variety of sequelae, which are important to take into account when your patients is having an operation.

The intent of this pamphlet is to assist you in getting your patient safely through the operation.

**Polio in Europe** - It is estimated that in Europe around 700,000 people are now living with the late effects of polio.

### **General information about acute polio and sequelae.**

Poliovirus is a piconarvirus which most often causes flu-like symptoms, but in approximately 1% of those infected it also affects the nervous system. Traditionally, polio is associated with asymmetric flaccid paresis of the extremities. Less known is that the virus also may affect the basic areas of the cerebellum, the cranial nerves, [bulbar polio] and the autonomic nervous system. After the acute stage, recovery

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occurs over a period from days to many months. The recovery may be total or only partial and comes through three different processes.

1. Neurons that are not totally destroyed regenerate totally or partly.
2. Surviving neurons develop an increased amount of axon endings which replace the field of innervation of the dead neurons.
3. The individual muscle fiber hypertrophies.

In this context, it is worth to notice a couple of facts. Before muscle weakness can be observed clinically, neuron loss has to exceed 50%, and neurons of affected muscles may innervate 10 to 20 times as many muscle fibers than neurons of unaffected muscles. Furthermore, degeneration whereby muscle atrophy may not be very apparent. Consequently, it reality damage from polio can be significantly more widespread than can be judge clinically.

The regenerative processes do not last, and many patients, who have had polio, experience a total or partial return of the initial symptoms 30 to 50 years after the acute infection. Some may even experience new symptoms that were not present earlier. Persons at risk of having late polio symptoms are those who had major nerve damage and extensive recovery at the time of the acute polio attack.

### **Psychological aspects**

Many polio patients have, during their childhood, gone through long hospitalisations and rehabilitation periods, and these experiences may still influence them. In the mid-last century, it was proper attitude not to inform, children of coming operations, in order to avoid making them anxious. Children were therefore picked up without notice, taken away, and woke up with a plaster, pain and severe nausea. Many polio patients therefore carry with them horrible memories related to operations.

The polio children went through long and tough training courses, and were constantly encouraged to keep going and continue to get as far as possible. Generally, such experiences have given the patients the attitude that they do not ask for help until it is absolutely necessary. Therefore, it is particularly important that the staff is responsive to patients' request for help..

### **Operation and polio. PATHOPHYSIOLOGY AND ANATOMY.**

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| <ul style="list-style-type: none"><li>• The respiratory center may have suffered, and respiratory regulation may still be affected, causing unrecognised chronic accumulation of CO<sub>2</sub>.</li><li>• Centres for pulse and blood pressure may have suffered, causing fragile regulation of pulse and blood pressure.</li><li>• Formatio Reticularis may have suffered, making it more difficult for polio patients to stay awake.</li><li>• Affection of the autonomic nervous system.</li><li>• Weakened respiratory muscle.</li><li>• Diminished number of neurons and dysfunction of synapses: The acute polio infection has not only led to a reduction in the number of nerve cells; it may also have caused a decrease in acetylcholine production of surviving cells</li><li>• Paresis of muscles in the oropharynx and</li></ul> | <ul style="list-style-type: none"><li>oesophagus and of the recurrent nerve may not be recognised, as they may be slight and unknown to the patient.</li><li>• Affection of the pain sensation pathways in the spinal canal may have lead to suboptimal functioning of pain modulating reflexes.</li><li>• Abnormal distribution of tissues, decreased volume of muscle tissue and increased volume of adipose tissue.</li><li>• Decreased blood volume caused by a diminishing in volume of vessels in the paretic extremities.</li><li>• Scoliosis/kyphosis.</li><li>• Lack of muscle to cover nerves.</li><li>• Increased risk of cardiovascular diseases.</li></ul> |
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**Of relevance to surgical and anesthesia procedure - polio patients may have the following: sequelae:**

**PATHOPHYSIOLOGY AND ANATOMY**

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| <ul style="list-style-type: none"> <li>• Increased sensitivity to muscle relaxants. The extent of the paresis [primarily and current] may give an indication of how much.</li> <li>• Increased sensitivity to opioids and other centrally functioning analgesics and sedatives. History of fatigue and medicine consumption can help estimate the extent of the problem.</li> <li>• Increased risk of cardiac arrhythmia and a fall in blood pressure due to affection of the central and/or the autonomic nervous system.</li> <li>• Cardiovascular diseases may be disguised by the low physical activity of the polio patient.</li> <li>• Reduced ventilation caused by either weakened respiratory muscles, thoracic deformity or dysfunction of the respiratory centre.</li> <li>• Increased risk of upper airway obstruction,</li> </ul> | <ul style="list-style-type: none"> <li>• caused by unrecognised paresis of the recurrent nerve or oropharyngeal muscles.</li> <li>• Increased risk of aspiration caused by reflux and/or dysfunctional coughing reflex.</li> <li>• Increased pain sensitivity caused by affection of pain reflexes in the spinal cord.</li> <li>• Low blood volume in spite of normal haemoglobin values.</li> <li>• Increased risk of peripheral nerve traction injuries.</li> <li>• Increased sensitivity to cold because of a decrease in muscle mass and affected autonomic regulation.</li> <li>• Increased risk of pressure ulcers caused by deformities.</li> <li>• Increased risk of fractures caused by osteoporosis or paralyzed limbs.</li> <li>• Increased risk of post-operative urinary</li> </ul> |
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**In order to get your patient safely through an operative course, it is important to consider that polio patients may experience the following:**

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| <p><b>Pre operatively</b></p> <ul style="list-style-type: none"> <li>• A thorough history including all primary paresis, as the nerve damage generally is underestimated by the clinical investigation.</li> <li>• A general assessment of the patient's functional ability, to disclose the need for physical assistance and planning a realistic post operative course.</li> <li>• A dialogue with the patient to uncover any special problems in the position needed during the operation.</li> <li>• An anterior access is to be preferred for a hip replacement because this does not cut the rotators.</li> </ul> <p><b>Post Operatively.</b></p> <ul style="list-style-type: none"> <li>• Pain treatment should be multimodal with the use of NSAID and local anaesthesia in the wound, using the least possible amount of</li> </ul> | <ul style="list-style-type: none"> <li>• opioid.</li> <li>• Blood loss should be replaced at a lower threshold, as paretic extremities may have lower blood volume and/or compensatory vasoconstrictive reflexes may be dysfunctional.</li> <li>• Increased risk of aspiration caused by the oropharyngeal paresis or reflux.</li> <li>• Increased risk of post-operative urinary retention.</li> <li>• Increased risk of post-operative paralytic ileus caused by a possible affection of the autonomic nervous system.</li> <li>• It will take longer than normal for the patient to regain his or her usual level of functioning.</li> </ul> <p style="text-align: right;">[Continued overleaf]</p> |
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- Mobility may be significantly affected as polio patients compensate for their paresis by the substitution of other muscles. This means that they have to be more awake to compensate, and that incisions through muscles which usually do not cause problems, may cause a serious problem for the mobilisation of polio patients.
- The longer period to regain normal activity means that any prophylactic anticoagulation should be maintained longer.

### **Rehabilitation.**

- In training of polio patients, there's a risk of overloading and decrease of muscle strength. Most polio muscles are best trained by submaximal load, i.e. training of endurance rather than strength.
- It is important that the patient seek expert advice.

**Except for minor operations polio patients are not suitable for outpatient surgery or fast tracked surgery**

## **Important for surgeons.**

**When a polio patient is to undergo surgery, it is important to focus on the following**

### **Pre operatively**

- A thorough history including all details of paresis during the primary infection and the present condition. The clinical judgement will generally underestimate the nerve injuries.
- History of cranial nerve affection (bulbar polio or ventilator assistance), deformities and/or affection of muscles of thorax, shoulders or neck. A spirometry test should be made in these cases. If the vital capacity is less than 1.5 litres an (arterial) a-puncture should be performed.
- An assessment of whether neck scoliosis requires fiberscopes at intubation.
- A dialogue with the patient to uncover any special problems in the position needed during the operation.
- Restrictive dosage of pre medication.
- If there is suspicion of recurrens palsy (anamnesic information about cranial nerve affection or weakened voice - constant or intermittent) a laryngoscopy should be performed to evaluate plicae vocalis.
- Whenever possible, the patient should be put into position while awake.
- In general, start out with 50% of the normal dosage of anesthetics. If there is suspicion of extensive nerve damage, even less is recommended.
- Anesthetics must be carefully titrated using agents that are non depolarising and with short elimination time.
- Nerve stimulator should be used to monitor the effect of muscle relaxants.
- Pulse, blood pressure, oxygen saturation, and sleep depth should be monitored carefully.
- Low threshold for replacing blood loss, because the patient may have lower blood volume or dysfunctional vasomotor reflexes.
- Pain treatment should be multimodal whenever possible, with the use of NSAID preparations and local anesthesia in the wound and a minimum of opioids.
- Secure protection against cooling.

[Post-operatively continues on next page]

### **Post operatively**

- Waking up time may be significantly prolonged.
- Post-operative respiratory treatment may be needed and must be possible.
- Patients should be observed in recovery ward at least twice as long as usual.
- Upper airway obstruction may occur if there is an unrecognized paresis of the oropharynx or recurrent nerve.
- Increased risk of aspiration caused by reflux and insufficient cough reflexes.
- Increased risk of post-operative blood pressure and oxygen saturation.
- Protection against cooling with extra blankets.

### **Regional anesthetics**

Scoliosis can make it difficult to place the anesthetics, and the doses of anesthetics should be carefully administered.

### **Local anesthetics**

Infiltration anesthesia and nerve blocks can be used without special precautions. As diaphragmatic

paresis may occur during supraclavicular and Scalene block, they should not be used for patients that cannot tolerate a reduction in their vital capacity of 30%.

### **Respiratory treatment**

Prior to surgery of polio patients with ventilators, their ventilator unit should be consulted.

## **Important for staff at the operating theatre.**

**When a polio patient is to undergo surgery, it is important to focus on the following:**

- Whenever possible, the patient should be put into position while awake.
- The patient may need extra blankets
- The patient may have significant osteoporosis and subsequently a risk of fractures.
- The patient may have increased risk of nerve damage caused by traction, and of pressure ulcers.
- Patients may carry with them severe traumatic experiences of surgery in the past, and may therefore need special consideration to overcome the fear.

## **Important for staff at the recovery room.**

**When a polio patient is to undergo surgery, it is important to focus on the following:**

- The wake up time may be significantly prolonged.
- An increased risk of the need for post operative ventilation.
- The patients should be observed in recovery room at least twice as long as usual.
- An increased risk of upper airway obstruction caused by unacknowledged paresis of the orthopharynx and recurrent nerve
- Increased risk of aspiration caused by reflux and insufficient cough reflexes.
- Increased risk of power operative urinary retention.
- Close check on pulse, blood pressure, and oxygen saturation.
- The patient may need extra blankets.
- Patients may carry with them severe traumatic experiences of surgery in the past, and may therefore need special consideration to overcome the fear.

## Important for staff at the wards.

When a polio patient is to undergo surgery, it is important to focus on the following:

### Pre operative

- Assessment of the patient's functional level to determine special needs of physical assistance and to make a realistic plan for the post operative course.

### Post operative

- Pain treatment should be multimodal whenever possible, with the use of NSAID preparations and local anesthesia in the wound and a minimum of opioids.
- Low threshold for replacing blood loss, as the patient may have lower blood volume and/or dysfunctional compensatory vasoconstrictive reflexes.
- An increased risk of post operative paralytic ileus due to possible affection of the autonomic nervous system.
- Increased risk of aspiration caused by reflux and insufficient cough reflexes.
- Increased risk of post operative urinary retention.
- Extra blankets should be offered as the patient may be very intolerant to cold
- It may take longer than usual for the patient to regain his or her overall level of functioning.

- Mobility may be significantly reduced as polio patients generally compensate for paresis by substituting other muscles. This means that they have to be more awake in order to compensate. It also means that muscle incisions that usually do not cause problems, can be a serious obstacle to mobilization for polio patients.
- An extended mobilization period means that any thrombosis prophylaxis should be maintained for a longer period.

### Rehabilitation.

- There is a risk of overloading and thereby promoting the degeneration of the regeneration processes. Polio muscles should generally be trained only with submaximal load, i.e. training of endurance rather than strength.

### Moreover

- Except for very minor operations, polio patients are not suited for outpatient surgery of fast track surgery.

Patients may carry severe traumatic experiences of surgery in the past, and may therefore need special consideration to overcome their fear.

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**Websites.** [www.ptu.dk](http://www.ptu.dk) [www.post-polio.org](http://www.post-polio.org)  
Danish version  
[www.polio.dk/media/3669/poliopatienter-og-operation.pdf](http://www.polio.dk/media/3669/poliopatienter-og-operation.pdf)

# POLIO PATIENTS AND SURGERY

## POLIO HISTORY FORM

### Information about your polio patient's acute polio and sequelae

To be filled out by the patient undergoing operative procedure. Can be photocopied or cut out and included in patients records.

Name ..... Date of Birth .....

I contracted polio in 19 ....., and was hospitalised for ..... months.

I was originally paralyzed in the following parts of my body

.....  
.....  
.....  
.....

At the moment, I experience the following consequences from polio. [Please circle]

Decreasing muscle strength	YES	NO
Muscle cramps, twitches or jerks	YES	NO
Muscle and joint pain	YES	NO
Breathing problems	YES	NO
General pronounced fatigue	YES	NO
Sleeping problems	YES	NO
Swallowing problems	YES	NO
Weakened voice	YES	NO
Cold intolerance	YES	NO
Urinary problems	YES	NO
Bowel problems	YES	NO
Other		

I use the following aids

.....  
.....  
.....  
.....  
.....

I need help with the following

