

The Nuts and Bolts of Rods and Screws

...

Intraoperative Monitoring Guide for
Spine Surgeries

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PREFACE

“The Nuts and Bolts of Rods and Screws or Intraoperative Guide for Spine Surgeries” was written for the monitorist by a monitorist. After years of panicked telephone calls, faxes, text messages, etc from monitorists pleading for assistance and instruction about a surgical procedure I decided to write “Nuts and Bolts...”.

The intent is for the monitorist to be able to utilize the information for each surgical procedure in their pre-operative planning and then intraoperative monitoring. The sections give specifics on what neural structure is at risk and when during the surgery, the modalities that can assess the function of those neural structures, what supplies will be required, what position the patient will be in etc. For each surgery there are two levels of monitoring, standard and advanced. I advocate that the advanced be employed routinely.

A literature review and bibliography are included. They are in no way exhaustive but do represent an excellent sampling of the scientific data that supports the modalities advocated in “Nuts and Bolts..”

“Nuts and Bolts...” is a work in progress. Additions will be made routinely as new surgical procedures become standard of care. Updates will be provided as requested.

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****Quick Pick: The handbook is also color-coded for quick referencing.**

Cervical: Yellow

Thoracic: Blue

Lumbar: Green

Anterior L4-S1 Instrumentation/Fusion

This surgery will include: discectomy, interbody fusion and plating.

WHAT structure is at risk? **WHEN** is it at risk? **HOW** is it at risk?
 Prioritizing monitoring modalities per surgical phase

Standard

WHAT	WHEN	HOW	MODALITIES
Brachial Plexus (Positioning)	<ul style="list-style-type: none"> Immediately after positioning on the operative frame and then throughout the surgery Taping of shoulders 	<ul style="list-style-type: none"> Compression of the nerves of the brachial plexus from the positioning pads Alignment of the arm on the arm board Possible arm movement during procedure by anesthesiologist 	<ul style="list-style-type: none"> SSEP: Median N. (or Ulnar N. if taping shoulders) SSEP: Radial N.
Cauda Equina	<ul style="list-style-type: none"> Decompression Instrumentation & fusion 	<ul style="list-style-type: none"> Mechanical contact with neural structures Distraction/compression of neural structures 	<ul style="list-style-type: none"> EMG primarily SSEP aperiodically
Lumbar Nerve Roots (L4 and L5)	<ul style="list-style-type: none"> Decompression Instrumentation & fusion 	<ul style="list-style-type: none"> Mechanical contact with neural structures Distraction/compression of neural structures 	<ul style="list-style-type: none"> EMG primarily SSEP aperiodically

Complex

WHAT	WHEN	HOW	MODALITIES
<i>Lumbar Nerve Roots (L4-S1)</i>	<ul style="list-style-type: none"> <i>Decompression</i> 	<ul style="list-style-type: none"> <i>Mechanical Contact (Direct or Indirect)</i> 	<ul style="list-style-type: none"> <i>H- Reflex</i>
<i>Sensory Nerve Roots (L4-S1)</i>	<ul style="list-style-type: none"> <i>Decompression</i> 	<ul style="list-style-type: none"> <i>Mechanical Contact (Direct or Indirect)</i> 	<ul style="list-style-type: none"> <i>Dermatomal SEP</i>

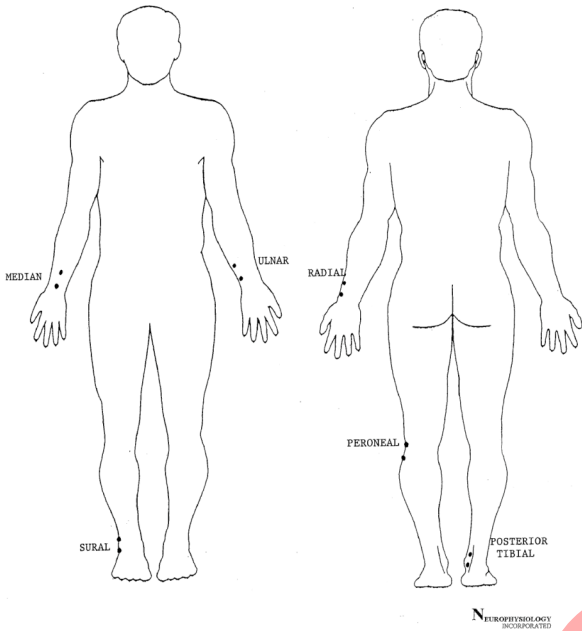
Anesthesia

Standard: TIVA Protocol (see notebook)

Minimum 2/4 Train of Four measured at hand following exposure or surgeon's preference

***Avoid bolus injections of any anesthetic agent

Electrode Man for SSEP Sites



Standard: SSEP: Median (or Ulnar if taping shoulders), Posterior Tibial

Complex: *Dermatomal SEP: L4, L5*
SSEP: Peroneal, Sural

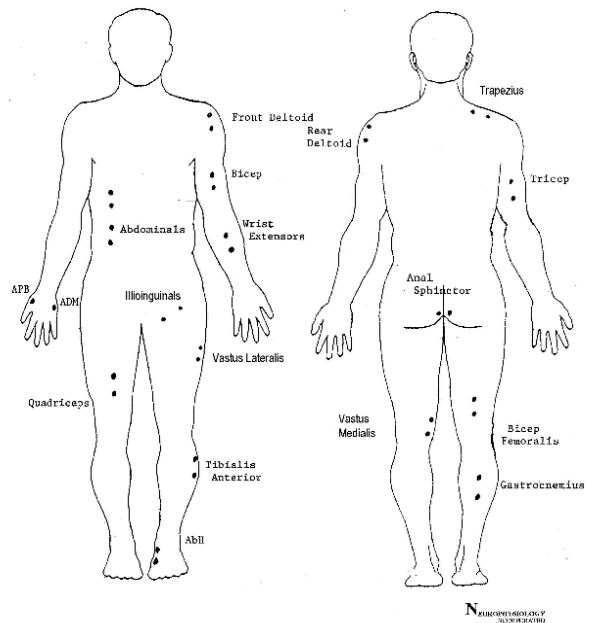
Electrode Man for Myotome Recordings

Standard: EMG: L4- Vastus Lateralis or Bicep Femoralis
 L5- Tibialis Anterior
 S1- Gastrocnemius

Complex: *EMG: L3- Vastus Medialis*

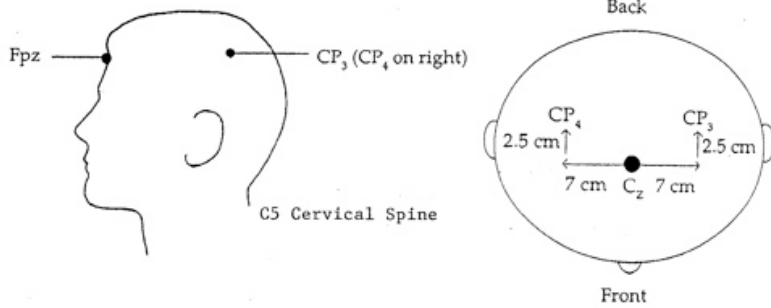
Hoffman's reflex: Tibialis Anterior, Gastrocnemius

Train of Four



Anterior L4-S1 Instrumentation/Fusion

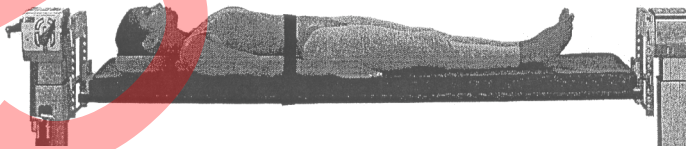
Head Needle Placement 10/20



Montage: Fpz – Cz'
Fpz – C4'
Fpz – C3'

Complex: Fpz – C5 spine orinion,
Popliteal Fossa (Peripheral
leg response),
Erb's point (Peripheral
arm response)

Bed Frame



Anterior L4-S1 Instrumentation/Fusion

Supplies List

Standard

- _____ 4 SSEP cortical needle electrodes
- _____ 1 common (ground) electrode with cable
- _____ 8 SSEP stimulator pads
- _____ 4 pair snap lead SSEP cables
- _____ 4 pair SSEP extension cables
- _____ 6 pair of EMG needle electrodes

Complex

- _____ *Subcortical, Erb's point, popliteal fossa needle electrodes*
- _____ *12 SSEP stimulator pads*
- _____ *6 pair snap electrodes*
- _____ *6 pair SSEP extension cables*
- _____ *2 pair of EMG needle electrodes*
- _____ *4 sets of Hoffman's reflex needle electrodes (use existing Tibialis/Gastrocnemius needles)*

Anterior

See handbook for complete description of all modalities, stimulus and recording parameters, and bibliography for references supporting use of modalities for standard and complex monitoring recommendations.

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