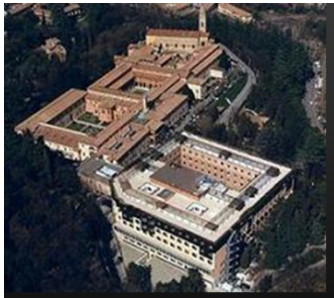
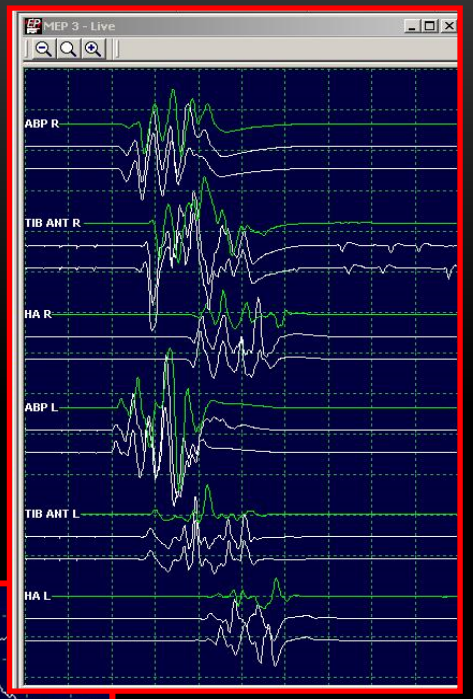
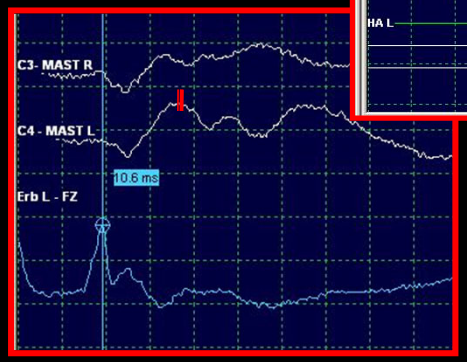
INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING STRATEGIES IN ADOLESCENT IDIOPATHIC AND NEUROMUSCULAR SCOLIOSIS.

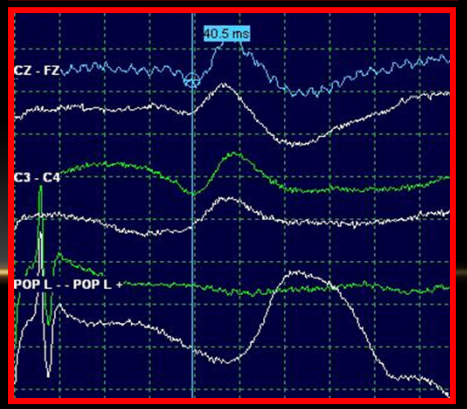
Francesca Pastorelli; Mario Di Silvestre; Francesco Lolli; Francesco Vommaro; Elena Maredi; Konstantinos Martikos; Tiziana Greggi

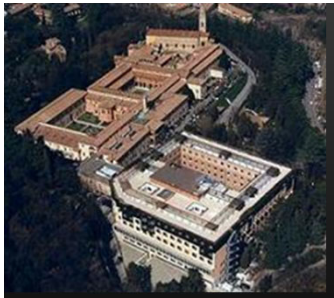


Spinal cord integrity is potentially at risk during spine surgery and postoperative neurologic deficits are more frequent in patients with neuromuscular scoliosis. Intraoperative monitoring (IOM) of spinal cord function with Somatosensory (SSEP) and Motor Evoked Potentials (MEP) reduce the risk of motor deficits, but reliable recordings are sometimes unobtainable in patients with diseases of the central (CNS) or peripheral nervous system (PNS). Moreover, immaturity of the motor pathways and anesthesiological limitations can interfere with IOM in younger patients.









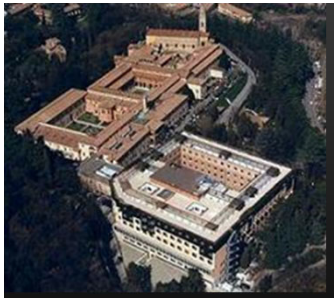
POPULATION STUDIED

70 consecutive patients affected by scoliosis and treated by posterior instrumented fusion with pedicle screws only instrumentation

38 patients (9 M, 29F, aged 7-18 years, mean 15)

idiopathic scoliosis

- 32 (17 M, 15 F, aged 7 - 20 years, mean 14)
- **neuromuscular scoliosis**
- CNS pathology: 17/32 patients with pyramidal involvement in 5 cases and epilepsy in 6.
  - encephalopathy in 14
  - syringomyelia in 6
  - Arnold Chiari malformation in 1
- PNS pathology: 5/32 patients
  - axonal hereditary neuropathy in 1
  - demyelinating hereditary neuropathy in 2
  - Spinal Muscular Atrophy in 1
  - Duchenne's muscular dystrophy in 1



RESULTS

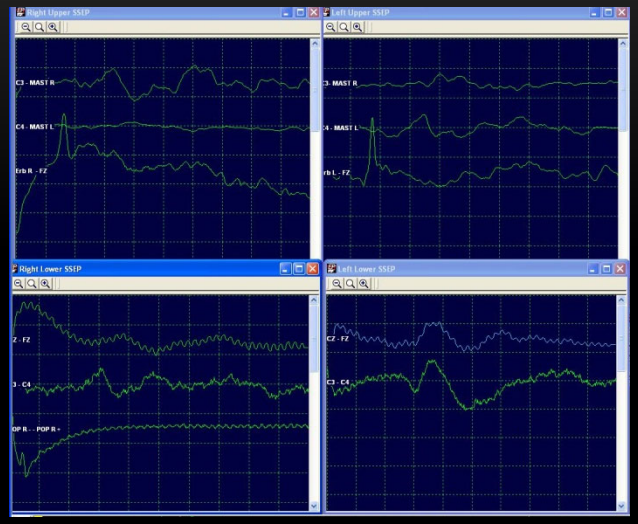
38 idiopathic scoliosis

- Reliable IOM performed in 38/38 patients (100%)
- One patient presented transient postoperative paraparesis
- No false negative results
- No false positive alarms

32 neuromuscular scoliosis

- Reliable IOM performed in 31/32 patients (96,8%)
  - Cortical SSEPs recorded in 30/32 (93,75%) patients
  - TES-MEPs recorded in 29/32 (90,62%) cases.
- Poor baseline responses were recorded preferentially in patients with PNS involvement.
- No patient showed postoperative deficits.
- No false negative results.
- Two false positive alarms were recorded in patients with pathologic baseline recordings

Duchenne's muscular dystrophy



Reliable SSEP and TES-MEP responses

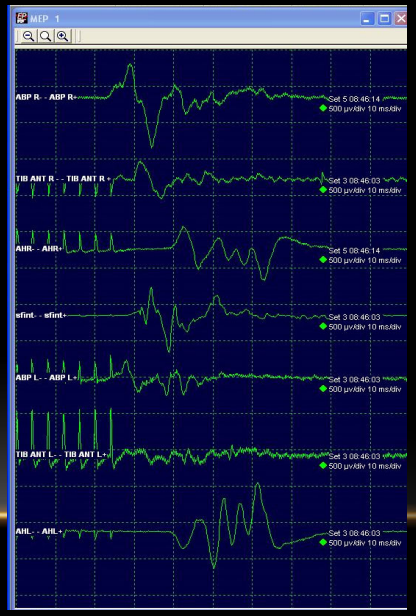
Good intraoperative monitoring of sensory and motor central pathways and of sfinteric functions

M, 17years

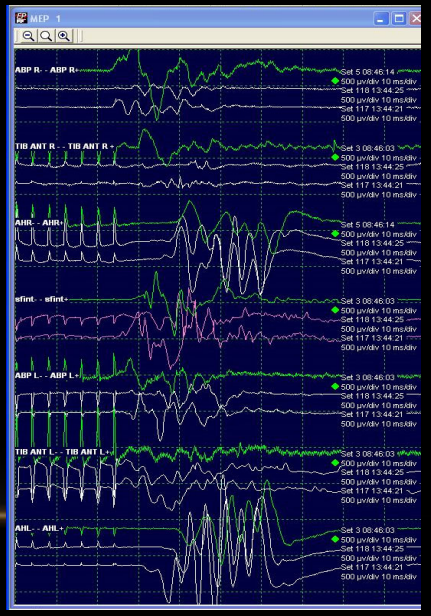
Severe scoliosis

Severe flaccid tetraparesis and muscular atrophy;

wheel chair bound since the age of 11

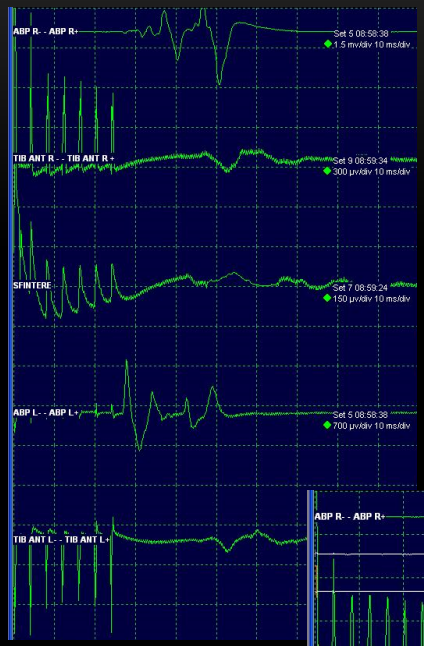


Baseline



End

Spinal muscular atrophy



Baseline

Good SSEP responses

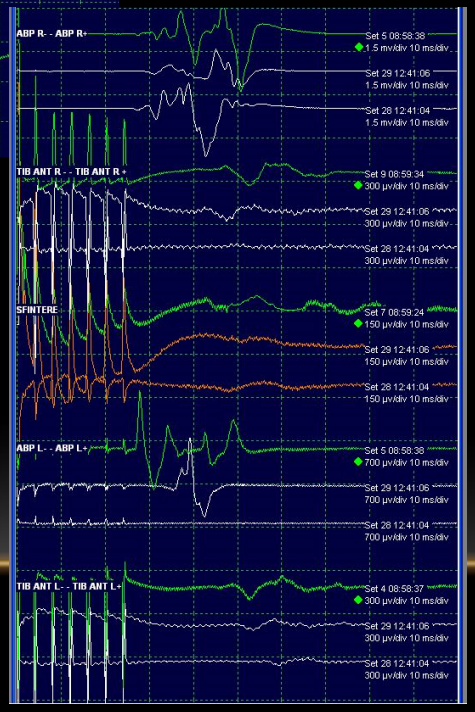
Poor baseline TES-MEP recordings at lower limbs and anal sphincter

M, 15 years

Severe scoliosis

Severe flaccid tetraparesis and muscular atrophy;

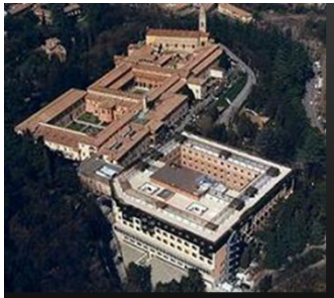
wheel chair bound since the age of 12



Significative intraoperative reduction of the amplitude of TES-MEPs. NO postoperative deficits: FALSE POSITIVE RESULT

Good intraoperative monitoring of sensory pathways
Poor monitoring of motor and sfinteric pathways

End



DISCUSSION

- Assessment of IOM with SSEPs and TES-MEPs under total venous anaesthesia during spine surgery is **effective and reliable** in neuromuscular scoliosis as well as in idiopathic scoliosis.
- Even in patients with severe motor deficits the intraoperative monitoring of sensory pathways and of sphincter functions should be performed
- However, expecially in patients with **PNS diseases** reliable responses can be unobtainable.
- Different IOM strategies should be proposed for such patients, for which the PNS involvement interfere with intraoperative spinal cord monitoring.