Polyneuropathy in critically ill patients

C F Bolton

A common cause of muscle weakness in the intensive care unit

More than 30 years ago, during a 4-year period, we observed five patients who presented in the ICU with unexplained difficulty in weaning from mechanical ventilation, and with limb weakness. At that time weaning difficulties had been attributed to diaphragmatic fatigue, and limb weakness to a catabolic myopathy. Clinical signs indicated a motor and sensory polyneuropathy, and electrophysiological tests, a primary axonal degeneration.

A prospective study in ours and other hospitals has shown muscle is commonly involved in critically ill patients, at times involving muscle only, with varying morphological changes of myosin deficiency and necrosis. The entity of critical illness myopathy has been defined by Lacomis and colleagues.

In addition to the polyneuropathy, all of our patients had early evidence of septic encephalopathy. It consisted of varying degrees of depressed consciousness, generalised EEG abnormalities but unremarkable CT head scans and CSF examinations. While the encephalopathy, polyneuropathy and myopathy tend to improve after the critical illness has been brought under control, long term follow-up has shown residual effects causing varying degrees of mental and neuromuscular disability.

Intensivists are now instituting a ‘least sedation method’. The mental status and muscle strength can be tested at the time of periodic withdrawal of sedative drugs. This allows better monitoring of sedation and, if weakness is demonstrated, electrophysiological and muscle biopsy studies. The nature of neuromuscular disorder having been identified, effective rehabilitation and attempts at long term prognosis are then possible.

There have been interesting investigations of the pathophysiology. The nerve membranes demonstrate abnormalities of excitability. Muscle membranes are inexcitable on direct stimulation. The prolonged duration of the compound muscle action potential, now known to be typical of critical illness myopathy, is due to decreased muscle membrane conduction velocity. Dysfunction of sodium channels, as originally suggested by Rich et al, may explain these phenomena.

Further basic studies are needed, as are efforts to utilise clinical, electrophysiological and muscle biopsy methods in the ICU to detect these nervous system effects and institute mental and physical rehabilitation. The greatest hope is for the discovery of a ‘magic bullet’ to interrupt the septic cascade and prevent these devastating nervous system effects.

Competing interests None.

Provenance and peer review Commissioned; not externally peer reviewed.

Received 19 July 2011
Accepted 21 July 2011

J Neurol Neurosurg Psychiatry 2012;83:475. doi:10.1136/jnnp-2011-300997

REFERENCES
Polyneuropathy in critically ill patients

C F Bolton

*J Neurol Neurosurg Psychiatry* 2012 83: 475
doi: 10.1136/jnnp-2011-300997

Updated information and services can be found at:
http://jnnp.bmj.com/content/83/5/475

These include:

**Supplementary Material**
Supplementary material can be found at:
http://jnnp.bmj.com/content/suppl/2012/04/25/jnnp-2011-300997.DC1.html

**References**
This article cites 5 articles, 1 of which you can access for free at:
http://jnnp.bmj.com/content/83/5/475#BIBL

**Email alerting service**
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

**Topic Collections**
Articles on similar topics can be found in the following collections

- JNNP Impact commentaries (17)
- Muscle disease (247)
- Musculoskeletal syndromes (519)
- Neuromuscular disease (1272)
- Peripheral nerve disease (615)
- Drugs: CNS (not psychiatric) (1879)
- Radiology (1690)
- Surgical diagnostic tests (378)
- Drugs: musculoskeletal and joint diseases (251)
- Mechanical ventilation (31)
- Mechanical ventilation (31)

**Notes**

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/