GCMI
Gold Coast Medical Imaging Pty Ltd
IMAGING UPDATE
FEB 04
THE OFFICIAL NEWSLETTER OF GOLD COAST MEDICAL IMAGING/TWEED VALLEY RADIOLOGY

Nerve Conduction Studies & Electromyography

Nerve conduction studies (NCS) and study of the muscle with needle examination (EMG) were first clinically used in the 1920s. It became more generally acceptable clinically in the 1950s and has been refined since then with the advance of computerised systems that allow easy and fast acquisition and retrieval of the data. It is the most important modality to effectively investigate peripheral nerve and muscle disorders. It is also extremely useful as an adjunct to MRI and CT scanning in assessment of spinal disease.

NCS tell us about the peripheral nervous system. They are useful in defining whether the patient's sensory and motor symptoms are due to focal or generalised peripheral nerve disorders.

The results are abnormal in generalised peripheral neuropathies or focal compressive lesions. Focal slowing of nerve conduction or drop in motor response may be seen with compressive lesions of the peripheral nerve, such as seen in carpal tunnel or ulnar nerve lesions (see figures one and two). Prominent slowing occurs with demyelination such as seen in Gullian Barre Syndrome (GBS).

EMG gives functional information about the nerve and muscle that is unable to be obtained in any other way. It can assess whether there is primary muscle or nerve damage. It can be of immense help in deciding whether the problem is related to nerve damage, such as peripheral neuropathies or radiculopathies, or whether the primary problem is related to weak and damaged muscles. It assesses how severe the damage is.

The EMG can help define the site of the problem and once the site is determined the differential diagnosis is narrower and able to be clarified. It helps to decide where and what sort of imaging to perform.

USING ELECTROPHYSIOLOGY MOST EFFECTIVELY IN PERIPHERAL NERVE LESIONS

NCS are very useful. The sensory responses are the first to be affected and eventually disappear. Therefore they are useful to identify if there is a problem or not, where the problem is and how severe the lesion is, eg. carpal tunnel syndrome will at first have a prolonged distal latency of the median nerve only. The amplitude of the response is low. If the compression is severe the motor responses will be affected, seen as prolonged distal latency and then as it becomes more severe, reduction of the median motor amplitude. In peripheral neuropathies all the sensory and/or motor responses will be reduced.

The EMG is very useful to identify how severely the nerve is damaged. When the myelin sheath is compressed but the underlying axon is normal the EMG will be normal. If the underlying axon is compressed enough to be damaged the EMG will show changes that can identify the duration of injury. It is useful for

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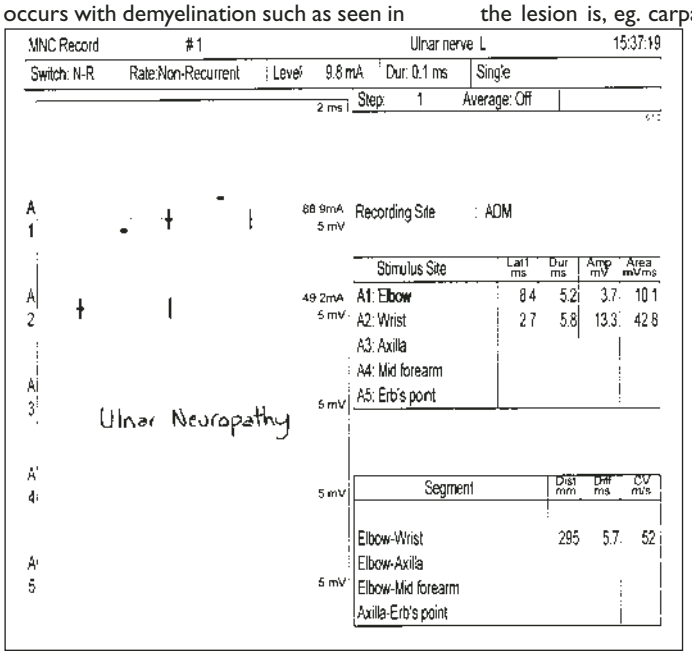

Figure One: Ulnar neuropathy of the elbow

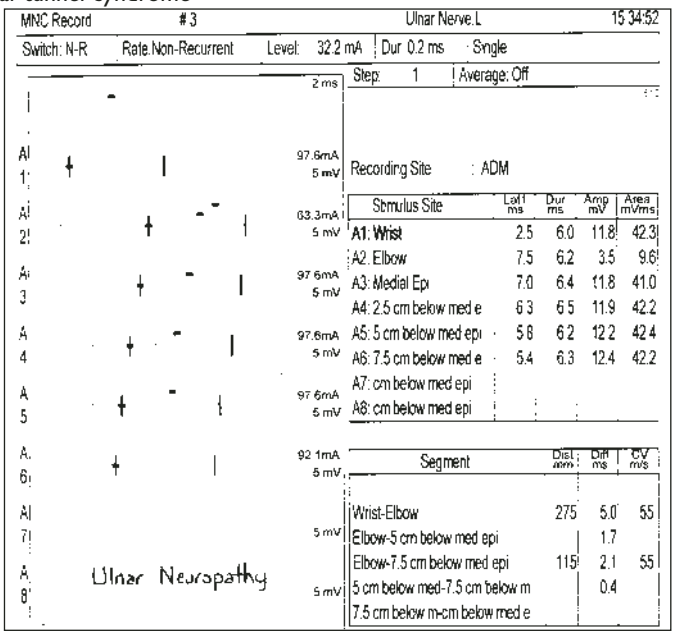

Figure Two: Inching

There is a drop in amplitude of the motor response between the elbow and wrist. On inching (figure two) this is localised to the medial epicondyle, consistent with conduction block or on area of demyelination at this site.

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Ultrasound of Nerves

Improvements in ultrasound technology, particularly small footprint, high frequency, high resolution, linear array probes have allowed ultrasound to visualise peripheral nerves. In the upper limb the median, radial and ulnar nerves can be identified in the upper arm and forearm. In the lower limb the sciatic, common peroneal, tibial and major branches can be visualised in most patients.

Ultrasound can support clinical and electro-physiological testing for detection of compressive lesions caused by nerve entrapment or compromise in a variety of osteofibrous tunnels of the limbs. There are many possible sites of compromise of the nerves. For example, the median nerve may be compromised in the carpal tunnel and the ulnar nerve in the cubital or Guyon canals. In the lower limb the common peroneal nerve may be compromised around the fibular neck or the posterior tibial nerve in the carpal tunnel.

Other lesions such as nerve tears or neurogenic tumours or other adjacent pathologies impinging on nerves may also be identified. The interdigital nerves of the foot may be examined in the intermetatarsal spaces for Morton's neuroma.

Ultrasound offers several key advantages including availability and the ability to perform a dynamic examination including movement of the adjacent muscles and tendons which is helpful in demonstrating normal nerve movement and flexibility, as well as evidence of narrowing of a compressed nerve or swelling of the nerve proximal to compression

CARPAL TUNNEL SYNDROME

Compression of the median nerve in the carpal tunnel at the wrist may result in a compressive neuropathy.

Ultrasound is useful in demonstrating space occupying lesions that may increase pressure within the carpal tunnel, such as ganglion, lipoma or haematoma. Anomalous musculo-tendinous junctions or muscle hypertrophy associated with physical activity may also contribute to raised pressure within the carpal tunnel. Rare causes such as a variant median artery may occasionally be seen.

Criteria have been established for sonographic diagnosis of carpal tunnel syndrome. The characteristic appearance is of proximal swelling of the median nerve with distal narrowing and compression of the nerve as it passes through the more distal canal. A cross sectional area of greater than 13mm^2 has a high correlation with the diagnosis (see figure one of median nerve).

OTHER REGIONS

Compressions within other osteofibrous canals may be identified. Adjacent impinging lesions may be identified and neurogenic tumours may be identified. A neuroma or neurofibroma may be seen as a well defined swelling of the nerve or lesion arising on the periphery of the nerve and may be the cause of peripheral nerve symptoms (see figure two of neuroma).

SUMMARY

Ultrasound provides a cost effective available means of visualising peripheral nerves and has been demonstrated to be helpful in diagnosis of carpal tunnel syndrome and other nerve entrapments and peripheral nerve lesions.

Dr David Mitchell, Radiologist.

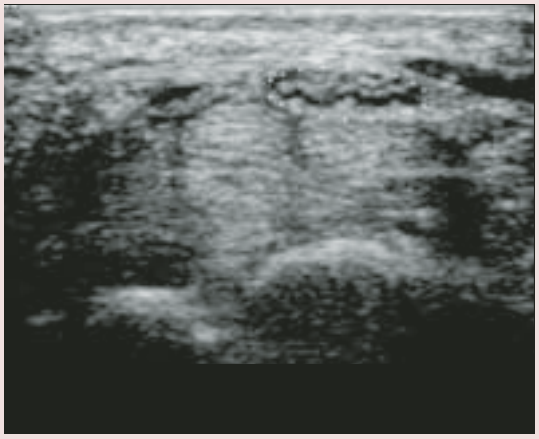

Figure One: Median nerve

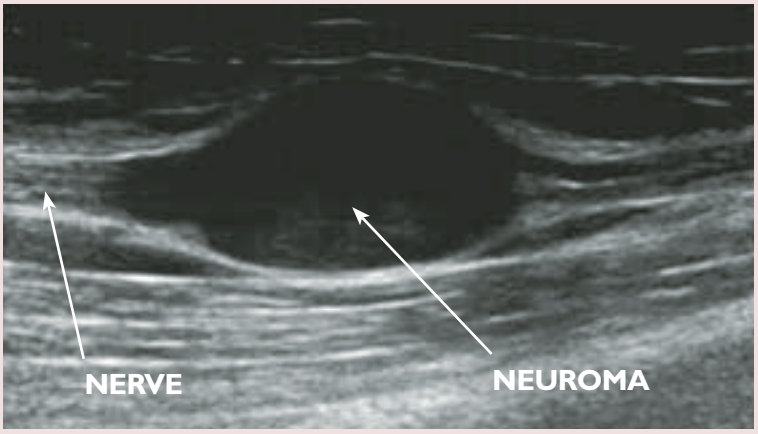

Figure Two: Neuroma

NCS & EMG from page 1

prognosticating on the necessity and response to surgery.

UTILITY OF EMG IN CERVICAL OR LUMBAR NERVE ROOT COMPRESSION

NCS are usually normal and are only useful for excluding peripheral neuropathies or focal nerve problems as a cause of the patient's symptoms.

EMG changes are the most important. The EMG is an important addition to MRI and CT and gives functional information about the nerve root. The changes are seen in proximal and distal muscles innervated by that nerve root but only if the underlying axon is damaged. If the compression is less severe, only the myelin sheath may be pressured and the EMG would then be normal.

SUMMARY

EMG/NCS are the gold standard for diagnosis of peripheral nerve and primary muscle disorders. They are underutilised in the assessment of diseases of the spine. ***Complete assessment of the peripheral nerve system requires appropriate and high quality EMG/NCS.***

Dr Melinda Pascoe, Neurologist, Neurophysiologist. Neurology Choice, Pacific Private Clinic

Expanded Reporting Service

New Virtual Reporting Centre enhances radiologist skills and turnaround times on the Gold Coast.

GCMI's network partner I-Med, recently opened their first Virtual Reporting Centre (VRC) in Melbourne. The VRC's state-of-the-art teleradiology technology will assist our local radiologists in managing workload and providing additional resources which will have a number of benefits for our referrers and "waiting" patients.

GCMI believes that the VRC will enable it to offer a superior medical imaging service, which includes the following:

* Enhanced turnaround time for "waiting" patients.
* The ability to seek a second opinion.
* Increased opportunity to access a radiologist who has a particular sub-specialty.

The good news is that you do not have to change your current booking process. You will continue to refer patients as normal.

The VRC in Melbourne will initially operate Monday to Friday from 8.30am to 6.00pm Eastern Standard Time. These hours of operation will be reviewed regularly and modified to meet demand.

Only radiologists who meet the following criteria will be employed in the Reporting Centre:

* Have a comprehensive and proven set of general skills with a sub-specialty.
* Flexibility to work only part time at the Centre as we have a fundamental belief that all radiologists need to maintain a proportion of "hands on" radiology.
* Fulfils all the RANZCR and state registration requirements.

The radiologists working in the Reporting Centre include:

* Dr Darren Lockie, a breast specialist who will work two days per week in the Reporting Centre, one day at Latrobe Breastscreen and one day at Monash Breastscreen.

* Dr Jeremy Frank, a senior radiologist with general skills and a sub specialty in multi-slice CT, especially in abdominal, vascular and thoracic imaging. Currently the consultant is in charge of CT in a major metropolitan hospital with extensive experience in electronic imaging.

* Dr Logendra Naidoo, a senior radiologist who has held various positions in South Africa and Australia including the Royal Melbourne and Children's Hospitals and until recently was a partner in a Melbourne private practice for approximately 20 years.

* Dr Mark Cooper who works in private and public practice in Melbourne. Mark has special interests in musculo-skeletal ultrasound and breast imaging.

* Dr Marcus Mykytowycz is the director and radiologist of Northern Imaging Group in Tasmania with a sub-specialty in vascular interventional radiology.

Resumés of all Reporting Centre radiologists are available on request and via the I-Med website (www.i-med.com.au).

Centre radiologists will be encouraged to communicate with referring doctors to discuss cases just as local radiologists do now.

New Radiologists

GCMI has been busy of late recruiting some of the country's most promising new radiologists. Dr Tony Cullen and Dr Ruben Krishnananthan bring new and extensive skills to the existing GCMI team, resulting in the provision of a higher quality imaging service.

Dr Cullen and Dr Krishnananthan have comprehensive skill sets across all modalities of radiology with special interests in:

Dr Tony Cullen

- breast imaging
- interventional radiology
- head and neck imaging
- oncological imaging

Dr Ruben Krishnananthan

- musculoskeletal MRI
- musculoskeletal interventional radiology
- oncological imaging

New Client Relations Team Member

GCMI and Tweed Valley Radiology (TVR) are pleased to welcome Karen Wicks to the Client Relations team. Karen began working for TVR as a receptionist in September 2003 at the South Tweed Heads clinic and transferred to Client Relations in January 2004.

Karen will be visiting referrers in the area from Palm Beach to Byron Bay. GCMI and TVR are confident that Karen will prove to be a great asset to the region and provide you with exceptional service.

Karen can be contacted on (07) 5588 3702.

Peripheral Insertion of Central Catheter (PICC)

Peripherally Inserted Central Catheters (PICC) are commonly used in patients with poor venous access and in patients who will require long term intravenous access for antibiotics or other chemotherapeutic agents. Insertion of a PICC line is achieved using local anaesthetic and can be performed by our interventional radiologists as an outpatient procedure in GCMI's Southport and The Tweed Hospital clinics.

Following injection of local anaesthetic a suitable vein, preferably above the elbow of the dominant arm, is punctured under ultrasound guidance. The catheter tip is positioned in the distal Superior Vena Cava just above the Right Atrium. Correct position is confirmed fluroscopically and/or by x-ray.

The catheter is secured to the skin by either a self adhesive fixation device or sutures.

A hub provides future access for intermediate to long-term infusion of antibiotics and certain chemotherapeutic agents. When it is not being used the PICC should be flushed once a week to reduce the risk of blockage.

For more information please call our radiologists at GCMI Southport on (07) 5591 5422.

Figure One: Locating the vein under ultrasound guidance

Figure Two: Inserted PICC line

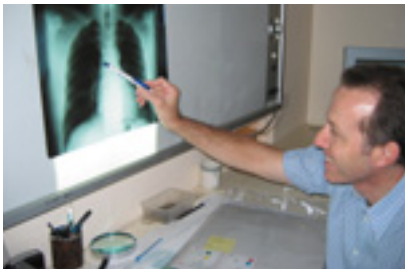

Figure Three: Fluroscopy/x-ray confirms placement of catheter tip

Shared Care Program Bulk Billed

GCMI and TVR bulk bill all obstetric ultrasounds for patients in the Antenatal Shared Care program at the Gold Coast and Tweed Hospitals.

All pensioners and health care card holders will also have all obstetric ultrasounds bulk billed.

TO ASSIST US IN ENSURING THE RELEVANCE OF TOPICS COVERED IN FUTURE EDITIONS OF **IMAGING UPDATE**, WE LOOK FORWARD TO YOUR FEEDBACK ON THE FOLLOWING:

1. DO YOU HAVE ANY COMMENTS RELATING TO **IMAGING UPDATE**?

2. WHAT TOPICS WOULD BE OF INTEREST TO YOU IN FUTURE EDITIONS OF **IMAGING UPDATE**?

3. WE WELCOME THE OPPORTUNITY TO SHOWCASE OUR STATE-OF-THE-ART FACILITIES. WOULD YOU LIKE US TO CONTACT YOU TO ARRANGE A TOUR AT A TIME THAT SUITS YOU? ☐ YES ☐ NO

Name: Practice:

Address:

Phone: Fax: Email:

Speciality/Interest:

PLEASE NOTE THAT THE INFORMATION COLLECTED IN THIS FORM WILL BE USED FOR GCMI PURPOSES ONLY.

☐ PLEASE DO NOT SEND ME FUTURE ISSUES OF **IMAGING UPDATE**

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