A Lady with Dysarthria

Speaker: Siu CY
Chairman: Leung CS

Caritas Medical Center
• 65/F
• ADLI, walk unaided
• Live alone in Public Estate
• Retired factory worker
• PMH
  – Pneumonia 2009
  – Dyspepsia, OGD 2009: gastritis
  – Insomnia
• Medication
  – Pepcidine 20mg BD, Xanax 0.25mg nocte PRN
Jan 2010 (OPD)

• C/O Right upper limb weakness x 2 weeks
  – Subacute onset
  – No slurring of speech/choking
  – No numbness
  – Walk unaided

• P/E
  – BP 118/59
  – Rt upper limbs power 5-, other limbs power full
Jan 2010 (OPD)

- Blood test CBC, L/RFT, TFT normal
- CT brain 2/2010: NAD
- Right upper limb weakness better in the later follow up.
- Defaulted follow up since 2/2010 then
Nov 2010 (Admission)

- Admitted for right upper limb weakness for 4 days
- Mild right Lower limb weakness
- Association with slurring of speech and choking.
- Able to walk unaided
- Association with palpitation, dizziness, subjective dyspnoea on exertion. No chest pain
Nov 2010 (admission)

• P/E
• BP 163/76
• Chest clear, HS dual no murmur, abdomen soft non tender
• Mild dysarthria
• 4 limbs power full, sensation intact, jerk normal
• No cerebellar sign
Nov 2010 (Admission)

- CXR clear, ECG sinus rhythm
- CT brain: small hypodense area over Lt caudate can be due to lacunar infarct
- Repeat BP 130/70
- Bl test: fasting glucose 4.3, LDL 2.62
- Other blood test also essentially normal
- XR C spine: mild degenerative changes
Nov 2010 (Admission)

- Treat as minor stroke
- Aspirin added
- Seen by speech therapist: no choking, suggested DAT
- EMS 20, BI 100
- Discharge on Day 3 of admission
Apr- Sept 2011 (OPD )

• C/o Progressive worsening of slurring of speech in subsequent follow up 4/2011
• Also c/o increase choking on thin diet
• FEES done 6/2011:
  – Vocal cord function normal, no pharyngeal delay
  – Medium thickened fluid for 2 spoons and mild thickened fluid given for 1 spoon: penetration and aspiration seen.
  – Moderate residual seen in pharynx and not clear by multiple swallows
• Put on thickened diet
Apr-Sept 2011 (OPD)

• Sept 2011
• On thickened diet with fair swallowing ability
• Increase Right upper limb weakness
• Live alone
• Difficult to do Household task, need help by friends.
• Still walk unaided and self bathing, dressing, and do simple cooking
• Refer GDH for further stroke rehabilitation.
Oct 2011 GDH

• C/o Progressive increase right upper limb weakness for months, decrease in muscle size.
• Associate with on and off neck pain.
• Further increase slurring of speech with easy choking.
• Lots of sputum especially at night, difficult to cough out at night and affecting sleeping.
Oct 2011 GDH

• **Social History:**
  – Live alone in Public estate in Sham Shui Po
  – Divorced with 3 Children, 1 son live in China.
  – Relationship fair only. They only occasionally visited her
  – Seldom go out alone this year. Household task help by a good friend.
  – Self bathing and toileting, doing simple cooking
  – Retired factory worker, Financially depends on own saving and some subsidies from daughter.
Oct 2011 GDH

- Feeling unhappy about the physical illness
- On and off crying
- Poor relationship with children
- No suicidal idea
Oct 2011 GDH

• Physical examination
  – BP 105/55, pulse 75
  – BW 38.2kg BMI 16.6
  – Right proximal upper limbs power 4, distal upper limb power 3
  – Muscle wasting over right hand
  – Lt upper limbs, bilateral lower limbs power full
  – Sensation intact
  – Gait: walk unaided
  – Other system unremarkable
Oct 2011 GDH

- EMS 15/20, BBS 41/56, FR 9”
- MRMI 34/40, MFAC 5
- TUGT 20s
- BI 73/100
- Feeding I, Dressing/grooming/toileting Standby Assistant,
- Bathing Slight Assistance
- FTHUE level 4
- AMT 10/10
- GDS 13/15
Imp: Recurrent CVA with Rt upper limb weakness and dysarthria, swallowing problem, mood problem

- Limb power and hand function training, ADL training
- Refer Speech therapist for Swallowing problem
- Refer psychiatrist for mood problem
- Caring problem
- Refer orthopedic x ?cervical myelopathy
Oct 2011 OLMH

- Admitted EMW for multiple non specific complain including dizziness, vomiting, cough, sputum, poor appetite.
- Express low mood
- According to daughter, patient repeated attend AED and GP for minor problem
• Transfer from EMW to OLMH for further management
  – Poor relation with children
  – Further low mood due to bulbar problem and deteriorating physical condition
  – Difficult to communicate with others due to dysarthria.
  – Poor sleep and much saliva stasis in oral cavity
Oct 2011 OLMH

- Seen by Psychiatry: adjustment disorder
- Seen by MSW, Strongly refuse OAH for caring problem, decline home help service.
- Seen by speech therapist, able to tolerate thickened/minced diet
- Mood better and discharge
- Decline psychiatry follow up.
Nov 2011 Ortho OPD

- Not compatible with Cervical myelopathy clinically
- MRI cervical spine and Nerve conduction test (NCT) arranged.
Dec 2011 NCT result

- NCT done on 12/2011 by orthopedics
- NCT of bilateral median and ulnar nerve shown normal sensory conduction while the right ulnar and median motor signal was markedly diminished and slow in conduction across the wrist while the left side motor also shown similar finding but better than right
Dec 2011 NCT result

- The right lower limb motor shown diminished signal and absent sural nerve signal while Left side is normal
- Comment: upper limb sensory test was normal, unlikely due to entrapment or polyneuropathy
- EMG: all normal
- Imp: Disuse atrophy after Stroke
Nov- Dec 2011

- Cont’d training in GDH
- Mood improving
Summary

- Labelled recurrent CVA
- Right upper limbs weakness with dysarthria and swallowing problem
- Progressive worsening
- No cardiovascular risk factor
- NCT/EMG (by ortho) suggested Disuse atrophy after Stroke
Nov-Dec 2011 GDH

- Notice to have tongue fasciculation and wasting.
- Case discuss with neurologist
- Await MRI Cervical spine, MRI brain and brain stem added
  - Appointment 1/2012
Jan 2012 Admission

• Admitted x Slip and fell with right shoulder contusion while doing exercise at home
• No history of fall before
• Also c/o worsening swallowing, slurring of speech and frequent sputum retention
Jan 2012

• P/E
  – dysarthria++
  – Rt Upper limb power 3
  – Lt upper limb/bilateral lower limb power 4
  – Sensation all intact
  – All jerk brisk+
  – Generalize muscle wasting especially bilateral small muscle wasting+
  – bilateral ankle clonus+
  – Tongue fasciculation +
Jan 2012

- MRI Cervical spine+brain+brain stem:
  - No cord or nerve root compression
  - No brain and brain stem lesion or infarct
Jan 2012

- NCT and EMG repeated by neurologist
- NCT
  - Small CMAPs of Rt median, Rt ulnar and Lt peroneal nerves.
  - Motor conduction velocities were normal and no conduction block was found
Jan 2012

- EMG
  - Lower limb muscle were unremarkable.
  - EMG of Rt biceps revealed increase insertional and spontaneous activity, unstable MUAPs and increase in polyphasia. These findings signify the possibility of early active denervation changes.
Jan 2012

- Overall comment
  - Low CMAPs found in the nerve conduction study were related to muscle wasting. The active neurogenic changes noted in the EMG raise the suspicious of *anterior horn cell* disease but it is only noted in the upper limbs.
Differential Diagnosis

• Recurrent CVA with decondition and progressive weakness
• Cervical myelopathy
• Motor neuron disease
• **Diagnosis:**

Motor Neuron disease
Jan 2012

- Aspirin off
- Severe dysarthria
- Fail swallowing test
- Reviewed by speech therapist
  - Severe hyperkinetic dysarthria
  - Moderate to severe oropharyngeal dysphagia
  - Suggested D puree diet + thickener, PEG feeding in long run.
• Diagnosis and prognosis of motor neuron disease explained to patient and patient’s daughter
Problem

• Felt frustrated towards communication barrier due to dysarthria
• Difficult on swallowing, and she refuse Ryle’s feeding or PEG feeding.
• Lot’s of saliva and difficult for swallowing, leading to easy saliva retention
• Caring problem
Progress

• Once develop tearing in ward with low mood
• Worry about caring problem
• Seen by psychiatry.

Adjustment disorder, mood was easily affect by the rehabilitation progress.
Progress

• Artane 1mg BD was added to decrease oral secretion.
• Poor social support as fair family relationship only
• Refuse home-help service. Want to prepare congee by herself.
• Support from friend, help for marketing and household task
Progress

- Walk unaided in ward
- Mood improved and decline psychiatry follow up
- Discharge and continue training in GDH
Feb 2012 GDH

- Plan return to China for long term caring and management by son
- Discharge from GDH
- Walk unaided with supervision
  BI 98 with ADL up to self bathing
Motor Neuron Disease
Introduction

• Motor neuron disease (MND) is a progressive, incurable neurodegenerative disorder, that causes muscle weakness, disability and eventually death.

• Motor neuron disease is the preferred term in UK

• In US, Amyotrophic lateral sclerosis (ALS) and MND sometimes used interchangeably.
Epidemiology

• Incidence of the disease is 1.-2.7 in 100000/year in Caucasian
• Prevalence rate from 2-7/100000.
• Incidence of MND is positively correlated with age until 74 years old and decreases thereafter.
• Male: Female 1.3/1
• Mean survival times from onset of disease: 32.6 months

Variations of the incidence of MND according to age.

Variations of MND mortality according to age.
Epidemiology

• Study from Taiwan 2008
  – Incidence 1.05 in 100000/year
  – Incidence rate tended to increase with age, peaked in the ranges of 65-69 years in men and 70-74 years in women.

Epidemiology – Hong Kong

• From 1997-2002, 120 cases identified
• Average age of onset was 58.76 years,
• Peak age of onset was 60-64 years without sex difference
• Incidence rate 0.6 in 100000 per year
• Prevalence 3.04/100000

Fong GC. An epidemiological study of motor neuron disease in Hong Kong. Amotroph latateral scler other motor neuron disord 2005;6:164-8
Epidemiology

- Sporadic in 90% of cases, about 10% are familial.
- Predominantly affects middle aged and elderly people.
Epidemiology in elderly

- Scotland 1989-1998
- 135 of 1226 cases were aged 80 years old or older. (11%)
- 43% were men.
- Incidence was 10.2/100000 in male and 6.1/100000 in female.
- 50% had bulbar onset, more likely in older people (OR 1.5)
- Median survival from first symptoms was 1.7 years, less than younger patient (p=0.0003)
- Increasing age at onset predicts worse survival.

R.B Forbes: The Epidemiology of amyotrophic lateral sclerosis (ALS/MND) in people aged 80 or over. Age and Ageing 2004;33:131-134
Risk factor

• The only established risk for MND are age and family history
• Some evidence suggested that smoking is also a risk factor
• Other risk factor including military service, heavy metal exposure, heavy manual labor etc suggested but weak or conflicting evidence.
Pathophysiology

• MND are characterized by selective degeneration of motor neurons, including the pyramidal fibre in the cerebral cortex, motor neurons in ventral horn cells, and cranial motor neurons.
Pathophysiology

- Additional pathologic findings may include a loss of frontal or temporal cortical neurons, particularly in ALS with frontotemporal dementia.
- Intracellular inclusions in degenerating neurons and glia are frequent neuropathological findings of MND.
- TDP-43 has been identified as major component of inclusions in sporadic MND.
Pathophysiology

• SOD1 gene mutations have been found in ~20% of individuals with the inherited forms of amyotrophic lateral sclerosis.

• SOD1 gene encodes for the enzyme superoxide dismutase, a free radical scavenger that reduce cellular oxidative stress throughout the body.
Spectrum of MND

• Amyotrophic lateral sclerosis (ALS)
  – Most common
  – Involve both upper and lower motor neurons.
  – Both anterior horn cell and corticospinal tract dysfunction
Spectrum of MND

• Progressive muscular atrophy (PMA)
  – Only lower motor neuron involvement.
  – Slightly more common in men,
  – Earlier mean age of onset
  – Better prognosis than ALS
  – 4%

• Primary lateral sclerosis
  – Only upper motor neuron degeneration
  – Better prognosis than ALS
  – 2%
Spectrum of MND

• Progressive bulbar palsy
  – Progressive upper and lower motor neuron disorder of cranial muscle
Spectrum of MND

• May or May not progress to ALS
Clinical features

• The loss of motor neurons results in primary clinical symptoms and signs of MND.

• Classic MND tends to be focal in onset, with a particular group of muscles affected first.

• Asymmetry limb weakness ~80%
Clinical features

• Mixture of upper and lower motor neuron features
Clinical features

• Upper motor neuron symptoms
  – Spastic tone, hyperreflexia
  – Slowness of movement, stiffness, spastic gait, poor balance
  – Spastic dysarthria,
  – Dysphagia due to slow and discoordinated contraction of swallowing muscle
  – Emotion liability

• Lower motor neuron symptoms
  – Muscle atrophy, fasciculation, weakness
  – Profound weakness. Affect daily ADL, gait
  – Dysarthria result from weakness of tongue, lips or palate. Hoarseness caused by vocal cord weakness.
  – Dysphagia results from tongue weakness, disruption of oral phase/pharyngeal phase/both.
Clinical features

- Limb, bulbar and respiratory onset
Clinical features – limb onset

• In the upper limbs
  – early symptoms are most commonly due to asymmetrical distal weakness, causing patients to drop objects or turning keys etc.
  – Wasting of intrinsic small muscles of hands is common.

• In the lower limbs
  – Early symptoms include foot drop, sensation of heaviness of one or both legs.
  – Wasting of tibialis anterior
Clinical features – bulbar onset

- 20%
- Slurring of speech due to impaired tongue movement. Wasting and fasciculation of tongue.
- Dysphagia tends to occur later.
- Pseudobulbar palsy. Emotional liability, as inappropriate laughing or crying.
Clinical features – Respiratory onset

• Respiratory muscle affected first.
• 1-3%
• Presented with dyspnoea and orthopnoea.
• More subtle clinical features resulting from hypoventilation overnight, including frequent waking, unrefreshing sleep, hypersomnolence and early morning headache.
Clinical features

- Progressive disorder
- Spread within the segment of onset and then across multiple spinal and cranial segments.
- Unilateral arm => Contralateral arm => Ipsilateral leg => Contralateral leg
- Progressive to neuromuscular respiratory failure and dysphagia.
- Respiratory failure is the most common cause of death.
Investigation

• Blood test
  – Thyroid Function test to exclude hyperthyroidism - manifest clinically with weakness, fasciculation and hyperreflexia
  – Vit B12 – Combined dengeration of spinal cord
  – Creatine Kinase- Rise in polymyositis, inclusion body myositis.
  – Serum protein electrophoresis with immunofixation – rule out monoclonal gammopathy. Patient with lymphoma may present with motor neuropathy.
Investigation

• MRI brain and cervical spine
  – Intracranial lesion
  – Cord compression
Investigation

• Nerve Conduction test
  – Sensory and motor nerve conduction test most often normal
  – Compound motor action potential (CMAP) amplitudes may be reduced in severely atrophic and denervated muscles.
  – Motor conduction block should be absent. (multiple focal motor neuropathy, demyelinating disease)
  – Motor conduction velocity should be normal or may be mild slowing
  – Sensory amplitude and velocities should be normal.
Electromyography (EMG)

- Features of acute and chronic denevation or reinnervation.
- Acute denevation: fibrillation and positive sharp waves.
- Chronic denevation and reinnervation: large amplitude, long duration, complex motor unit action potential (MUAPs) with neurogenic recruitment and reduce interference pattern.
- Fasciculation potential may appear in denervated muscle.
Investigation

• EMG abnormalities are not pathognomonic for the disease, can be seen in any disease causing chronic and ongoing denervation.

• Diagnosis of MND should be suggested by the observation of similar abnormality in many muscles of proximal and distal limbs, in the absence of radiological demonstration of corresponding nerve root compression considered significant enough to cause the abnormality.
Diagnosis

• No single test can make a definitive diagnosis of MND
• Clinical evaluation supported by electrophysiological confirmation.
• Clinical criteria
Revised El Escorial Criteria

- **Definite ALS**
  - UMN and LMN in Three region

- **Clinically definite ALS - Laboratory supported**
  - UMN and/or LMN signs in one region + Carrier of gene mutation

- **Clinically probably ALS**
  - UMN and LMN signs in two region with some UMN signs rostral to LMN signs

- **Clinically probably ALS - Laboratory supported**
  - UMN signs >= 1 region + LMN sign defined by EMG in two region

- **Clinically possible ALS**
  - UMN + LMN sign in one region or UMN sign in at least two region, or
    UMN and LMN sign in two region with no UMN signs rostral to LMN sign

***Regions: bulbar, cervical, thoracic, lumbosacral***

Awaji criteria

TABLE 3. Awaji-shima consensus recommendations for the application of electrophysiological tests to the diagnosis of amyotrophic lateral sclerosis*

<table>
<thead>
<tr>
<th>ALS</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinically definite ALS</td>
<td>Defined by clinical or electrophysiological evidence by the presence of LMN as well as UMN signs in the bulbar region and at least two spinal regions or the presence of LMN and UMN signs in three spinal regions</td>
</tr>
<tr>
<td>Clinically probable ALS</td>
<td>Defined by clinical or electrophysiological evidence by LMN and UMN signs in at least two regions with some UMN signs necessarily rostral to (above) the LMN signs</td>
</tr>
<tr>
<td>Clinically possible ALS</td>
<td>Defined when clinical or electrophysiological signs of UMN and LMN dysfunction are found in only one region; or UMN signs are found alone in two or more regions; or LMN signs are found rostral to UMN signs. Neuroimaging and clinical laboratory studies will have to be performed and other diagnoses must have been excluded</td>
</tr>
</tbody>
</table>

* ALS denotes amyotrophic lateral sclerosis, UMN upper motor neuron, and LMN lower motor neuron

- Equivalence of clinical and electrophysiological test finding in establishing neurogenic changes in body regions.
- Improving the sensitivity
Prognosis and factor

- Median survival time from onset to death ranged from 20 to 48 months, only 10-20% survived longer than 10 years.
- Poor prognostic factor
  - Bulbar form of MND correlated with a more rapid neurological impairment.
  - Advanced age at symptoms onset.
  - Lower than predicted forced vital capacity (FVC).
  - Low BMI.
Treatment

- Disease-modifying treatment
- Symptomatic treatment
Disease-modifying treatment
Riluzole

- Only disease-modifying drug approved for treating MND
- Glutamate release antagonist.
- Prolongs survival by 3 months after 18 months of treatment.
- May have little effect in advance MND. Not recommend for patient have tracheostomy required for ventilation.
Riluzole

• The precise mechanism of action is unclear, thought to reduce glutamate induced excitotoxicity.
Riluzole

• Common side effect: GI upset, and fatigue
• Liver function need to be regularly monitored. Treatment should be stopped if liver enzyme exceed 5 times of upper limit of normal.
Symptomatic treatment

1. Respiratory management
2. Nutritional management
3. Sialorrhoea
4. Pseudobublar emotional labiality
5. Spasticity and cramps
6. Pain
Respiratory management

- Caused by respiratory or bulbar muscle weakness
- Aggregated by aspiration and pneumonia.
- Pneumonia is responsible for majority of death
- Early recognition of dyspnoea and hypoventilation is important as mechanical ventilation can be initiated as early as possible which showed to prolong survival.
Respiratory management

• **Respiratory symptoms**
  – Spirometer for assessment of early respiratory symptoms.
  – Forced vital capacity was shown to be a significant predictor of survival in MND.
  – Decrease in Vital capacity to 50% predicted associated with respiratory symptoms.
  – Insensitive for detecting problems due to bulbar dysfunction.
Respiratory Management

• Hypoventilation
  – Elevated blood CO2 and bicarbonate => late finding
  – Sleep studies with overnight oximetry can reveal nocturnal desaturation.
  – Full polysomonomography is sometimes required to differentiate obstruction sleep apnoea from hypoventilation.
Respiratory Management

• Secretions in the upper and lower airway are difficult to handle, increase risk of aspiration.
• Patients and carers are encouraged to learn the technique of assisting expiratory movement.
  – Manual assisted cough
  – Home suction
• Alteration in food texture.
Respiratory Management

- Non invasive ventilation (NIV) is considered before invasive ventilations or tracheotomy.
- Prolong survival and improved quality of life, except in patients with poor bulbar function

Respiratory Management

- No trial to evaluated the indication for initiating NIV.
- Intervention is usually recommended if respiratory symptoms develop or when FVC <50% predicted.
- Patient with cognitive problems, moderate to severe bulbar disease or failure to clear secretions should be consider for invasive ventilation.
- It requires frequent tracheal suction and multidisciplinary team care.
- Patient and caregiver should be fully informed of the burdens and benefit of this option.
Nutritional management

• Malnourished MND patients are prone to respiratory decompensation and worsening of quality of life.
• Difficult in mastication and swallowing
• Prone to choking and aspiration
• Regular assess by speech therapists
Nutritional management

- Initial management of dysphagia include modification of food and fluid consistency.
- Enteral feeding by Percutaneous endoscopic gastrostomy (PEG) is considered if patient is not fit for oral feeding.
- No evidence to prolong live or improve quality of life.
- Stabilizing body weight/BMI.
- Some guideline recommend that to start PEG feeding when FVC is above 50% predicted so as to minimize the risk of respiratory complication.
Sialorrhoea

- Excessive saliva
- Facial muscle weakness and reduce swallowing ability
- Increase chance of aspiration
- Drug: amitriptyline is commonly used.
- Botulinum toxin injection into salivary gland to reduce saliva production.
- Low dose Radiation therapy to salivary glands.
Pseudobulbar emotional labiality

- Pseudobulbar affect in MND includes excessive laughing, crying and involuntary emotional expression disorder
- Affect close to 20-50% of MND patient, more prevalent in cases of bulbar form.
- Bilateral corticobulbar tract degeneration
- Drug: Dextromethophan-quinidine.
Spasticity and cramps

- Spasticity and cramps can cause pain and impair function in MND
- Treatment options: stretching exercise, hydrotherapy
- Drug Treatment: baclofen may be useful
Pain

- Pain is common in MND patient, due to muscle spasm and muscle spasticity.
- Skin break down and musculoskeletal pain
- Attentive nursing care
- Analgesics
Multidisciplinary management

• Multidisciplinary team management to deal with problem of MND patient.
• Doctor, nurse, physiotherapist, occupational therapist, speech therapist, psychologist, social worker.
• Prolong survival and better quality of life.
Palliative care

• Despite a focus on helping patient to live with motor neuron disease after diagnosis, the disease with progress.

• Palliative care to maximise patient’s quality of life and that of family, by relieving symptoms and psychological support

• To improve the quality of dying and death.

• End of life decision

• Advance directive.
Summary

- Motor neuron disease is an incurable illness which lead to progressive paralysis and eventual death.
- Clinical diagnosis support by electrodiagnostic studies.
- Riluzole and Non invasive ventilation can prolong survival.
- Symptomatic treatment
- Multidisciplinary management.
Thankyou