Fig. 6.—Complex motor unit potential. Associated with reinnervation (facial palsy) (milliseconds time scale).

Fig. 7.—Motor units in myasthenia gravis after fatigue (milliseconds time scale).

Fig. 8.—Fibrillation action potentials (milliseconds time scale).

in motor neurone disease, etc., is not detectable in dystrophia myotonica.

Synchronization of Motor Unit Activity

In normally innervated muscle the contraction of motor units is asynchronous, thus providing for the smooth contraction of voluntary muscle. Thus if two needle electrodes of a double channel electromyograph with differential amplifiers are inserted into two different motor units the timing of the motor unit potentials appears out of phase. In myelopathic lesions (notably acute anterior poliomyelitis) Buchthal and Clemmesen (1943) described synchronous activity of motor units detectable by three needle electrodes. This, they suggested, was due to the spread of nervous impulses to contiguous neurones. An alternative explanation has been suggested by Denny-Brown (1944), who has suggested that apparent synchronization is due to the detection by two or more needle electrodes of the same, often large, motor unit due to uncovering of this unit by loss of the small motor units. Whatever may be the explanation the occurrence of 'synchronization' in myelopathic lesions and its rarity in normal muscles or in peripheral nerve lesions is undoubted.

To sum up, therefore, clinical electromyography, although in its infancy, is of proven value in peripheral nerve lesions in that it can provide evidence of nerve damage, recovery and retention of any function before these phenomena can be estimated clinically. Although less is known about the electromyographic appearance in other diseases, the detection and recognition of potentials and their relative preponderance yields information unobtainable by other methods. It is usefully

combined with the use of intensity-duration curves described elsewhere in this issue.

I wish to thank Dr. P. Bauwens, physician in charge of the Department of Physical Medicine, St. Thomas's Hospital, for permission to publish the pictures of muscle potentials illustrating this article, which were taken from departmental records. They were obtained by photographing cathode ray tube traces of the muscle potentials after recording on magnetic tape.

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3. Case Report:

Facial Nerve Palsy

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A man, aged 61, was first seen in May 1948, giving a history of discharge from both ears since 1917, when he was torpedoed, with recent pain in the right ear, unsteadiness and a right facial palsy in the lower half of the face which had been present

for ten days. Examination showed a complete palsy of the lower half of the right side of the face, with an incomplete palsy of the upper half; there were large perforations of both drumheads, with foetid discharge from the right ear and marked deafness.

He was admitted to hospital with a diagnosis of bilateral chronic suppurative otitis media, right facial palsy and right labyrinth irritation. A right radical mastoidectomy was performed. He was then referred to the physiotherapy department for investigation and treatment of the facial palsy. The findings were reported thus:—

‘The muscles respond to faradic stimulation—there is now voluntary movement in the upper part and to a lesser extent in the lower part of the face on the right side. Treatment consisting of faradic stimulation and exercises will be given and recovery should be rapid.’

Four weeks later the facial movements appeared normal and the patient was discharged from hospital. Two weeks later the right ear was dry.

The patient was readmitted one month later complaining of a persistent right-sided temporal headache. The mastoidectomy cavity contained granulations and was discharging pus. His symptoms subsided with treatment to the ear cavity; there were no signs of involvement of the central nervous system, and he was later issued with a hearing aid.

In January 1949, nearly seven months after the recovery of his facial palsy, he was readmitted with a recurrence of the palsy. He also had a right-sided temporal headache, an enlarged and tender retromandibular gland, and the mastoidectomy cavity contained foetid granulations. The facial palsy was reported on thus:—

‘The right side of the face shows a weak faradic response in all muscles supplied by the facial nerve. Faradism and exercises to the affected muscles are to be resumed.’

Examination of the central nervous system showed no abnormality and the patient was put on penicillin therapy (total given 3,150,000 units); the right mastoid cavity was reopened and the granulations curetted. There was no evidence of cholesteatoma.

The patient made a good recovery but there was no clinical improvement in the facial palsy. He was discharged from hospital in February and attended as an out-patient.

During the next three months the right facial nerve showed no sign of recovery in spite of treatment, and accordingly an electromyogram was undertaken. The patient was readmitted in May for a right tarsorrhaphy. There was still much

foul-smelling discharge from the right ear. An X-ray of the right mastoid area showed the operation cavity, as well as an area of rarefaction in the petrous bone mainly in the peri-antral region extending towards the apex.

Electromyogram Report

‘Electrical reactions showed a slight faradic response in the levator anguli oris and orbicularis oris and a sluggish weak galvanic response in all muscles supplied by the facial nerve. An electromyogram has been done and shows *fibrillation indicating denervation* in the right frontalis and levator anguli oris muscles.

‘Putting these results together, there is a true reaction of degeneration. This being so, it is recommended that surgical intervention be considered as *the prognosis for the facial nerve is otherwise hopeless.*’

The right mastoid was explored again in June, when the old mastoid cavity was found lined with diseased mucosa. The petrous part was found filled with soft diseased bone, which was removed, and a specimen of mucosa and bone was sent for section.

Pathological Report

‘Decalcified sections show a fairly well differentiated squamous cell carcinoma. The malignant tissue is surrounded by fibrous tissue. There are numerous eosinophils, some within the malignant tissue. Numerous isolated cell nests consisting of malignant cells are seen lying free in the fibrous tissue.’

The patient was transferred to the Royal Cancer Hospital for radiotherapy in July, and was seen again in the out-patient department in August, having received a dose of 5,600 r. by radium bomb. The facial palsy was still present, with some discharge from the mastoid cavity.

Summary

A case of chronic otorrhea with facial palsy is reported in which the palsy, having rapidly recovered following a radical mastoidectomy, recurred seven months later and showed no sign of recovery. Electromyography indicated denervation and together with the electrical reactions gave a hopeless prognosis. Further exploration of the mastoid cavity and histological examination of material removed revealed a squamous cell carcinoma.

I would like to thank Mr. F. C. Ormerod for permission to publish this case, also Dr. Basil Kiernander, Dr. Kenneth G. Rotter and Dr. H. A. Lucas for their help and advice.