



FACIAL PARALYSIS: ISSUES AND TIPS FOR REHABILITATION

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PREFACE

Dear Sir/Madam, this booklet intends to provide you with some useful information on the problem you are experiencing. You have already obtained some indications from your specialist doctor, others may be useful for an effective rehabilitation process.

BRIEF INTRODUCTION

The face has a rich motility and represents the most immediate approach to other people; an alteration to "normal functionality" involves a discomfort that does not pertain only to the "motor deficit" but also to the communicative sphere with predictable and very frequent repercussions on the emotional and psychological level. The face is a reference which we all use to recognize faces and images since our first days of life. In fact, we are able to satisfy this "primary" need by focusing attention on what can be defined as the "key points" of communication, i.e. eyes and mouth.

The increase in knowledge on the clinical evolution of this complex pathology is leading to a more correct therapeutic orientation from a pharmacological and surgical point of view, according to the evidence in the scientific literature. At the same time there has also been an evolution of the rehabilitation approach.

A BIT OF HISTORY

The phenomenon was already known at the time of the Egyptians, Romans and Incas, as demonstrated by numerous pictorial and sculptural findings. We owe to the Arab physician and philosopher Avicenna, who worked in Persia before the year 1000, the discoveries concerning a difference between peripheral and central paralysis. The appellation of "Bell's palsy", however, is linked to Sir Charles Bell, a British surgeon, anatomist, neurologist who described the innervation of the muscles and skin of the face in 1830.



Figure 2. Man's head with facial paralysis. Smyrna, 2nd century AD. (Source: Internet)

FACIAL INJURY. WHAT ARE WE TALKING ABOUT?

CAUSES

Facial paralysis can have multiple causes:

- **Bell's palsy**, is the most common form of facial paralysis. It is a peripheral neuropathy that can occur at any age, although it is much more common after the age of 60. The precise cause is unknown; it is believed to be the result of inflammation of the facial nerve which controls the muscles on one side of the face, possibly triggered by a viral infection. Its incidence varies between 15 and 40 cases per 100,000 inhabitants per year. Recurrences are estimated to occur between 10 and 64% of cases and in 36% of cases they affect the same side¹.
- **Pathologies of neurological aetiology**: stroke, head trauma, progressive demyelinating diseases. In these cases the paralysis is defined as one of the "central" type
- **Tumours**: Acoustic neuroma and schwannoma are among the tumours that can cause facial paralysis. In this circumstance, multiple cranial nerves are often involved as occurs in acoustic neuroma or parotid tumours. Disorders (symptoms) can range from acute and persistent paralysis to slower and progressive one.²
- **Infections**: Some viruses, such as varicella-zoster, herpes simplex, and Epstein-Barr virus (EBV) can cause facial paralysis. Even Lyme disease, an infection caused by a bacterium, *Borrelia Burgdorferi*, transmitted to humans by tick bites, can cause bilateral facial paralysis, among other symptoms.
- **Traumas**: due to accidents or deep wounds

¹ For further information see the webliography (8,9)

² For further information see the webliography (8,9)

When two/three weeks from the onset there has been no sign of recovery, it is necessary to consult a specialist in Physical Medicine and Rehabilitation to start an adequate rehabilitation process as soon as possible.

Difference between central and peripheral paralysis

When the paralysis is peripheral, an entire half face is affected (fig. 3a) while, when it is central, only the lower part is affected (fig. 3b)

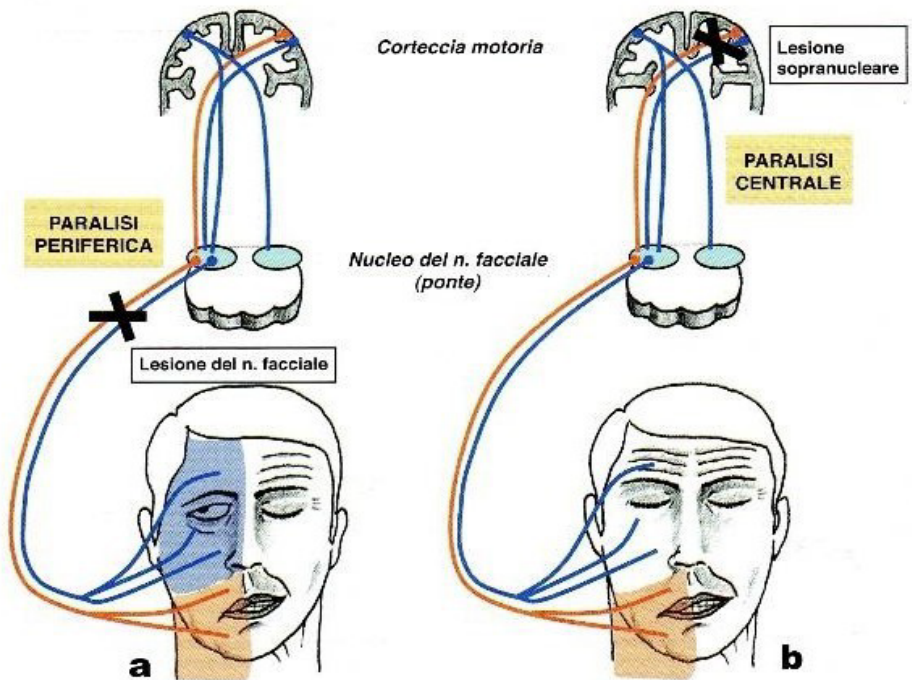


Figure 3) Depending on the level of the lesion, a) the whole half face is affected (e.g. in Herpes simplex); b) only the lower part (e.g. in stroke) (6)

What does the extent of the damage depend on?

The extent of the damage, to which the functional outcomes are linked, depends on the degree of impairment of the nerve which can range from more or less severe degrees of compression to interruption of the nerve fibre, as illustrated in figure 1.

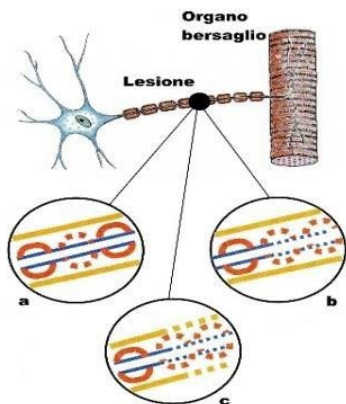


Figure 1. a) degree of mild compression, spontaneous recovery in 2-3 weeks; b) major impairment of the nerve fibre, recovery in a few months; c) complete lesion; surgery may be required (6, modified)

HOW DO YOU GET THE DIAGNOSIS?

For a correct diagnosis it will be necessary to proceed through a neurological examination and radiological imaging and laboratory investigations. In particular:

- Needle electromyography (EMG), which measures muscle electrical activity, provides information on damage to nerve branches after the onset of the disease and can subsequently document reinnervation (return of activity).
- Electroneurography (ENG) is a valid prognostic tool, even after 1-3 months. It measures nerve conduction velocity (sensory and motor components) and response amplitude from onset. Conduction velocity, which is a function of nerve fibre activity, tells us how recovery is going.

What happens when a person experiences peripheral paralysis?

Cranial nerve VII is essentially a motor nerve, with a sensory component carrying the gustatory innervation of the anterior $\frac{2}{3}$ of the tongue; consequently the disturbances will be almost exclusively of a motor type, with loss of voluntary and reflex responses, e.g. the wink. Sensitivity however, which is conducted by the trigeminal nerve, remains intact.

In the acute phase (flaccid), there is atony of the side of the face in the part of the lesion, with smoothing of the frontal wrinkles, drooping lower eyelid, smoothing of the nasolabial fold, lowering of the corner of the mouth.

On the injured side, atony will lead to difficulty in chewing, loss of fluids when drinking and brushing the teeth, loss of saliva and impaired verbal and non-verbal communication; increased sensitivity to high-pitched sounds and pain may also be present.

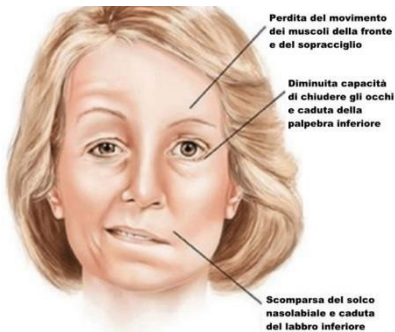


Figure 4. In peripheral paralysis, a clear asymmetry between healthy and diseased parts is also observed in the face at rest (Source: Internet, modified)

The typical and clearly visible manifestation of the disease is Bell's sign, which consists of the upward and outward rotation of the eyeball as the eyelids attempt to close. This sign becomes visible in peripheral paralysis due to lack of activation of the orbicularis and consequent failure of the eyelid to close. The outward fall of the lower eyelid due to atony can decrease the protection and hydration of the globe, not due to a lack of tear secretion, but due to the inability of the eyelid to hold back the tears produced. Without adequate precautions, the patient will run against the risk of infection and ulceration of the cornea.



Figure 5 (Source: Internet)

In a relatively short time there is generally a recovery, but complications may include an excessive increase in muscle tone (hypertonicity), and loss of selectivity in movements (appearance of synkinesis, i.e.

massive and involuntary movements: for example in chewing the eye is closed, or in closing the eyelids the corner of the mouth is stretched). Synkinesias, in their evolution, lead to the structuring of the spasm of the muscles, they do not have a spontaneous recovery, and indeed they tend to get worse. The so-called "crocodile tears phenomenon", lachrymation associated with chewing, is also frequent; all these phenomena are due to a reinnervation that occurred in a "random" way involving sites other than the physiological ones.

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Pharmacological treatment

1. **"Classic" pharmacotherapy** The therapy is based on the administration of cortisone, or an association between cortisone and antivirals in the most severe or complete forms of paralysis.³
2. **Botulinum toxin** If hypertonia develops, the pharmacological alternative consists in local infiltrative treatment with botulinum toxin in the muscle affected by the spasm or in the subcutaneous tissue. The toxin partially paralyses the muscle and relaxes it by reducing or even eliminating the spasms. The effect is temporary and lasts from 3 to 6 months, after which the treatment must be repeated.

³ For further information see the webliography (8)

REHABILITATION TREATMENT: some considerations

There are several rehabilitation approaches:

1. **Electrostimulation:** it is gradually being abandoned as it seems to compromise rather than facilitate the regeneration of the nerve fibre causing the establishment of permanent muscle contractures which are absolutely non-functional to recovery.
2. **Rehabilitation techniques:** the proposals vary from the analytical muscular approach of classical neuromotor re-education (e.g. Kabat methodology) to the request for expressive mimic production, to the treatment that refers to the neurocognitive approach as well as to the so-called "*Self-training*" pathways.

The limit of these approaches, with the exception of the neurocognitive one, is that they are always based on external stimuli or reflexes that do not refer to the strategies that neuroscience indicates as "facilitating" in the reacquisition of a movement and which require activation of cognitive processes such as memory, attention, the conscious perception of a tactile or motor stimulus, together with the ability to build an image of the movement to be performed.

Objectives of rehabilitation treatment

The diversity of pathological situations indicates the need of an individual rehabilitation project with an exercise program drafted on the needs of each patient. However, in general, some "gold standard" objectives can be identified to be considered valid for the generality of the situations, such as:

- recover the symmetry of the face at rest and in movement
- improve the quantity of movements, researching their quality (selectivity)

- act on the communicative, verbal and non-verbal aspects as well as on other functional aspects such as: chewing, sucking, retaining liquids
- prevent or learn to control complications

Caregiver training is provided as part of the rehabilitation program, if necessary.

The rehabilitation treatment in the Rehabilitation Department

In our Department we believe that an approach based on the physiological mechanisms of learning and therefore of motor learning should be preferred over other methodologies that look at a reflex activation of movement often causing annoying muscle contractions that hinder recovery.

The recovery addresses the functions of facial expressions as well as those of phonation, chewing and swallowing and aims to restore that complexity and refinement of movement that characterizes facial expressions, which is the main actor of all "non-verbal" communication as well as, as we know, an "irreplaceable" complement to verbal communication.

The recovery of facial functions is sought not only from the muscular point of view, but also from the cognitive and expressive functions. First of all, the person must acquire awareness: for example through movements guided by the therapist, often with the patient with his/her eyes closed, in order to facilitate the perception of the correct movement and guide him/her to a correct and as complete as possible recovery of information regarding a precise movement of the face.

The correct reacquisition first of perception and then of movement will avoid using compensation strategies that are "spontaneously" adopted by our body but which compromise the recovery of function. Precisely because of the relevance of the facial expression in interpersonal relationships, it is important that the recovery is as close as possible to physiological movements where the movement programming strategies are spontaneously activated and must instead be reacquired after the event.

Treatment frequency

Depending on the case, the patient will initially be followed up 2-3 times a week. Each session lasts 45 minutes.

Therapeutic proposals: some examples

Please find below some explanatory images of some exercises and tools used during the rehabilitation treatment.

Recognition of tactile surfaces

Surface-coated “tongue depressors” that are pleasant to the touch are used to restore equal perception of the face. The exercise is useful both for the perception of the deficient muscles and for the reduction/overcoming of any pain caused by an inconsistency between the information coming from the paretic face and those deposited "in memory".



Recovery of the ability to retain liquids

Sometimes the pathology causes a deficit in the ability to manage liquids inside the oral cavity with annoying losses. Through the use of three-dimensional surfaces made to be perceived inside the cheek or lip, the proposed exercise aims to restore the perception of the diseased part in order to recover the containment functions performed by the muscles of the cheek and lip.



USEFUL INFORMATION FOR THE PREVENTION OF FURTHER DAMAGES

In the acute and subacute phase it is considered useful to respect the following measures:

- pay attention so that contractures/fatigue of the face do not arise during daily activities
- in order to improve awareness, check in the mirror how much, for example in speaking, the healthy part prevails, dragging along the diseased part, and worsening the asymmetry.
- avoid forcing facial activity, e.g. in talking for a long time and especially on the phone, where there is no visual reference to non-verbal communication.
- until the eyelid closes on its own, and as recommended by the ophthalmologist, sleep with the eye patch on. In this period it is advisable to carry out frequent eye checks, to avoid injury to the cornea (use of specific eye drops, etc.);
- avoid too bright lights, spend too much time at the PC (protective lenses against blue light could be useful, ask your ophthalmologist); when you feel that your eyes get tired, stop and relax your face;
- avoid cold, draughts, and protect your face well;
- in order to avoid the use of pathological compensation strategies, one can gradually try to chew on the diseased part, but foods that are not too firm or chewy. Avoid chewing gum;
- when brushing your teeth, rinse your mouth slowly, with small quantities of water, also in this case without forcing.

In conclude, we can say that, with the aim of recovery as close as possible to physiology, it is necessary to avoid exercising the part in an attempt to regain strength: in doing so, in fact, there is a risk of involuntary movements and excessive increase in muscle tone, without however being able to overcome the hyperactivity of the healthy side, the asymmetry and the functional deficit.

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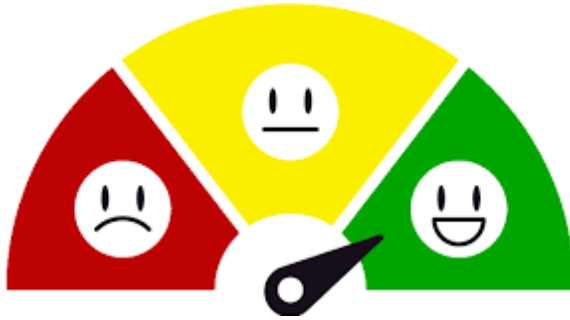
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NOTICE

This booklet is accurate at the time of printing and is updated periodically. Between one edition and another, however, there could be changes in the operation.



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