Understanding Bell's palsy – a review

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ABSTRACT

Bell’s palsy is a unilateral, lower motor neuron weakness of the facial nerve. Facial dysfunction has a dramatic effect on a patient’s appearance, psychological wellbeing and quality of life. Bell’s palsy has been described in patients of all ages, and is more common in adults than in children. The causes of the paralysis still remain unknown. Establishing the correct diagnosis is imperative and choosing the correct treatment options can optimize the likelihood of recovery. Hence this review deals with etiology, signs and symptoms, diagnosis and treatment management for Bell’s palsy.

Keywords: Bell’s palsy, paralysis, anoxia, corticosteroid, decompression, regeneration

Introduction

Bell's palsy is a temporary facial paralysis resulting from damage or trauma to the facial nerves. It results from traumatic, compressive, infective, inflammatory or metabolic abnormalities involving the facial nerve. Each facial nerve control blinking and closing of the eye, eye, facial expressions such as smiling and frowning, carries nerve impulses to the lacrimal or tear glands, the saliva glands, and the muscles of a small bone in the middle ear, the stapes and also transmits taste sensations from the tongue. Bell's palsy affects men and women equally and can occur at any age, but it is less common before age 15 or after age 60. Generally, Bell's palsy affects only one of the paired facial nerves and one side of the face, however, in rare cases, it can affect both sides.

Etiology

The cause of the inflammatory process in the facial nerve remains uncertain. However the causes include microcirculatory failure of the vasonervorum, viral infection, ischemic neuropathy, autoimmune reactions surgical procedure such as local anesthesia tooth extraction, infections osteotomies, preprosthetic procedures, excision of tumors or cysts, surgery of TMJ and surgical treatment of facial fractures and cleft lip/palate. Recently, attention has been focused on infection with herpes simplex virus type 1 (HSV-1) as a possible causative since its titers has found to be elevated in affected patients. But studies have failed to isolate viral DNA in biopsy specimens and hence remain a question. In addition to herpes, Bell's palsy has been linked with many other viral infections, such as varicella zoster, HIV, syphilis, Epstein – Barr virus and cytomegalovirus. Besides conditions like hypertension and diabetes mellitus, Lyme
disease, sarcoidosis and various cancers or tumors may predispose to single or multiple attacks.\textsuperscript{19} The familial cases of recurrent ipsilateral and alternating contralateral facial nerve palsy have both autosomal dominant and recessive inheritance.\textsuperscript{20} This genetic predisposition may also include variations in the immune response of each individual towards the inciting antigen.

**Symptoms and diagnosis**

Symptoms of Bell’s palsy vary from person to person and range in severity from mild weakness to total paralysis. The symptoms includes twitching, weakness, or paralysis on one or both sides of the face, drooping of the eyelid and corner of the mouth, headache, drooling, dryness of the eye or mouth, impairment of taste, and excessive tearing in one eye.\textsuperscript{22} However, these symptoms usually begin suddenly and reach their peak within 48 hours. Other symptoms may include pain or discomfort around the jaw and behind the ear, ringing in one or both ears, headache, loss of taste, an increased sensitivity to sound on the affected side, impaired speech, dizziness, and difficulty eating or drinking. Adour et al stated that the anoxia of the nerve, caused by a primary or secondary ischemia, followed by compensatory dilatation of the blood vessels supplying the nerve, is part of the process causing the occurrence of ear pain.\textsuperscript{21}

The proper history and physical examination provide the key to the diagnosis. A thorough history must include inquiry on exposure to various viruses (herpes, chicken pox-varicella zoster, HIV, etc) and history of stress and cold symptoms. Assessment of Bell’s phenomenon and corneal reflex can help to predict the risk of corneal injury. The ear should be examined for mass or herpes rash. Head and neck examination should include the parotid and the entire body should be examined for erythema migrans.\textsuperscript{23} Audiometric tests should be performed to assess any hearing loss and its type and severity. Since diabetes mellitus is present in more than 10 percent of patients with Bell’s palsy, fasting glucose or A1C testing may be performed in patients.\textsuperscript{24} Peripheral facial palsy can be detected using complete blood count thereby prevent lymphoreticular malignancy.\textsuperscript{25} Selection of imaging studies depends on the injury in a particular patient. Computed tomography (CT) or MRI can be done if there is no improvement in facial paresis even after 1 month. Serum antibodies against herpes zoster and \textit{B burgdorferi} can be checked if the patient has signs such as vesicular lesions on the external ear or lives in an area where Lyme disease is endemic. Serum calcium and angiotensin-converting enzyme levels will be higher in case of sarcoidosis. Cerebrospinal fluid testing is helpful if infection or malignancy is suspected; however, in case of BP cerebrospinal fluid tends to show mild and inconsistently elevated cell counts and protein levels. Electrodiagnostic testing is not very reliable in the initial stages; however, after 2 weeks, it may detect denervation and demonstrate nerve regeneration.\textsuperscript{26}

**Treatment management**

Before starting the treatment clinical and electrophysiological assessment has to be done for the presence of complication and disease severity. Physical treatment includes the use of local superficial heat therapy (i.e. hot packs or infrared rays) for 15min/session for the facial muscles prior to electrical stimulation. Massage which has been frequently been prescribed for facial palsy, improves circulation and may prevent contracture.\textsuperscript{27} Analgesics such as acetaminophen, aspirin, or ibuprofen may relieve the pain of Bell’s palsy, but produce side-effects. Facial paralysis may result from viral infection hence anti-viral have been used in treating Bell's palsy. The commonly used antivirals are Acyclovir, famciclovir and valaciclovir. Oral steroids such as Deltasone, methyl prednisolone, prednisolone and pediapred have traditionally been prescribed. Steroids can not only improve prognosis in facial paralysis, but also improve quality of life and sleep.\textsuperscript{28} Corticosteroid prevent or lessen nerve edema, inflammation and swelling in the facial bony canal; antiviral drug suppress viral replication in the neural tissue, thus they may protect the facial nerve from severe damage.\textsuperscript{29} Inflammation and anoxia of the facial nerve causes reversible neurapraxia initially, which
can be followed by Wallerian degeneration. Hyperbaric oxygen increases the oxygen diffusion gradient around anoxic tissues, which may facilitate resolution of edema and promote regeneration.\textsuperscript{30} Hyperbaric oxygen through the inhalation of 100% oxygen yielded better outcomes than steroids but the pressure inside a hyperbaric chamber is 1.5 - 3 times of atmosphere pressure and can potentially cause round window rupture, vision change, tingling in fingers and claustrophobia.\textsuperscript{31} Electrical stimulation can cause contraction of muscles that have lost innervations and promote nerve regeneration and expression of growth-related genes.\textsuperscript{32,33} Electric stimulation in recent years has been used in repair of injured nerves. Regeneration following nerve injury requires multiple processes including the survival and regrowth of neurons, budding of nerves, as well as axonal elongation, connection and synapses formation. Electric stimulation may affect the early stage of nerve regeneration, such as the survival of neurons and budding of nerves.\textsuperscript{34} Acupuncture and magnets have been used to treat diseases for a long time, but its efficacy is not proven in evidence-based medicine. Literature survey show that acupuncture is effective, although all studies are blemished by flaws like lack of randomization or blinding.

Apart from above treatment eye and facial muscles protection is necessary. Eye protection include the use of artificial tears, night time eye patch ophthalmic ointment before sleep and eyeglasses to protect from the light, dust and wind while in long term treatment, ophthalmic consultation is necessary for possible surgical interference, if there is a failure of spontaneous eye closure.\textsuperscript{35-37} Facial muscle protection from injury may be achieved by use of porous adhesive tape to prevent deviation of mouth to the healthy side during smiling. When surgery is not indicated, local injection with botulinum toxin-A seems to be the most appropriate therapy in case of management of facial hyperkinesis.\textsuperscript{38} Exercises like raising the eyebrows, opening and closing the eyes, blowing, and whistling can be performed a few times daily while standing in front of a mirror. Decompression of the facial nerve can also be accomplished by a delicate microsurgical procedure but have side effects like hearing loss and damage to the facial nerve, which may be permanent. Cosmetic surgeries such as browlifts, facelifts, muscle shortening, removal of excess upper eyelid skin, muscle relaxing procedures and static slings are available to improve appearance, but they will not improve muscle function. Nerve and muscle grafts or transpositions can offer functional improvement as well as improve appearance but these are complex procedures.

Conclusions

Bell's palsy is an acute benign cranial polyneuritis and is currently considered the leading disorder. Most patients with Bell’s palsy regain normal function with or without medical therapy, often within 3 weeks. In some cases, full recovery takes up to 9 months, but up to 30% are left with potentially disfiguring facial weakness, involuntary movements, and/or persistent lacrimation. A delay in the diagnosis and administration of medications could play a role in residual weakness of the face and mouth. Hence this review will help in understanding the etiology, early detection methodologies, complications and treatment strategies of Bell’s palsy so as to protect from recurrence. Further research is required to identify those at risk of permanent paralysis and measures to prevent.

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