Acta Scientific Otolaryngology

Volume 3 Issue 2 February 2021

Case Report

Post-infectious Lymphedema Can Cause Facial Paralysis

Salvatore Bühling*

Department of Surgery (Section of Otolaryngology and Maxillofacial Surgery), Eberhard-Karls-University of Tübingen, Baden Württemberg, Germany

***Corresponding Author:** Salvatore Bühling, Department of Surgery (Section of Otolaryngology and Maxillofacial Surgery), Eberhard-Karls-University of Tübingen, Baden Württemberg, Germany.

DOI: 10.31080/ASOL.2020.03.0174

Received: December 25, 2020

Published: January 30, 2021

Abstract

Background: Lymphedema (LE) as well as facial palsy´s (FP) are relatively common disease.

FP can be divided into idiopathic FP (Bell´s palsy) and secondary FP due to a determined reason like trauma. The most common reasons of secondary FP are metabolic disease, tumors, infections, neurological disorders, autoimmune disorders, trauma and surgical interventions.

LE is a high protein edema. The most common reasons for a secondary LE are lymphatic filariasis, irradiation and surgical interventions.

Report: A 51 year old male with uncontrolled diabetes mellitus and a hypersensitivity lung disease (HLD) presented with 3 days fever and cellulitis in his face. He developed a very extensive LE and becomes septic (in the cours, he needs pressors and intubation for airway protection). The rapid streptococcal test was positive.

In the examination, we diagnosed then a dense, painless facial nerve palsy in all branches on the left (except his marginal branch).

Conclusion: In our knowledge, this is the first publication which reports, that a LE causes a secondary FP.

Due to the fact, that both LE and FP are not so rarely seen disorders, our goal is to sensitise other physicians about the possibility of a casual coherence between them; that may be of important relevance for the outcome of the patients.

Keywords: Facial Paralysis; Bells Palsy; Lymphedema; Cellulitis; Infection Disease; Autoimmune Disease

Abbreviations

ANC: Absolute Neutrophilic Count; DKA: Diabetic Ketoacidosis; FP: Facial Palsy; HLD: Hypersensitivity Lung Disease; LE: Lymphedema; UPFNP: Unilateral Peripheral Facial Nerve Palsy.

Introduction

Facial paralysis

There are many reasons for FP; it can be due to lesions in peripheral- or central nervous system [1]. Further, FP can be classificated in bilateral facial palsy (which are with a prevalence of 0,3-2% of all facial palsy´s very rare) [2] and in unilateral peripheral facial nerve palsy; the latter can be divided into idiopathic (primary) peripheral facial nerve palsy, without a known cause (also called Bell´s palsy) and a secondary facial nerve palsy due to various, but detectable reasons [3].

The differentiation between primary and secondary facial nerve palsy may be quite difficult in some cases, but this decision is im-

portant, because therapy as well as prognosis may be influenced by this decision [4].

Clinical presentation and diagnosis

The long intracranial way of the facial nerve makes him very susceptible for different kinds of injury´s [5]. Therefore, also the clinic varies due to different locations of the lesions of the facial nerve; the nervus facialis supplies autonomic innervation of submandibular- and lacrimal gland, the anterior two thirds of tongue about chorda tympani (taste) and a part of the ear; above this, it also makes the motoric innervation of the face and the stapedius muscle [6].

Consequently, the characteristic symptoms of an unilateral peripheral facial nerve paralysis are: inability to close or wink the eye or close the mouth on the involved aspect, an unilateral facial weakness, which could lead to impaired facial expression (when the patient tries to smile, his face appears unilateral expressionless) and can also affected eating and speech [6,7]. Furthermore it can come to an altered sense of taste as well as dry eyes and decreasing lacrimation; pain around the ear and hyperaccusis are also often reported symptoms [6].

Thus, facial paralysis is first and foremost a clinical diagnosis; during the ear examination the stapedius reflex may be reduced or eliminated [8].

Bell´s palsy

Bell´s palsy is an acute, idiopathic and common peripheral neuropathy worldwide [9].

The prevalence of Bell´s palsy versus secondary facial nerve palsy amounts 75% versus 25% [10].

Bell´s palsy is a diagnosis of exclusion [11].

Even if the etiology is still unknown, it has been postulated, that Bell´s palsy could be associated with autoimmune disease, viral infections and vascular ischemia [6].

Unilateral peripheral facial nerve palsy (UPFNP)

The incidence of UPFNP is denoted with 30:100,000 (rarer then Bell´s palsy) [1].

Unilateral secondary facial nerve palsy can be based on a variety of reasons (see table 1).

Disorders of the immune system
Myasthenia gravis [6]
Guillian Barre syndrome [6,12]
Miller-Fisher syndrome [12]
Systemic lupus erythematodes (SLE) [12]
Drugs:
Linezolid, interferon, and so on
Infection diesease:
Borreliosis [6]
Busse Buschke diesease (cryptococcosis) [12]
Leprosy [12]
Herpes-simplex infections [6]
Influenza viruses [7]
Mastoiditis [6]
Malignant external otitis [14]
Neurocysticerosis [4]
Otitis media [6]
Parotitis [15]
Ramsey-Hunt syndrome [16]
Syphilis [12]
Toxocarosis [17]
Tuberculous meningitis [12]
Varicella zoster infections [6]
Metabolic disease:
Diabetes mellitus [4, 12]
Pre-eclampsia [18]
Stroke:
Pontine tegmental hemorrhage [12] as well as ipsilateral pontine infections [19]
Surgery:
Removal of cerebellopontine angle tumors [20]
Trauma:
Birth injury [21]
Crush injury/Whiplash [6,12]
Tumors:
Cerebello-pontine angle tumors (neurinome/schwannoma) [3]
Facial nerve neurinoma [3]

Leucemia [3]
Lymphoma [6]
Pons tumour [3]
Middle-ear tumors [3]
Parotid gland tumors [3]
Petrosal bone tumors
Other disease:
Autism and Asperger´s syndrome [7]
Histiocytosis X [22]
Melkersson-Rosenthal syndrome [23]
Moebius syndrome (impaired nervus abducens as well as nervus facialis) [12]
Parkinson syndrome [7]
Sarkoidosis [12]

Table 1

Treatment options for facial nerve palsy

The therapy options are controversial discussed due to lack of the evidence of large randomized and controlled trials [24]. But the most effective initial treatment seemed to be constituted of corticosteroids and anti-viral drugs [25]. A double-blinded and placebo-controlled trial was also able to show a significantly better outcome of the patients who recieved an early application of corticosteroids (compared to the placebo-group) [26].

If there is a decision for treatment, it should be initiated within the first three days after onset [27].

Later treatment options (e.g. in case of facial nerve spasms) are mainly surgical reconstruction or botulinum toxin A [9].

Prognosis/Outcome

The outcome can improve up to one year after onset [6].

80-85% of the patients recover within three months absolutely and spontaneously (independent of the treatment) [25]. 15-20% have impairments for longer [7]. Severe sequelae remains by just 5% [10,11].

The long-term derogations of facial nerve palsy include facial spasms, decreased tearing and crocodile tears, psychosocial problems, synkinesis as well as contractures [10].

If there is a recovery from the nerve paralysis, it mostly occurs within the first three weeks after onset of the palsy [8].

Altogether, there is a good prognosis for patients with facial nerve palsy [28].

Case Report

We report here about a 51 year old male, with a history of uncontrolled diabetes mellitus type 2 as well as a consecutive diabetic ketoacidosis (level of blood sugar: 730 mg/dl) and a hypersensitivity lung disease (HLD), who presented initially from NSMC with a history of three days of fevers and left periorbital cellulitis, which was complicated by an acutely worsening facial and neck cellulitis, which was on the left more pronounced then of the right side.

The therapy was started on intravenous fluid and insulin (because he was found to be in DKA). Furthermore, due to the given concern for infection, they started to applicate vancomycin/zosyn.

Several hours later, he was noted to have marked stridor and was complaining of difficulty breathing; so he was intubated for airway protection. Upon intubation exudates were noted in the oropharynx, but a good view of the larynx was obtained with a glide scope and there was a Grade 2 view. There was a positive result in the rapid strep test for group A streptococcals.

At this time, the GP was consulted and given a history of uncontrolled diabetes mellitus as well as a rapidly worsening facial swelling; he was started empirically on vancomycin, cefepime, and amphotericin for coverage of mucomycosis. Due to the positive strep test, the patient additionally received vancomycin/zosin and clindamycin.

But nevertheless, he was found to be febrile to 104F, and was furthermore neutropenic with an absolute neutrophilic count (ANC) of 480 cells/µl.

The patient was then transferred to our hospital via MedFlight for higher tertiary care.

When we saw the patient initially, he was edematous from the chest up, especially around the left orbit, where the Ophthalmology-department diagnosed and treated a perceptual cellulitis.

Contrasted scans showed diffuse edema but no collections. Unfortunately, the contrast agent wrecked his fragile kidneys and he

was on continuous veno-venous hemofiltration as well as on pressors for sepsis.

Three weeks later, the patient was better overall. He was extubated, weaned off from the pressors and transferred to the floor. But up to this time, he still remains on dialysis and on tube feeds for aspiration risk.

We could also find at this time small crusting and non-painful ulcers of the tongue, which are probably due to the intubation and the dryness surrounding hospitalization.

However, we detect by the examination on the bedside, that the patients left facial/periorbital region was still very impressive, despite his edema having improved everywhere else. The patient presents also, most likely as a result of his lymphedema, a dense facial nerve paralysis in all branches on the left, except his marginal branch which was robustly intact. The patient reports, that his face was not painful. His voice was strong and he has no other CNS deficits.

Overall, the post-operative diagnosis was lymphedema from the infection, which lead in the course to a unilateral, secondary, peripheral facial nerve paralysis. In our knowledge, this is the first report about a casual relationship between LE and FP.

Discussion

Lymphedema (LE)

Lymphedema (LE) are high protein edemas due to chronically overwhelmd lymphatic systems [29]. It commonly manifested with dermal fibrosis, edema and inflammation [30].

At first, it comes to a fluid rich phase, which leads than to hyperkeratosis of the skin and a magnification as well as fibrosis of subcutaneous tissue [31].

To understand the pathomechanism of LE, it is necessary to know a few things about the function of lymphatic vessels: they are like a transport system for large molecules and fluid from the tissue to the lymphnodes; there ensued a clearence of the lymphatic fluency from pathologic particles; so they are also necessary for the balance of the extracellular fluid [32]. If due to any dysfunction or blockage the circulation doesn´t work, it comes to an accumulation of protein-rich fluid in the subcutaneous tissue; the risk of infections is then highly increased [32]. The patients shows often an impairment of the immunesystem, which predisposing them to many different infection disease [30]. Especially cellulitis is commonly seen in secondary LE; the cellulitis then involved subcutaneous fat and the deeper dermis (the upper dermis is often afflicted by an erysipel) [33]. Both, the impaired immunesystem (due to exacerbated diabetes mellitus and HLD) and the infection in form of the cellulitis could be also seen in our patient. Such infections of soft-tissue, which are accompanied with secondary LE may lead to sepsis (like seen in our patient) and in the worst case to death [34].

Changes and remodelling in lymphatic tissue can be due to many different physiologically (e.g. Lymphangiogenesis, which is also quite important for the immune system) as well as pathologically causes [35].

LE can be divided in a hereditary and a secondary LE [36].

The hereditary LE is a quite uncommon and rare disease; it is caused by altered genes, which are involved in the developmental process as well as the growth of lymphatic vessels [36]. Clinically, these changes cause abnormalities and alterations of the lymphatic function and lead therefore to the characteristic consequences of LE [36].

Secondary LE developed often due to a chronic disease; pathophysiologically, interstitial fluid accumulated in tissue due to a process, that injure lymphatic vessels and leads in consequence to impaired function of the involved areas due to the swelling [37].

The LE manifested usually tardily, but with a steadily progression [33].

Worldwide, the most common reason for secondary LE is lymphatic filariasis (caused by filarial nematodes, which makes an invasion of the lymphatic vessels).

In the western world however, irradiation as well as surgical interventions are the most common causes for LE [37]. Within the frame of surgical interventions, dissected lymphatic vasculature (e.g. lymphadenectomy) due to breast cancer is a very common cause [37].

Naturally, nearly all kinds of cancer which were treated with irradiation or lymphnode dissection can cause a LE; common ex-

amples are genitourinary and gynecological cancers, head and neck cancers and melanomas [38].

Furthermore, there are still also a variety of other causes for secondary LE, like infections and inflammation (what we have seen in our patient) as well as trauma and so on [37].

It was declared, that in the USA approximately 2-5 mio. people suffer under LE, but it is quite difficult to make exact states, because LE is deemed to be quite underdiagnosed [39].

Independent of the casual reason for LE, the onset of chronic symptoms can be deferred from months till decades of years after the initally exposure [40]. Any harm of lymphatic tissue leads to lifelong risk in developing a secondary LE [40]. Who of the patients with the same illness (respectively intervention) developed a LE and who not differs from case to case; there seemed to be pre dispositioning factors, but the etiology are still not fully understood yet [33].

There are several (conservative as well as surgical) treatment-options for LE:

The available conservative treatment-options are constituted in compression bandaging [41]. manual lymph drainage and massage [42], exercise programs and modification in lifestyle (such as weight loss) [43], and interventions such as electrical stimulation as well as low-level laser therapy [44].

Furthermore, there are some drugs in discussion: in trials, ketoprofen (which works against inflammation) [45]. and ubenimex as well as lymfactin (which enhances the lymphangiogenesis) are stated as auspicious [46].

In the surgical field, there are also a variety of treatments disposable, such as liposuction [47], transplantation of lymphnodes [48], as well as a lot of different kinds of vascular anastomosis [49]. In addition to this, new technics in surgical cancer-management should reduce (respectivily prevent) the number of cancer-related LE [50].

Over all, the efficacy in disease controlling is still limited, probably due to the problem, that the therapy-options are primarily only symptomatic [33].

Chronic LE needs a lifelong care and is still today considered to be irreversible [31].

Conclusion

LE and FP are relatively common diseases. But to our knowledge, this is the first report about a casual relationship between this two disorders. We have shown here, that a distinctive LE (with consecutive severe cellulitis) can cause an acute facial nerve palsy.

Actually, diabetes mellitus can be also a reason for FP, but in our patient the acute onset as well as the co-incidence with the marked LE and cellulitis let it be in our opinion highly probable, that in this case the FP is indeed caused by the LE. Naturally both, FP and LE can have a strong association with an impaired immunesystem and infections, which both predisposition to the development of this diseases and could be also seen in our patient.

Due to the fact, that both conditions are often seen (namely independent by a physicians specialty), our aim is to sensitize physicians, that there can be a casual coherence between them. This may be of relevance for diagnostic, therapy as well as prognosis and may help, to recognize precocious risk-factos in patients.

Conflict of Interests

The author declare any conflicts of interest.

Bibliography

1. Kim IS., *et al*. "Correlation between MRI and operative findings in Bell's palsy and Ramsay Hunt syndrome". *Yonsei Medical Journal* 48.6 (2007): 963-968.
2. Stahl N and T Ferit. "Recurrent bilateral peripheral facial palsy". *Journal of Laryngology and Otology* 103.1 (1989): 117-119.
3. Kawiak W., *et al*. "Diagnostic difficulties in etiology of the lesion of peripheral neuron of the facial nerve during the growth of sialoma". *Annales Universitatis Mariae Curie-Sklodowska* 48 (1993): 125-128.
4. Valenca MM., *et al*. "Idiopathic facial paralysis (Bell's palsy): a study of 180 patients". *Arquivos de Neuro-Psiquiatria* 59 (2001): 733-739.
5. Cha CI., *et al*. "Comparison of facial nerve paralysis in adults and children". *Yonsei Medical Journal* 49.5 (2008): 725-734.

6. Atzema C and RD Goldman. "Should we use steroids to treat children with Bell's palsy?" *Canadian Family Physician* 52 (2006): 313-314.

7. Slavkin HC. "The significance of a human smile: observations on Bell's palsy". *Journal of the American Dental Association* 130.2 (1999): 269-272.

8. Finsterer J. "Management of peripheral facial nerve palsy". *European Archives of Oto-Rhino-Laryngology* 265.7 (2008): 743-752.

9. Su Y., *et al*. "Nerve growth factor for Bell's palsy: A meta-analysis". *Experimental and Therapeutic Medicine* 9.2 (2015): 501-506.

10. Peitersen E. "Bell's palsy: the spontaneous course of 2,500 peripheral facial nerve palsies of different etiologies". *Acta Otolaryngology* 549 (2002): 4-30.

11. Axelsson S., *et al*. "Outcome of treatment with valacyclovir and prednisone in patients with Bell's palsy". *Annals of Otology, Rhinology, and Laryngology* 112.3 (2003): 197-201.

12. Keane JR. "Bilateral seventh nerve palsy: analysis of 43 cases and review of the literature". *Neurology* 44.7 (1994): 1198-1202.

13. Ogundipe O and M Smith. "Bell's palsy during interferon therapy for chronic hepatitis C infection in patients with haemorrhagic disorders". *Haemophilia* 6.2 (2000): 110-112.

14. Zaky DA., *et al*. "Malignant external otitis: a severe form of otitis in diabetic patients". *American Journal of Medicine* 61.2 (1979): 298-302.

15. Chen WL., *et al*. "Outcome of treatment 46 patients with Bell's palsy with aciclovir and prednisone". *Shanghai Kou Qiang Yi Xue* 14.6 (2005): 590-592.

16. Holland NJ and GM Weiner. "Recent developments in Bell's palsy". *BMJ* 329.7465 (2004): 553-557.

17. Finsterer J., *et al*. "Neurotoxocariasis associated with lower motor neuron disease. Report of one case". *Revista medica de Chile* 138.4 (2010): 483-486.

18. Mylonas I., *et al*. "Idiopathic facial paralysis (Bell's palsy) in the immediate puerperium in a patient with mild preeclampsia: a case report". *Archives of Gynecology and Obstetrics* 272.3 (2005): 241-243.

19. Thomke F., *et al*. "Seventh nerve palsies may be the only clinical sign of small pontine infarctions in diabetic and hypertensive patients". *Journal of Neurology* 249.11 (2002): 1556-1562.

20. Sood S., *et al*. "Hypoglossal-facial nerve anastomosis: assessment of clinical results and patient benefit for facial nerve palsy following acoustic neuroma excision". *Clinical Otolaryngology and Allied Sciences* 25.3 (2000): 219-226.

21. Salonen IS and R Uusitalo. "Birth injuries: incidence and predisposing factors". *Z Kinderchir* 45.3 (1990): 133-135.

22. Allard P., *et al*. "Cerebral and pulmonary histiocytosis X. Neurologic manifestations disclosing a pseudotumoral formation on the floor of the 4th ventricle". *Revue de Pneumologie Clinique* 40.5 (1984): 305-309.

23. Ruza Paz-Curbera E and M Fernandez Benitez. "Melkersson-Rosenthal syndrome in a diabetic boy". *Allergologia et Immunopathologia* 26.6 (1998): 291-293.

24. Turk-Boru U., *et al*. "The efficacy of steroids in idiopathic facial nerve paralysis: an open, randomized, prospective controlled study". *Kulak Burun Bogaz Ihtis Derg* 14 (2005): 62-66.

25. Salinas RA., *et al*. "Corticosteroids for Bell's palsy (idiopathic facial paralysis)". *Cochrane Database System Review* 3 (2010): CD001942.

26. Sullivan FM., *et al*. "Early treatment with prednisolone or acyclovir in Bell's palsy". *The New England Journal of Medicine* 357.16 (2007): 1598-1607.

27. Sittel C., *et al*. "Bell's palsy: a 10-year experience with antiphlogistic-rheologic infusion therapy". *American Journal of Otology* 21.3 (2000): 425-432.

28. Peitersen E. "Natural history of Bell's palsy". *Acta Otolaryngology* 492 (1992): 122-124.

29. Executive C. "The Diagnosis and Treatment of Peripheral Lymphedema: 2016 Consensus Document of the International Society of Lymphology". *Lymphology* 49.4 (2016): 170-184.

30. Zampell JC., *et al*. "Regulation of adipogenesis by lymphatic fluid stasis: part I. Adipogenesis, fibrosis, and inflammation". *Plastic and Reconstructive Surgery* 129.4 (2012): 825-834.

31. International Society of L. "The diagnosis and treatment of peripheral lymphedema. 2009 Concensus Document of the International Society of Lymphology". *Lymphology* 42.2 (2009): 51-60.

32. Douglass J., *et al*. "Self-Care for Management of Secondary Lymphedema: A Systematic Review". *PLoS Neglected Tropical Diseases* 10.6 (2016): e0004740.

33. Yuan Y., *et al*. "Modulation of Immunity by Lymphatic Dysfunction in Lymphedema". *Frontiers in Immunology* 10 (2019): 76.

34. Rockson SG. "Addressing the unmet needs in lymphedema risk management". *Lymphatic Research and Biology* 4.1 (2006): 42-46.

35. Alitalo K. "The lymphatic vasculature in disease". *Nature Medicine* 17.11 (2011): 1371-1380.

36. Connell F., *et al*. "A new classification system for primary lymphatic dysplasias based on phenotype". *Clinical Genetics* 77.5 (2010): 438-452.

37. Rockson SG. "Lymphedema". *American Journal of Medicine* 110.4 (2001): 288-295.

38. Cormier JN., *et al*. "Lymphedema beyond breast cancer: a systematic review and meta-analysis of cancer-related secondary lymphedema". *Cancer* 116.22 (2010): 5138-5149.

39. Rockson SG and KK Rivera. "Estimating the population burden of lymphedema". *Annals of the New York Academy of Sciences* 1131 (2008): 147-154.

40. Armer JM and BR Stewart. "Post-breast cancer lymphedema: incidence increases from 12 to 30 to 60 months". *Lymphology* 43.3 (2010): 118-127.

41. Lawenda BD., *et al*. "Lymphedema: a primer on the identification and management of a chronic condition in oncologic treatment". *CA: A Cancer Journal for Clinicians* 59.1 (2009): 8-24.

42. Pinell XA., *et al*. "Manipulative therapy of secondary lymphedema in the presence of locoregional tumors". *Cancer* 112.4 (2008): 950-954.

43. Murdaca G., *et al*. "Current views on diagnostic approach and treatment of lymphedema". *American Journal of Medicine* 125.2 (2012): 134-140.

44. Carati CJ., *et al*. "Treatment of postmastectomy lymphedema with low-level laser therapy: a double blind, placebo-controlled trial". *Cancer* 98.6 (2003): 1114-1122.

45. Rockson SG., *et al*. "Pilot studies demonstrate the potential benefits of antiinflammatory therapy in human lymphedema". *JCI Insight* 3.20 (20018).

46. Tian W., *et al*. "Leukotriene B4 antagonism ameliorates experimental lymphedema". *Science Translational Medicine* 9.389 (2017).

47. Boyages J., *et al*. "Liposuction for Advanced Lymphedema: A Multidisciplinary Approach for Complete Reduction of Arm and Leg Swelling". *Annals of Surgery on Oncology* 22 (2015): S1263-1270.

48. Lin CH., *et al*. "Vascularized groin lymph node transfer using the wrist as a recipient site for management of postmastectomy upper extremity lymphedema". *Plastic and Reconstructive Surgery* 123.4 (2009): 1265-1275.

49. Chang DW. "Lymphaticovenular bypass for lymphedema management in breast cancer patients: a prospective study". *Plastic and Reconstructive Surgery* 126.3 (2010): 752-758.

50. Armer J., *et al*. "Lymphedema following breast cancer treatment, including sentinel lymph node biopsy". *Lymphology* 37.2 (2004): 73-91.