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ORIGINAL ARTICLE

Does diabetes mellitus affect the prognosis of idiopathic peripheral facial paralysis?

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OBJECTIVE: Although peripheral neuropathy is a major aspect of the disease, a relationship between the pathogenesis of facial nerve paralysis and diabetes mellitus has not been proved. Management of diabetes mellitus also may be complicated by the corticosteroids used to treat facial nerve paralysis. In our hospital, patients with concomitant diabetes and facial nerve paralysis are always hospitalized to keep their blood sugar values at safe levels.

MATERIALS AND METHODS: We retrospectively investigated the medical reports of patients with peripheral facial paralysis treated in a 9 years period to document the efficacy of medical treatment. Blood sugar levels were monitored regularly and regulated by insulin.

RESULTS: Total decompression of the facial nerve was performed in 4 patients. Among the surgical patients, 1 diabetes patient had House-Brackmann grade 3/6 paralysis outcome and the other 3 patients (1 with diabetes, 2 without diabetes) had grades 1/6 to 2/6. Patients who refused surgical treatment showed incomplete improvement. Electroneuronography values for the other patients, including the 3 patients with House-Brackmann grade 6/6, showed a less than 90% difference between the 2 sides. All patients but 1 in the control group and 2 in the diabetes group showed an improvement to House-Brackmann grade 1/6 or 2/6, 9 months after treatment.

CONCLUSION: The presence of diabetes mellitus is a not a poor prognostic indicator in idiopathic facial nerve paralysis if treated with corticosteroids. However, high House-Brackmann grade paralysis has been an unfavorable prognostic sign. These patients must be closely monitored, and insulin should be administered to keep the blood sugar levels in safe range.

Idiopathic peripheral facial paralysis (IPFP), or Bell's palsy, is a nonfatal but debilitating disease that causes functional, esthetic, and psychosocial problems. The consensus on the etiopathogenesis of IPFP is that herpes virus infections lead to edema of the fallopian canal and eventual ischemia of the nerve within.[1]

There is no difference between sexes in incidence for IPFP, and it affects 20 of 100,000 persons annually.[1] Watanabe and colleagues showed that diabetes patients have more cranial nerve paralysis than their nondiabetes counterparts.[2] Paisey and colleagues reported a 3.6% prevalence of facial paralysis among 503 Mexican patients with type 2 diabetes.[3]

There appears to be consensus on treatment of IPFP based on the administration of corticosteroids and antiviral agents, such as acyclovir and valacyclovir. Some published data criticize the efficacy of each regimen. Recent studies, however, demonstrate the positive effect of corticosteroids on the outcome of IPFP. In their meta-analysis, Ramsey and colleagues demonstrated that corticosteroids have clinical and statistical benefits on healing in patients with complete facial paralysis.[4] In recent years, viral factors have been accepted as important in etiology, so antiviral treatment has become part of treatment protocols for IPFP. There are several reports criticizing the efficacy of antiviral treatment either alone or in combination with prednisolone. The general agreement is the administration of corticosteroids has better outcomes when compared with application of antiviral agents alone, and it remains the first choice in management of IPFP because of the anti-inflammatory and immunosuppressive effects of corticosteroids.[5] However, when corticosteroids and antiviral agents are used together, their effect is enhanced.[6]

Administration of corticosteroids has a negative impact on the blood sugar levels of diabetes patients. Therefore, hospitalization of these patients so that insulin can be administered simultaneously with corticosteroids is strongly advised.

PATIENTS AND METHODS

This analysis was performed on records of patients who were admitted to the otorhinolaryngology departments of Başkent University Hospital and Bayindir Hospital with the complaint of facial nerve palsy between November 1996 and May 2005. Of 41 diabetes patients with IPFP, 26 presented with concomitant hypertension. All the diabetes patients were hospitalized for medical treatment and blood sugar regulation. Fifty-eight normoglycemic controls with IPFP were treated primarily on an outpatient basis.

All patients were graded using a facial nerve grading system developed by House and Brackmann (HB), approved by the Facial Nerve Disorders Committee of the American Academy of Otolaryngology. HB grade 2/6 patients were excluded from the study. Patients with HB grade 6/6 were evaluated using electroneurongraphy (ENoG).

All patients received corticosteroid treatment. In 17 patients (15 diabetes patients, 2 nondiabetes controls) referred during the first 2 days of paralysis, antiviral treatment was also added. The standard treatment regimen consisted of initial administration of intravenous methylprednisolone 250 mg (3-4 mg/kg). On Day 2, patients received oral fluocortolon 1 mg/kg/day. The corticosteroid dose was tapered 10 mg every second day until termination. During treatment of the diabetes group, blood sugar levels were monitored with premeal blood samples by the endocrinology department, and insulin was administered appropriately.

Facial functions in the diabetes group were evaluated daily during hospitalization, weekly after discharge for the first month, and monthly thereafter. In the nondiabetes group, patients were followed in the same manner as on an outpatient basis. Individuals who reached HB grades 1/6 and 2/6 were classified as having a good recovery. The patients with facial paralysis of higher grades were followed for 9 months.

Chi-square test was used for statistical analysis. P values less than .05 were considered significant.

RESULTS

The HB classification at baseline of both the diabetes and nondiabetes groups is shown in Table 1. At the time of admission, 10 patients had HB grade 6/6, and 6 of them were in the diabetes group. Diabetes and nondiabetes patients showed no significant difference in their HB scale scores at the time of admission (P > .05).

Table 1. House-Brackmann Grading Scale of Diabetes and Nondiabetes Patients at the Time of Admission

	HB 3/6	HB 4/6	HB 5/6`	HB 6/6
Diabetes (n)	12	15	8	6
Controls (n)	22	13	19	4

HB = House-Brackmann Facial Scale.

Treatment was started on average 2.2 days following the onset of paralysis. All patients were treated with corticosteroids. Seventeen of them (15 diabetes patients, 2 nondiabetes controls) also received acyclovir. After the initial dose of intravenous methylprednisolone 250 mg (3-4 mg/kg), patients received oral fluocortolon 1 mg/kg/day, starting on second day.

The average blood sugar level was 281 mg/dL (maximum 430 mg/dL) at admission. Blood sugar levels were regulated by insulin infusion in 5 patients, by 4-dose insulin (regular insulin preprandially with intermediate-acting insulin at bedtime) in 28 patients, by 2-dose insulin (intermediate-acting insulin before breakfast and dinner) in 4 patients, by oral antidiabetics in 2 patients, and by diet in 2 patients. None of the patients had any complication because of corticosteroid therapy.

Among the diabetes group, 3 of the patients had additional facial paralysis on the opposite side of the face, and there was a single patient with paralysis on the same side as previously.

Ten cases (6 diabetes patients, 4 nondiabetes controls) with HB grade 6/6 paralysis were also evaluated by ENoG. Among them, 7 patients (4 diabetes patients, 3 nondiabetes controls) showed more than 90% degeneration in consecutive tests administered in 2 to 3 day intervals. Total decompression of the facial nerve was performed on 2 patients from both groups. The remainders were treated medically.

HB classification of patients at the end of the follow-up is presented in Table 2. Overall, 87% of diabetes patients and 91% of nondiabetes controls recovered with HB grades 1/6 and 2/6. This difference in treatment outcomes was not statistically significant (P > .05). In contrast, high HB grades of facial paralysis at baseline were highly significant in predicting the prognosis of the paralysis (P < .0005).

DISCUSSION

IPFP occurs frequently after herpes virus infection. Murakami and colleagues have identified the HSV-1 genome in facial nerve endoneural fluid and postauricular muscle in 11 of 14 patients with IPFP.[7] Reactivation of the virus in geniculate ganglion has been demonstrated in IPFP patients.

IPFP is more common among diabetes patients. In our series, none of the patients from the nondiabetes group had IPFP previously; however, 4 diabetes patients did.

Table 2. Outcome of Treatment in Diabetes and Nondiabetes Patients According to HB Scale Grade at Time of Admission and Results of Electroneurongraphy

HB in adm.	<6/6	6/6	6/6	6/6
ENoG in adm.	Not performed	>90%	>90%	<90%
Treatment type	Medical	Decompression	Medical	Medical
		Treatment outcome		
Diabetes (n)	HB 1/6-2/6 (35)	HB 1/6 (1) HB 3/6 (1)	HB 3/6 (2)	HB 3/6 (2)
Nondiabetes (n)	HB 1/6-2/6 (54)	HB 1/6-2/6 (2)	HB 2/6 (1)	HB 3/6 (1)

HB = House-Brackmann Facial Scale; EnoG = electroneuronography; adm.: admission.

In a report of 2570 patients with untreated IPFP, Peitersen demonstrates the natural course of the disease: 71% of untreated patients will have a complete recovery from IPFP.[8] Some published data criticized the efficacy of corticosteroids on complete IPFP. A meta-analysis by Ramsey and colleagues emphasized that corticosteroids are still superior to placebo, and they found them to be at least 17% more effective than placebo in patients with complete paralysis[4]. In another evidence-based review, Grogan and Gronseth stated that, in IPFP, oral corticosteroids probably and an acyclovir-prednisone combination possibly are effective in improving facial functional outcomes.[9] De Diego and colleagues demonstrated that a combination of antiviral drugs with corticosteroids served better than corticosteroids alone[5]. Several other studies also have supported the use of combined treatment.[4,5,10] We preferred to add acyclovir to our treatment protocol, especially in diabetes patients. Antiviral treatment, however, is not efficacious if not initiated early in the course of the disease. Because of this, in our study, if the patient was admitted in the first day of paralysis, we added antiviral drugs to treatment.

Although diabetes mellitus has not been confirmed to be among the etiologic factors of IPFP, a higher incidence of IPFP among diabetes patients may indicate that microangiopathic changes are a predisposing factors in development of IPFP. Chronic changes in vascular and neural tissue that occur in diabetes may affect improvement of IPFP unfavorably.[11] Ben-David and colleagues reported significant difference in auditory brainstem evoked potential findings in diabetes patients when compared with nondiabetes controls and postulated that acute facial paralysis in patients suffering from diabetes mellitus may share a common etiology with diabetic peripheral neuropathy.[12]

The effect of diabetes mellitus on neural tissue, as well as on small vessels, which impairs the healing process on the compressed and ischemic nerve, is open to discussion. Most patients with diabetes are also hypertensive. Yanagihara and Hyodo found significantly higher incidence of diabetes and hypertension in IPFP when compared with Ramsay Hunt syndrome, which has no relation to either diabetes or hypertension.[13] Kudoh and colleagues investigated the effects of diabetes and hypertension on recovery from IPFP.[14] They reported no significant difference among patients suffering from IPFP and diabetes, IPFP and hypertension, or isolated IPFP, but they found worse outcomes in patients with concurrent IPFP, diabetes, and hypertension. Microangiopathy also may be an unfavorable prognostic factor, although there is no clinical evidence to support this hypothesis. It can be speculated that microangiopathy in diabetes causes hypertension and this may affect the final outcome in IPFP. Hence, hypertension in relation to diabetes may explain the conflicting results in studies that demonstrated that diabetes is a poor prognostic factor, because most of these studies did not consider concomitant hypertension.

The unfavorable effect of corticosteroids on blood sugar levels in diabetes patients creates a challenge during management of IPFP in these patients. Diabetes patients need to regulate blood sugar levels during administration of corticosteroids, and this necessitates full monitoring of blood sugar levels and administration of insulin during and even after treatment.

Outcome in diabetes patients with untreated IPFP has been shown to be much worse when compared with nondiabetes patients. Peitersen reported results in 76 diabetes patients in a series of 2570 patients with IPFP.[8] He observed the spontaneous resolution in patients left untreated. Only 25% of the diabetes patients with untreated IPFP recovered normal facial function while the overall recovery rate was 71%.

In our diabetes patients with IPFP, HB grade at the initial presentation was not significantly different from the nondiabetes controls, and, with corticosteroid treatment, we reached a resolution rate higher than values reported in the literature. We treated not only the paralytic patients but also the paretic patients. We believe that the initial paretic presentation may rapidly progress to complete paralysis in these patients if left untreated.

Diabetes was not a significant poor prognostic factor for IPFP. ENoG results predict the outcome with medical treatment in both diabetes and nondiabetes

patients and indicate to us which patients will need surgery.

We did not observe any complication related to corticosteroid treatment in our patients. Inpatient treatment of diabetes patients with corticosteroids is a safe modality if done under close monitoring of blood sugar levels and appropriate antidiabetic treatment.

Our belief is that diabetic patients with IPFP should not be deprived of corticosteroid therapy for fear of corticosteroid complications. On the contrary, these patients should be treated aggressively because their prognosis is poorest if they are left untreated.

REFERENCES

1. Yanagihara N. Incidence of Bell's palsy. Ann Otol Rhinol Laryngol Suppl 1988;137:3-4.
2. Watanabe K, Hagura R, Akanuma Y, Takasu T, Kajinuma H, Kuzuya N, et al. Characteristics of cranial nerve palsies in diabetic patients. Diabetic Res Clin Pract 1990;10:19-27.
3. Paisey RB, Arredondo G, Villalobos A, Lozano O, Guevara L, Kelly S. Association of differing dietary, metabolic, and clinical risk factors with microvascular complications of diabetes: a prevalence study of 503 Mexican type II diabetic subjects. II. Diabetes Care 1984;7:428-33.
4. Ramsey MJ, DerSimonian R, Holtel MR, Burgess LP. Corticosteroid treatment for idiopathic facial nerve paralysis: a meta-analysis. Laryngoscope 2000;110:335-41.
5. De Diego JI, Prim MP, De Sarria MJ, Madero R, Gavilan J. Idiopathic facial paralysis: a randomized, prospective, and controlled study using single-dose prednisone versus acyclovir three times daily. Laryngoscope 1998;108(pt 1):573-5.
6. Adour KK, Ruboyianes JM, Von Doersten PG, Byl FM, Trent CS, Quesenberry CP Jr, et al. Bell's palsy treatment with acyclovir and prednisone compared with prednisone alone: a double-blind, randomized, controlled trial. Ann Otol Rhinol Laryngol 1996;105:371-8.
7. Murakami S, Mizobuchi M, Nakashiro Y, Doi T, Hato N, Yanagihara N. Bell palsy and herpes simplex virus: identification of viral DNA in endoneurial fluid and muscle. Ann Intern Med 1996;124(Pt 1):27-30.
8. Peitersen E. Bell's palsy: the spontaneous course of 2,500 peripheral facial nerve palsies of different etiologies. Acta Otolaryngol Suppl 2002;549:4-30.
9. Grogan PM, Gronseth GS. Practice parameter: steroids, acyclovir, and surgery for Bell`s palsy (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 2001;56:830-6.
10. Brown JS. Bell's palsy: a 5 year review of 174 consecutive cases:an attempted double blind study. Laryngoscope 1982;92:1369-73.
11. Paolino E, Granieri E, Tola MR, Panarelli MA, Carreras M. Predisposing factors in Bell's palsy: a case-control study. J Neurol 1985;232:363-5.
12. Ben-David J, Gertner R, Podoshin L, Fradis M, Pratt H, Rabina A. Auditory brain stem evoked potentials in patients suffering from perpheral facial nerve palsy and diabetes mellitus. J Laryngol Otol 1986;100:629-33.
13. Yanagihara N, Hyodo M. Association of diabetes mellitus and hypertension with Bell's palsy and Ramsay Hunt syndrome. Ann Otol Rhinol Laryngol 1988;97:5-7.
14. Kudoh A, Ebina M, Kudo H, Matsuki A. Delayed recovery of patients with Bell's palsy complicated by non-insulin-dependent diabetes mellitus and hypertension. Eur Arch Otorhinolaryngol 1998;255:166-7.