Diabetes mellitus: a risk factor in patients with Graves’ orbitopathy

Rachel Kalmann, Maarten Ph Mourits

Abstract

Aims—To assess the prevalence of dysthyroid optic neuropathy (DON) in patients with diabetes mellitus (DM) and Graves’ orbitopathy (GO) and to investigate the complications of surgery for GO in these patients.

Methods—The records of 482 consecutive patients with GO referred in a 5-year period were studied. Those patients who also had DM were selected for further study. The prevalence of insulin dependent diabetes mellitus (IDDM) and non-insulin dependent diabetes mellitus (NIDDM) was registered, as well as the prevalence and course of DON in the patients who underwent surgery for GO. The postoperative complications were recorded.

Results—Out of 482 patients with GO, 15 (3.1%) also had DM. Eight (1.7%) had IDDM, 7 (1.4%) had NIDDM. Five patients (3.3%) three with IDDM and two with NIDDM developed DON with 50% improvement of visual acuity after treatment, whereas in the whole population of 482 GO patients 19 had DON (3.9%), showing 69.4% improvement of vision after treatment. 10 patients with GO and DM were operated for GO; in one of them an optic atrophy developed as a result of a postoperative haemorrhage directly after a three wall orbital decompression by coronal approach. No other postoperative complications occurred.

Conclusions—The prevalence of IDDM in patients with GO is higher than in the normal population. DON occurs much more frequently in patients with GO and DM than in the total group of GO patients and seems to have a worse visual prognosis.

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patients, 1.7% (95% confidence interval 0.53–2.8%) had IDDM, whereas seven patients (1.4%) had NIDDM. All patients were white.

The course and the medical and/or surgical interventions of the patients with DM and DON are shown in Table 1. Five of the 15 patients with GO and DM had DON (33.3%) (patients 1–5), all with visual field defects and two of them with oedema of the optic discs. All of them underwent treatment with high dose steroids (500 mg methylprednisolone intravenously, every 48 hours, four times), orbital decompression or both. One patient (number 5), in whom the DON presented itself on the right side as an anterior ischaemic optic neuropathy (AION) also had myasthenia gravis. In five of the 10 eyes (50%) treatment resulted in an improvement of the visual acuity (0.1 or more), in four eyes (40%) visual function stabilised, and in one eye (10%) vision decreased after treatment. In the whole group of 482 patients with GO, 19 patients (36 eyes) developed DON (3.9%). Twenty five of these eyes (69.4%) improved after treatment, in 10 patients (28.8%) visual function stabilised, and in one patient (2.8%) it worsened.

The prevalence of diabetic retinopathy in the patients with GO, DM, and DON was the same as in the group of patients with GO, DM, but without DON (respectively 1/5 and 2/10) (Tables 1 and 2).

In four patients (Table 2, patients 12–15) no operations for GO were performed.

### Discussion

The overall prevalence of DM in our population of GO patients (3.1%) is in accordance with the 2.5% prevalence in the normal Dutch population. The differences in visual outcome after therapy between these two groups appeared not to be statistically significant (p>0.1).

The prevalence of diabetic retinopathy in the patients with GO, DM, and DON was the same as in the group of patients with GO, DM, but without DON (respectively 1/5 and 2/10) (Tables 1 and 2).

Patients 6–11 underwent several surgical procedures for the GO (see Table 2). One of them (patient 7) underwent a rehabilitative three wall orbital decompression by coronal approach. She developed an intraorbital haemorrhage on the left side, immediately postoperatively, which in spite of an immediate anterior septum perforation resulted in no light perception and atrophy of the optic disc on that side. She had no blood clotting abnormalities. In the other patients no postoperative complications, such as haemorrhage, delayed wound healing, or infection occurred.

In four patients (Table 2, patients 12–15) no operations for GO were performed.

### Table 1 Patients with Graves’ orbitopathy, diabetes mellitus, and dysthyroid optic neuropathy (n=5)

<table>
<thead>
<tr>
<th>Patient (age in years)</th>
<th>Sex</th>
<th>Diabetes mellitus</th>
<th>Retinopathy</th>
<th>VA before DON treatment</th>
<th>DON treatment</th>
<th>VA after treatment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (60) F</td>
<td>IDDM</td>
<td>—</td>
<td>0.6 0.6</td>
<td>steroids orally two wall orbital decompression</td>
<td>0.6 0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (66) F</td>
<td>NIDDM</td>
<td>—</td>
<td>0.6 0.6</td>
<td>two wall orbital decompression</td>
<td>0.5 0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (65) F</td>
<td>IDDM</td>
<td>—</td>
<td>0.1 0.4</td>
<td>three wall orbital decompression</td>
<td>0.5 0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 (60) F</td>
<td>IDDM</td>
<td>background retinopathy, panretinal photocoagulation scars</td>
<td>0.016 0.25</td>
<td>steroids iv two wall orbital decompression</td>
<td>0.25 0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 (65) M</td>
<td>NIDDM</td>
<td>—</td>
<td>0.5 0.6</td>
<td>steroids iv 0.6 1.0</td>
<td>also myasthenia gravis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DM=diabetes mellitus; IDDM=insulin dependent diabetes mellitus; NIDDM=non-insulin dependent diabetes mellitus; VA=visual acuity; DON=dysthyroid optic neuropathy.

### Table 2 Patients with Graves’ orbitopathy and diabetes mellitus (n=10)

<table>
<thead>
<tr>
<th>Patient (age in years)</th>
<th>Sex</th>
<th>Diabetes mellitus</th>
<th>Retinopathy</th>
<th>Therapy for GO</th>
<th>Complications/comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 (38) F</td>
<td>IDDM</td>
<td>—</td>
<td>—</td>
<td>two wall orbital decompression right eye</td>
<td>—</td>
</tr>
<tr>
<td>7 (49) F</td>
<td>NIDDM</td>
<td>—</td>
<td>—</td>
<td>Recession IRM right eye three wall coronal decompression</td>
<td>postoperative orbital haemorrhage on the left side, resulting in a blind eye</td>
</tr>
<tr>
<td>8 (17) M</td>
<td>IDDM</td>
<td>—</td>
<td>—</td>
<td>Recession IRM right eye Upper and lower eyelid surgery</td>
<td>—</td>
</tr>
<tr>
<td>9 (68) F</td>
<td>IDDM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>10 (48) F</td>
<td>IDDM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>11 (55) F</td>
<td>NIDDM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>12 (64) F</td>
<td>NIDDM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>13 (49) F</td>
<td>NIDDM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>14 (66) F</td>
<td>NIDDM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>15 (63) F</td>
<td>IDDM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

GO=Graves’ orbitopathy; IRM=inferior rectus muscle; POAG=primary open angle glaucoma.
Diabetes mellitus is a chronic disease that affects millions of people worldwide. The prevalence of IDDM (insulin-dependent diabetes mellitus) in Europe is approximately 0.22–0.26%. In this study, the incidence of IDDM was 1.7%, significantly higher than in the general population.

IDDM and autoimmune diseases such as myasthenia gravis, Graves’ disease, and polymyositis have been observed to occur together in one patient. This finding supports the theory that autoimmune diseases may be inherited in families.

The association between DM and DON (dysthyroid optic neuropathy) has been reported in the literature. In this study, the incidence of DON in diabetic patients was 26.3%, significantly higher than in the normal population. DON is a serious postoperative complication and it may be advisable to operate on these patients side by side in different sessions to prevent its recurrence.

The presence of retinopathy not a reliable risk factor in predicting its development. The unilateral orbital haemorrhage after a three wall orbital decompression is a severe postoperative complication we have not encountered before. Although it is a rare complication, a generalised vasculopathy and platelet disorders in DM patients have been identified as potential mechanisms.

Diabetic retinopathy did not occur more frequently in the patients with DON than in the patients who did not develop DON, making the presence of retinopathy not a reliable risk factor in predicting its development.
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