Diabetic Retinopathy and Maculopathy

Epidemiology

Diabetic retinopathy is a frequent microvascular complication of diabetes mellitus.

Patients with Type 1 Diabetes

- Retinopathy is rare in children before puberty
- Up to 85% of patients with diabetes for 25 years or more years may develop retinopathy
- Diabetic maculopathy is present in 15% of patients with diabetes for more than 15 years

Patients with Type 2 Diabetes

- Up to one third of patients are diagnosed as having mild retinopathy when diabetes is detected
- Nearly 80% of patients develop retinopathy after 15 to 20 years
- Diabetic maculopathy can occur in nearly 25% of patients

Symptoms

Diabetic retinopathy and maculopathy usually develop and progress without symptoms. Fundus screening is mandatory, since only advanced stages cause symptoms.

Signs and symptoms that suggest the development of retinopathy are:
- sudden drop of visual acuity
- non-correctable drop of visual acuity
- If the macula is affected:
  - impaired vision
  - impaired colour vision
  - blurred vision
- “floaters” seen in front of the eye; these are caused by vitreous haemorrhages or tractive retinal detachments.

Risk Factors

- hyperglycaemia
- arterial hypertension
- diabetes duration
- hormonal changes (pregnancy, puberty)
- smoking
- concomitant nephropathy

Early Worsening of Diabetic Retinopathy

Early worsening (euglycaemic re-entry) of retinopathy affects patients with type 1 diabetes. It is rare (<5% of the patients), occurs primarily during the first 12 months of metabolic improvement, and is more frequent in patients with diabetes duration >10 years and long term poor glycaemic control (HbA1c >10%). It cannot be prevented by gradual improvement of HbA1c. The positive effect of improved glycaemic levels outweighs early worsening.

Diagnostic Work-Up

Check the following items:
- visual acuity
- lens and vitreous
- intraocular pressure (in cases of severe non-proliferative or proliferative retinopathy or advanced eye disease)
- ocular fundus using binocular biomicroscopic funduscopy (in mydriasis)

The results should be documented using standard examination procedures (Fig. 1).

Treatment Objectives

Prevention of visual loss and blindness through interdisciplinary cooperation by:
near normoglycaemia as safely as possible
blood pressure normalization (< 140/80 mm Hg)
opthalmological treatment (laser/IVOM).

Examination Schedule as a Rule

The following apply in principle:
- Retinopathy absent – Examination by a retina specialist once per year
- If retinopathy is present, examination at intervals as specified by the retina specialist.

Exceptions

- Children below the age of 11 do not need fundus inspection until they have had diabetes for 5 years or more
- Pregnant women with type 1 diabetes must be examined at diagnosis with close follow-up throughout pregnancy
- Type 2 diabetes: shortly after diagnosis of diabetes
- Patients at high risk of early worsening (T1 Diabetes) must be monitored by a retina specialist before ICT is established.
**Annex**

### Standardised Ophthalmological Examination Sheet

<table>
<thead>
<tr>
<th>AOK</th>
<th>LKK</th>
<th>BKK</th>
<th>IKK</th>
<th>VdAK</th>
<th>AEV</th>
<th>Knappschaft</th>
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</tbody>
</table>

**Patient Name**

**Date of Birth**

**Health Insurance Details**

**Date**

**Diabetes Type**
- □ type 1
- □ type 2
- □ other
- □ HbA1c
- □ diabetes duration

**Art. Hypertension**
- □ yes
- □ no
- □ treated
- □ untreated
- □ Diabetic nephropathy

### Ophthalmological Examination Sheet

Please mark the applicable diagnostic criteria. The fundus should be examined in mydriasis.

#### Best corrected visual acuity
- right eye
- left eye

#### Anterior segments:
- □ cataract
- □ artificial lens
- □ rubeosis iridis

#### Fundus:
- □ microaneurysms (enter the numbers of quadrants involved)
- □ intraretinal hemorrhages (enter the numbers of the quadrants involved)
- □ venous beading (enter the numbers of the quadrants involved)
- □ intraretinal microvascular abnormalities (enter the numbers of the quadrants involved)
- □ hard exudates
- □ soft exudates
- □ neovascularisations
- □ tractional retinal detachment without macular involvement
- □ tractional retinal detachment with macular involvement
- □ vitreous haemorrhage
- □ laser scars

#### Retinopathy Stage:
- □ no retinopathy
- □ mild or moderate non-proliferative diabetic retinopathy
- □ severe non-proliferative diabetic retinopathy
- □ proliferative diabetic retinopathy
- □ clinically significant diabetic macular oedema

#### Other ophthalmological diagnoses:
- □

#### Recommendations:
- □ fluorescence angiography
- □ IVCM
- □ pan-retinal laser coagulation / cryocoagulation
- □ focal laser coagulation at the posterior pole
- □ vitrectomy

#### Comparison with previous examination
- □ stable
- □ better
- □ worse

**Next examination in ____________ months**

**Date of examination, signature and stamp of the retina specialist**

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**Fig. 1** Standardised Ophthalmological Examination Sheet.
### Table 1  Stages, ophthalmological finding and therapy.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Ophthalmological finding</th>
<th>Ophthalmological therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 non-proliferative diabetic retinopathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mild level</td>
<td>microaneurysms</td>
<td>no laser coagulation</td>
</tr>
<tr>
<td>moderate level</td>
<td>additionally, isolated intraregional hemorrhages and/or some venous beading</td>
<td>no laser coagulation</td>
</tr>
<tr>
<td>severe level</td>
<td>&quot;4-2-1-rule&quot;: &gt; 20 isolated microaneurysms and intraretinal hemorrhages in 4 quadrants</td>
<td>laser coagulation only for patients at risk</td>
</tr>
<tr>
<td></td>
<td>or venous beading in 2 quadrants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or intraretinal micro vascular abnormalities (IRMA) in 1 quadrant</td>
<td></td>
</tr>
<tr>
<td>1.2 proliferative diabetic retinopathy</td>
<td>neovascularization of the disk, neovascularization elsewhere</td>
<td>laser coagulation</td>
</tr>
<tr>
<td></td>
<td>vitreous hemorrhage, retinal detachment</td>
<td>laser coagulation if possible; alternative vitrectomy</td>
</tr>
<tr>
<td>2. diabetic Maculopathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 focal macular oedema</td>
<td>focal areas of oedema, hard exudates or intraretinal haemorrhages at the posterior pole</td>
<td>no laser coagulation</td>
</tr>
<tr>
<td></td>
<td>like 2.1, but parafoveal vision threatening form = clinically significant macular oedema</td>
<td>targeted laser coagulation</td>
</tr>
<tr>
<td>2.2 diffuse macular oedema</td>
<td>extensive oedema of the macula and beyond, with hard exudates</td>
<td>grid laser photoagulation − IVOM if center is involved</td>
</tr>
<tr>
<td></td>
<td>and intraregional haemorrhages</td>
<td></td>
</tr>
<tr>
<td>2.3 ischaemic maculopathy</td>
<td>diagnosis using fluorescence angiography: progressive occlusion of the perifoveal capillary network</td>
<td>no therapy available</td>
</tr>
</tbody>
</table>

![Fig. 2](Image)  Procedure for type 2 diabetes pursuant to the National Disease Management Guideline “Diabetic Retinopathy and Maculopathy”.