Vascular disease location, severity and progression in diabetic patients

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Disclosure

Speaker name: Katja S. Mühlberg

I have the following potential conflicts of interest to report:
- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest
Vascular disease LOCATION

**macroangiopathy**
- PAD
- Coronary heart disease
- Cerebrovascular disease

**microangiopathy**
- retinopathy
- nephropathy
- small vessel disease
  - cerebral
  - coronary/intramural
- neuropathy
- diabetic foot syndrome
Vascular disease LOCATION

**macroangiopathy**

- PAD
- Coronary heart disease
- Cerebrovascular disease

- distal nature of the disease
- lesions predominantly in BTK-arteries and A. profunda femoris
- symmetrical, multi-segmental
- stenoses even in collateral vessels

→ poor distal run-off

Jude EB et al. Diab Medic 2010
Vascular disease LOCATION

- macroangiopathy
  - PAD
  - Coronary heart disease
  - Cerebrovascular disease

→ location of lesions did not differ between patients with and without DM

Vascular disease LOCATION

macroangiopathy
- PAD
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- no difference in supratentorial infarcts
- infratentorial infarcts more common in elderly diabetic patients

→ higher vulnerability of vertebrobasilar circulation in diabetes

Iwase M et al.: Diabetes Research and Clinical Practice 1998
Vascular disease LOCATION

- microangiopathy
  - retinopathy
  - nephropathy
  - small vessel disease
    - cerebral
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  - neuropathy
  - diabetic foot syndrome

"The transparent man"
German Museum of Hygiene, Dresden
Vascular disease LOCATION

microangiopathy

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- non-proliferative retinopathy
- proliferative retinopathy
  
  NVD neovascularization disc
  NVE neovascularization elsewhere

- maculopathy with edema
Vascular disease LOCATION

microangiopathy

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- diabetic glomerulosclerosis
- arteriolosclerosis
- papillary necrosis
  - increased risk of pyelonephritis

Kimmelstiel-Wilson-lesions
(nodular glomerulosclerosis)
Vascular disease LOCATION

**microangiopathy**

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- Resultant lesions are deep small infarcts, most often involving basal ganglia, pons, thalami and cerebral white matter (with later gliosis)
  
  *Caplan LR J of Stroke 2015*

**diabetic heart disease:**

- coronary heart disease
- heart failure
- diabetic cardiomyopathy

- Small artery about 0.4 mm diameter probably near its bifurcation, showing hyperplastic thickening of the media and narrow lumen.

  *Mosseri M et al. Circulation 1986*
Vascular disease LOCATION

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- peripheral sensory neuropathy
- peripheral motor neuropathy
- autonomic neuropathy

- numbness to touch and vibration
- reduced position sense causing
- poorer coordination and balance
- reduced sensitivity to temperature change and pain
- spontaneous tingling or burning pain
Vascular disease LOCATION

microangiopathy

- retinopathy
- nephropathy
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cerebral
coronary/intramural
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- peripheral sensory neuropathy
- peripheral motor neuropathy
- autonomic neuropathy

- muscle loss
- bone degeneration
- impaired balance and coordination
- muscle weakness
Vascular disease LOCATION

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- peripheral sensory neuropathy
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diverse symptoms, depending on the affected glands and organs:
- poor bladder control
- abnormal blood pressure or heart rate
- sweat disturbances
- poor variability of heart frequency in exercise
- no claudication in PAD
- no angina pectoris in CHD
- gastroparesis, nausea, vomiting,…
- genital impotence, ED
Vascular disease LOCATION

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Vascular disease SEVERITY and PROGRESSION

- more than 1 million people a year undergo amputation of lower limb
- 85% of them precipitated by foot ulcer

→ poor prognosis in patients with PAD and diabetic foot ulcer: 50% dying at 5 years

*International Diabetes Federation. 2014
Gu Y et al. Diabetes Ther 2015
Johannesson A et al. Diabetes Care 2009*
Vascular disease SEVERITY and PROGRESSION

- macroangiopathy
  - PAD
  - Coronary heart disease
  - Cerebrovascular disease

- progresses more rapidly
- more severe in extend

- Framingham study
  excess risk of developing PAD in DM:
  ♂: 3.5-fold
  ♀: 8.6-fold

- Rochester study
  cumulative incidence of PAD:
  15% 10 years after diagnosis of DM
  45% 20 years later

- 3- to 4-fold increased mortality
  compared with healthy individuals

Jude EB et al. Diab Medic 2010
International Diabetes Federation. 2014
Gu Y et al. Diabetes Ther 2015
Johannesson A et al. Diabetes Care 2009
Vascular disease SEVERITY and PROGRESSION

macroangiopathy

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- adults with diabetes are 2 to 4 times more likely to have heart disease or a stroke than adults without diabetes.

- 68% of people age 65 or older with DM die from some kind of heart disease
- 16% die of stroke

- leading cause of cognitive decline and functional loss in the elderly

EPIC-Norfolk study (Khaw, BMJ 2001)
Vascular disease SEVERITY and PROGRESSION

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DM 1: 90% after 15 years
DM 2: 25% after 15 years

30% of blindness in Europe


Fong DS et al. in Diabetes Care 27 suppl. 1. 2004
Vascular disease SEVERITY and PROGRESSION

- DM 1 and DM 2: 25% after 10 years

- Patients with manifest nephropathy develop endstage renal disease (ESRD):
  - DM 1: 75% after 20 years
  - DM 2: 20% after 20 years

- Diabetic nephropathy = single leading cause of ESRD

American Diabetes Association. Standards of medical care in Diabetes -2013

The decreasing prevalence (and possibly later onset) of diabetic nephropathy in subsequent year-cohorts. (Hovind, Diabetes Care 2003)
Vascular disease SEVERITY and PROGRESSION

- DM 1 and DM 2: 50% after 10 years develop neuropathy
- most common (80%): peripheral senso-motoric neuropathy
- autonomic neuropathy (second most common): >50% after 20 years
- 4-fold higher rate of sudden cardiac death (ventricular fibrillation)

American Diabetes Association. Standards of medical care in Diabetes - 2013
Vascular disease SEVERITY and PROGRESSION

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- DM is the reason for >50% of nontraumatic amputations
- major amputations occur 11 times (!) more frequently in diabetics than in non-diabetics
Diabetes affects nearly every vascular bed.

PAD, CHD,…are more commonly asymptomatic because of neuropathy.

Patients present later with more severe disease.

Common goal:
reduction of vascular events:
MI, stroke, amputation-
that too often result in disability, social decline and death.
Thank you for your attention & have an exciting time in Leipzig

“You’re right! Leipzig’s the place for me! ’Tis quite a little Paris; people there Acquire a certain easy finish’d air.”

J. W. v. Goethe
Faust I
Global Expert Exchange
Jan 26, 2016
Multidisciplinary patient-centered approach for diabetic patient treatment

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