ECG
Disorders

- rhythm disorders
- bundle branch blocks
- de/re-polarization disorders
- other
Rhythm disorders

Bradyarytmia

Ventricular

SVT*

Regular/irregular

Tachyarytmia

Ventricular

SVT*

* supraventricular
Tachyarytmia

- **Sinus tachycardia**
  - regular
  - P wave before each QRS complex at least in one lead
  - heart rate above 90-100
Sinus tachycardia
Tachyarytmia

• Atrial flutter
  – irregular/regular
  – several P waves before QRS complex (saw-like)
  – frequency of atria 200-300/min
  – to QRS complex only each 2nd, 3rd, ... atrial contraction is conducted
Atrial flutter with 3:1 conduction
Atrial flutter with 5:1 contraction
Tachyarytmia

- Atrial fibrillation with rapid ventricular response
  - Irregularly irregular
  - Without P wave before QRS complex – fibrilatory waves
  - peripheral pulse deficiency is present
Atrial fibrillation
Patient: [Redacted]

IRREGULAR RHYTHM, NO P-WAVE FOUND

RR 293 ms

PE: ...

QRS 3" ...

PR 295 ms T 31"

QRS 68 ms S (V1) 0.10 mV 5.62

P 79 ms P (II) 0.25 mV

P + QRS 507 ms Sokol. 1.09 mV

UNCONFIRMED REPORT

[Electrocardiogram tracings]
Tachyarytmia

- Ventricular tachycardia
  - regular
  - bizarre, widened, but always same QRS complexes
  - frequency above 120/min
Tachyarytmia

• Ventricular fibrillation
  – irregular
  – rapid, widened ventricular complexes of various shape
  – frequency above 400/min
Ventricular fibrillation
Pacemaker rhythm

- PM incision before QRS complex
  - may be of various intensity and shape
- frequency about 70/min
- the rest of ECG is unrepresentative for ischemic changes
Bradyarytmia

• Sinus bradycardia
  – regular/irregular
  – heart rate below 60-50/min
  – P before each QRS complex
**Sinus bradycardia**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
<td>Patient</td>
<td>pulzova1930</td>
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<tr>
<td>HR (min)</td>
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<td>Axis</td>
<td>P</td>
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<td>Intervals</td>
<td>QRS 56 ms</td>
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<td>PR (ms)</td>
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<td>QT (ms)</td>
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<td>QTC (ms)</td>
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<td>Sokol.</td>
<td>2.34 mV</td>
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<tr>
<td>Age</td>
<td>M / F</td>
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<tr>
<td>Height (cm)</td>
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<td>Weight (kg)</td>
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**ECG Tracings**

- Lead I
- Lead II
- Lead III
- Lead aVR
- Lead aVL
- Lead aVF
- Lead V1
- Lead V2
- Lead V3
- Lead V4
- Lead V5
- Lead V6

**Technical Details**

- Scale: 10 mm/mV
- Time: 25 mm/s
- Frequency: 0.05-35 Hz
- Date: 07-FEB-07 05:59:51
- Device: FNsP Ruzinov, centralny prijem
- Model: AT-2plus
- Calibration: 4.12 cm
Bradyarytmia

- A-V junction rhythm
  - regular/irregular
  - frequency below 50/min
  - without P wave before QRS complex
Patient: 

HR 47/min  Axis: 

Intervals:  QRS 50°  ORS(II) CONTOUR ABNORMALITY

RR 1279 ms  T 36°  CONSIDER ANTEROSEPTAL MYOCARDIAL DAMAGE

P  - ms

PR  - ms  P (II)  - mV  5.62

QRS 96 ms  S (V1)  - mV

QT 522 ms  R (V5)  0.49 mV

OTC 462 ms  Sokol.  1.35 mV

Age:  M / F  cm  Kg

10 mm/mV

UNCONFIRMED REPORT
Premature beats/extrasystoles

Supraventricular
- no P wave can be found before QRS complex
- QRS complex is narrow, of regular shape, conduction time below 0.12s
- earlier than expected

Ventricular
- no P wave can be found before QRS complex
- QRS conduction time is more than 0.12s
- deformed QRS with negative T wave
- polymorphic/monomorphic

alone
binded
duplets-triplets
salves
Supraventricular premature beat

Compensatory pause
Ventricular premature beat
Triplets of ventricular extrasystole
PVC bigeminy
Conduction disorders

• AV blocks
  – AVB 1. gr
  – AVB 2. gr
    • Mobitz I (Wenkebach)
    • Mobitz II
  – AVB 3. gr
A-V block I. gr

- lengthened PQ interval, more than 0.2s
- P wave before each QRS complex
- all P waves are conducted to QRS complex
A-V block I. gr.

P waves
A-V block II. grade

• Mobitz I (Wenkebach type)
  – PQ interval is continuously lengthened
  – finally one P wave is not conducted to QRS
  – there is a compensatory pause after not conducted QRS and the length of the next PQ interval is normal

• Mobitz II
  – lengthened PQ interval above 0.2 s
  – Some P waves are not conducted to QRS complex
  – we speak about it as: 2 to1 A-V block
A-V block II. gr. – Mobitz I

QRS missing
2:1 A-V block II. gr, Mobitz II
A-V block III. gr.

- Atria and ventricles are beating independently from each other
- P-P interval is constant and about 60-90/min
- RR interval is constant and about 40-55/min, QRS of normal configuration
Bundle branch blocks

• Right bundle branch block
  – incomplete (iRBBB)
  – complete (RBBB)

• Left bundle branch block
  – incomplete
    • Left anterior bundle branch hemiblock
    • Left posterior bundle branch hemiblock
  – complete
- M shape QRS in V1-V2
- rSR’, RSr’, RSR’
- Deep and wide S in V5-V6, or limb leads
- QRS more than 0,12 s

- Incomplete block
- QRS less than 0,12 s
KBPTR / RBBB*

*right bundle branch block
BPTR / iRBBB

r

R'

S
LBBB

- QRS more than 0.12 s
- Wide and dull R in V5-V6, I (M shaped QRS)
- QS complex in V1-V2
- Slow growth of R in V3-V4
- Elevation of ST segment in V1-V4
- Opposite polarity of QRS and T wave
- **Ischemic changes cannot be evaluated!!!**
Opposite polarity T and QRS

Wide QRS

ST elevation

Wide and dull R

Slow growth of R
Left Bundle Branch Block

M shaped QRS
HR 115/min  Axis:  P -61
Intervals:  QRS -70
RR 520 ms  T +121
P 84 ms  R 20 ms
PR 112 ms  S (U1) -0.31 mV
QRS 160 ms  S (V1) 0.13 mV
DT 364 ms  Sokol. 3.76 mV
OTC 506 ms  S 5.62

Supraventricular Arrhythmia
Left Atrial Abnormality
Abnormal Left Axis Deviation
Non Specific Intraventricular Block
QRS (T) Contour Abnormality
Consistent with Anteroseptal Infarct
Possibly Recent
Consistent with Inferior Infarct
Possibly Recent

Unconfirmed Report
ST segment and repolarisation disorders

ST elevation?

Yes

Elevation in 2 or more limb or neighbouring precordial leads of more than 1mm?

Acute myocardial infarction with elevation STEMI

No

Depression of ST segment of more than 1mm in 2 or more leads?

Positive enzymes? (CK-MB, troponin)

Yes

No

NSTEMI

Ischemia
ST elevation dynamics

Evolution of Acute MI