Rhythm irregularities / conduction disorders

This is a group of irregularities that involves the system that generates and transmits the electrical impulses that are necessary for the heart's activity. The electrical phenomena precede and start the sequence of the mechanical phenomena that cause the heart's pumping activity (heart contractions). The electrical impulses are conducted through specialised cells located in the atriums and ventricles.

The specialised cells in the atrium are called sinus nodes or sinoatrial nodes. This is where the first electrical impulse that determines the heart to beat regularly is generated. The electrical impulse is conducted along the atrial wall towards the atrioventricular node (another group of specialised cells located at the junction between the atriums and the ventricles), where a small delay takes places (that enables the ventricles to fill up with blood from the atriums); afterwards, the electrical impulse spreads through a specialised network in the ventricles, through the two main branches (right and left).

A normal heart activity consists of a regular succession of cardiac cycles (relaxation/contraction) with a frequency that varies between 60 and 100 heartbeats per minute in adults, while resting and in a wakeful state. Cardiac frequency is influenced by numerous factors (activity, stress, emotions, medication, acute or chronic conditions). Any kind of irregularity in the frequency or regularity of the cycles represents a rhythm irregularity/ conduction disorder and it is caused by the occurrence of electrical stimuli from other areas than the usual ones and/or the deceleration, stop or desynchronisation of the conduction at any level.

This condition is clinically translated in the occurrence of palpitations, stops, skipped heartbeats, dizziness, syncope (loss of consciousness), depending on the type and duration of the arrhythmia.

Methods of diagnosis

- ECG
- Effort test
- Holter ECG 24/48 hours
- Electrophysiologic study (EPS)
- Tilt test
- Event loop recorder

Treatment

- Medication: antiarrhythmic drugs
- Implantable antiarrhythmic devices that aim to prevent, diagnose and treat rhythm irregularities / conduction disorder:
    - Cardiac pacemakers, including resynchronisation therapy
    - Cardiac defibrillators
- Interventional procedures: ablation treatment (interrupting the mechanism that maintains the arrhythmia)
- Surgical procedures

The most frequent rhythm irregularities are:

- Supraventricular arrhythmia, originating in the atriums
    - Sinus tachycardia – increased frequency of electrical impulse discharges in the sinoatrial node

    - Sinus bradycardia – decreased frequency of electrical impulse discharges in the sinoatrial node
    - Atrial extrasystoles
    - The presence of electrical impulses in the atriums from other locations than the sinus node
    - Sinus node disease (Sick Sinus Syndrome)
    - Paroxysmal supraventricular tachycardia (PSVT)
    - Atrial fibrillation/atrial flutter
    - Preexcitation syndrome (Wolff-Parkinson-White Syndrome)
- Ventricular
    - Ventricular extrasystoles – the presence of electrical impulses in the ventricular myocardium
    - Ventricular tachycardia
    - Ventricular fibrillation

Another category of electrical irregularities are those related to conduction, i.e. the obstructions that can be located in:

- The atrium – sinoatrial obstructions
- The atrioventricular node – the atrioventricular obstructions block the conduction of the electrical impulse from the atriums to the ventricles; they can either have no clinical significance or they can reach complete obstruction, in which case, we recommend a cardiac pacemaker implantation;
- The ventricles – the branch obstructions completely or partially block the conduction of the electrical impulse through the ventricular branches (complete or partial, left or right branch obstruction); these obstructions might require a cardiac pacemaker implantation, depending on their association and symptomatology.

For patients who require administration of medication that determines a significant decrease in the cardiac frequency, cardiac stimulation (cardiac pacemaker implantation) might be necessary in order to prevent the occurrence of syncopes (loss of consciousness).

See:
www.stimulator.ro – Cardiac pacemaker
www.pace-maker.ro – Pacemaker
www.defibrilator-cardiac.ro – Cardiac defibrillator/Implantable cardioverter