

Direct Current Cardioversion

Introduction

Heart rhythm is mainly controlled by the conduction system of the heart. Any abnormality in the conduction system may result in abnormal heart rhythm (arrhythmia). Arrhythmias with fast heart rate can cause syncope, heart failure or occasionally cardiac death. It may be necessary to stop arrhythmias as soon as possible. Direct current cardioversion (DCV) is the conversion of arrhythmias with fast heart rate to normal rhythm with the use of electric shock. Depending on the situation, it may be used as an elective or emergency procedure.

Importance of the Procedure

DCV can quickly abolish arrhythmias to resume a normal rhythm. Common indications are atrial fibrillation, atrial flutter, supraventricular tachycardia and ventricular tachycardia. Depending on the type and duration of arrhythmia, the amount of energy used and successful rate may be different. Especially in case of ventricular tachycardia, if you refuse this procedure, the effect of arrhythmia may be detrimental or even fatal in emergency situation. Alternative treatments include anti-arrhythmic drugs and radio-frequency catheter ablation of the arrhythmogenic substrate.

Pre-Procedure Preparation

- In elective case, you will be invited to a ward or a clinic for some preliminary tests including electrocardiogram, chest X-ray and blood tests. We may perform a trans-esophageal echocardiogram before DCV. Fasting for 4-6 hours is necessary before DCV.
- In elective DCV, your doctor will explain to you the risks, benefits and procedure of DCV. You need to sign an informed consent.
- In emergency DCV, the preparatory work mentioned above may not apply. An IV infusion will be set up.

The Procedure

- This procedure is performed at bedside or in a cardiac catheterization centre.
- Electrodes are adhered to the chest to monitor the heart rate and rhythm. Blood oxygen monitor through your finger will be set up.
- Two electrode pads are placed on your chest wall, either both on the front or one on the front and the other on the back.
- You will be sedated with medications and oxygen supplement may be given.
- A pulse of electric current is delivered through these pads to the chest. The amount of energy used depends upon the type of arrhythmia to be cardioverted. You may experience pain during the electric shock.
- If the initial shock fails to terminate the arrhythmia, the energy may need to be stepped up or electrodes may be repositioned.
- In case of immediate recurrence of arrhythmia, the procedure may be repeated.

Post-Procedure Care and Follow Up

- After the procedure, you will be kept on close monitoring in the ward.
- Oral diet may be resumed when you are fully conscious.
- You may feel mild pain or discomfort on the chest for a few days after the procedure.
- You may need to take blood thinning drug for 4 weeks after DCV.

Risks and Complications

- The procedure carries certain risks.
- Complications include transient low blood pressure, stroke, transient arrhythmias, pulmonary edema and painful skin burns.
- DCV of atrial fibrillation and atrial flutter may trigger dislodgement of any undetected existing blood clot inside the heart and there is a risk for stroke (5.3%). Use of blood thinning drug before and after DCV reduces the risk to 0.8%. Alternatively, before DCV, trans-esophageal echocardiogram can be used to exclude any existing blood clot in the heart.

Remarks

- It is hard to mention all the possible consequences if this procedure is refused.
- The list of complications is not exhaustive and other unforeseen complications may occasionally occur. The risk quoted is in general terms. In special patient group, the actual risk may be higher.
- Should a complication occur, another life-saving procedure or treatment may be required immediately.
- If there is further query concerning this procedure, please feel free to contact your nurse or your doctor.

Reference

1. Zipes DP, editors. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 7th ed. Philadelphia: W.B. Saunders; 2005.
2. 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2010;122(18 Suppl 3):S640.
3. 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2015 Nov;132.