

DC cardioversion of haemodynamically stable inpatients with atrial arrhythmias under conscious sedation on CCU at Gloucestershire Royal and Cheltenham General Hospitals

Howell Williams (SpR in Cardiology), Nicol Vaidya (Associate Specialist in Cardiology)

Written: Sept 2019. Due for review: Sept 2023

Introduction

DC cardioversion aims to restore sinus rhythm among patients in persistent arrhythmias. For atrial arrhythmias (atrial fibrillation and atrial tachycardias including atrial flutter) this may be done in the following clinical situations:

- urgently in haemodynamically unstable patients to restore haemodynamic stability
- semi-electively in:
 - o patients presenting with new-onset atrial arrhythmias in whom a rhythm control strategy is planned (e.g presenting to ED with palpitations)
 - o inpatients in whom pharmacological rate control has failed and who remain tachycardic in an atrial arrhythmia
 - o inpatients with heart failure in whom sinus rhythm may improve cardiac output
- electively in stable patients with persistent atrial arrhythmias to assess the symptomatic benefit of sinus rhythm

Duration of atrial arrhythmia and anticoagulation status do not matter in haemodynamically unstable patients in whom the aim of DC cardioversion is to restore haemodynamic stability. For all other patients, DC cardioversion should only be undertaken if the duration of atrial arrhythmia is <48 hours, or if the patient has either been taking anticoagulation for a minimum of 3 weeks prior to the procedure (see below for detail) or had a pre-procedure TOE to exclude LA appendage thrombus.

Patients must be sedated in all but the most emergent situations, due to pain associated with DC cardioversion. It has previously been shown that among stable elective patients, conscious sedation administered without the supervision of an anaesthetist is a safe and effective approach, and reduces waiting times and on-the-day cancellations in the elective group (1-3).

This protocol covers the use of conscious sedation for DC cardioversion of haemodynamically stable inpatients with atrial arrhythmias on CCU, without anaesthetic supervision. This has occasionally been performed at GRH/CGH in the past and is common in other centres. It may be performed by medical staff who are ALS certified, trained in DC cardioversion and experienced in conscious sedation techniques (see the Academy of Medical Royal Colleges 2013 "Safe Sedation Practice for Healthcare Procedures").

It does not cover haemodynamically unstable patients, who should be managed according to the ALS algorithm with appropriate anaesthetic support.

Exclusion criteria

Patients with the following co-morbidities should normally be added to the Theatres emergency list for DC cardioversion with anaesthetic supervision due to increased risks associated with conscious sedation:

1. Previous complication from conscious sedation
2. Sleep apnoea
3. Obesity
4. Significant respiratory disease or any history of respiratory failure
5. Known previous difficult tracheal intubation
6. Congenital heart disease

Procedure

1. Ensure sufficient staff are available
 - a. Minimum of one doctor (SpR or above) and one nurse (RGN from CCU team) required
2. Confirm rhythm with 12 lead ECG
3. Confirm anticoagulation status
 - a. Patients who have been in an atrial arrhythmia for less than 48 hours do not need to have been chronically anticoagulated
 - i. A single dose of therapeutic LMWH heparin should be delivered to these patients ahead of DC cardioversion
 - b. Patients who have been in an atrial arrhythmia for more than 48 hours must have been anticoagulated for a minimum of 3 weeks prior to DC cardioversion (4)
 - i. This may involve verbal confirmation from the patient that they have taken a NOAC without interruption, or proof of regular INR checks with therapeutic range results (≥ 2.0)
4. Confirm 'nil by mouth' status
 - a. Patients must have been 'nil by mouth' for a minimum of 6 hours prior to sedation
5. Obtain written informed consent
6. Connect to bedside cardiac monitor and continuous oxygen saturation monitoring
7. Connect defibrillator pads and leads
 - a. Ensure the defibrillator has transcutaneous pacing capability due to small risk of bradycardia post-cardioversion
8. Connect patient to supplemental oxygen (usually 4L/min through nasal specs)
9. Ensure a working yankauer sucker is available at the bedside
10. Ensure the following drugs are readily available at the bedside:
 - a. Midazolam (must use 1mg/1ml strength)
 - b. Flumazenil (does not need to be drawn up)
 - c. Atropine
11. Administer conscious sedation – this
 - a. IV midazolam:
 - i. 2mg initial dose for patients under 60 years old

- ii. 1mg initial dose for patients over 60 years
 - b. Assess level of sedation after a minimum of 2 minutes
 - i. If level of sedation is insufficient, administer further IV midazolam in boluses:
 - 1. 1mg boluses in patients under 60
 - 2. 0.5mg boluses in patients over 60
 - ii. Allow a minimum of 2 minutes after each injection to assess level of sedation to a maximum 7.5mg total. Doses above 7.5mg may be given following discussion with the responsible consultant
 - c. Ensure oxygen saturation is being continuously monitored
12. When sufficient sedation has been achieved
 - a. Ensure the synchronise function on the defibrillator is switched on
 - b. Remove supplemental oxygen
 - c. Deliver a 150J synchronised shock
 - d. Re-assess rhythm on defibrillator screen and printed strip, and check heart rate and blood pressure
 - i. If still in atrial arrhythmia, deliver up to two further shocks (usually both at 200J but can deliver 360J if the defibrillator has the capability to do so)
 - ii. If sinus rhythm has been achieved for a few beats and atrial arrhythmia has then recurred, no further attempts at DC cardioversion should be made
 - e. If now in sinus rhythm:
 - i. Confirm rhythm with 12 lead ECG
 - ii. Allow the patient to recover from conscious sedation with continuous oxygen saturation monitoring and cardiac rhythm monitoring ongoing
13. Patients may be discharged when the effects of sedation have fully resolved, after a minimum of 1 hour. This should normally be assessed by the doctor responsible for administering the sedation but may be delegated to the CCU nursing team.

Post procedure

1. All patients should be anticoagulated for a minimum of 4 weeks post DC cardioversion. Ongoing anticoagulation beyond 4 weeks is based on the CHADSVASC score and will be decided on by the responsible consultant in conjunction with the patient themselves
2. Appropriate follow up should be put in place as advised by the responsible consultant
3. Patients should not drive for 24 hours following conscious sedation

References

1. Notarstefano P, Pratola C, Toselli T et al. Clin Electrophysiol. 2007 May;30(5):608-11
2. Hubner PJ, Gupta S, McClellan I. Heart 2004; 90(12): 1447-9
3. Raipancholio R, Sentinella L, Lynch M. Heart 2001;86:571-572
4. Kirchof P, Benussi S, Kotecha D et al. European Heart Journal, Volume 37, Issue 38, 7 October 2016, Pages 2893–2962
5. Safe sedation practice for healthcare procedures: standards and guidance. Academy of Medical Royal Colleges, 2013