

**HR-UK**

**Heart Rhythm UK**



CERTIFICATE OF  
ACCREDITATION

(ELECTROPHYSIOLOGY  
SpR/StR)

**PRACTICAL LOGBOOK**

**BY**

**Name:**

**GMC Number:**

## ELECTROPHYSIOLOGY LOGBOOK FOR SpRs/StRs KNOWLEDGE BASE FOR ELECTROPHYSIOLOGY PROCEDURES

This logbook is aimed primarily at the cardiology non-subspecialty trainee i.e. ST3-5. It provides a structured companion to the JRCPTB cardiology speciality training curriculum to develop **core basic** skills in electrophysiology. The practical logbook assumes a specific level of background knowledge, the minimum being the curriculum required for the HRUK examination. Guidance is given in the following document regarding expected knowledge, skills and attitudes.

### Interventional electrophysiology (all modules compulsory)

1. Diagnostic electrophysiology  
(Could be part of an ablation procedure)
2. Ablation of narrow complex tachycardia (SVT)
3. Ablation of atrial flutter (isthmus dependant and atypical)
4. Ablation of ventricular tachycardia (normal heart and/or scar related)
5. Ablation of Atrial fibrillation and/or Atrial tachycardia

### SUMMARY OF INFORMATION REQUIRED

|                               | Module   | Logbook Cases                                    | Case Studies  |
|-------------------------------|--|--|---|
| <b>All modules compulsory</b> | Diagnostic electrophysiology                               | 5 Narrow complex<br>5 Ventricular tachycardia    | 2 Narrow complex<br>1 Ventricular tachycardia                   |
|                               | Ablation of narrow complex tachycardia                     | 15 narrow complex tachycardia                    | 2 AVNRT<br>2 WPW<br>1 Concealed pathway                         |
|                               | Ablation of atrial flutter (isthmus dependant or atypical) | 5 isthmus dependant and atypical atrial flutters | 1 isthmus dependant atrial flutter<br>1 atypical atrial flutter |
|                               | Ablation of ventricular tachycardia                        | 5 ventricular tachycardia                        | 1 RVOT  |
|                               | Ablation of Atrial fibrillation / Atrial tachycardia       | 5 AF or atrial tachycardia                       | 1 AF or atrial tachycardia                                      |

Each completed logbook will have a total of

- 40 Recorded procedures (first or joint operator)

- Supervisor: - Consultant specialising in electrophysiology
- 12 Case studies
  - For which the trainee must set up and control the operating system themselves.
  - Supervisor: - Experienced cardiac physiologist

To gain a certificate of accreditation in electrophysiology it is expected that the cardiology trainee has a knowledge and understanding of the following:

Normal ECG and electrogram interpretation and recognition including baseline intervals:

- A-H (ms)
- H-V (ms)
- Coronary sinus activation patterns
- AV relationship
- VA conduction
- Decremental conduction

ECG and EGM Interpretation of the following:

- Atrial Fibrillation
- Atrial Flutter (isthmus dependant and atypical)
- Atrial Tachycardia
- AVNRT
- AVRT
- Pre-excitation
- VT (Normal heart and scar related)

Care and routine maintenance of all equipment.

- Correct application and positioning of all consumables including ECG, defibrillation pads, ground pads, surface kits for navigational mapping systems.
- Preparation of all equipment including navigational mapping systems and irrigated catheter systems.
- Recording technique including recognition and reduction of artefact.
- Recording system settings, use and adjustments.
- Pacing system settings, use and adjustments.
- Pacing protocols for induction and termination of arrhythmias.
- Diagnostic and therapeutic electrode selection and rationale.
- Therapy modality and rationale.
- Application of anti-arrhythmic medication for diagnostic and therapeutic purposes.
- Compatibility of navigation mapping systems, radiofrequency generators, irrigated catheter systems and diagnostic and therapeutic electrodes.

### General attitude

- Take a sensible, professional attitude to arrhythmia management; learn under supervision with appropriate requests for advice.
- To communicate effectively with patients and their family and contacts to take an effective history.
- Consent patients sensitively with an objective assessment of risks.
- Be aware of the importance of members of a multidisciplinary catheter laboratory team in safe performance of procedures.
- Communicate effectively and positively with other professionals involved in the patient's care.
- Remain calm and professional in the event of adverse complications.
- Be diligent in recording the management of the patient and achieving effective communication with primary care physicians and other professionals involved.
- To appreciate the psychological impact of the patient's illness on the patient and their family, and manage it sensitively.

### **Supervisor(s)**

You must obtain verification of the information and completion of the assessment sections from your supervisor(s).

It is recommended for the practical logbook component that the supervisor be a consultant specialising in electrophysiology and that for the individual case studies the supervisor be an experienced cardiac physiologist with appropriate experience in electrophysiology and ideally hold the HRUK certificate of accreditation or the NASPEXAM/IBHRE qualification (electrophysiology).

Further information on the logbook can be obtained from HRUK, 9 Fitzroy Square, London W1T 5HW. Tel +44 207 692 5433; e-mail [hruk@bcs.com](mailto:hruk@bcs.com)

## MODULE 1 - DIAGNOSTIC ELECTROPHYSIOLOGY

The trainee will perform a diagnostic EP procedure (this could be part of an ablation procedure). Trainees should demonstrate competence in both the choice and placement of catheters, mapping systems used and the set up and use of the operating system.

Trainees are required to submit a logbook of 10 procedures where they are either first or joint operator. Indications for diagnostic procedures will vary and although the majority are likely to be for the investigation of narrow complex tachycardia (SVT Study), 5 VT/VT stimulation tests should be included in the logbook.

In addition the trainee should undertake 3 case studies (2 SVT studies and 1 VT stimulation test) for which they **set up and control the operating system themselves**. Each case study must include appropriate tracings demonstrating

- Baseline measurements
- Diagnostic manoeuvres
- Tachycardia initiation and
- Termination and ablation **if appropriate**.

### Objectives

- Successfully evaluate a patient presenting with a tachycardia and identify all possible electrophysiological mechanisms.
- Elicit key factors in the history to help distinguish between different tachycardias.
- To understand and be able to direct autonomic manoeuvres in a clinic setting.
- To be able to select appropriate investigations to help diagnose the presenting arrhythmia.
- To correctly select patients appropriate for electrophysiological studies and catheter ablation.
- To safely and competently carry out an invasive electrophysiological study and interpret the findings.
- To safely and competently manage all drug therapy associated with the care of the patient.

### Knowledge

- Of the electrophysiology mechanisms of tachycardias.
- Of medico-legal issues concerning consent and provision of information.
- Of the range of variation in presentations and clinical findings associated with different arrhythmia mechanisms.
- Of the range of ECG recording equipment for detecting intermittent arrhythmias and their appropriate use.
- Of 3-dimensional cardiac anatomy.

- Of the equipment required for electrophysiological studies and catheter ablation.
- Of intracardiac electrographic patterns in tachycardias and their interpretation.
- Of ablation techniques and ability to use information from imaging and intracardiac electrograms to guide and evaluate the effectiveness of ablation.
- Of potential complications of invasive electrophysiological procedures and their management.
- Of the pharmacology, side-effects and interactions of drugs used in the management of these conditions.

### **Skills**

- Competence in performing autonomic manoeuvres.
- To prepare a patient for an electrophysiological study, safely and competently insert vascular sheaths and undertake the procedure.
- To safely and accurately manipulate electrodes in the blood vessels and heart.
- To accurately document records of all aspects of patient care.





| No. | Procedure          | Patient Hospital Number | Procedure Date | Pre Procedure Evidence/Diagnosis | Post Procedure Outcome | Diagnostic electrodes | Ablation Electrode | Pre procedure ECG | Post procedure ECG | Operator (1 <sup>st</sup> /joint) |
|-----|--------------------|-------------------------|----------------|----------------------------------|------------------------|-----------------------|--------------------|-------------------|--------------------|-----------------------------------|
| 6   | VT (Stim Or Study) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 7   | VT (Stim Or Study) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 8   | VT (Stim Or Study) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 9   | VT (Stim Or Study) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 10  | VT (Stim Or Study) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |

Consultant name and signature:

Date:

VT Stim: Ventricular tachycardia stimulation study      VT Study: Diagnostic VT study

# SVT Case Study 1

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
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|  |

Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
| ECG at time of symptoms                    |        |              |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## SVT Case Study 1 (cont)

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|  |     |  |     |  |
|--|-----|--|-----|--|
| Baseline intervals (ms)  | A-H |  | H-V |  |
| Retrograde curve performed?                                    |     |  |     |  |
| V-A conduction?  |     |  |     |  |
| Anterograde curve performed?                                   |     |  |     |  |
| Decremental conduction evident?                                |     |  |     |  |
| Tachycardia induced?   |     |  |     |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis  |     |  |     |  |
| Treatment plan including risks,<br>rationale etc               |     |  |     |  |

## SVT Case Study 1 (cont)

Comments:

Supervisor comments:

### **Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- Diagnostic manoeuvres
- Tachycardia termination

Supervisor name, signature and job title:

Date:

## SVT Case Study 2

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
|  |
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|  |

Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
| ECG at time of symptoms                    |        |              |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## SVT Case Study 2 (cont)

| Number of sheaths inserted   | Approach | Size (French) | Type    |  |
|--|----------|---------------|---------|--|
|  |          |               |         |  |
|  |          |               |         |  |
|  |          |               |         |  |
|  |          |               |         |  |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |  |
|  |          |               |         |  |
|  |          |               |         |  |
|  |          |               |         |  |
|  |          |               |         |  |

| Baseline intervals (ms)  | A-H |  | H-V |  |
|--|-----|--|-----|--|
| Retrograde curve performed?                                    |     |  |     |  |
| V-A conduction?  |     |  |     |  |
| Anterograde curve performed?                                   |     |  |     |  |
| Decremental conduction evident?                                |     |  |     |  |
| Tachycardia induced?   |     |  |     |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis  |     |  |     |  |
| Treatment plan including risks,<br>rationale etc               |     |  |     |  |

## SVT Case Study 2 (cont)

Comments:

Supervisor comments:

### **Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- Diagnostic manoeuvres
- Tachycardia termination

Supervisor name, signature and job title:

Date:

# VT Stimulation Case Study 1

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
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Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
| ECG at time of symptoms                    |        |              |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## VT Stimulation Case Study (cont)

| Number of sheaths inserted   | Approach | Size (French) | Type    |
|--|----------|---------------|---------|
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|  |  |
|--|--|
| VT Stimulation protocol used                                   |  |
| Tachycardia induced?   |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |  |
| Tachycardia diagnosis  |  |
| Treatment plan including risks,<br>rationale etc               |  |

## VT Stimulation Case Study (cont)

Comments:

Supervisor comments:

### Include the following where appropriate:

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- Diagnostic manoeuvres
- Tachycardia termination

Supervisor name, signature and job title:

Date:

## **MODULE 2-4 ABLATION OF NARROW COMPLEX TACHYCARDIA, ABLATION OF ATRIAL FLUTTER AND ABLATION OF VT**

The following objectives, knowledge and skills apply to modules

- 2 Ablation of narrow complex tachycardia
- 3 Ablation of atrial flutter (isthmus dependant/atypical)
- 4 Ablation of VT (normal heart/scar related)

### **Objectives**

- To understand the principles and practical aspects of the use of conventional intracardiac recording to define the mechanism and precise site of origin of clinical cardiac arrhythmias.
- To understand the principles and practical aspects of the use of complex electroanatomic mapping tools (e.g. NavX/ESI, Carto) to define the mechanism and precise site of origin of clinical cardiac arrhythmias.
- To master catheter ablation techniques for the treatment of arrhythmias.

### **Knowledge**

- Of endocardial activation patterns in, atrial flutter, AVNRT, AVRT, AF, atrial tachycardia and VT.
- Of endocardial signals suggestive of critical sites for arrhythmia maintenance e.g. very early atrial or ventricular signals in WPW syndrome, slow pathway potentials in AVNRT and mid-diastolic potentials in VT.
- Of the use of intracardiac programmed stimulation to induce and terminate tachycardias, aid in the diagnosis of dual AV nodal pathways, define the mechanism of a junctional reciprocating tachycardia (AVNRT) and the presence of unidirectional or bidirectional isthmus block in patients presenting with atrial flutter.
- Of the use of pacing techniques to define critical sites for arrhythmia generation in patients with VT.
- Of the principles underlying non contact intracardiac mapping, complex activation and potential maps. An understanding of benefits and limitations of these systems.
- Of the biophysics of RFA catheter ablation, and understanding of alternatives.

### **Skills**

- Manipulation and positioning of electrophysiological recording, pacing and ablation catheters safely and effectively.
- Ability to recognise activation patterns characteristic of specific arrhythmias in "real time".

- Ability to successfully ablate cardiac arrhythmias based on interpretation of endocardial signals and pacing techniques.
- Perform entrainment, concealed entrainment and pace-mapping to identify sites critical for arrhythmia maintenance.
- Demonstrate endpoints of successful ablation.
- Safely deploy, set-up, interpret and use complex mapping systems.
- Demonstrate ability to identify electrical wavefronts during re-entrant arrhythmias and electrically silent areas in patients with VT or complex congenital heart disease.
- Use of these systems to demonstrate lines of block after catheter ablation lesions.
- To recognise and treat complications.

### **SCAR RELATED VT (if applicable)**

#### **Knowledge**

- Of the indications and limitations of VT ablation.
- Of mapping techniques used for scar related VT.
- Of the principles of substrate mapping versus VT mapping.
- Of the role and principles of operation of advanced mapping systems.
- Of potential complications and risks of VT ablation.
- Of techniques for induction and termination of VT.

#### **Skills**

- Be able to select appropriate patients for VT ablation.
- Be able to consent a patient in a balanced and informed way about success rate, risks and benefits of VT ablation.
- Demonstrate catheter manipulation skills necessary to perform VT ablation.
- Understand principles of RF energy delivery and alternative energy sources.
- Competence at use of an electronic EP recording system.
- Competence at ICD troubleshooting and programming in patients with VT needing ablation.

## MODULE 2 – ABLATION OF NARROW COMPLEX TACHYCARDIA

Trainees will assist and/or perform ablation of narrow complex tachycardia. A total of 15 procedures should be performed as a logbook, of which at least

- 3 should be AVNRT
- 6 should be for AVRT
  - 3 for WPW syndrome
  - 3 for a concealed accessory pathway

In addition the trainee should undertake 5 case studies for which they **set up and control the operating system themselves**.

- 2 AVNRT
- 3 AVRT of which 1 must be for a concealed pathway

Each case study must include appropriate tracings demonstrating

- Baseline measurements
- Diagnostic manoeuvres
- Tachycardia initiation and
- Termination and ablation **if appropriate**.







| No. | Procedure    | Patient Hospital Number | Procedure Date | Pre Procedure Evidence/Diagnosis | Post Procedure Outcome | Diagnostic electrodes | Ablation Electrode | Pre procedure ECG | Post procedure ECG | Operator (1st/joint) |
|-----|--------------|-------------------------|----------------|----------------------------------|------------------------|-----------------------|--------------------|-------------------|--------------------|----------------------|
| 13  | SVT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                      |
| 14  | SVT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                      |
| 15  | SVT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                      |

Consultant name and signature:

Date:

# AVNRT Case Study 1

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
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Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
| ECG at time of symptoms                    |        |              |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## AVNRT Case Study 1 (cont)

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|   |     |  |     |  |
|---|-----|--|-----|--|
| Baseline intervals (ms)                                     | A-H |  | H-V |  |
| Retrograde curve performed?                                 |     |  |     |  |
| V-A conduction?   |     |  |     |  |
| Anterograde curve performed?                                |     |  |     |  |
| Wenkebach rate (pre and post RF ablation)                   |     |  |     |  |
| Decremental conduction evident?                             |     |  |     |  |
| Evidence if dual AV node physiology                         |     |  |     |  |
| Tachycardia induced?  |     |  |     |  |
| Diagnostic manoeuvres performed (pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis                                       |     |  |     |  |
| Tachycardia termination (ATP, Cardioversion)                |     |  |     |  |
| Treatment plan including risks, rationale etc               |     |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | LocaLisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## AVNRT Case Study 1 (cont)

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

|                      |
|----------------------|
| Comments:            |
| Supervisor comments: |

**Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- AH Jump if present
- WB Pacing is PR > RR?
- Tachycardia initiation
- RF recordings if appropriate e.g. ablation signal, junctional tachycardia during ablation
- Tachycardia termination

|   |
|---|
| Supervisor name, signature and job title: |
| Date:                                     |

## AVNRT Case Study 2

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
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|  |

Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
| ECG at time of symptoms                    |        |              |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## AVNRT Case Study 2 (cont)

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|  |     |  |     |  |
|--|-----|--|-----|--|
| Baseline intervals (ms)  | A-H |  | H-V |  |
| Retrograde curve performed?                                    |     |  |     |  |
| V-A conduction?  |     |  |     |  |
| Anterograde curve performed?                                   |     |  |     |  |
| Wenkebach rate (pre and post RF ablation)                      |     |  |     |  |
| Decremental conduction evident?                                |     |  |     |  |
| Evidence if dual AV node physiology                            |     |  |     |  |
| Tachycardia induced?   |     |  |     |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis  |     |  |     |  |
| Tachycardia termination (ATP, Cardioversion)                   |     |  |     |  |
| Treatment plan including risks, rationale etc                  |     |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | LocaLisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## AVNRT Case Study 2 (cont)

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

|                      |
|----------------------|
| Comments:            |
| Supervisor comments: |

**Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- AH Jump if present
- WB Pacing is PR > RR?
- Tachycardia initiation
- RF recordings if appropriate e.g. ablation signal, junctional tachycardia during ablation
- Tachycardia termination

|   |
|---|
| Supervisor name, signature and job title: |
| Date:                                     |

## Concealed Pathway Case Study

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
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|  |
|  |

Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
| ECG at time of symptoms                    |        |              |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## Concealed Pathway Case Study (cont)

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|   |     |  |     |  |
|---|-----|--|-----|--|
| Baseline intervals (ms)                                     | A-H |  | H-V |  |
| Retrograde curve performed?                                 |     |  |     |  |
| V-A conduction?   |     |  |     |  |
| Anterograde curve performed?                                |     |  |     |  |
| Wenkebach rate (pre and post RF ablation)                   |     |  |     |  |
| Decremental conduction evident?                             |     |  |     |  |
| Evidence if dual AV node physiology                         |     |  |     |  |
| Tachycardia induced?  |     |  |     |  |
| Diagnostic manoeuvres performed (pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis                                       |     |  |     |  |
| Tachycardia termination (ATP, Cardioversion)                |     |  |     |  |
| Treatment plan including risks, rationale etc               |     |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | LocaLisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## Concealed Pathway Case Study (cont)

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

Comments:

Supervisor comments:

**Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- AH Jump if present
- WB Pacing is PR>RR?
- Tachycardia initiation
- RF recordings if appropriate e.g. ablation signal, junctional tachycardia during ablation
- Tachycardia termination

Supervisor name, signature and job title:

Date:

# AVRT-WPW Case Study 1

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
|  |
|  |
|  |

Investigations and Results

|  | Yes/No | Result  |
|--|--------|---|
| Baseline 12 lead ECG                       |        | PR interval<br>QRS duration<br>QT interval<br>Axis<br>Evidence pre-excitation |
| ECG at time of symptoms                    |        |   |
| ECG of vagal manoeuvres and / or adenosine |        |   |
| Echocardiogram                             |        |   |
| Holter Monitor                             |        |   |
| ILR (loop recorder)                        |        |   |
| Exercise Test                              |        |   |
| Coronary Angiogram                         |        |   |
| Tilt Table Test                            |        |   |
| Other Ix (specify)                         |        |   |

## AVRT-WPW Case Study 1 (cont)

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|  |         |  |     |  |
|--|---------|--|-----|--|
| Baseline intervals (ms)  | A-H     |  | H-V |  |
| Retrograde curve performed?                                    |         |  |     |  |
| V-A conduction?  |         |  |     |  |
| Retrograde atrial activation pattern?                          |         |  |     |  |
| Anterograde curve performed?                                   |         |  |     |  |
| Pathway ERP  | Pathway |  |     |  |
|  | AV Node |  |     |  |
| Decremental conduction evident?                                |         |  |     |  |
| Tachycardia induced?   |         |  |     |  |
| Induction method   |         |  |     |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |         |  |     |  |
| Tachycardia diagnosis  |         |  |     |  |
| Tachycardia termination (ATP, Cardioversion)                   |         |  |     |  |
| Treatment plan including risks, rationale etc                  |         |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | Localisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## AVRT-WPW Case Study 1 (cont)

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

|                      |
|----------------------|
| Comments:            |
| Supervisor comments: |

**Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- RF recordings if appropriate e.g. ablation signal, junctional tachycardia during ablation, loss of delta wave
- Tachycardia termination

|   |
|---|
| Supervisor name, signature and job title: |
| Date:                                     |

## AVRT-WPW Case Study 2

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
|  |
|  |
|  |

Investigations and Results

|  | Yes/No | Result  |
|--|--------|---|
| Baseline 12 lead ECG                       |        | PR interval<br>QRS duration<br>QT interval<br>Axis<br>Evidence pre-excitation |
| ECG at time of symptoms                    |        |   |
| ECG of vagal manoeuvres and / or adenosine |        |   |
| Echocardiogram                             |        |   |
| Holter Monitor                             |        |   |
| ILR (loop recorder)                        |        |   |
| Exercise Test                              |        |   |
| Coronary Angiogram                         |        |   |
| Tilt Table Test                            |        |   |
| Other Ix (specify)                         |        |   |

## AVRT-WPW Case Study 2 (cont)

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|   |         |  |     |  |
|---|---------|--|-----|--|
| Baseline intervals (ms)                                     | A-H     |  | H-V |  |
| Retrograde curve performed?                                 |         |  |     |  |
| V-A conduction?   |         |  |     |  |
| Retrograde atrial activation pattern?                       |         |  |     |  |
| Anterograde curve performed?                                |         |  |     |  |
| Pathway ERP   | Pathway |  |     |  |
|   | AV Node |  |     |  |
| Decremental conduction evident?                             |         |  |     |  |
| Tachycardia induced?  |         |  |     |  |
| Induction method  |         |  |     |  |
| Diagnostic manoeuvres performed (pacing or pharmacological) |         |  |     |  |
| Tachycardia diagnosis                                       |         |  |     |  |
| Tachycardia termination (ATP, Cardioversion)                |         |  |     |  |
| Treatment plan including risks, rationale etc               |         |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | Localisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## AVRT-WPW Case Study 2 (cont)

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

|                      |
|----------------------|
| Comments:            |
| Supervisor comments: |

**Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- RF recordings if appropriate e.g. ablation signal, junctional tachycardia during ablation, loss of delta wave
- Tachycardia termination

|   |
|---|
| Supervisor name, signature and job title: |
| Date:                                     |

## MODULE 3 ABLATION OF ATRIAL FLUTTER

For expected Objectives, Knowledge and Skills see module 2.

Trainees will assist and/or perform ablation of atrial flutter. A total of 5 procedures should be performed as a logbook, of which at least

- 1 should be isthmus dependant atrial flutter
- 1 should be for atypical atrial flutter

In addition the trainee should undertake 2 case studies for which they **set up and control the operating system themselves**.

- 1 should be for isthmus dependant atrial flutter
- 1 should be for atypical atrial flutter

Each case study must include appropriate tracings demonstrating

- Baseline measurements
- Diagnostic manoeuvres
- Tachycardia initiation and
- Termination and ablation **if appropriate**.

## RECORD OF COMPLETED ELECTROPHYSIOLOGY PROCEDURES

| No. | Procedure                                     | Patient Hospital Number | Procedure Date | Pre Procedure Evidence/Diagnosis | Post Procedure Outcome | Diagnostic electrodes | Ablation Electrode | Pre procedure ECG | Post procedure ECG | Operator (1 <sup>st</sup> /joint) |
|-----|---|-------------------------|----------------|----------------------------------|------------------------|-----------------------|--------------------|-------------------|--------------------|-----------------------------------|
| 1   | Flutter Ablation<br><br>(typical or atypical) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 2   | Flutter Ablation<br><br>(typical or atypical) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 3   | Flutter Ablation<br><br>(typical or atypical) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 4   | Flutter Ablation<br><br>(typical or atypical) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 5   | Flutter Ablation<br><br>(typical or atypical) |                         |                |                                  |                        |                       |                    |                   |                    |                                   |

Consultant name and signature:

Date:

# Atrial Flutter (isthmus dependant) Case Study

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
|  |
|  |
|  |

Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
|  |        | AV ratio     |
| ECG at time of symptoms                    |        | AV ratio     |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## Atrial Flutter (isthmus dependant) Case Study

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|  |     |  |     |  |
|--|-----|--|-----|--|
| Baseline intervals (ms)  | A-H |  | H-V |  |
| Retrograde curve performed?                                    |     |  |     |  |
| V-A conduction?  |     |  |     |  |
| Anterograde curve performed?                                   |     |  |     |  |
| Decremental conduction evident?                                |     |  |     |  |
| Tachycardia induced?   |     |  |     |  |
| Induction method   |     |  |     |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis  |     |  |     |  |
| Tachycardia termination (ATP, Cardioversion)                   |     |  |     |  |
| Treatment plan including risks, rationale etc                  |     |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | Localisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## Atrial Flutter (isthmus dependant) Case Study

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

|                      |
|----------------------|
| Comments:            |
| Supervisor comments: |

### Include the following where appropriate:

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- RF recordings if appropriate e.g. ablation signal, junctional tachycardia during ablation, loss of delta wave
- Tachycardia termination
- Evidence of bi-directional block?

|   |
|---|
| Supervisor name, signature and job title: |
| Date:                                     |

# Atrial Flutter (atypical) Case Study

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
|  |
|  |
|  |

Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
|  |        | AV ratio     |
| ECG at time of symptoms                    |        | AV ratio     |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## Atrial Flutter (atypical) Case Study

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|  |     |  |     |  |
|--|-----|--|-----|--|
| Baseline intervals (ms)  | A-H |  | H-V |  |
| Retrograde curve performed?                                    |     |  |     |  |
| V-A conduction?  |     |  |     |  |
| Anterograde curve performed?                                   |     |  |     |  |
| Decremental conduction evident?                                |     |  |     |  |
| Tachycardia induced?   |     |  |     |  |
| Induction method   |     |  |     |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis  |     |  |     |  |
| Tachycardia termination (ATP, Cardioversion)                   |     |  |     |  |
| Treatment plan including risks, rationale etc                  |     |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | Localisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## Atrial Flutter (atypical) Case Study

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

Comments:

Supervisor comments:

**Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- RF recordings if appropriate e.g. ablation signal, junctional tachycardia during ablation, loss of delta wave
- Tachycardia termination
- Evidence of bi-directional block?

Supervisor name, signature and job title:

  

Date:

## MODULE 4 – ABLATION OF VT

For expected Objectives, Knowledge and Skills see module 2.

Trainees will assist and/or perform ablation of VT (normal heart or scar related). A total of 5 procedures should be performed as a logbook, of which at least

- 1 should be for RVOT tachycardia
- 1 should be for fascicular VT

In addition the trainee should undertake 1 case study for which they **set up and control the operating system themselves.**

- 1 should be for RVOT tachycardia

Each case study must include appropriate tracings demonstrating

- Baseline measurements
- Diagnostic manoeuvres
- Tachycardia initiation and
- Termination and ablation **if appropriate.**

## RECORD OF COMPLETED ELECTROPHYSIOLOGY PROCEDURES

| No. | Procedure   | Patient Hospital Number | Procedure Date | Pre Procedure Evidence/Diagnosis | Post Procedure Outcome | Diagnostic electrodes | Ablation Electrode | Pre procedure ECG | Post procedure ECG | Operator (1 <sup>st</sup> /joint) |
|-----|-------------|-------------------------|----------------|----------------------------------|------------------------|-----------------------|--------------------|-------------------|--------------------|-----------------------------------|
| 1   | VT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 2   | VT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 3   | VT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 4   | VT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 5   | VT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |

Consultant name and signature:

Date:

# RVOT Case Study

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
|  |
|  |
|  |

Investigations and Results

|  | Yes/No | Result   |
|--|--------|--|
| Baseline 12 lead ECG                       |        | PR interval<br>QRS duration<br>QT interval<br>Axis |
| ECG at time of symptoms                    |        |  |
| ECG of vagal manoeuvres and / or adenosine |        |  |
| Echocardiogram                             |        |  |
| Holter Monitor                             |        |  |
| ILR (loop recorder)                        |        |  |
| Exercise Test                              |        |  |
| Coronary Angiogram                         |        |  |
| Tilt Table Test                            |        |  |
| Other Ix (specify)                         |        |  |

## RVOT Case Study (cont)

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|  |     |  |     |  |
|--|-----|--|-----|--|
| Baseline intervals (ms)  | A-H |  | H-V |  |
| Retrograde curve performed?                                    |     |  |     |  |
| V-A conduction?  |     |  |     |  |
| Anterograde curve performed?                                   |     |  |     |  |
| Decremental conduction evident?                                |     |  |     |  |
| Tachycardia induced?   |     |  |     |  |
| Induction method   |     |  |     |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis  |     |  |     |  |
| Tachycardia termination (ATP, Cardioversion)                   |     |  |     |  |
| Treatment plan including risks, rationale etc                  |     |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | Localisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## RVOT Case Study (cont)

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

|                      |
|----------------------|
| Comments:            |
| Supervisor comments: |

**Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- Response during RF
- Any pace mapping
- RF Signals with diastolic potential
- RF Signals with focal VT
- Tachycardia termination

|  |
|--|
| Supervisor name, signature and job title:<br><br>Date: |
|--|

## MODULE 5 – ABLATION OF ATRIAL FIBRILLATION AND ATRIAL TACHYCARDIA

Trainees will assist and/or perform ablation of atrial fibrillation and atrial tachycardia. A total of 5 procedures should be performed as a logbook, of which at least

- 1 should be for AF
- 1 should be atrial tachycardia

Prior to and during these cases, trainees should demonstrate appropriate use of complex mapping systems (e.g. Nav-X, Carto, Ensite Array) and their limitations.

In addition the trainee should undertake 1 case study of either ablation of atrial fibrillation or atrial tachycardia for which they **set up and control the operating system themselves**.

Each case study must include appropriate tracings demonstrating

- Baseline measurements
- Diagnostic manoeuvres
- Tachycardia initiation and
- Termination and ablation **if appropriate**.

### Objectives

- To select appropriate patients for catheter ablation treatment for AF and complex atrial arrhythmias.
- To have a comprehensive understanding of the anatomy and electrophysiology of the atria.
- Use all available imaging and mapping systems to undertake safe and effective catheter ablation for these arrhythmias.

### Knowledge

- Of risks associated with ablation of AF/AT, patient factors that may increase these and methods for reducing these risks.
- Of medico-legal issues concerning consent and provision of information.
- Of the anatomy of the left and right atria and how this may be distorted by disease process.
- Of all tools used for ablation of AF/AT including trans-septal puncture equipment, ablation catheter, electrophysiology systems (basic and complex), lesion generator.
- Sedative and analgesic drugs and their additive effects on patients.
- Risks associated with central venous puncture at femoral, subclavian and jugular sites and introduction of electrode catheters to the right atrium and coronary sinus.
- Anatomy, location of pulmonary veins and risks of cannulation.

- Risks and complications associated with the energy source used and the location and nature of vulnerable regions in the atria and how to monitor and avoid complications of energy delivery.
- Short, medium and long term complications of AF/AT management and their investigation and treatment.

### **Skills**

- Good assessment of a patient with AF/AT.
- Appropriate investigations/therapy to reduce intra-operative risk.
- Detailed working knowledge of cardiac and thoracic anatomy for AF/AT ablation.
- Satisfactory consent of patients for ablation.
- Able to safely and effectively sedate a patient for ablation of AF/AT and monitor throughout the procedure.
- Able to perform femoral and subclavian puncture and intubate the right atrium and coronary sinus with electrode catheters in >80% of patients.
- Able to monitor and investigate patients for possible complications arising from AF/AT ablation.



## RECORD OF COMPLETED ELECTROPHYSIOLOGY PROCEDURES

| No. | Procedure      | Patient Hospital Number | Procedure Date | Pre Procedure Evidence/Diagnosis | Post Procedure Outcome | Diagnostic electrodes | Ablation Electrode | Pre procedure ECG | Post procedure ECG | Operator (1 <sup>st</sup> /joint) |
|-----|----------------|-------------------------|----------------|----------------------------------|------------------------|-----------------------|--------------------|-------------------|--------------------|-----------------------------------|
| 1   | AF/AT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 2   | AF/AT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 3   | AF/AT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 4   | AF/AT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |
| 5   | AF/AT Ablation |                         |                |                                  |                        |                       |                    |                   |                    |                                   |

Consultant name and signature:

Date:

# Atrial Fibrillation/Tachycardia Case Study

Date

Patient ID

Clinical History

Pre-procedure diagnosis

Patient symptoms

On anti-arrhythmic drugs (specify)?

Other comments

|  |
|--|
|  |
|  |
|  |
|  |
|  |

Investigations and Results

|  | Yes/No | Result       |
|--|--------|--------------|
| Baseline 12 lead ECG                       |        | PR interval  |
|  |        | QRS duration |
|  |        | QT interval  |
|  |        | Axis         |
|  |        | AV ratio     |
| ECG at time of symptoms                    |        | AV ratio     |
| ECG of vagal manoeuvres and / or adenosine |        |              |
| Echocardiogram                             |        |              |
| Holter Monitor                             |        |              |
| ILR (loop recorder)                        |        |              |
| Exercise Test                              |        |              |
| Coronary Angiogram                         |        |              |
| Tilt Table Test                            |        |              |
| Other Ix (specify)                         |        |              |

## Atrial Fibrillation/Tachycardia Case Study (cont)

|  |          |               |         |
|--|----------|---------------|---------|
| Number of sheaths inserted   | Approach | Size (French) | Type    |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
| Diagnostic electrodes inserted<br>(include any specific rationale for selection) | Poles    | Curve         | Spacing |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |
|  |          |               |         |

|  |     |  |     |  |
|--|-----|--|-----|--|
| Baseline intervals (ms)  | A-H |  | H-V |  |
| Retrograde curve performed?                                    |     |  |     |  |
| V-A conduction?  |     |  |     |  |
| Anterograde curve performed?                                   |     |  |     |  |
| Decremental conduction evident?                                |     |  |     |  |
| Tachycardia induced?   |     |  |     |  |
| Induction method   |     |  |     |  |
| Diagnostic manoeuvres performed<br>(pacing or pharmacological) |     |  |     |  |
| Tachycardia diagnosis  |     |  |     |  |
| Tachycardia termination (ATP,<br>Cardioversion)                |     |  |     |  |
| Treatment plan including risks,<br>rationale etc               |     |  |     |  |

|                     |              |           |             |              |       |
|---------------------|--------------|-----------|-------------|--------------|-------|
| Mapping technique   | Conventional | Localisa  | Ensite NavX | EnSite Array | Carto |
|                     |              |           |             |              |       |
| Ablation performed? |              |           |             |              |       |
| Ablation target     |              |           |             |              |       |
| Ablation type       | RF           | Cooled RF | Cryo        |              |       |

## Atrial Fibrillation/Tachycardia Case Study (cont)

|                              |                  |           |          |
|------------------------------|------------------|-----------|----------|
| Ablation electrode           |                  |           |          |
| Number of ablations          |                  |           |          |
| Ablation settings            | Temperature (°C) | Power (W) | Time (s) |
|                              |                  |           |          |
| How was endpoint determined? |                  |           |          |
| Outcome                      |                  |           |          |
| Complications                |                  |           |          |

|                      |
|----------------------|
| Comments:            |
| Supervisor comments: |

**Include the following where appropriate:**

- Baseline 12 Lead ECG
- Baseline IEGM measurements
- Tachycardia 12 Lead ECG
- Tachycardia IEGMs with measurements
- Tachycardia initiation
- RF recordings if appropriate e.g. ablation signal, junctional tachycardia during ablation
- Tachycardia termination

|  |
|--|
| Supervisor name, signature and job title:<br><br>Date: |
|--|

## **ASSESSMENT OF COMPETENCIES**

### **Case studies:**

To be completed by supervising physiologist

- Modules 1-5: Compulsory

### **Electrophysiology skills assessment:**

To be completed by supervising consultant

For each field you need to mark the trainee as below.

- **1 - 3 Unsatisfactory**
- **4 - 6 Satisfactory**
- **7 - 9 Above expected**
- **0 – Not applicable**

You must justify each score of 1 – 3 with at least one explanation / example

Complete normal heart VT and/or scar related VT as applicable

Complete atrial fibrillation and/or atrial tachycardia as applicable

All columns relate to ablation procedures unless otherwise stated

## ELECTROPHYSIOLOGY SKILLS ASSESSMENT

| ELECTROPHYSIOLOGY SKILL   | EXAMPLE | Module 1-3           |                     |       |      |                |
|---|---------|----------------------|---------------------|-------|------|----------------|
|   |         | Diagnostic SVT Study | Diagnostic VT Study | AVNRT | AVRT | Atrial Flutter |
| <b>ASSESSMENT DATE</b>  | 1/1/8   |                      |                     |       |      |                |
| Check environment, including location of emergency equipment  | 8       |                      |                     |       |      |                |
| Select a study protocol appropriate to the procedure on the haemodynamic monitoring system  | 7       |                      |                     |       |      |                |
| Prepare all consumables and select EP electrodes appropriate to the procedure   | 8       |                      |                     |       |      |                |
| Ensure compatibility between electrodes, RF generators, cool flow pumps and navigational mapping systems                            | 8       |                      |                     |       |      |                |
| Set up navigational mapping systems i.e. NavX, LocaLisa, Carto etc according to the procedure type                                  |         |                      |                     |       |      |                |
| Connect all EP electrodes to the haemodynamic monitoring systems via the junction boxes   | 7       |                      |                     |       |      |                |
| Identify, record and measure the baseline rhythm i.e. AH, HV intervals and cycle length   | 8       |                      |                     |       |      |                |
| Record and identify any subsequent rhythms  | 6       |                      |                     |       |      |                |
| Safely perform basic pacing protocols and threshold checks  | 8       |                      |                     |       |      |                |
| Monitor the patients vital signs throughout the procedure   | 9       |                      |                     |       |      |                |
| Adjust parameters as necessary, for example, sweep speed, gains, electrogram position, pressure display, and electrograms displayed | 9       |                      |                     |       |      |                |
| <b>Consultant name and signature:</b>   |         |                      |                     |       |      |                |

## ELECTROPHYSIOLOGY SKILLS ASSESSMENT

| ELECTROPHYSIOLOGY SKILL   | EXAMPLE | Module 4-5      |                 |                     |                    |
|---|---------|-----------------|-----------------|---------------------|--------------------|
|   |         | Normal heart VT | Scar related VT | Atrial Fibrillation | Atrial Tachycardia |
| <b>ASSESSMENT DATE</b>  | 1/1/8   |                 |                 |                     |                    |
| Check environment, including location of emergency equipment  | 8       |                 |                 |                     |                    |
| Select a study protocol appropriate to the procedure on the haemodynamic monitoring system  | 7       |                 |                 |                     |                    |
| Prepare all consumables and select EP electrodes appropriate to the procedure   | 8       |                 |                 |                     |                    |
| Ensure compatibility between electrodes, RF generators, cool flow pumps and navigational mapping systems                            | 8       |                 |                 |                     |                    |
| Set up navigational mapping systems i.e. NavX, LocaLisa, Carto etc according to the procedure type                                  | 8       |                 |                 |                     |                    |
| Connect all EP electrodes to the haemodynamic monitoring systems via the junction boxes   | 7       |                 |                 |                     |                    |
| Identify, record and measure the baseline rhythm i.e. AH, HV intervals and cycle length   | 8       |                 |                 |                     |                    |
| Record and identify any subsequent rhythms  | 6       |                 |                 |                     |                    |
| Safely perform basic pacing protocols and threshold checks  | 8       |                 |                 |                     |                    |
| Monitor the patients vital signs throughout the procedure   | 9       |                 |                 |                     |                    |
| Adjust parameters as necessary, for example, sweep speed, gains, electrogram position, pressure display, and electrograms displayed | 9       |                 |                 |                     |                    |
| <b>Consultant name and signature:</b>   |         |                 |                 |                     |                    |