Arrhythmia Review Course 3

Narrow QRS Tachycardia

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Case 1
54/F, palpitation
After spontaneous sinus conversion
다음 중 가장 가능성 높은 심전도 진단은?

1) Typical AVNRT (slow/fast)
2) Atypical AVNRT (fast/slow)
3) Orthodromic AVRT with concealed bypass tract
4) Atrial tachycardia from Crista terminalis
5) Atrial flutter
Algorithm for Dx of narrow QRS tachycardia

1. Narrow QRS tachycardia (QRS duration less than 120 msec)
2. Regular tachycardia?
   - Yes
     - Visible P waves?
       - Yes
         - Atrial rate greater than ventricular rate?
           - Yes
             - Atrial flutter or atrial tachycardia
           - No
             - Analyze RP interval
               - Short (RP shorter than PR)
                 - RP shorter than 70 msec
                   - AVNRT
                 - RP longer than 70 msec
                   - AVRT AVNRT Atrial tachycardia
               - Long (RP longer than PR)
                 - Atrial tachycardia PJRT Atypical AVNRT
   - No
     - Atrial fibrillation Atrial tachycardia/flutter with variable AV conduction MAT
Mechanism of AVNRT

Anatomy of the Triangle of Koch

Central fibrous body
His bundle
Compact AV node
Tricuspid valve annulus

Fast pathway exit
Slow pathway

Fast pathway
Slow pathway

Common pathway
Compact AV node
Septal annulus

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2009
Induction of AVNRT
Case 2
case

- 37세 남자
- 간헐적 심계항진

- 일주일에 한두번, 수시간 지속, 갑자기 발생
Initial ECG
심계항진을 유발하는 가장 가능성 높은 진단은?

• 1. PVC
• 2. APC aberrancy
• 3. AVRT
• 4. AVNRT
• 5. slow VT
Holter
V pacing
During RFCA#1 3sec VA dissociation
심계항진을 유발하는 가장 가능성을 높은 진단은?

1. PVC
2. APC abberancy
3. AVRT
4. AVNRT
5. slow VT

=> AVRT with intermittent preexcitation
Case 3
F/49, palpitation (162 bpm)
Adenosine 6mg ivs
다음 중 가장 가능성 높은 심전도 진단은?

1) Typical AVNRT (slow/fast)
2) Atypical AVNRT (fast/slow)
3) Accelerated junctional rhythm
4) Atrial tachycardia from SVC
5) Atypical atrial flutter with 1:1 conduction
Retrograde P waves
Differentiation using retrograde P waves

Tai et al. JACC 1997
Induction of tachycardia (A600/310/300ms)
Induction of tachycardia
Pseudo VA-AV
Case 4
M/21, palpitation
야구선수(투수)
Tachycardia
Where is the location of bypass tract?

① Left lateral wall
② Right Free wall
③ Anteroseptal wall
④ Right posteroseptal wall
Localization of the Accessory Pathway

V1

- Negative delta
  - RV
    - Negative delta in II, III, aVF
      - Posteroseptal
    - Left axis deviation
      - Right free wall
    - Inferior axis deviation
      - Anteroseptal
  - Positive delta
    - LV
      - Iso/negative in I, aVL, V5-6
      - Postero septal
      - Left lateral

KHRS 2018
Baseline Rhythm
Tachycardia induction
VEST 600/300ms
EPS & RFCA

LAO

RAO
Before ablation

[Graph showing electrocardiogram tracings with labels for different leads and ablation sites]
Delta (-) during ablation
After Ablation
12 lead EKG at OPD

Referred by: YONGSOO BAEK

Confirmed By: KWON SUNGWOO 1410901
Case 5
case

• 65세 여자
• 반복적인 심계항진으로 내원
증상시 심전도
이 환자의 빈맥의 원인으로 가장 가능성이 높은 것은?

1. Atrial tachycardia
2. AVRT
3. typical AVNRT
4. atypical AVNRT
EP study - induction
Induction – long RP
Narrow complex SVT

A:V >1
Atrial tachycardia
Atrial flutter (AVNRT)

A:V = 1
A linked to V

No
Atrial tachycardia

Yes
His-refractory PVCs

• Atrial activation advanced*
• SVT terminates without atrial activation
• Atrial activation delayed

Orthodromic SVT

A:V <1
Sinus with 1:2 conduction (AVNRT) (Nodofascicular)

Ventricular overdrive pacing

• No retrograde conduction
• V-A-A-V response

Atrial tachycardia

Long RP SVT

• PPI – TCL >115 msec
• SA – VA >85 msec

No
Orthodromic SVT

Yes
AVNRT

*Same atrial activation sequence/same VA on next complex
RV overdrive pacing
-> His capture, VA dissociation
Adenosine
Case 6
27세 여자
반복적인 심계항진
다음 중 가장 가능성 높은 심전도 진단은?

1) Typical AVNRT (slow/fast)
2) Atypical AVNRT (fast/slow)
3) Orthodromic AVRT with concealed bypass tract
4) Focal atrial tachycardia
5) Atrial flutter
다음 중 arrhythmia의 focus 위치로 가장 의심되는 곳은?

1) Left superior pulmonary vein
2) Coronary sinus os
3) Crista terminalis
4) Superior vena cava
Earliest A: proximal CS
Termination without A
Start RA map...

His A to pCS A (similar)

0 msec

his
Earliest A was observed near his.

pCS to hisA +7ms
Transient AV block

During his mapping, AV block

CardioLab v6.9.6
Recovery...
Earliest site in RA (near his)
Earliest site in RA (near his)
다음 단계는?

1) 지금 여기서 ablation한다.
2) Artery puncture 를 해서 NCC map을 한다.
3) Septal puncture 를 해서 LA map을 한다.
NCC map
NCC map
NCC ablation
LA side mapping

-30 msec

good signal -30ms??

CardioLab v6.9.6
LA side mapping
LA side mapping
LA side mapping
LA side mapping
진단: left septal focal AT
Case 7
31/M, palpitation
2006 ASD, secundum op. s/p Bovine patch closure
Catheter Position

RAO

LAO
Baseline Rhythm
HRA entrainment (+)
Distal CS overdriving pacing
Proximal CS Entrainment(+)

258 msec
234 BPM
263 msec
228 BPM
AFL termination during CTI ablation
CTI bidirectional block(+)
No AFL induction
RAP 200ms with isoproterenol iv
Propagation & LAT during AFL
Different types of right atrial reentry circuits after ASD op.
After ablation
Case 8
44/M palpitation

Structurally normal heart
Entrainment @LA lat; PPI – TCL = 15ms
3D activation mapping

- RIPV
- RSPV
- LIPV
- LSPV
- Mitral Annulus
During ablation
Case 9
case

• 45세 남자
• 반복적 심계항진
Initial – narrow QRS
Wide QRS
Cycle length 280 msec

Cycle length 340 msec
심전도 진단은?

1. AV nodal reentrant tachycardia

2. AV reentrant tachycardia with left accessory pathway

3. AV reentrant tachycardia with right accessory pathway

4. Atrial tachycardia

5. Ventricular tachycardia
SVT induction

I
aVL
V1
HRA 10,20
HRA 17,18
HRA 15,16
HRA 13,14
HRA 11,12
His 7,8
His 5,6
His 3,4
His 1,2
Duo 9,10
Duo 7,8
Duo 5,6
Duo 3,4
Duo 1,2
Rva
Rvd

200 ms
Coumel’s Law

- An increase in the VA time > 20 ms with BBB is diagnostic of free wall AP ipsilateral to the side of BBB.
Case 10
31세 남자
반복적인 심계항진
Earliest retrograde A, CS 5,6 (LPS)
Tachycardia induced by A500/340/260
TCL 290ms, earliest A was CS 7,8.
Ablation V to delta, -23ms (MA 5:00)
Transient bump at MA 5:00
Antegrade AP was blocked (1.4 sec)
Ablation site

LAO
Retrograde AP was blocked.