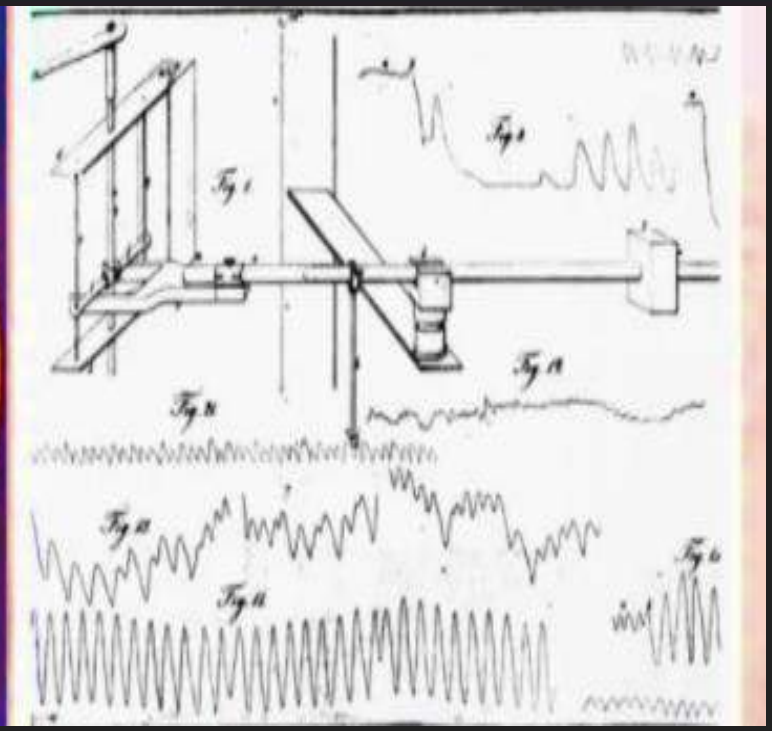
DC Shock

AliReza MohsenipourFoumani
Mansoor Mohsenabadi

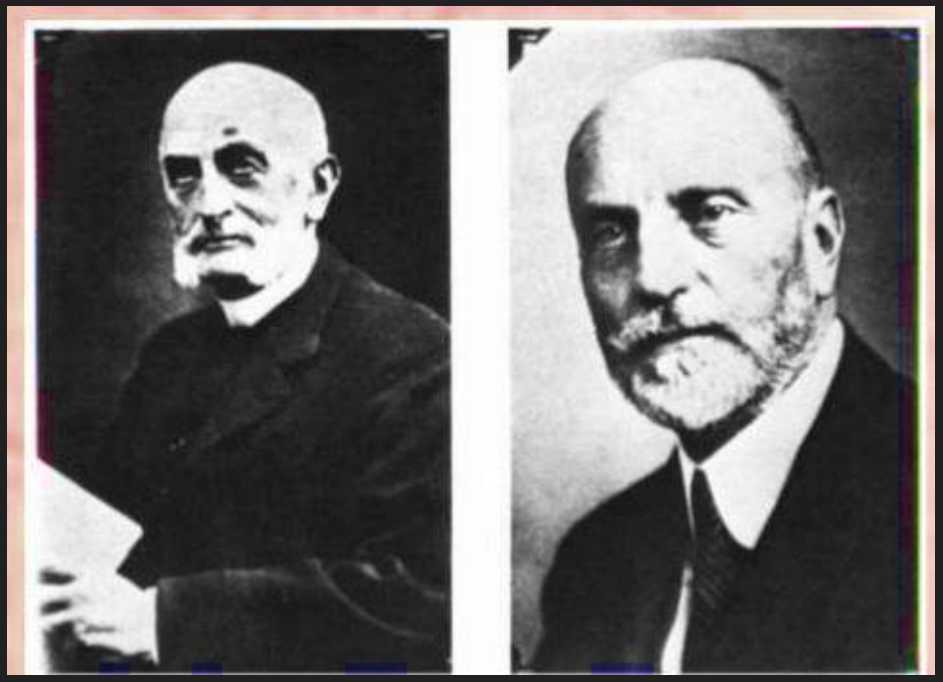
MSc of CCN & E-learning Planning in Medical Sciences
PhD Student of medical education
Lavasani Heart Center (S.S.O)

History



1849: Ludwigg and Hoffa — VF induced by electrical stimuli

History



1899: Prevost and Batelli - while a weak stimulus can produce fibrillation, a stimulus of higher strength applied to the heart could arrest ventricular fibrillation and restore normal sinus rhythm.

History

1947: First defibrillation on humans

Types of pericardial shock

Defibrillation:

- **External defibrillation:**
  - Manual external defibrillator.
  - Automated external defibrillator (AED).
- **Internal defibrillation:**
  - Direct internal defibrillator.
  - Implanted Cardioverter-defibrillator (ICD).

Cardioversion

Automated External (AED)

Uses computer to analyze heart then suggest whether a shock is needed or not • Usually found in public places • Made simpler for anyone to use

Mohsenabadi Mohsenipour

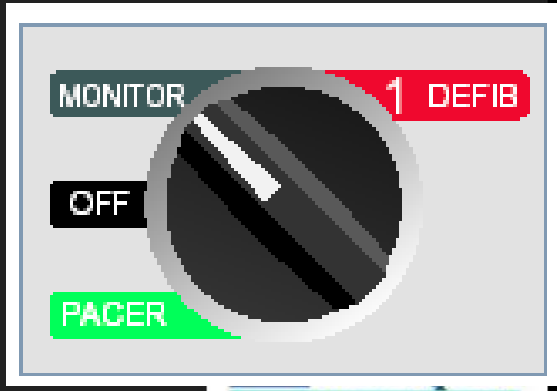
D/C Shock

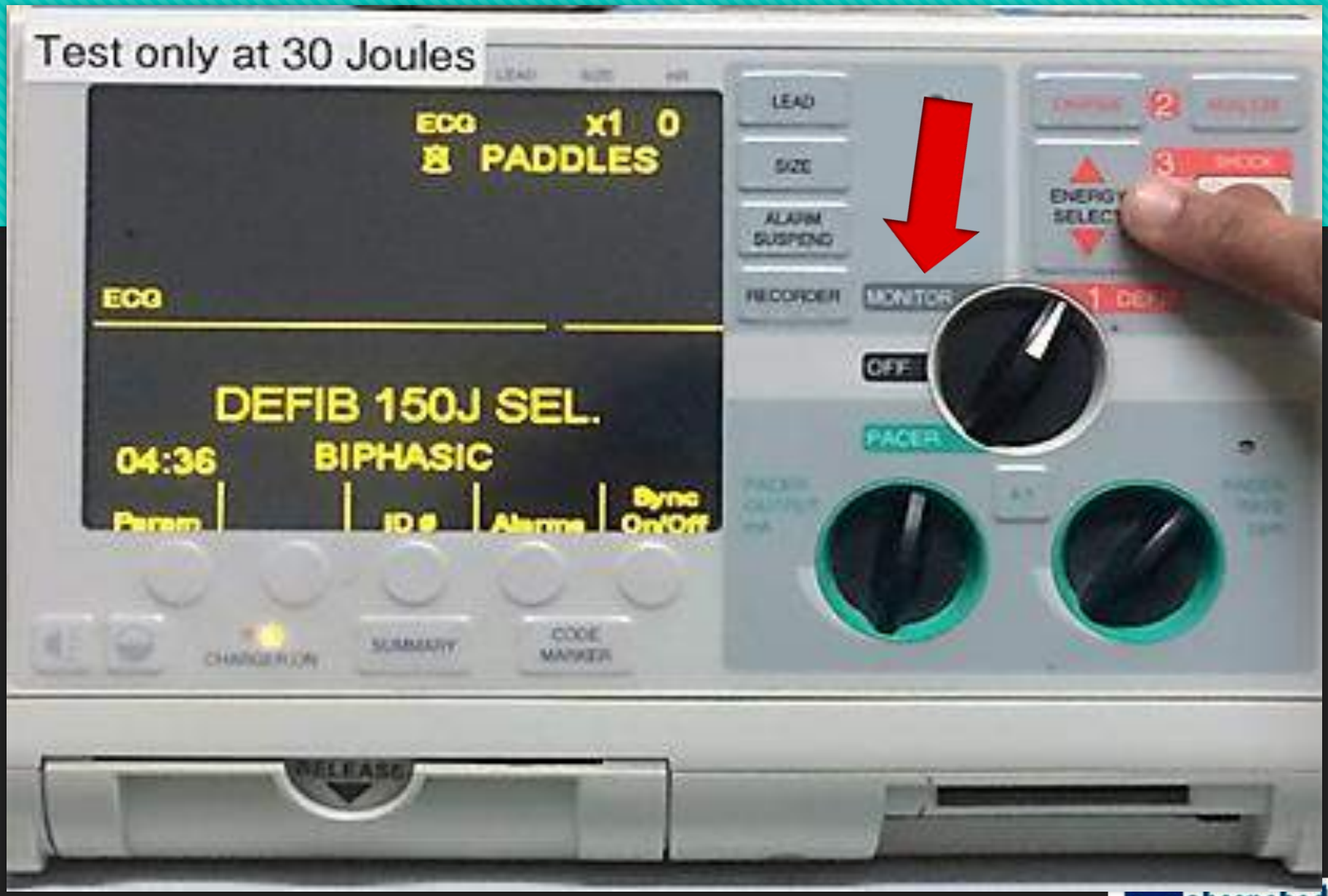
- Monitor
- Defibrillator
  - Clinically superior biphasic technology
- External Pacing
  - Clinically superior pacing technology
- Solutions for Customer Goals

Mohsenabadi Mohsenipour

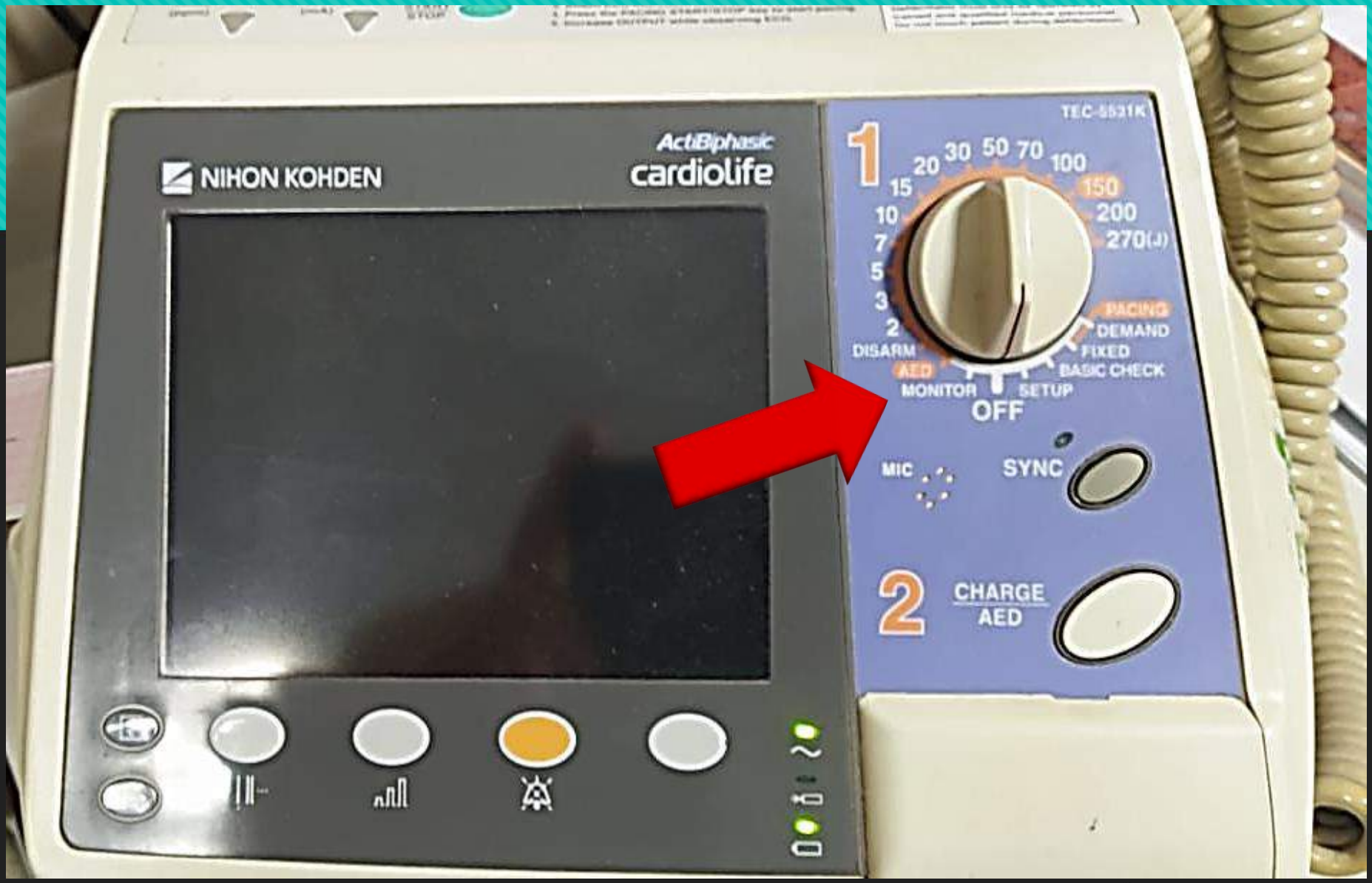
Monitor

- Basic ECG Monitoring:
  - Attach electrodes
  - Select MONITOR
  - Press LEAD button to get desired lead
  - Press SIZE button to get desired size

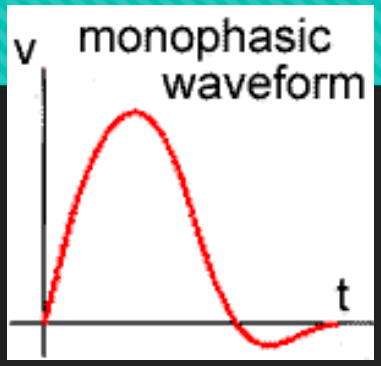




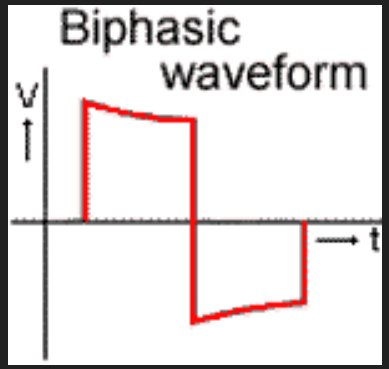

LIFEPAK 20e
DEFIBRILLATOR / MONITOR
Recommended
Adult VF Dose: 200-300-360J
1 ON
2 ENERGY SELECT
3 CHARGE
AED MODE
ANALYZE
LEAD
SIZE
SYNC
PACER
RATE
CURRENT
ALARMS
OPTIONS
PAUSE
PRINT
CODE SUMMARY
EVENT
Speed Dial
AC Mains
Service



Monophasic vs Biphasic



- Monophasic defibrillators deliver the energy in one direction and therefore require higher energy to defibrillate the heart.



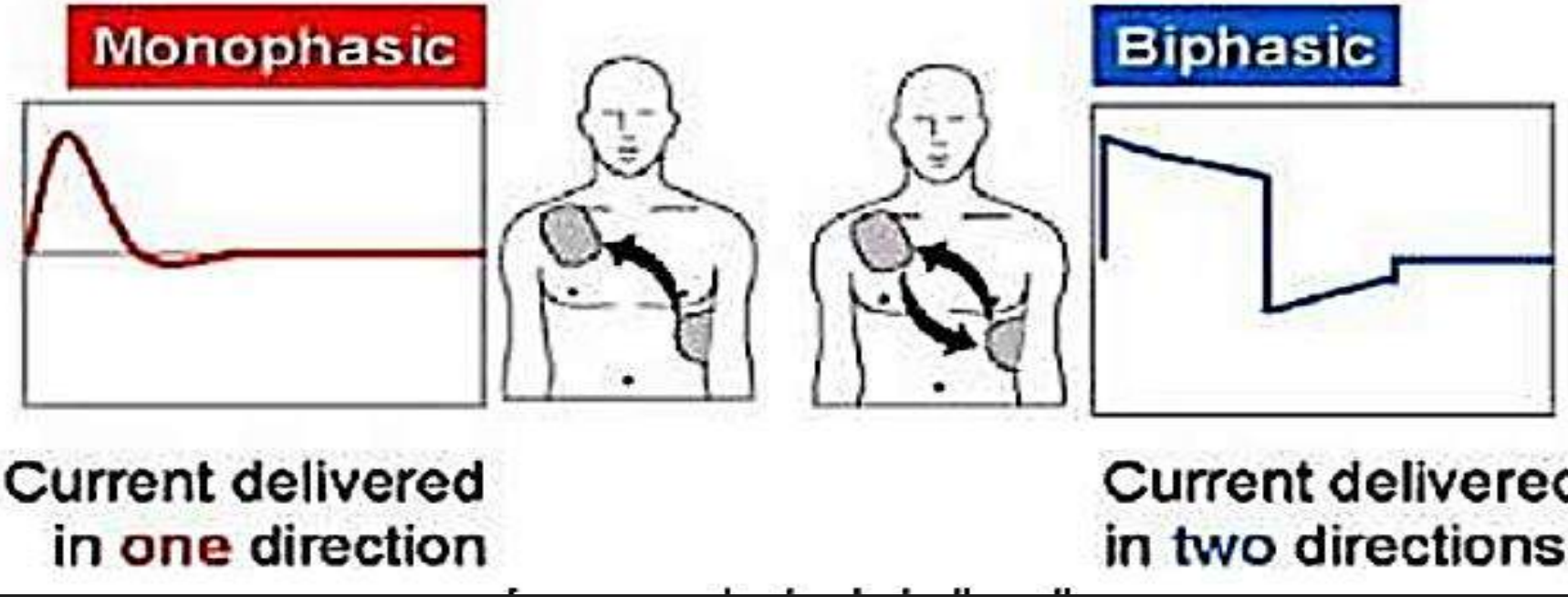
- Biphasic defibrillators deliver energy in two directions. For half the shock energy is delivered in one direction then the energy is delivered in the opposing direction for the latter half of the shock. This allows for lower peak energies to be delivered.

Mohsenabadi Mohsenipour

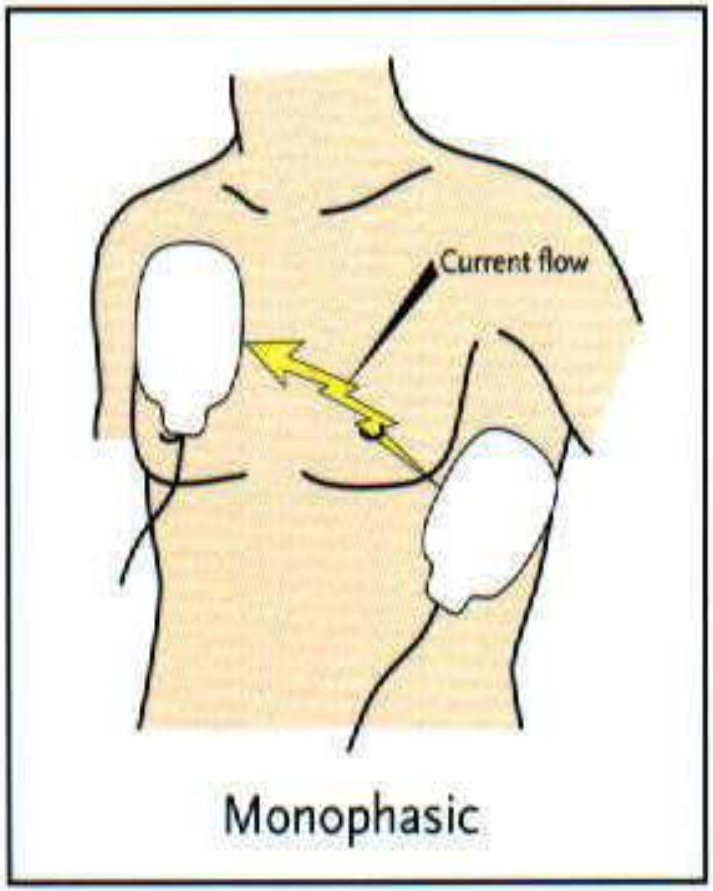
Monophasic vs Biphasic

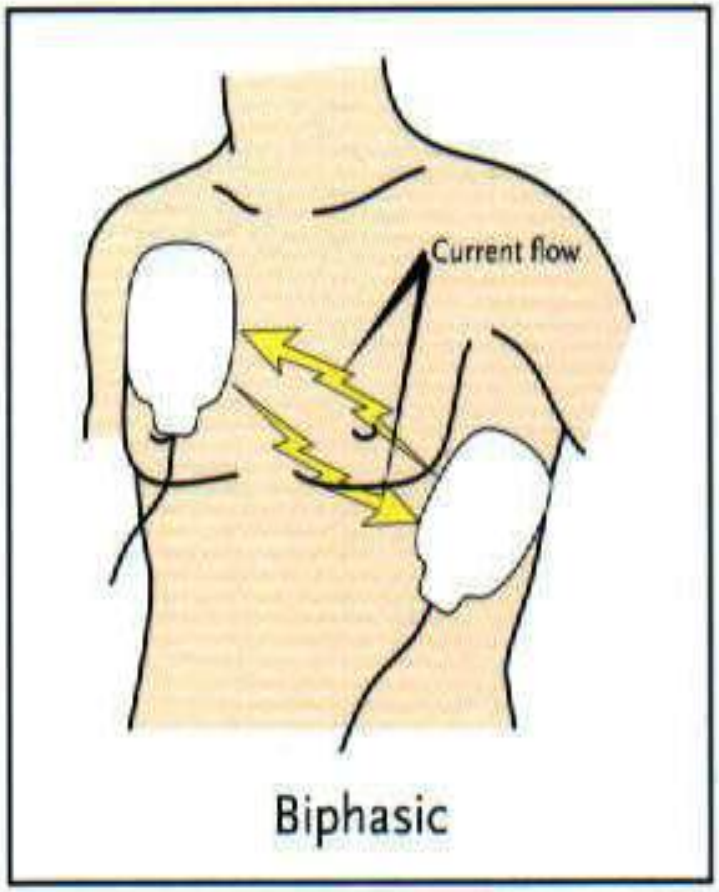
① Monophasic Waveform Defibrillators

② Biphasic Waveform Defibrillators



Monophasic vs Biphasic



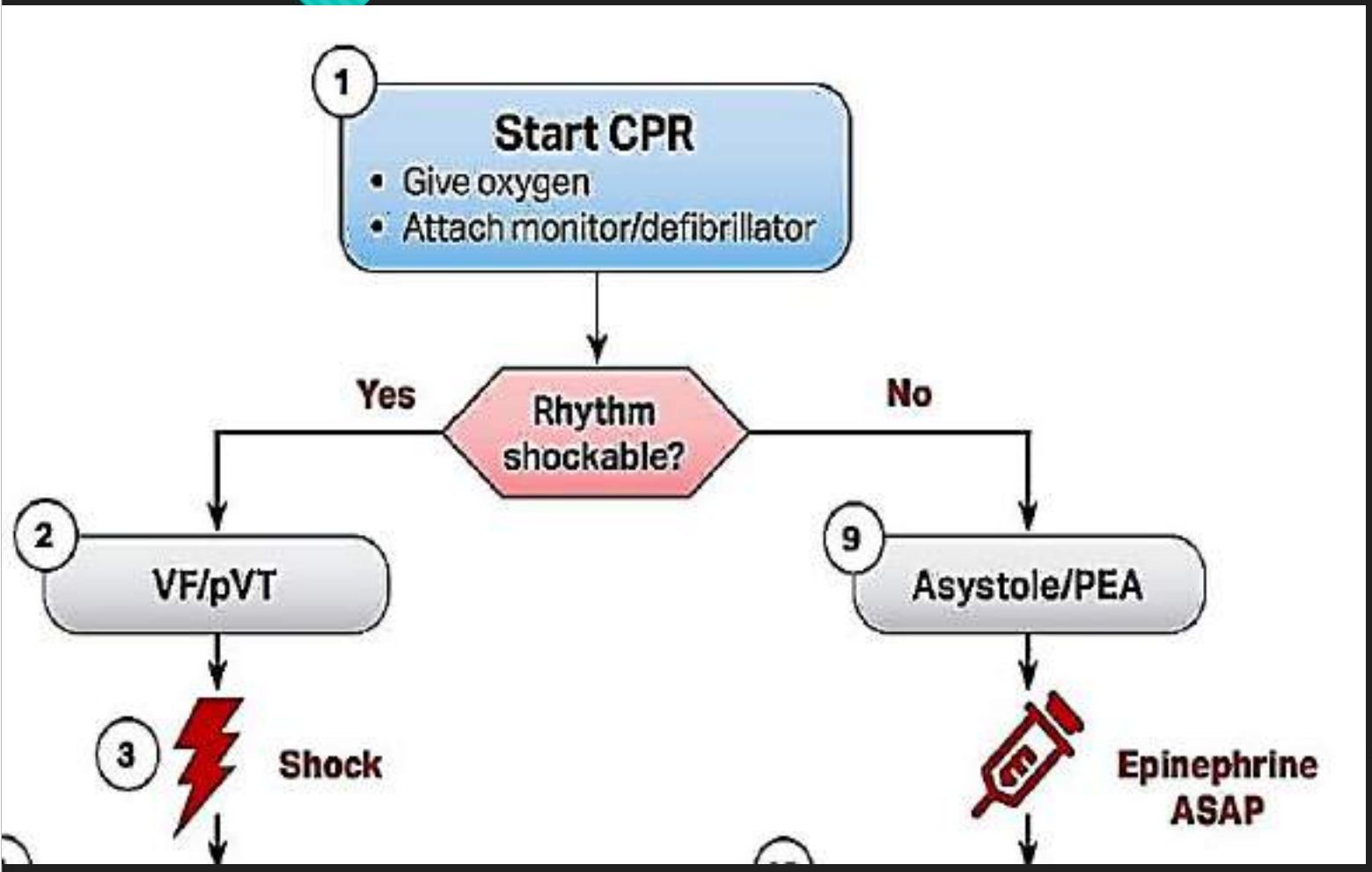


Monophasic vs Biphasic

	Monophasic				ZOLL Biphasic				
Defibrillation	200J	300J	360J	360J	120J	150J	200J	200J	
Synchronized Cardioversion	100J	200J	300J	360J	75J** 70J*	120J	150J	200J	
Pediatric Defibrillation	2J/kg				2J/kg				
Internal Defibrillation	Maximum of 50J				5J	10J	20J	30J	50J

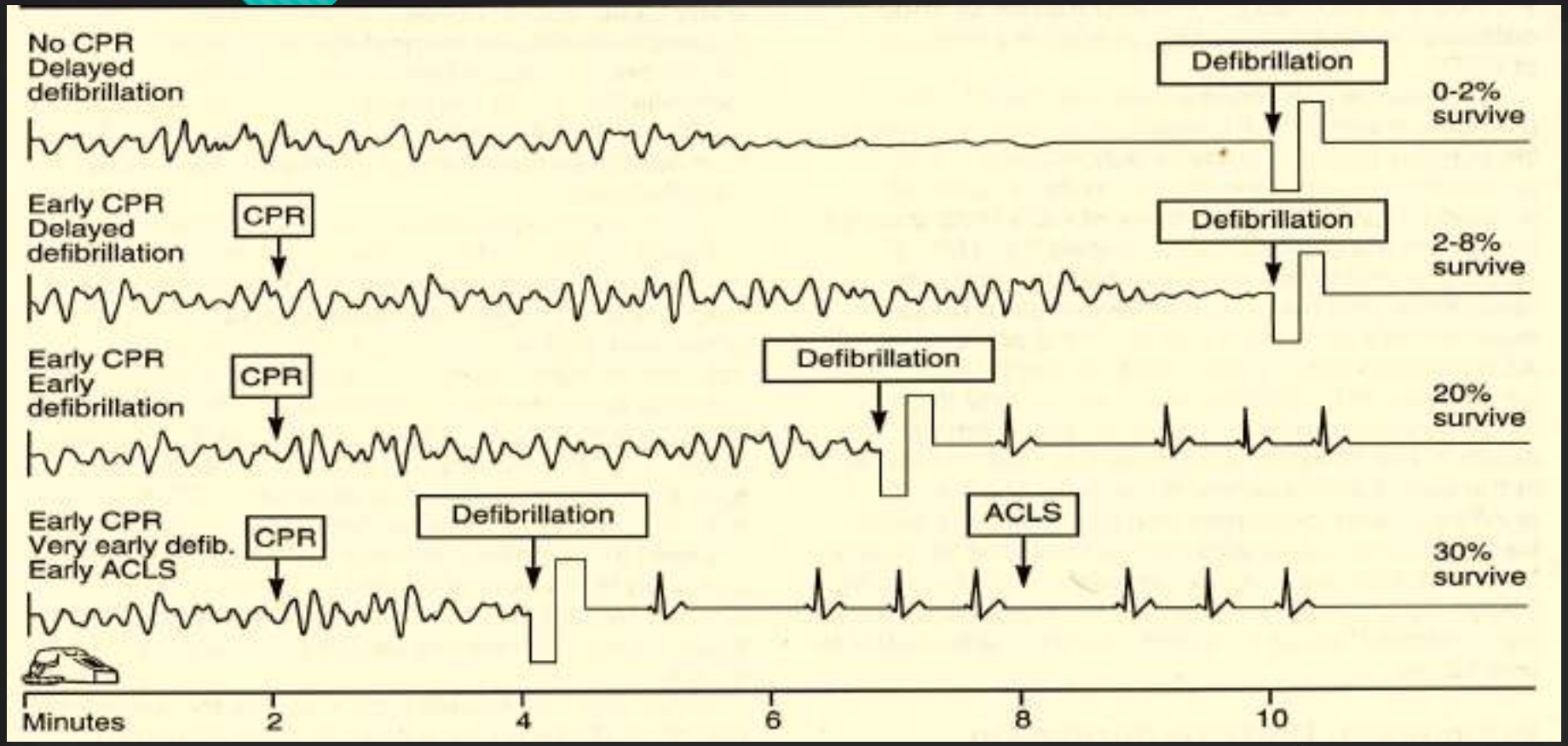
Five Links in the Adult Chain of Survival

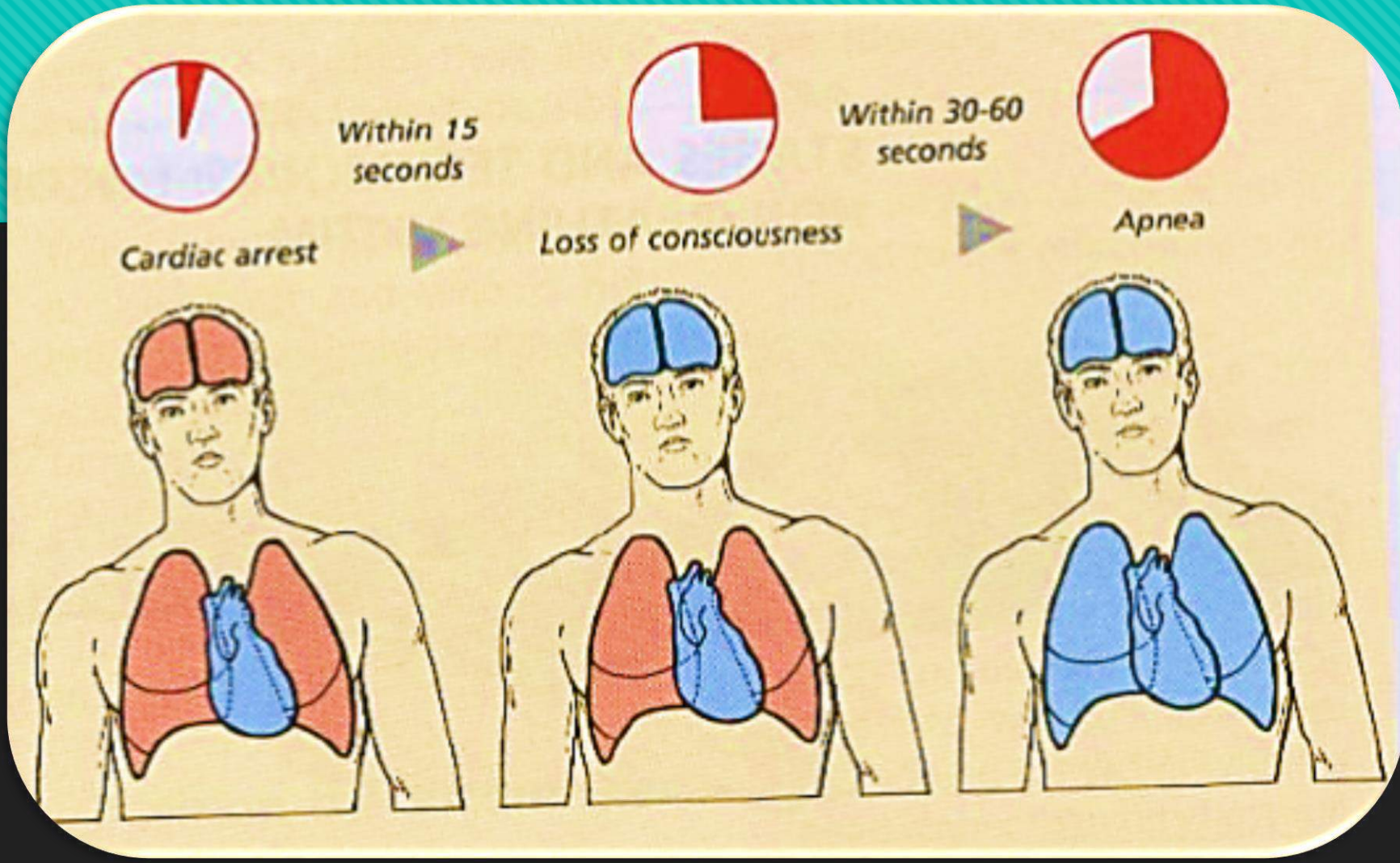
2020 ACLS Cardiac Arrest Algorithm



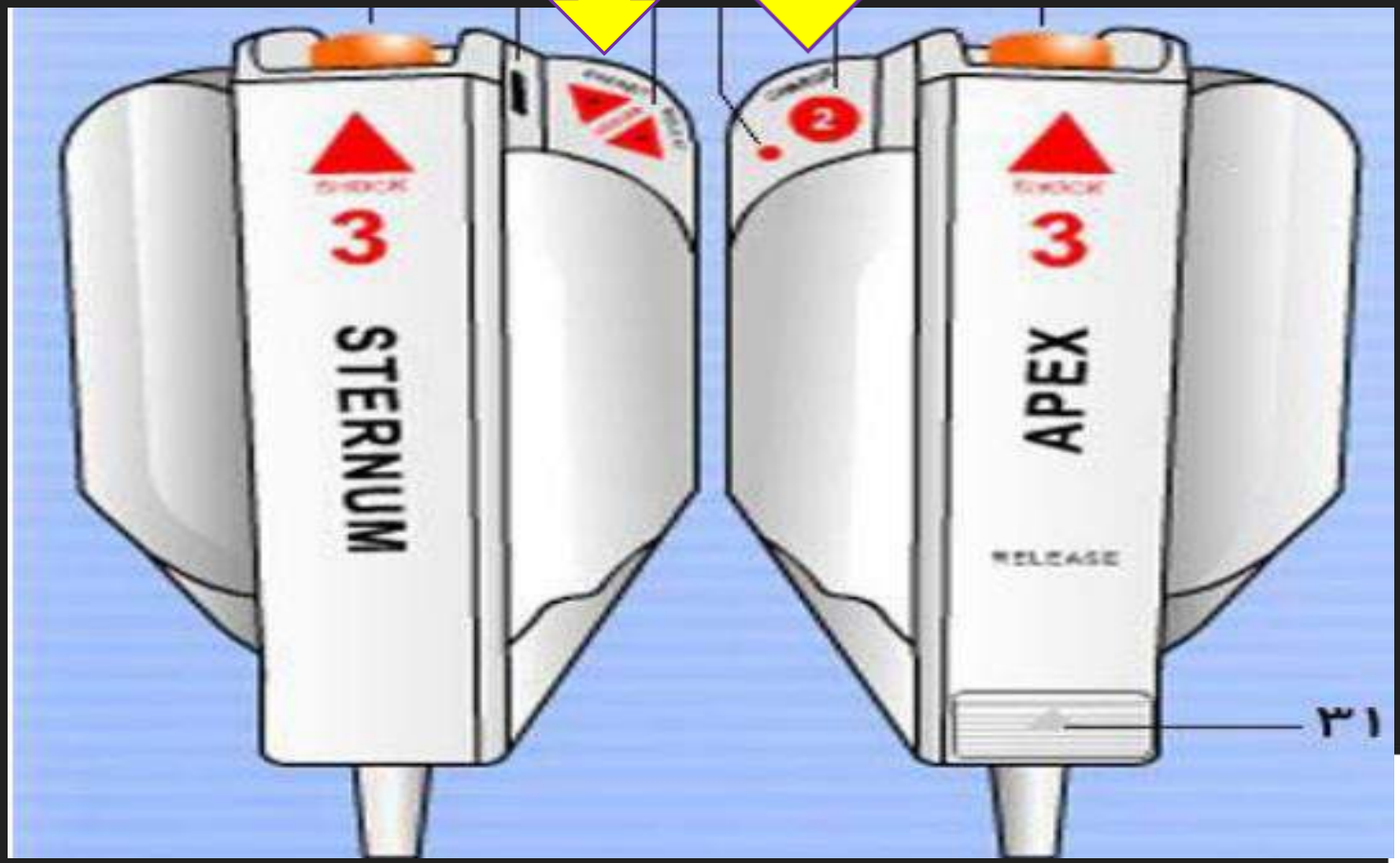
Mohsenabadi Mohsenipour

V.Fib & Time

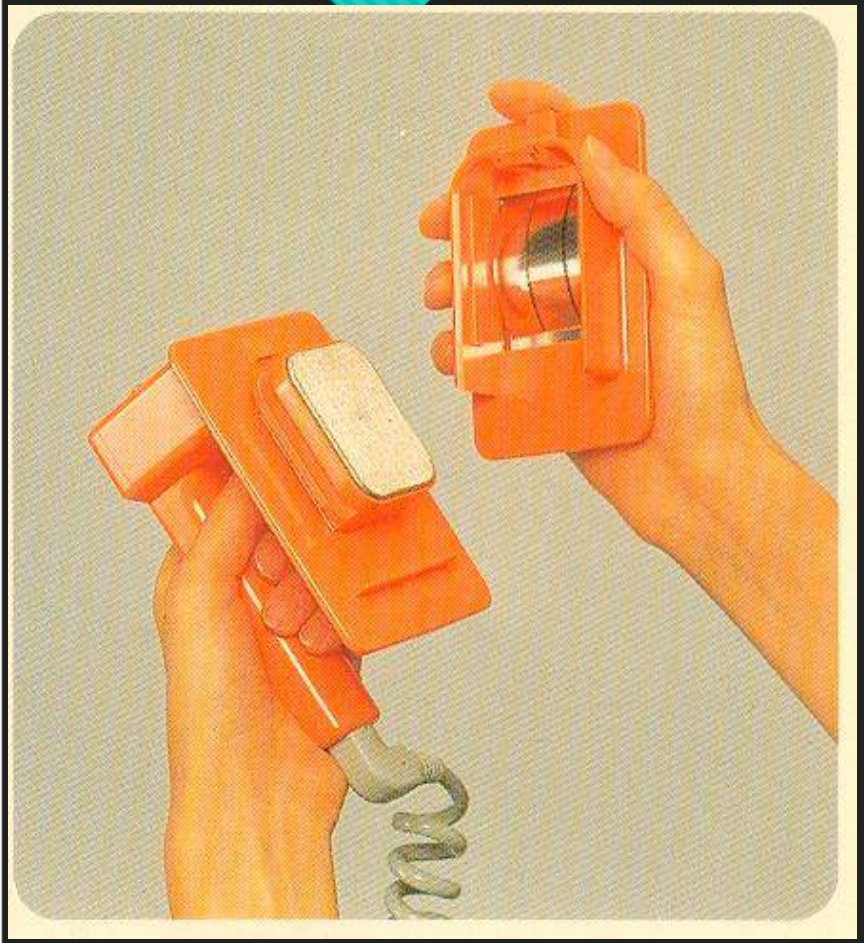


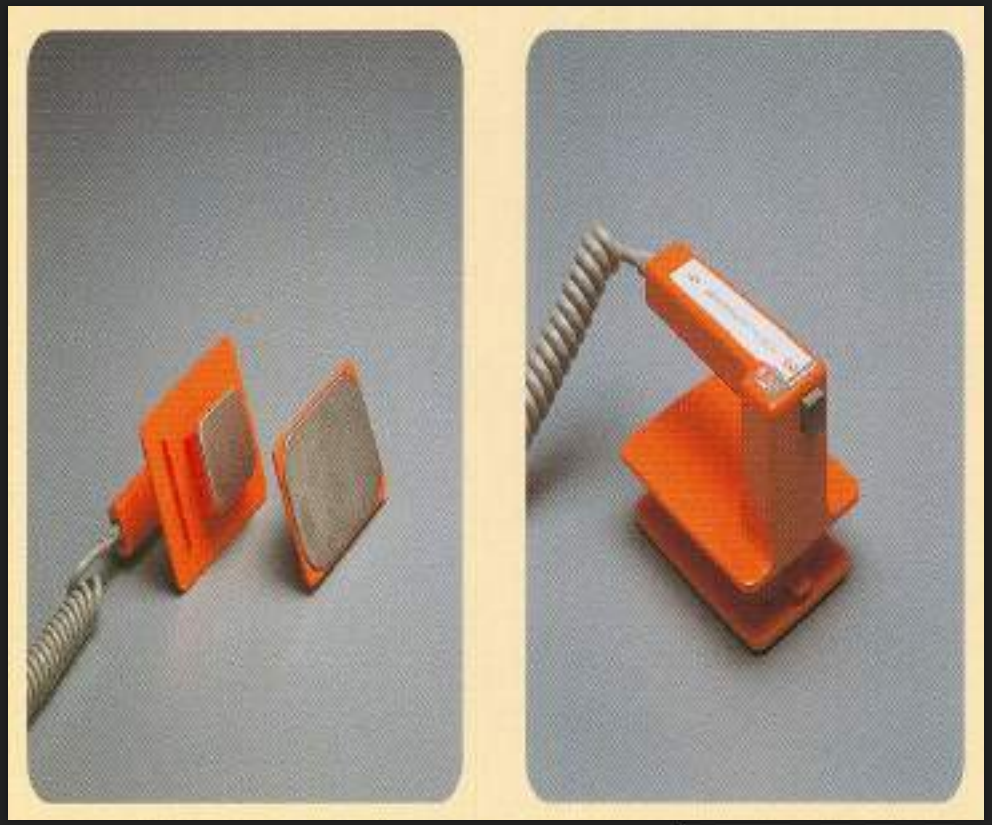


Paddle/ pad size



Pediateric Paddle





Pediateric Paddle

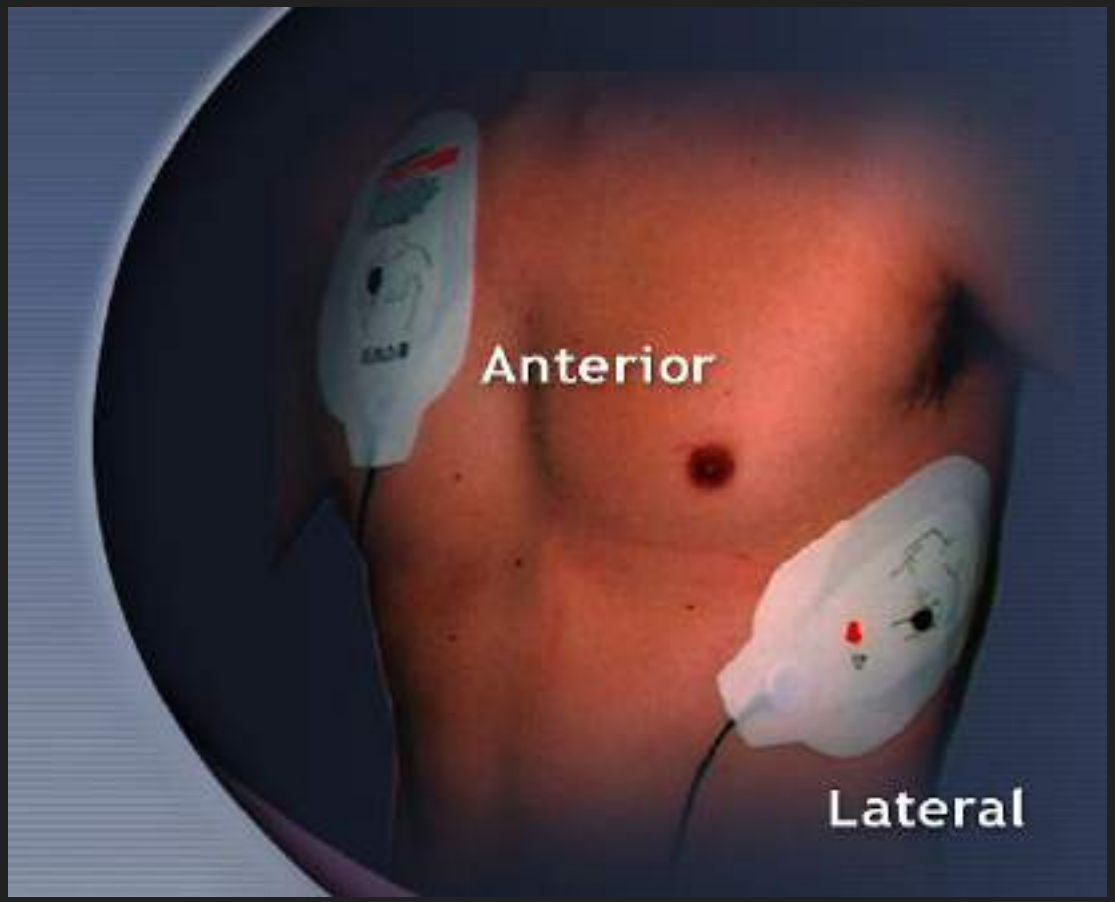
- Paddle Size:
- Infant < 1 year , <10 kg

Infant Size

- Child > 1 year , >10 kg

Adult Size

External Electric Therapy

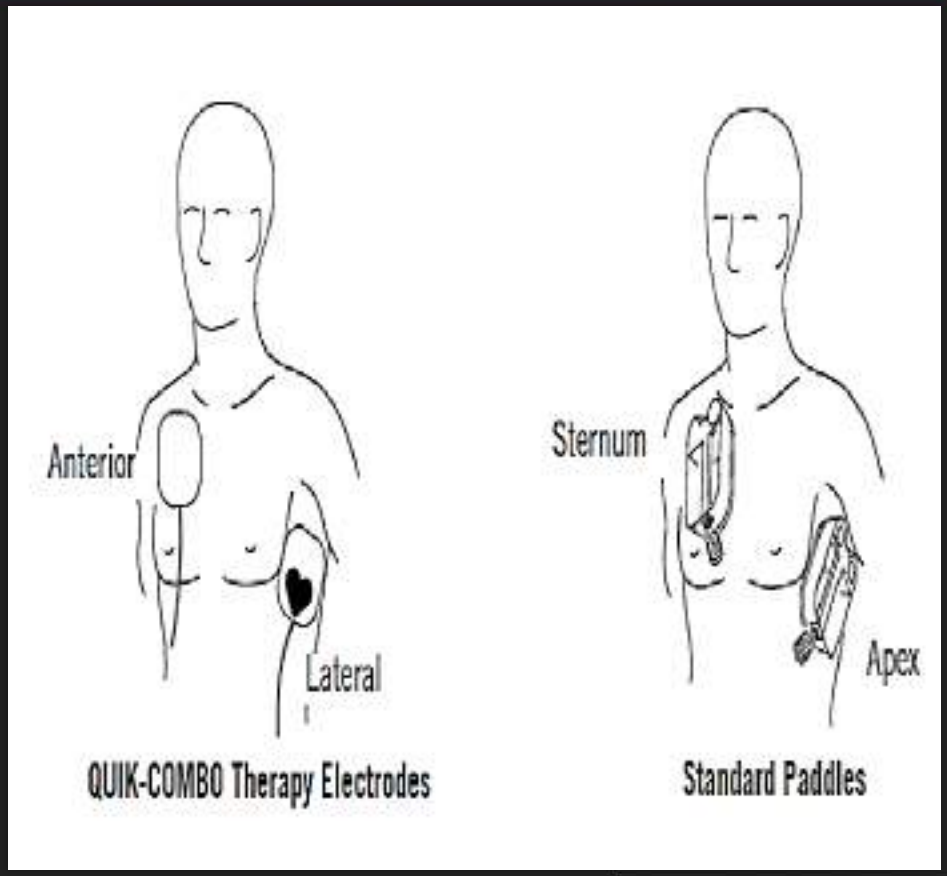


two accepted positions to optimize current delivery to the heart:

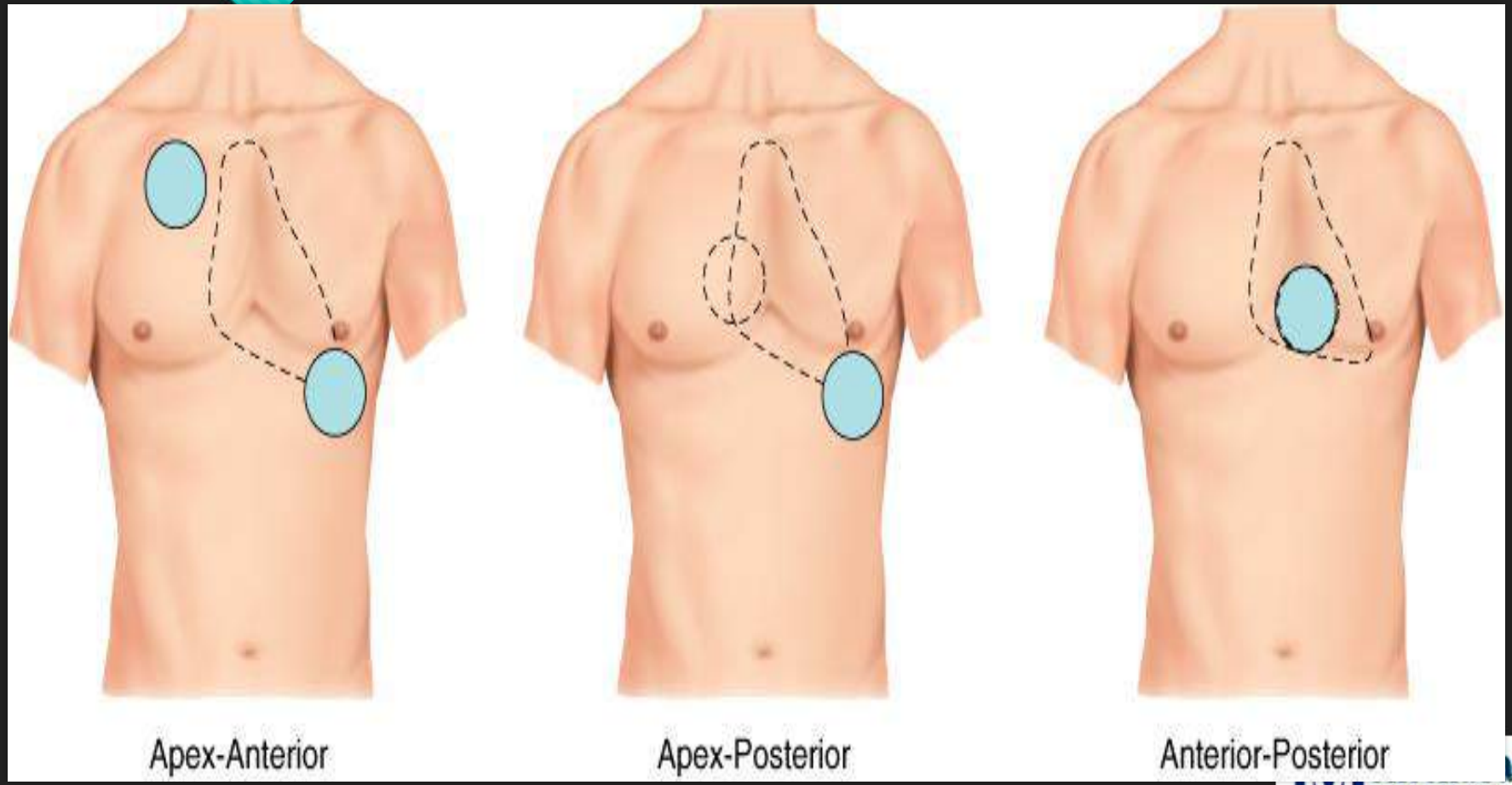
- Antero apical – one pad/paddle is placed to the right of the sternum just below the clavicle, and the other is centred lateral to the normal cardiac apex in the anterior or midaxillary line (V5–6)
- Anteroposterior – the anterior pad/paddle is placed over the praecordium or apex, and the posterior pad/paddle is placed on the back in the left or right infrascapular region.
- In applying either gel pads or MFE pads there must be good contact between the pad and the skin (needs to be dry and clean) to enhance adherence and decrease the chance of arching/burns

Antero apical Position

one pad/paddle is placed to the right of the sternum just below the clavicle, and the other is centred lateral to the normal cardiac apex in the anterior or midaxillary line (V5–6)

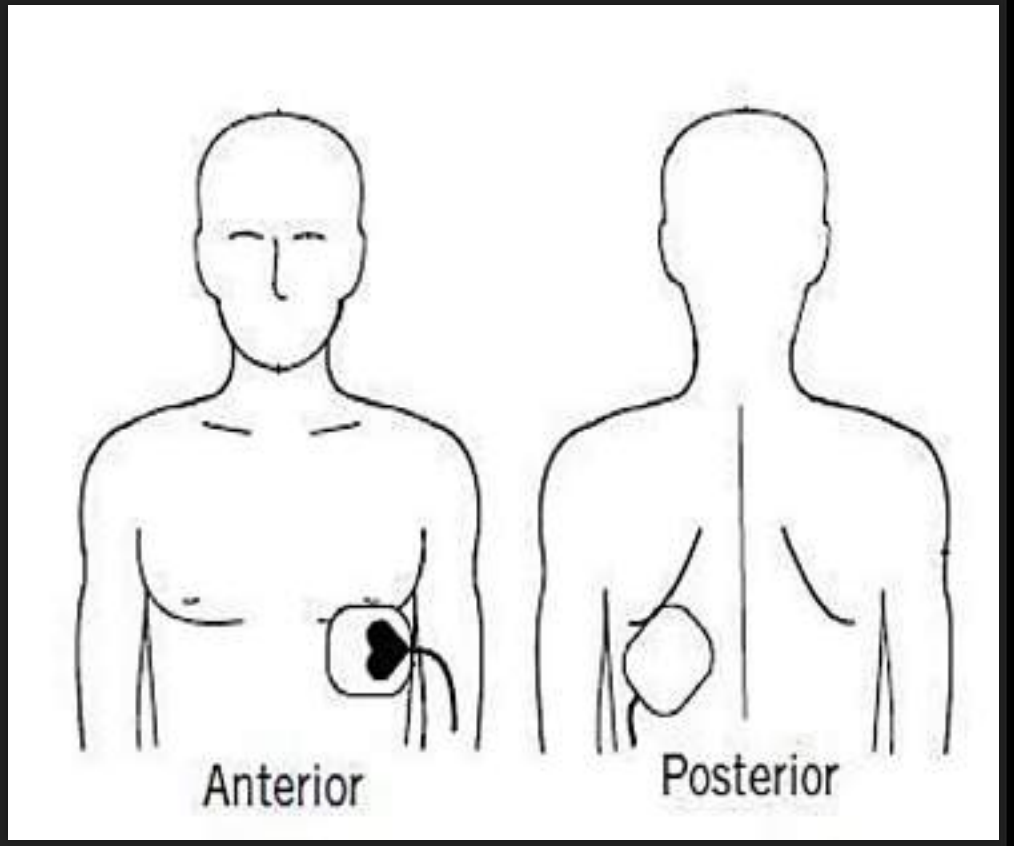


Antero apical Position

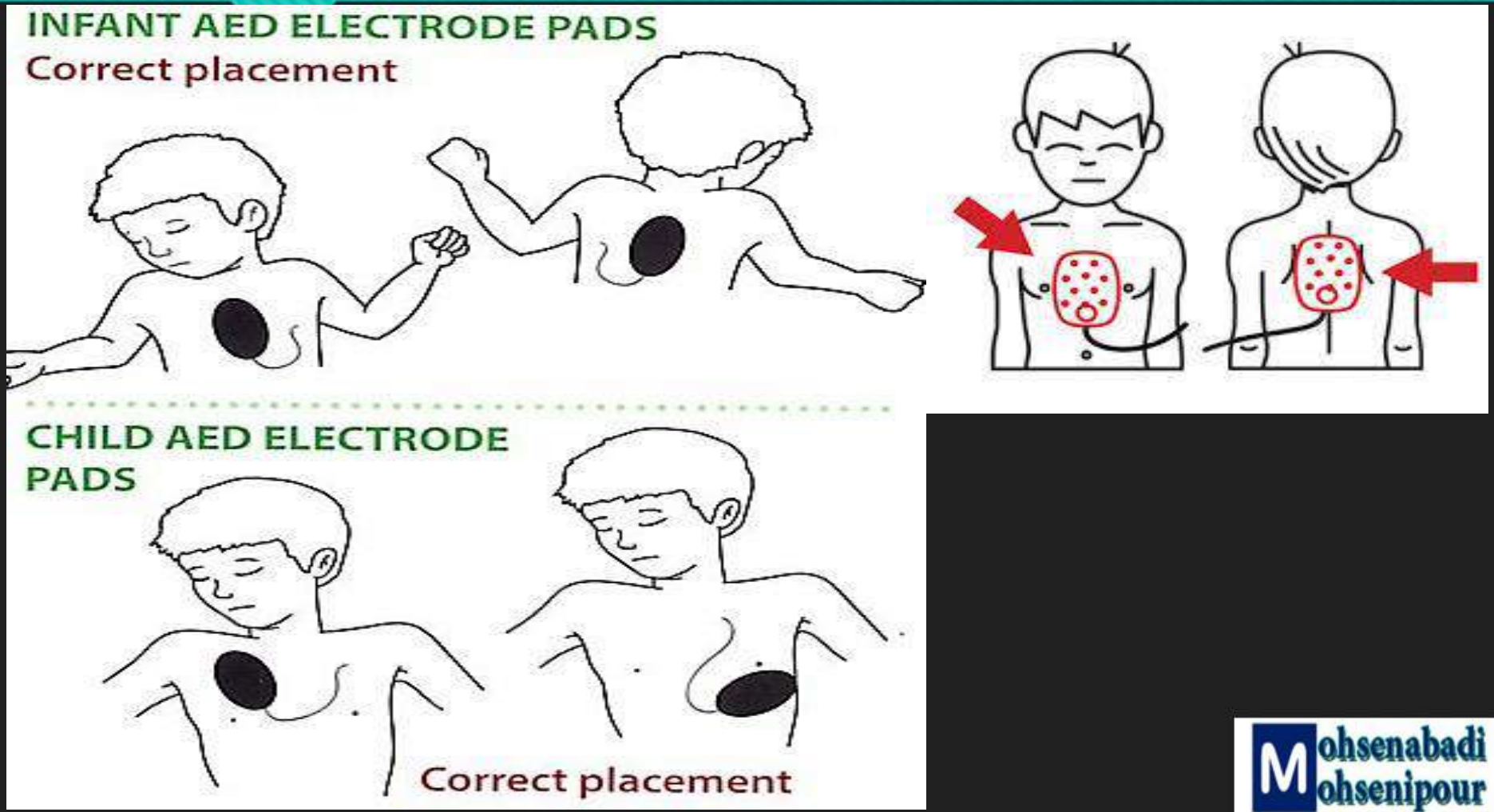


Anteroposterior Position

the anterior pad/paddle is placed over the praecordium or apex, and the posterior pad/paddle is placed on the back in the left or right infrascapular region.

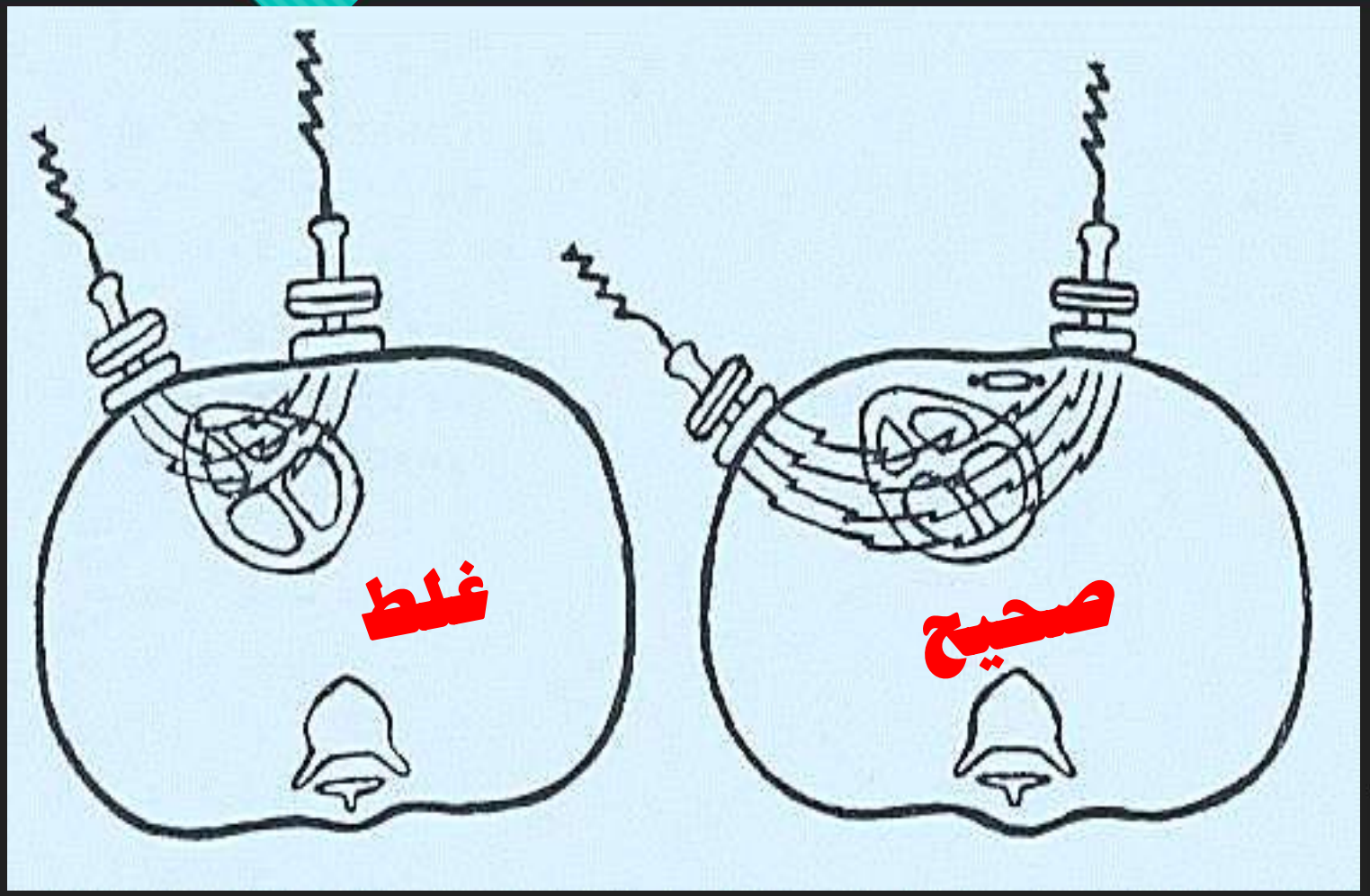


Paddle/ pad Position



Übung Defibrillation

Correct Position



Paddle electrodes

- The most well-known type of electrode (widely depicted in films and television) is the traditional metal paddle with an insulated (usually plastic) handle
- This type must be held in place on the patient's skin with approximately 25 lbs (11kg) of force while a shock or a series of shocks is delivered. Paddles offer a few advantages over self-adhesive pads
- Paddles are reusable, being cleaned after use and stored for the next patient. Gel is therefore not preapplied, and must be added before these paddles are used on the patient

رعايت اصول ايمني هنگام تخليه شوك الكتريكي :

- اطمينان از:

1. عدم تماس احيا گران با بيمار هنگام تخليه شوک .
2. عدم تماس احيا گران با تخت بيمار هنگام تخليه شوک
3. عدم خيس بودن کف زمين هنگام تخليه شوک

زيرا می تواند در فرد سالم منجر به ايست قلبی شود .

رعایت اصول ایمنی هنگام تخلیه شوک الکتریکی :

- قطع جریان اکسیژن هنگام تخلیه شوک تا از خطر آتش سوزی جلوگیری شود .
- اطمینان از فقدان نبض درزمانی که مانیتور در دسترس نباشد .
- کنترل ریتم قلب در بیشتر از یک اشتقاق
- بعد ازهربار شوک ، پنج ثانیه نبض بیمار با دقت کنترل گردد.
- در طول CPR انجام ماساژ قلبی و تنفس ، فقط به مدت 10ثانیه برای شوک دادن قطع میگردد.

ژل الکترود

ژل اولتراسونیک

Mohsenabadi Mohsenipour

Defibrillation Mode

- Defibrile (Asynchronize)

  (V.Tach – V.Fib)

- Synchronize (Cardioversion)

(PAT – A. flutter – A.Fibrilation – V.Tach)

Indications

Indications for defibrillation

- Pulseless ventricular tachycardia (VT)
  - Ventricular fibrillation (VF)
  - Cardiac arrest due to or resulting in VF

Async Shock Energy

Adult

Shock Energy for Defibrillation

- **Biphasic:** Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic**: 360 J

Ped

Shock Energy for Defibrillation

- First shock 2 J/kg
- Second shock 4 J/kg
- Subsequent shocks ≥4 J/kg, maximum 10 J/kg or adult dose

Indications

Indications for electrical cardioversion

- Supraventricular tachycardia
- (atrioventricular nodal reentrant tachycardia [AVNRT] and atrioventricular reentrant tachycardia [AVRT])
  - Atrial fibrillation
  - Atrial flutter
  - Ventricular tachycardia with pulse
  - Any patient with reentrant tachycardia with narrow or wide QRS complex (ventricular rate >150 bpm) who is unstable (eg, ischemic chest pain, acutepulmonary edema, hypotension, acute altered mental status, signs of shock)

Sync Shock Energy

Adult

Doses/Details

Synchronized cardioversion:
Initial recommended doses:

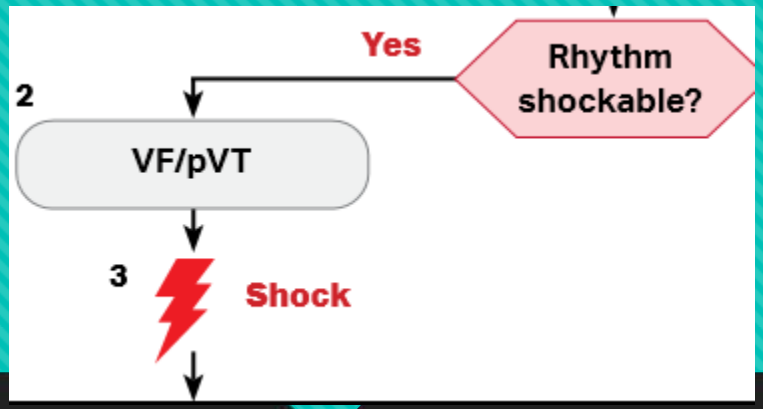
- Narrow regular: 50-100 J
- Narrow irregular: 120-200 J biphasic or 200 J monophasic
- Wide regular: 100 J
- Wide irregular: defibrillation dose (*not* synchronized)

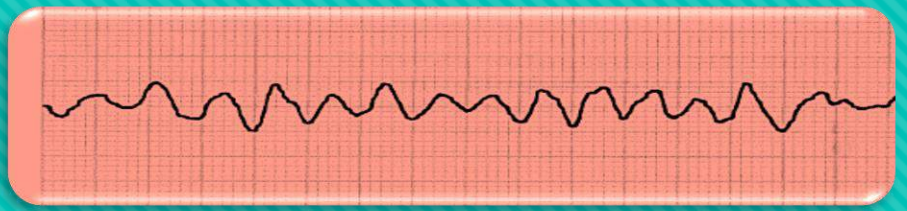
Ped

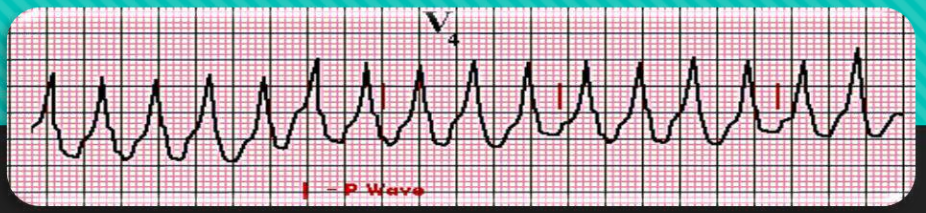
Doses/Details

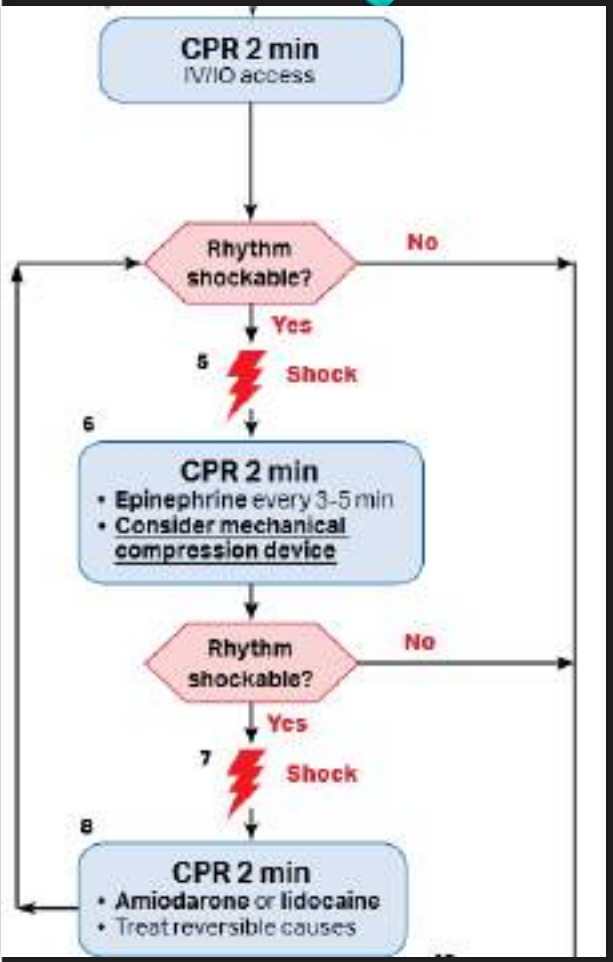
Synchronized cardioversion
Begin with 0.5-1 J/kg; if not effective, increase to 2 J/kg. Sedate if needed, but don't delay cardioversion.

Mohsenabadi Mohsenipour



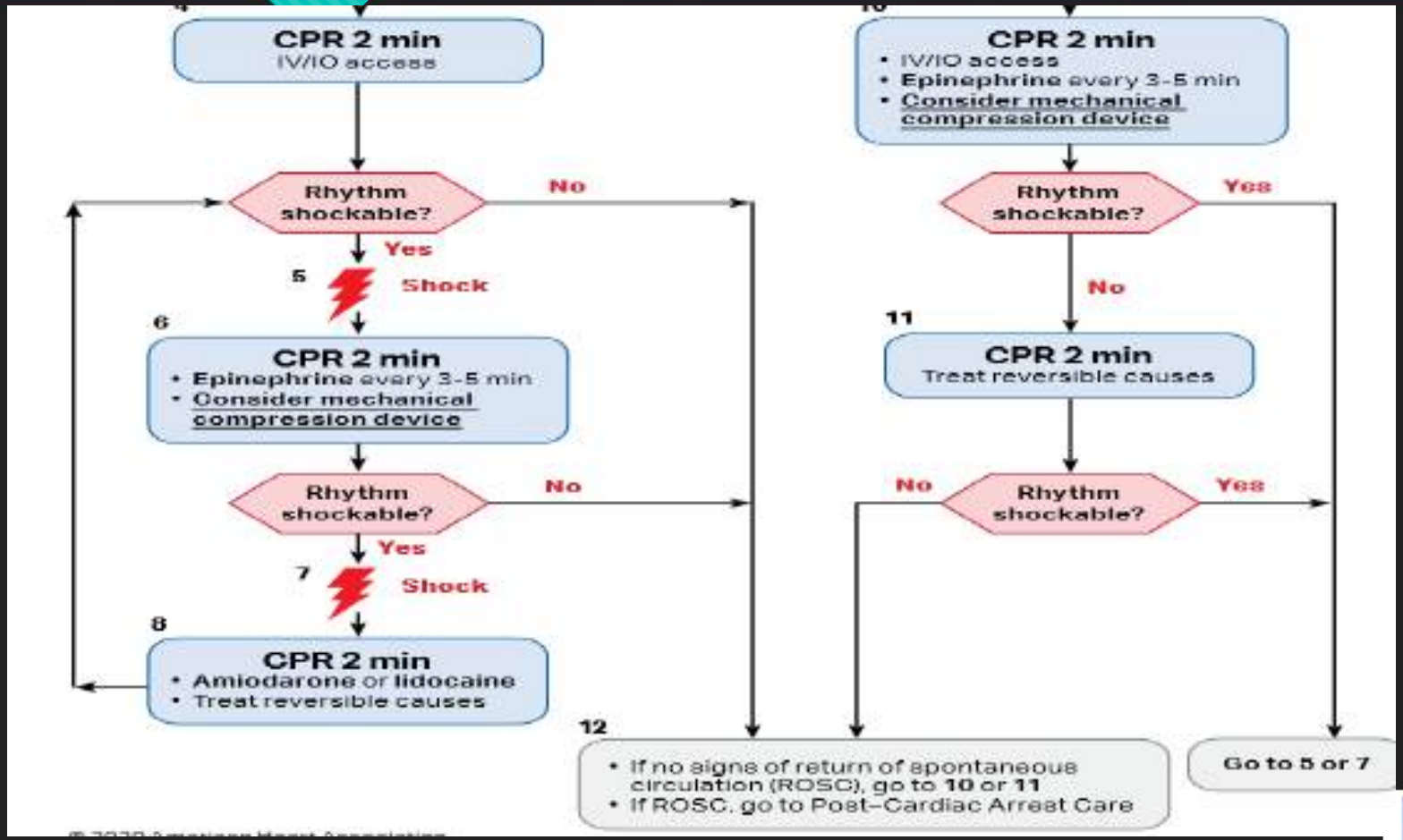






Mohsenabadi Mohsenipour

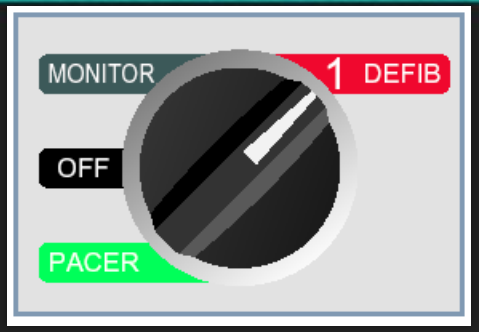
ACLS Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients



Mohsenabadi Mohsenipour

Defibrillation

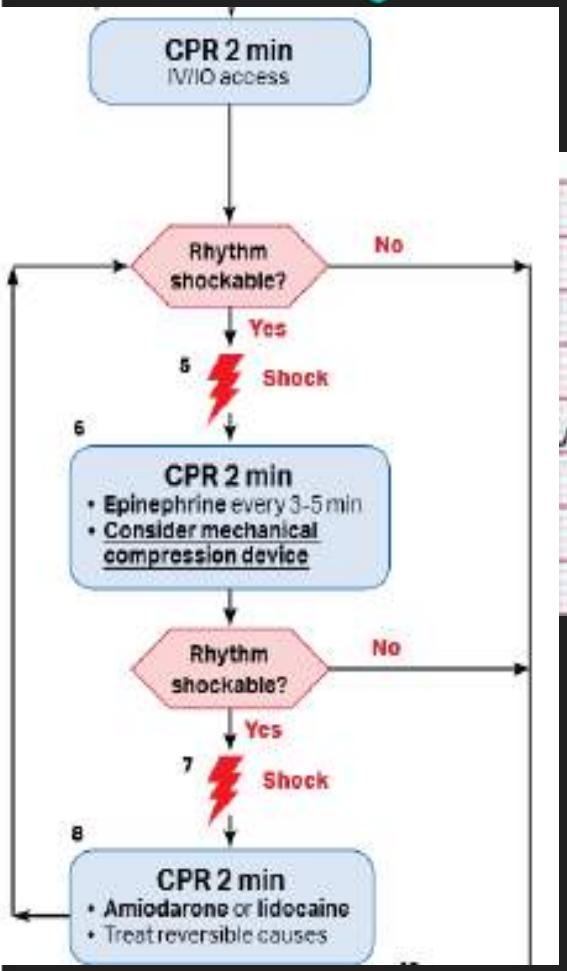
- Manual Defibrillation

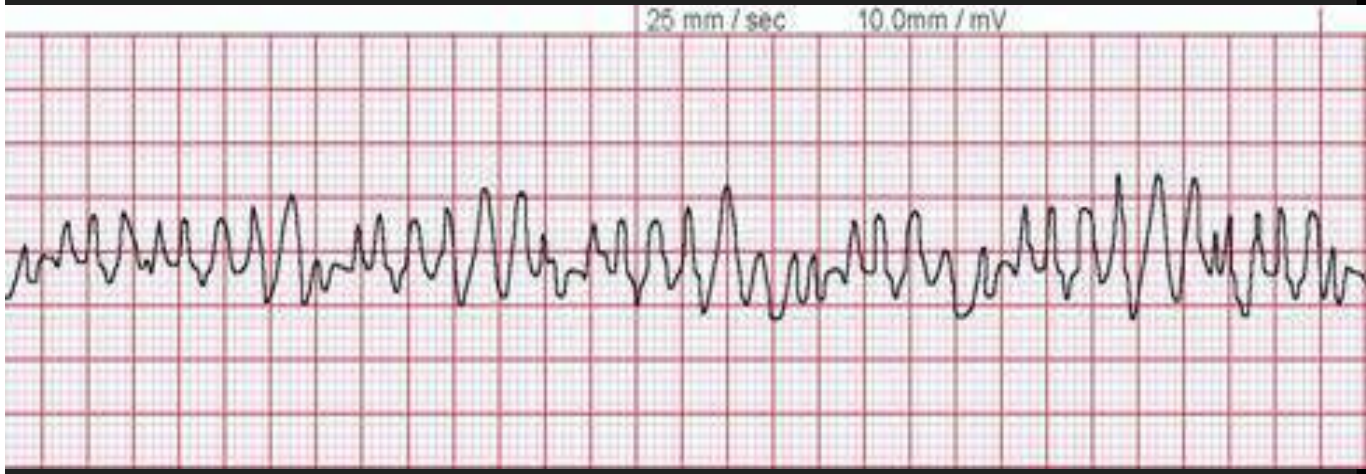


  - Select DEFIB
  - Unit automatically defaults to first shock setting determined in Configuration (typically 120J, 150J, 200J)
  - To change energy setting, use UP/DOWN ARROWS. Selected energy is displayed as “DEFIB XXXJ SEL”
  - Press CHARGE
  - Make sure everyone is clear
  - When SHOCK button lights, press SHOCK

Mohsenabadi Mohsenipour

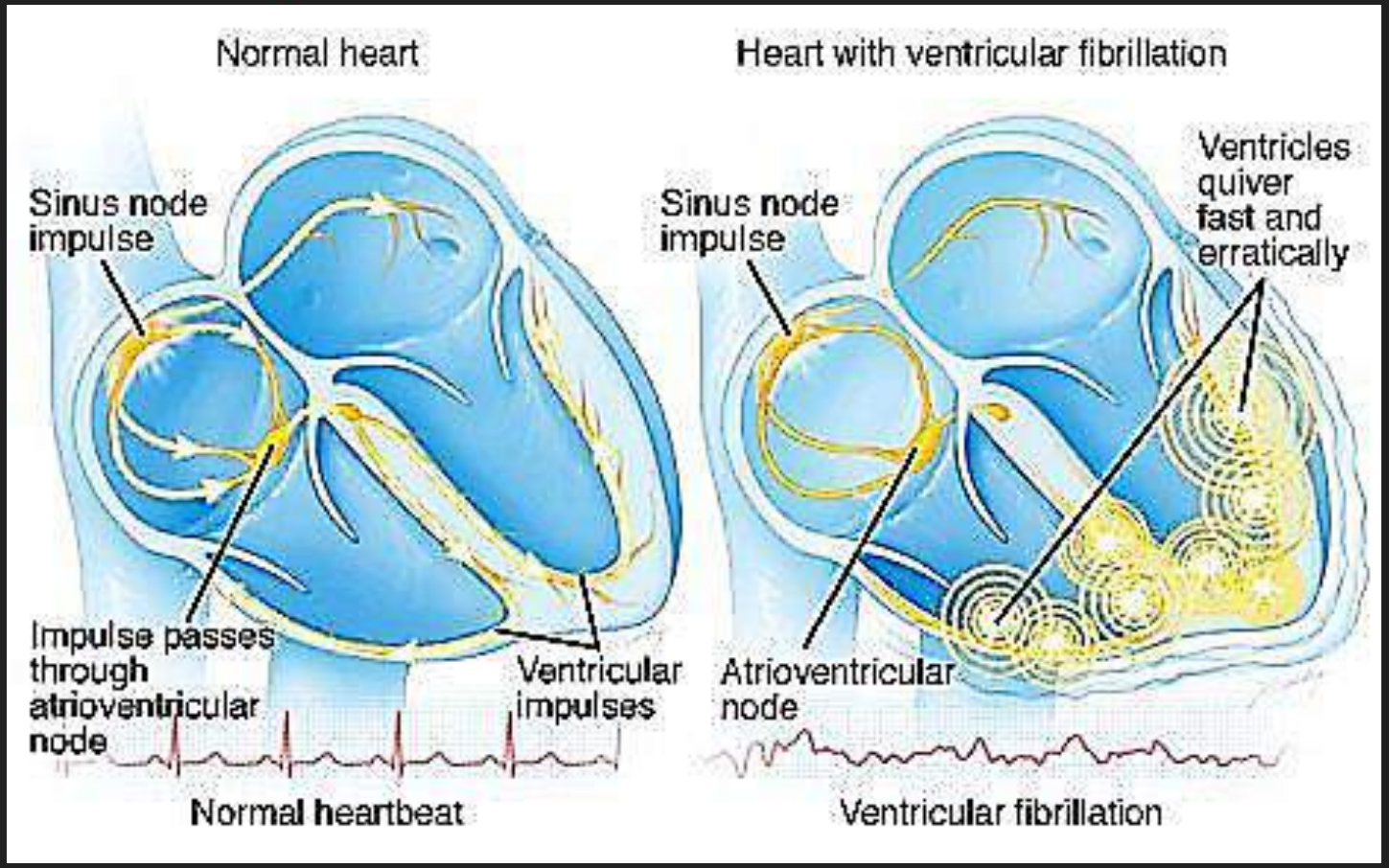
Ventricular Fibrilation





Mohsenabadi Mohsenipour

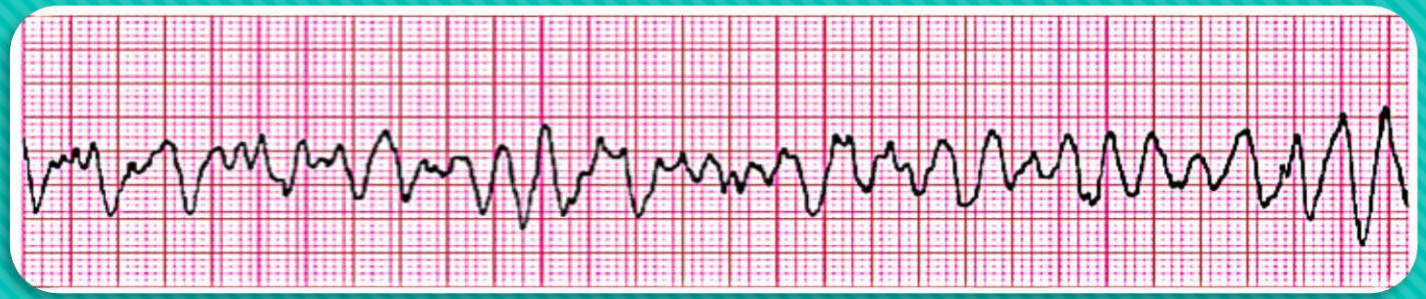
Ventricular Fibrillation



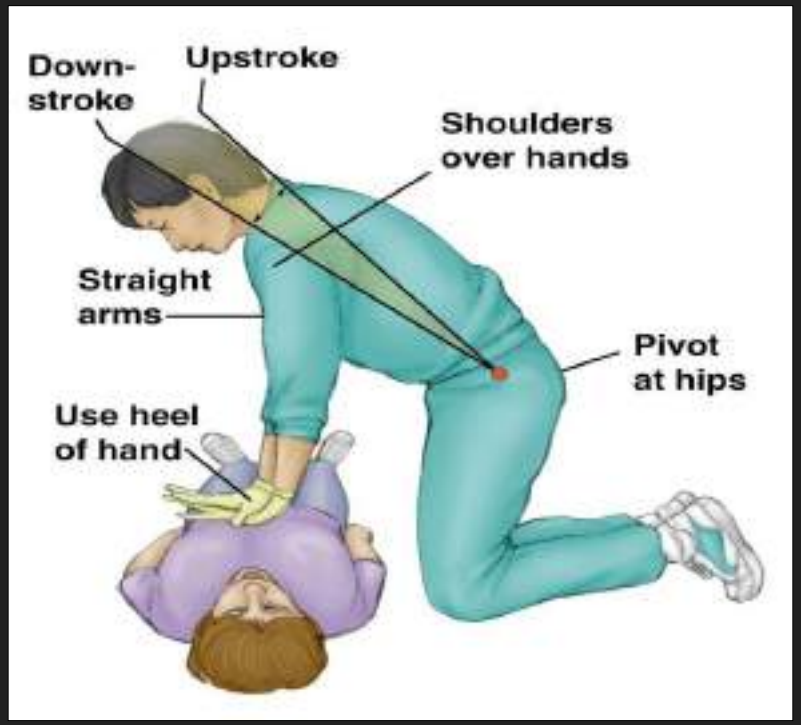
Ventricular Fibrillation

- Ventricular Fibrillation (VF) presents with chaotic electrical activity as the result of multiple ectopic foci originating in the ventricles.
- There are no organized QRS complexes.
- This lethal rhythm is seen in approximately seventy percent of sudden cardiac arrests.
- Fine and Coarse VF are differentiated by the amplitude of the activity.
- Fine VF has an amplitude of less than 5 mm (1 large square) whereas coarse VF is greater that 5 mm in amplitude

VF

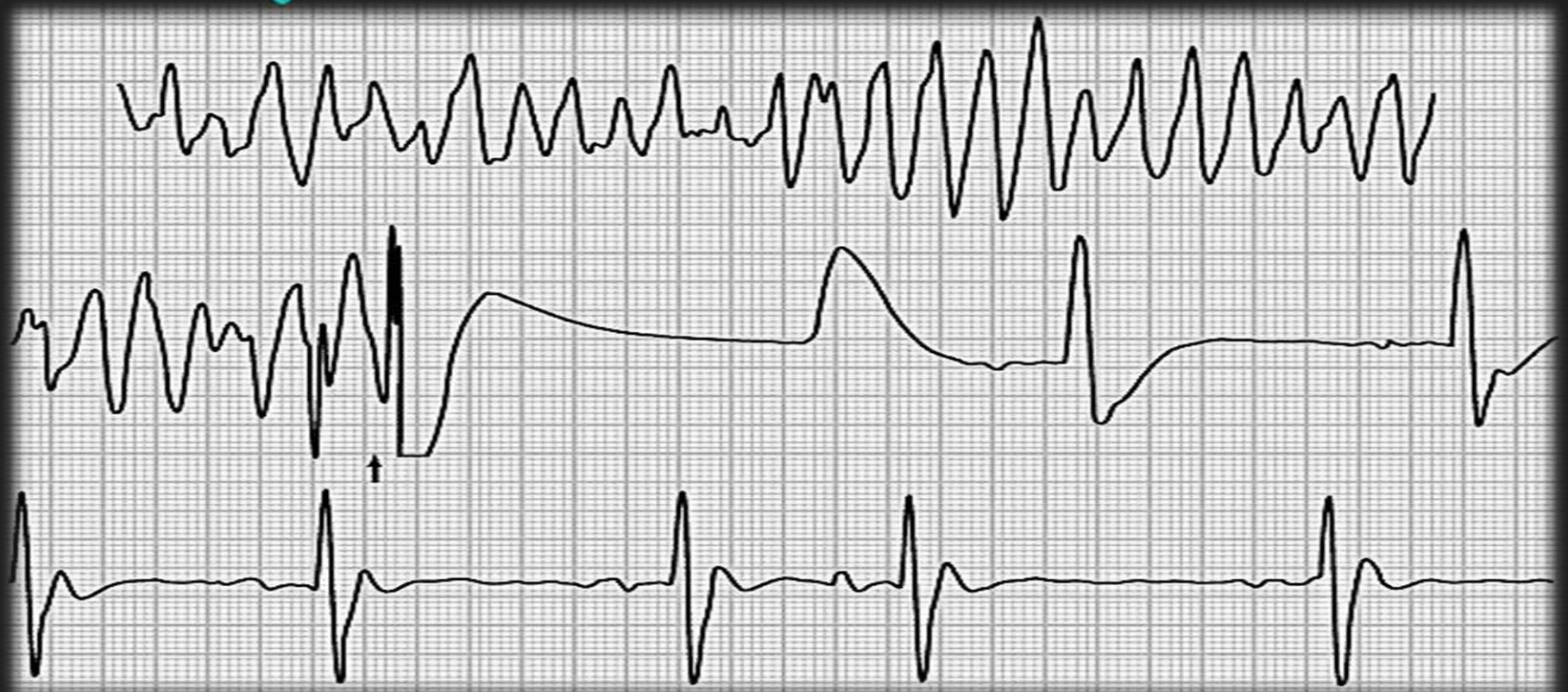


Cardiac massage started



Mohsenabadi Mohsenipour

Continuous electrocardiogram showing successful treatment of ventricular fibrillation by a countershock (given at the arrow)



VF

Before

After

Chest compression

Chest compression

The success of defibrillation depends on

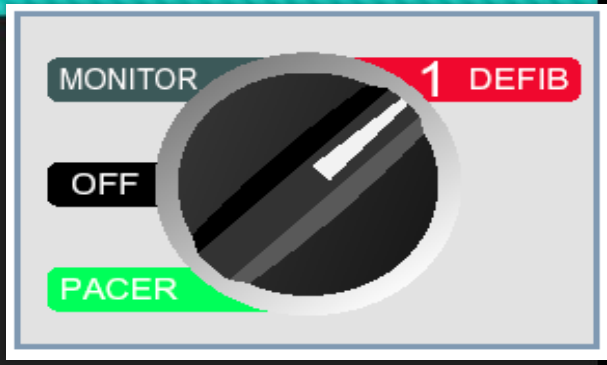
- Time elapsed since arrest
- Quality of electrical contact between treatment electrode and chest wall
- Myocardial oxygenation during CPR
- Chest wall size
- Defibrillating energy
- The total number of shocks delivered
- The time interval between successive shocks (chest wall impedance to electrical flow drops with successive shocks-max 2 minutes between).

H	Hypovolemia	Hypoxia	Hydrogen Ion (acidosis)	Hypo/Hyper-kalemia	Hypothermia
	Loss of fluid volume in the circulatory system. Look for obvious blood loss. Most important intervention is to obtain IV access and administer IV fluids. Use a fluid challenge to determine if the arrest is related to hypovolemia	Deprivation of an adequate oxygen supply can be a significant contributing cause of cardiac arrest. Ensure that the airway is open. Ensure adequate ventilation, and bilateral breath sounds. Ensure oxygen supply is connected properly.	Obtain an arterial blood gas to determine respiratory acidosis. Provide adequate ventilations. Use sodium bicarbonate to prevent metabolic acidosis if necessary.	Both a high and low K+ can cause cardiac arrest. Signs of high K+ include taller, peaked T-waves, and widening of the QRS complex. Signs of low K+ include flattened T-waves, prominent U-waves and possibly widened QRS complex. Never give undiluted intravenous potassium.	If a patient has been exposed to the cold, warming measures should be taken. Core temp. should be raised above 86 F and 30 C as soon as possible. The patient may not respond to drug or electrical therapy while hypothermic.

T	Toxins	Tamponade	Tension Pneumothorax	Thrombosis (heart: acute, massive MI)	Thrombosis (lungs: massive PE)
	Accidental overdose : Some of the most common include: tricyclics, digoxin, betablockers, and calcium channel blockers). Cocaine is the most common street drug that increases incidence of pulseless arrest. Physical signs include bradycardia, pupil symptoms, and other neurological changes. Poison control can be utilized to obtain information about toxins and reversing agents.	Fluid build-up in the pericardium results in ineffective pumping of the blood which can lead to pulseless arrest. ECG symptoms: Narrow QRS complex and **rapid heart rate.** Physical signs: jugular vein distention (JVD), no pulse or difficulty palpating a pulse, and muffled heart sounds. Perform: pericardiocentesis to reverse.	Tension pneumothorax shifts in the intrathroacic structure and can rapidly lead to cardiovascular collapse and death. ECG signs: Narrow QRS complexes and **rapid heart rate**. Physical signs: JVD, tracheal deviation, unequal breath sounds, difficulty with ventilation, and no pulse felt with CPR. Treatment: Needle decompression.	Causes acute myocardial infarction. ECG signs: 12 lead ECG with ST-segment changes, T-wave inversions, and/or Q waves. Physical signs: elevated cardiac markers on lab tests, and chest pain/pressure. Treatments: use of fibrinolytic therapy, PCI (percutaneous coronary intervention). The most common PCI procedure is coronary angioplasty with or without stent placement.	Can rapidly lead to respiratory collapse and sudden death. ECG signs of PE: Narrow QRS Complex and rapid heart rate. Physical signs: No pulse felt with CPR. distended neck veins, positive d-dimer test, prior positive test for DVT or PE. Treatment: surgical intervention (pulmonary thrombectomy) and fibrinolytic therapy.

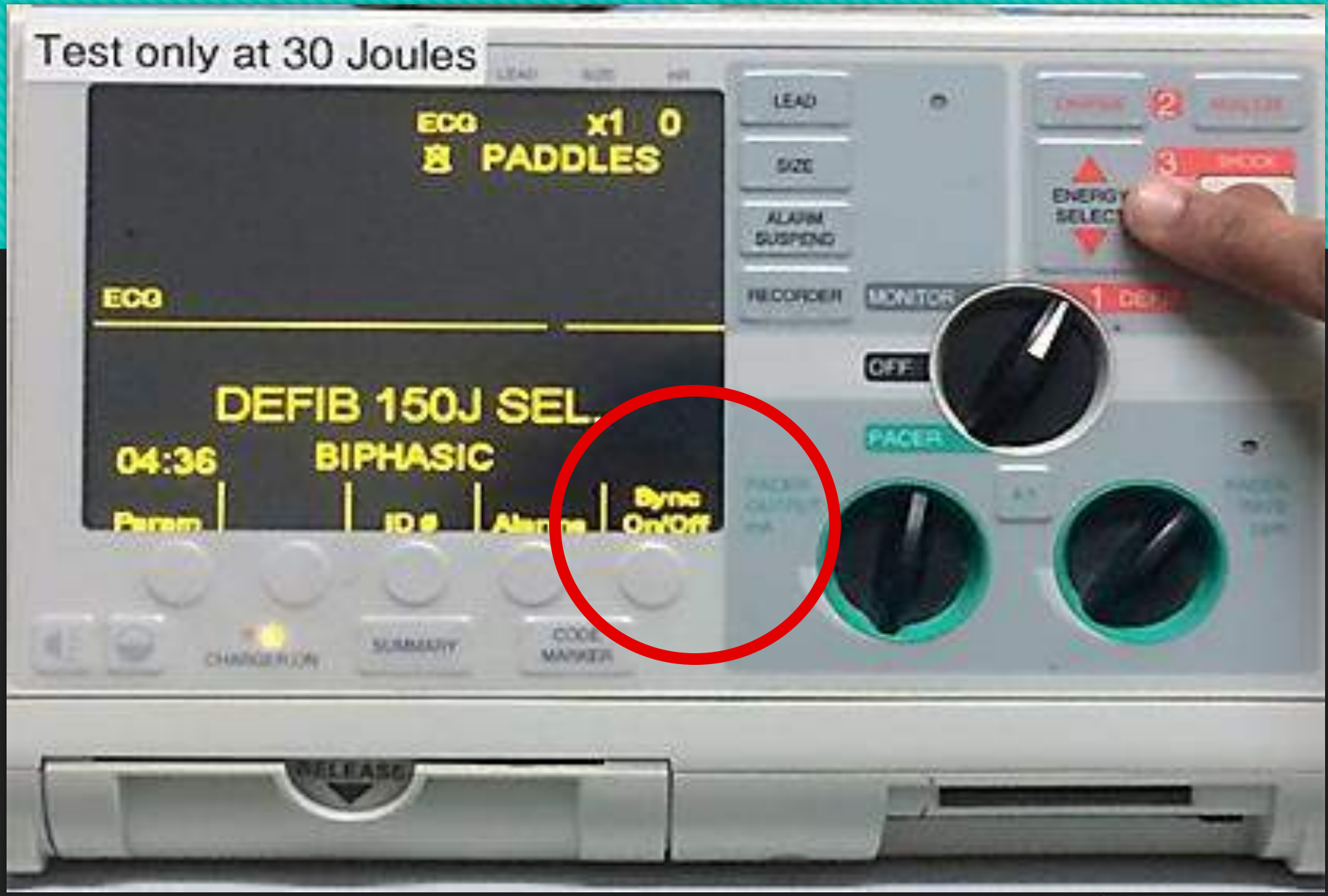
"You got a better idea? The paddles are BROKEN. Just turn the key."

Cardioversion

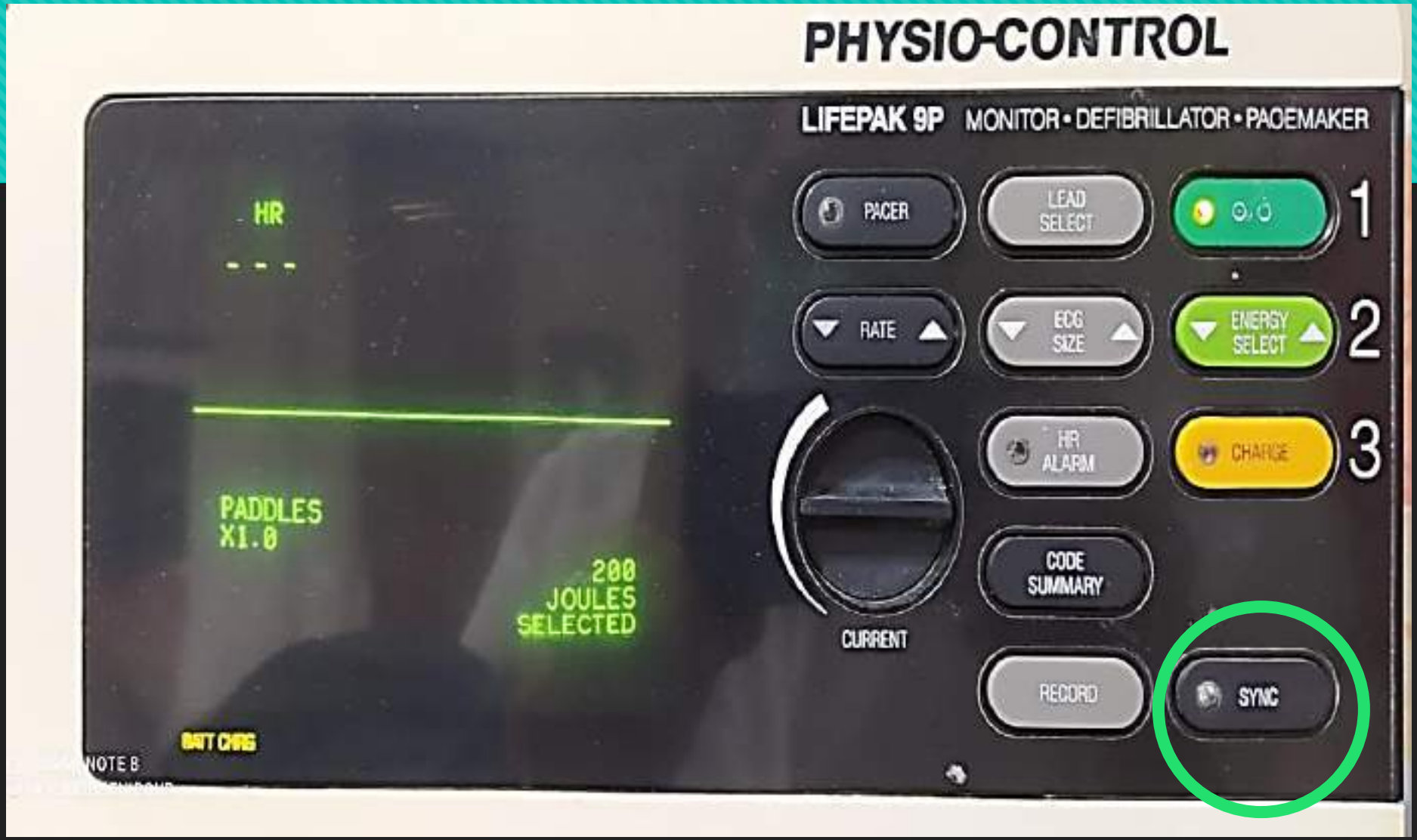


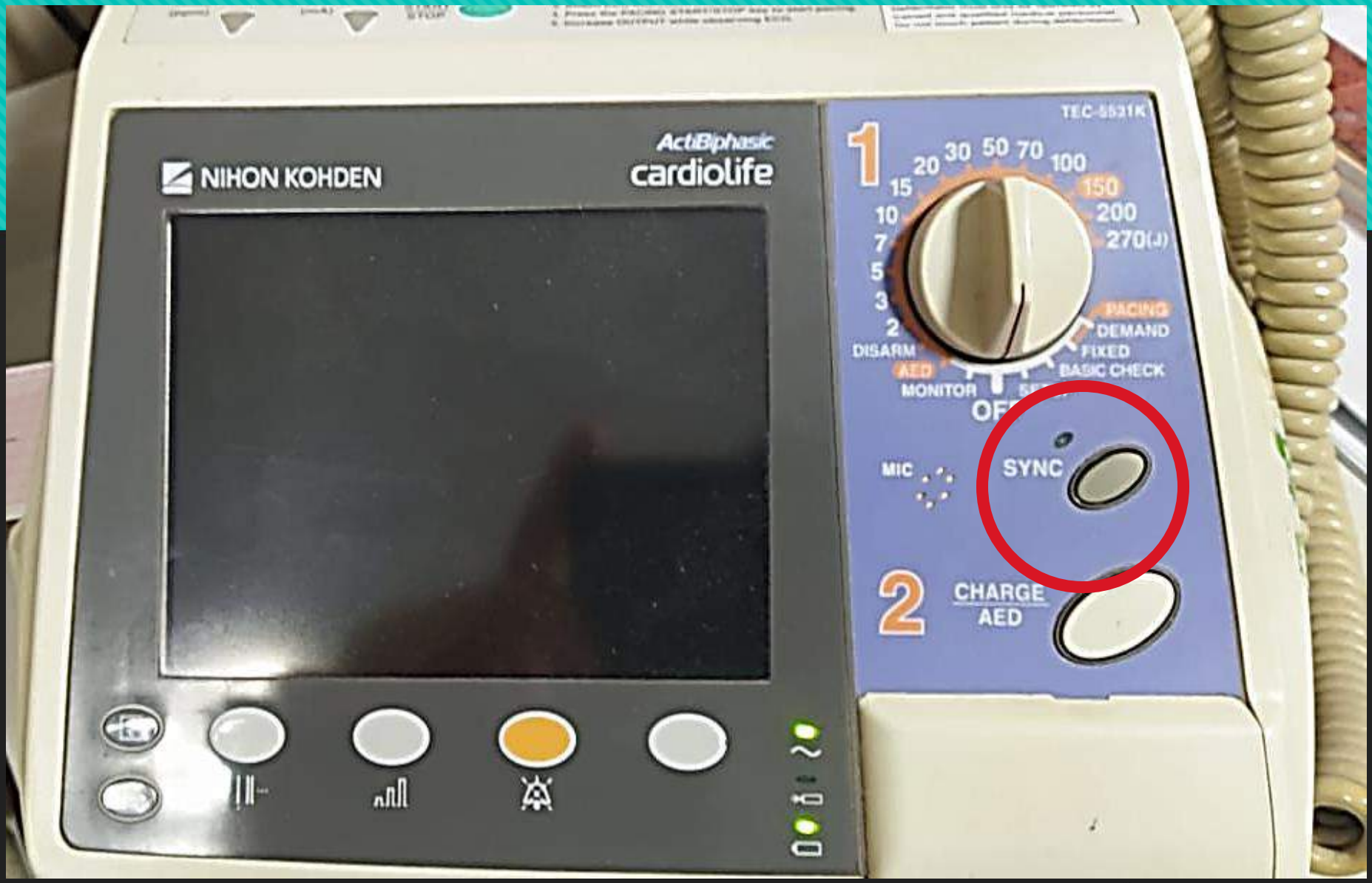
- Press LEAD to select desired ECG lead
- Select DEFIB
- Select desired energy level
- Press SYNC softkey. Verify presence of SYNC marker "↓"
- Press CHARGE
- Verify everyone is clear of patient
- Press SHOCK

Mohsenabadi Mohsenipour




LIFEPAK 20e
DEFIBRILLATOR / MONITOR
Recommended
Adult VF Dose: 200-300-360J
1 ON
2 ENERGY SELECT
3 CHARGE
AED MODE
ANALYZE
LEAD
SIZE
SYNC
RATE
CURRENT
ALARMS
OPTIONS
PAUSE
PRINT
CODE SUMMARY
EVENT
Speed Dial
AC Mains
Service
NOTE 8
OHSENIPOUR





Sync Shock Energy

Adult

Doses/Details

Synchronized cardioversion:
Initial recommended doses:

- Narrow regular: 50-100 J
- Narrow irregular: 120-200 J biphasic or 200 J monophasic
- Wide regular: 100 J
- Wide irregular: defibrillation dose (*not* synchronized)

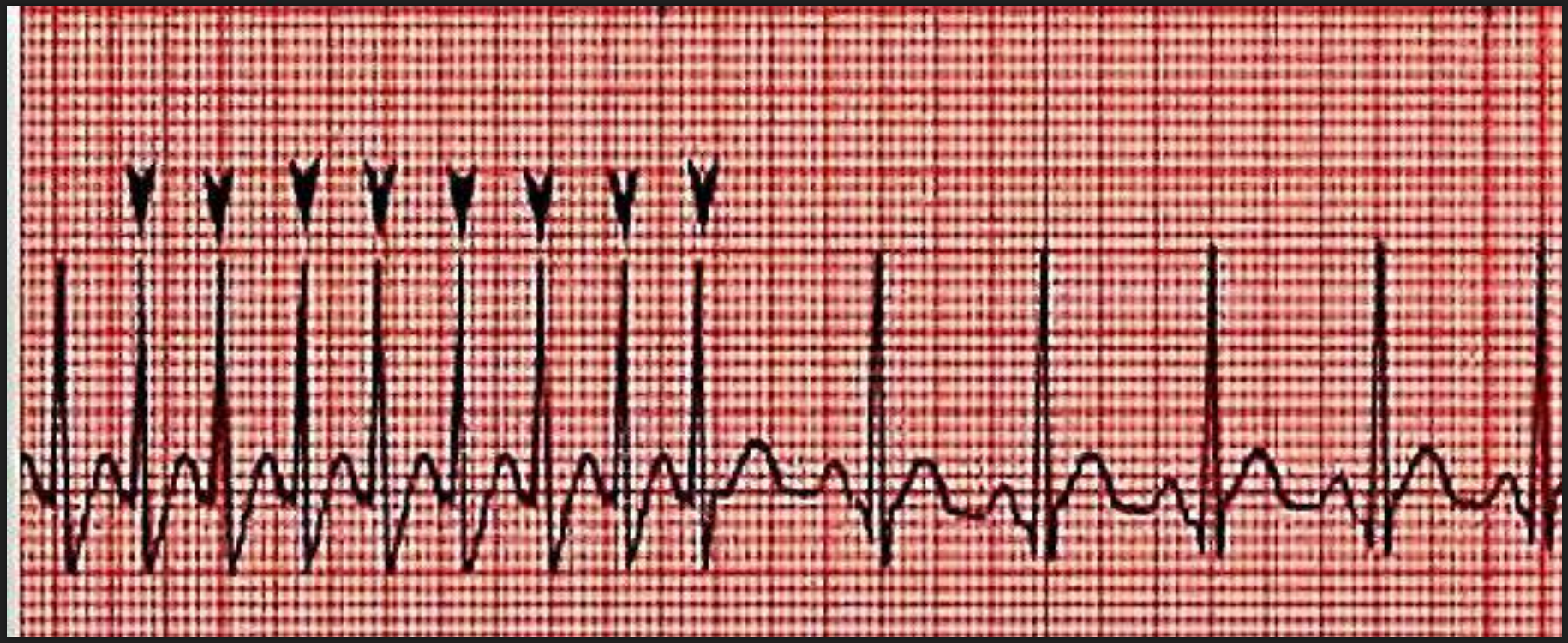
Ped

Doses/Details

Synchronized cardioversion
Begin with 0.5-1 J/kg; if not effective, increase to 2 J/kg. Sedate if needed, but don't delay cardioversion.

Mohsenabadi Mohsenipour

Cardioversion



Indications for synchronized cardioversion

unstable

- atrial fibrillation,
- atrial flutter,
- atrial tachycardia,
- supraventricular tachycardia's

Indications of Cardioversion

1. AF/AFL Patient with AF/AFL > 48 hours duration and anticoagulation for > 3–4 weeks (INR 2–3)
2. Acute onset AF/AFL with associated hemodynamic instability including the following:

- Angina pectoris
- Myocardial ischemia/infarction
- Hypotension/shock
- Heart failure
- Pulmonary edema
- Mitral stenosis
- Preexcitation (WPW syndrome)
- Left ventricular hypertrophy
- AS
- HTN
- HOCM

Indications of Cardioversion

3. AF/AFL of unknown duration and absence of thrombus in left atrium or atrial appendage by TEE

4. AF/AFL < 48-hour duration
   - Atrioventricular nodal reentry tachycardia
   - Atrioventricular reentry tachycardia
   - Ventricular tachycardia with a pulse

Contraindications of Cardioversion

- Known atrial thrombus
- Sinus rhythm or tachycardia
- Multifocal atrial tachycardia
- Junctional tachycardia
- Accelerated idioventricular rhythm
- Digitalis toxicity (digitalis-induced tachyarrhythmias)
- Severe electrolyte imbalance
- Hypokalemia
- Unknown duration of AF/AFL in a stable patient not receiving therapeutic antecedent anticoagulation in the absence of a TEE
- Patient that cannot be safely sedated

The initial recommended synchronized cardioversion

- narrow regular: 50-100 J; i.e., SVT and atrial flutter
- Narrow irregular: 120-200 J biphasic or 200 J monophasic; i.e., atrial fibrillation
- Wide regular: 100 J; i.e., monomorphic VT
- Wide irregular: defibrillation dose (not synchronized)

Patients with unstable tachycardia should be treated immediately with synchronized cardioversion. If a pulseless tachycardia is present patients should be treated using the cardiac arrest algorithm

Biephasic Energy select

Synchronize	Defibrillate	Disrhythmia
70 – 200	-	P.A.T
30 – 200	-	A.Flutter
70 – 200	-	A.Fibrilation
30 - 200	-	V.Tach (With pulse)
-	200	V.Tach (No pulse)
-	200	V.Fib

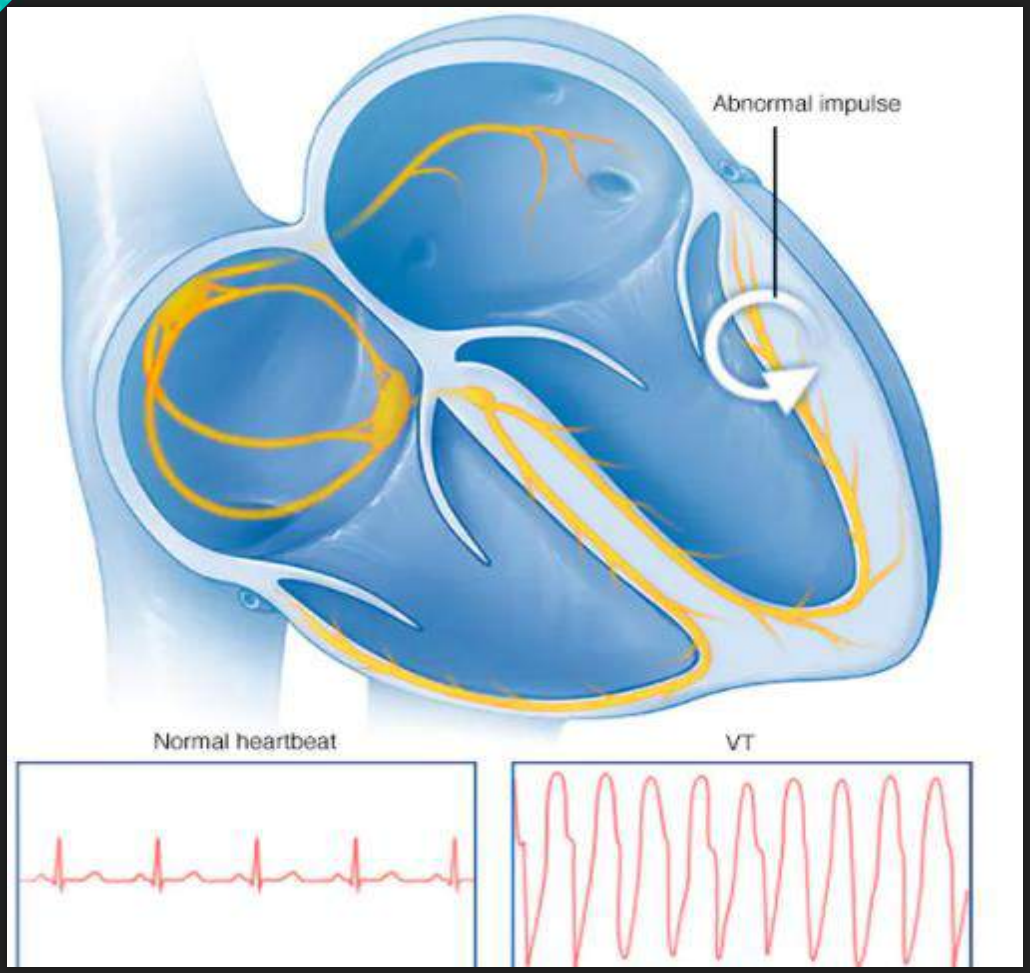
Mono phasic Energy select

Synchronize	Defibrillate	نام دیس ریتمی
50…..360JOULS	------	P.A.T
25…200 JOULS	-----	A.FLUTTER
50…..360JOULS	-----	A.FIBRILATION
1……360 JOULS	-----	V.TACH (With pulse)
-----	360	V.TACH (No pulse)
-----	360	V.FIB

Ventricular Tachycardia

- Ventricular Tachycardia (VT) is characterized by a wide complex, rapid rate that is generally regular in nature.
- May be as slow as 140 and as fast as 340
- May deteriorate to Vfib
- Can be with or without a pulse!!

Ventricular Tachycardia



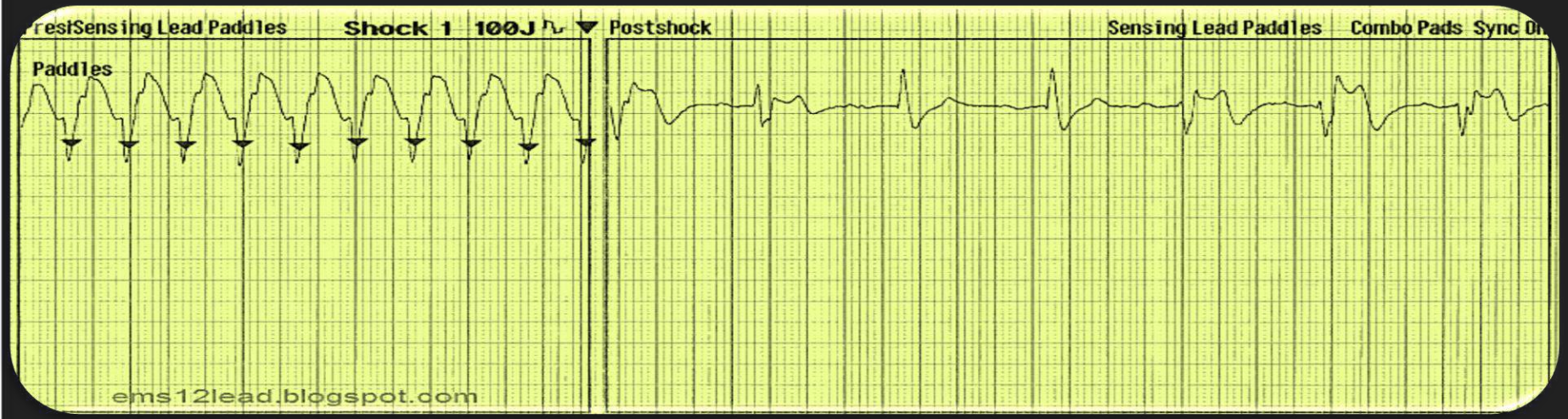
Ventricular Tachycardia

- More than 100 beats per minute

VT with Pulseness or pulseless

Stable or Unstable ??????????

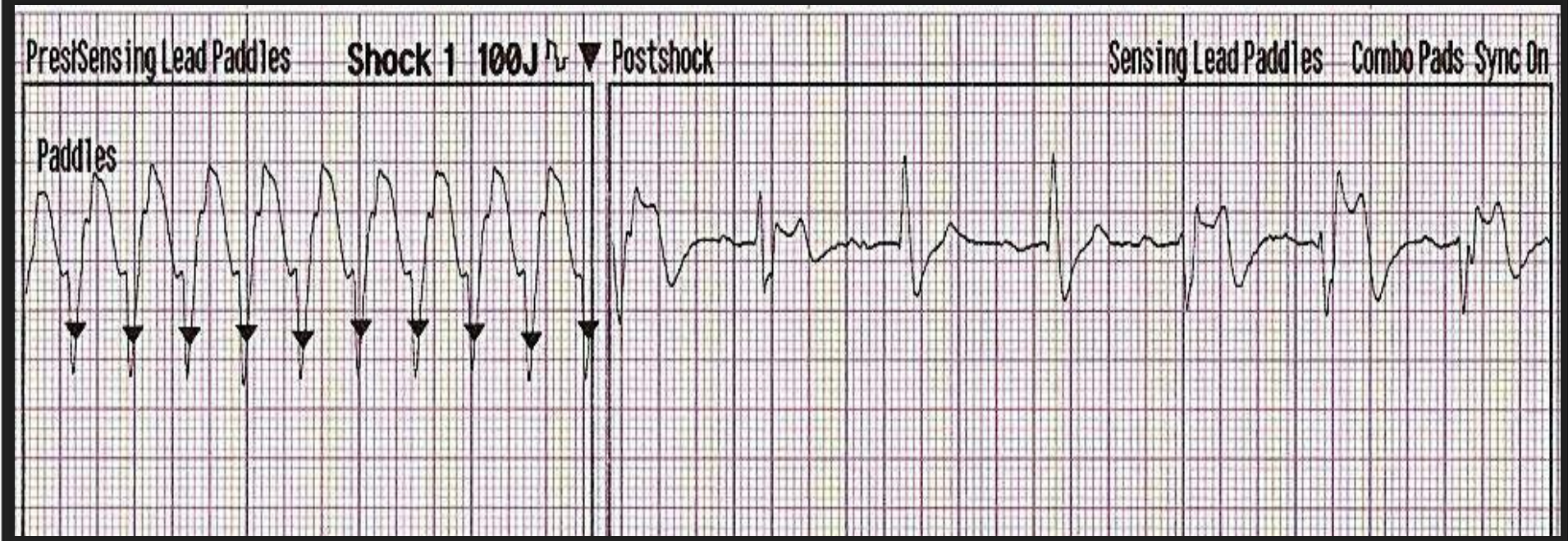
Synchronized Cardioversion



- Synchronization avoids the delivery of a LOW ENERGY shock during cardiac repolarization (t-wave).
- If the shock occurs on the t-wave (during repolarization), there is a high likelihood that the shock can precipitate VF (Ventricular Fibrillation).

Mohsenabadi Mohsenipour

Synchronized Cardioversion



Monomorphic Ventricular Tachycardia

Treatment of monomorphic VT is dependent upon whether the patient is stable or unstable

Polymorphic Ventricular Tachycardia

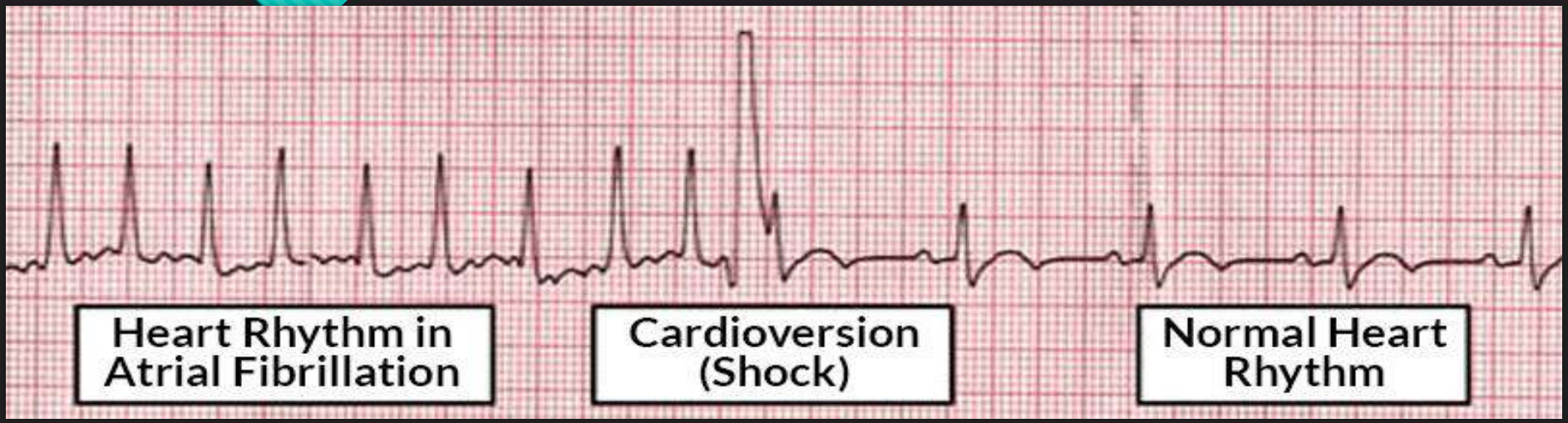
Unstable polymorphic ventricular tachycardia is treated with unsynchronized shocks (defibrillation).

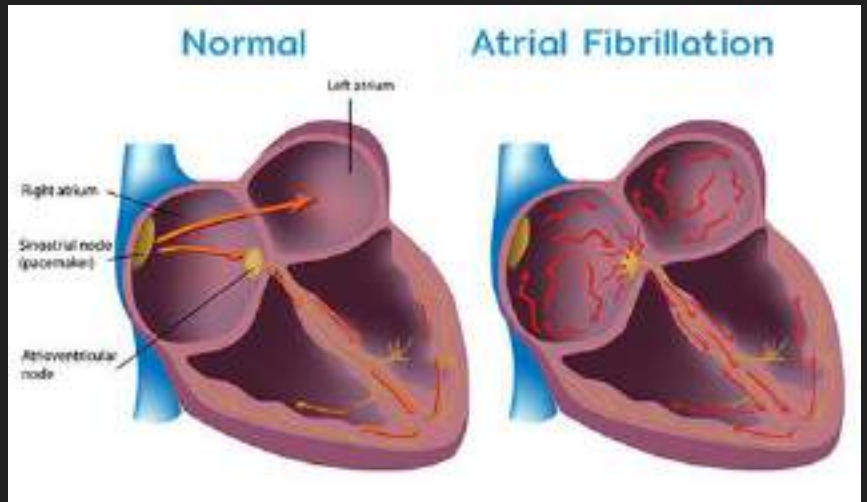
Defibrillation is used because synchronization is not possible.

SVT

Unstable patients with SVT and a pulse are always treated with synchronized cardioversion. The appropriate voltage for cardioverting SVT is 50-100 J. This is what AHA recommends and also SVT converts quite readily with 50-100 J.

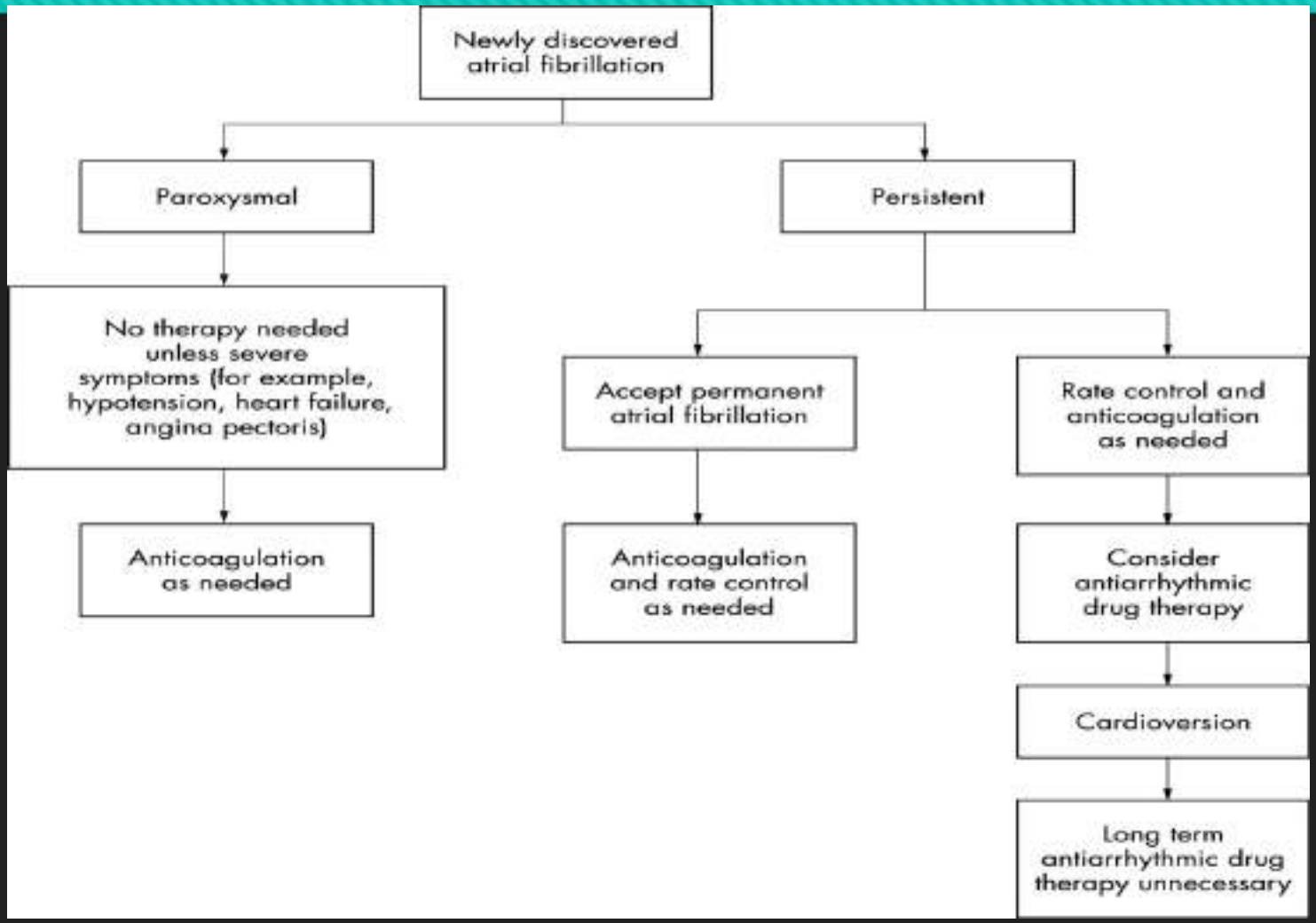
A.fib





Mohsenabadi Mohsenipour

management of patients with newly discovered atrial fibrillation



Mohsenabadi Mohsenipour

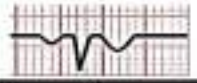
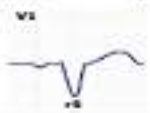
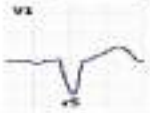
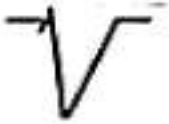
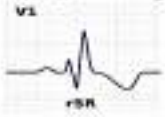
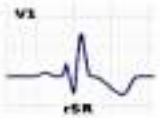
Defibrillation VS Cardioversion

Defibrillation	Cardioversion
Not synchronised	Synchronised on the R wave
For cardiac arrest	For periarrest tachyarrhythmias (unstable)
Higher energy joules	Lower energy joules
No escalating energy for next shock	Escalate for next shock (100 - 200 - 300 - 360J)

Factors Associated with Failed Cardioversion of Atrial Fibrillation

- Structural heart disease
- (eg, congestive heart failure, valvular disease)
- Underlying illness (eg, thyrotoxicosis)
- Dilated left atrium
- Extent of atrial fibrosis
- Longer duration of atrial fibrillation
- Too low energy
- Technique

تشخیص افتراقی VT با SVT with Aberrancy

	V.Tach	SVT with Aberrancy
۱	اغلب سن بالای ۳۵ سال	اغلب سن کمتر از ۳۵ سال
۲	بیماری زمینه ای قلبی (MI.CHF)	بیماری زمینه ای دریچه ای
۳	مثبت شدن کمپلکس QRS در aVR 	نرمال بودن(منفی بودن کمپلکسQRS در) aVR 
٤	تغییرات درنمای بلوک شاخه ای چپ 	تغییرات درنمای بلوک شاخه ای چپ 
	اندازه QRS بیشتر از ۱۶۰ میلی ثانیه در V1	اندازه QRS بیشتر از ۱۲۰ میلی ثانیه در V1
	بلوک شاخه ای چپ همراه با انحراف محور به سمت راست	بلوک شاخه ای چپ همراه با انحراف محور به سمت چپ
	وجودQRS منفی و هم جهت از V6تاV1	وجودQRS های غیر هم جهت از V6تاV1
	وجود موج S دندانه دار در V1 	وجود موج S صاف در V1 
	تغییرات درنمای بلوک شاخه ای راست 	تغییرات در نمای بلوک شاخه ای راست 
	اندازه QRS بیشتر از ۱۴۰ میلی ثانیه در V1	اندازه QRS بیشتر از ۱۲۰ میلی ثانیه در V1
	بلوک شاخه ای راست همراه با انحراف محور به سمت چپ	بلوک شاخه ای راست همراه با انحراف محور به سمت راست
	وجودQRS مثبت و هم جهت از V6تاV1	وجودQRS های غیر هم جهت از V6تاV1
	وجود QRS بای فازیک در V1 	وجود QRS تری فازیک در V1 (rsr') 

V.Tach

۵	وجود QRSهای منفی و هم جهت درلیدهای I.II.III 	موج R سمت چپ بلند از R سمت راست در V1 	Capture Beat (وجود یک بیت مینوسی درکمپلکسهای وابد) 	Fusion Beat وجود یک موج کوچک در کمپلکسهای وابد (ناشی از برخورد بیت های فوق بطنی و بطنی) 

Complication

Complication

- Serious complications include ventricular fibrillation (VF)
- Thromboembolization is associated with cardioversion in 1-3% of patients, especially in patients with atrial fibrillation
- Myocardial necrosis can result from high-energy shocks.
- transient hypotension,
- pulmonary edema
- skin burn.

Complication

Electrocardiographic changes

- ST segment depression (35%)
- ST segment elevation (15–19%)
- T wave changes

Complication

Arrhythmia and conduction abnormalities

- Premature atrial contractions
- Premature ventricular contractions
- SVT (primarily sinus tachycardia) (30%)
- Bradycardia (25%)
- Left bundle branch block
- Sinus arrest
- High-degree atrioventricular heart block (15%)
- NSVT (5%)
- VT
- VF (usually the result of an asynchronous shock

Complication

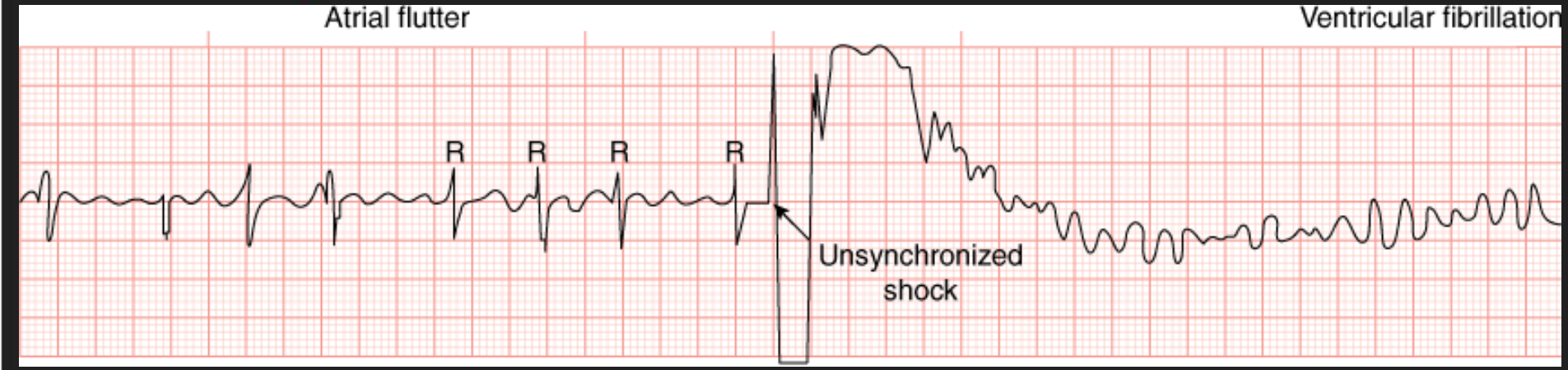
Embolization (pulmonary and systemic)

- 1–5% nonanticoagulated patients
- 0.5–0.8% anticoagulated patients
- Myocardial necrosis
- Myocardial dysfunction
- Atrial stunning
- Left ventricular dysfunction

Complication

- Transient hypotension
- Pulmonary edema rare
- Airway compromise
- Painful skin burns (20–25%)
- Physical trauma rare

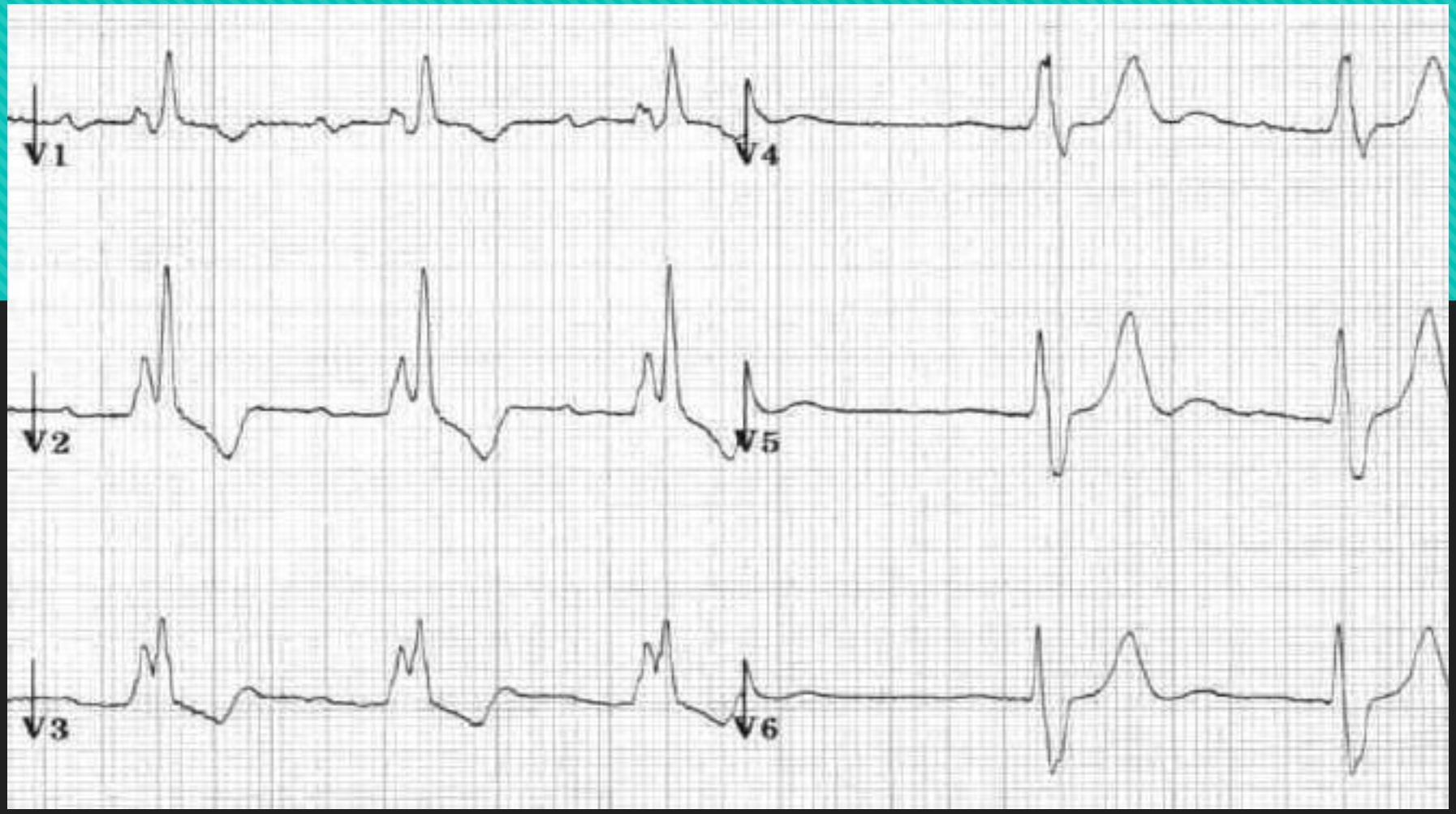
Complication



A complication of cardioversion: induction of ventricular fibrillation.
The ventricular arrhythmia occurred because the operator failed to enable the synchronizer, resulting in inadvertent delivery of the shock on the vulnerable T wave instead of the intended delivery on the R wave. This complication is preventable by enabling the synchronizer and checking that it is properly functioning before shock delivery

Contraindications

- For dysrhythmias due to enhanced automaticity such as in digitalis toxicity and catecholamine-induced arrhythmia, a homogeneous depolarization state already exists. Therefore, cardioversion is not only ineffective but is also associated with a higher incidence of post shock ventricular tachycardia/ventricular fibrillation (VT/VF)



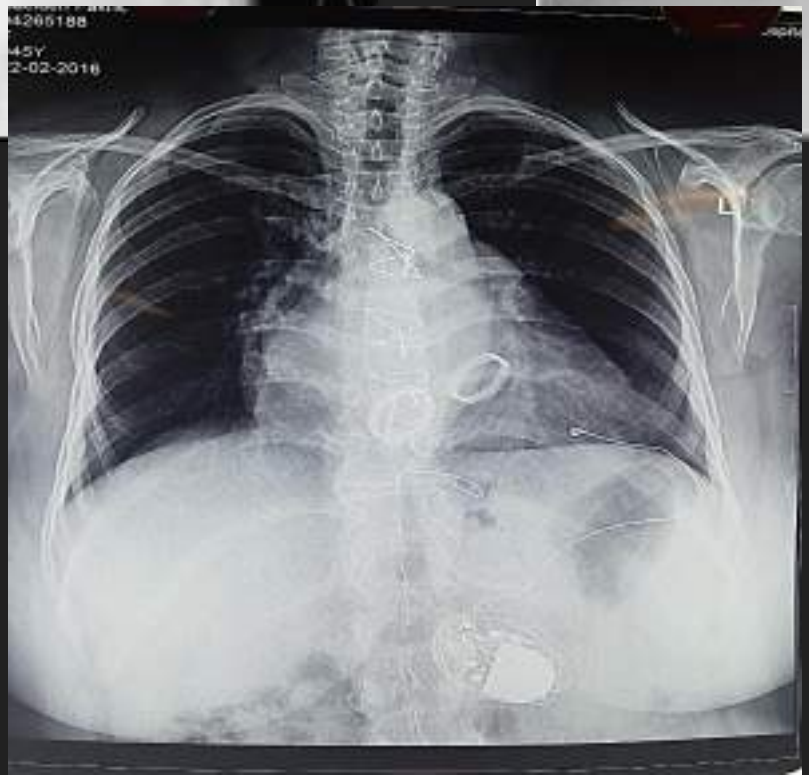
It is apparently not well recognized that the machines are not actually able to distinguish R waves from any other wave form and that the discharge follows the highest wave in the cycle, assuming this will always be an R wave. It can readily be seen that there are many circumstances

Special Populations

- Cardioversion in patients with digitalis toxicity
- Digoxin overdose or toxicity can present with any type of tachyarrhythmias or bradyarrhythmias. Cardioversion in the setting of digoxin toxicity is a relative contraindication. Digitalis sensitizes the heart to the electrical stimulus. Prior to cardioversion, electrolytes should be normalized. Cardioversion may cause additional arrhythmias, especially ventricular fibrillation.

Special Populations

- patients with permanent pacemakers/ICDs
- Cardioversion in patients with permanent pacemaker/ICD should be performed with extra care. Improper technique may damage the device, lead system, or myocardial tissue, resulting in device malfunction. The electrode paddle or patch should be at least 12 cm from the pulse generator and anteroposterior paddle position. The lowest amount of energy should be used during cardioversion, based on the patient's clinical condition. After cardioversion, the pacemaker/ICD should be interrogated to ensure normal function of the device.



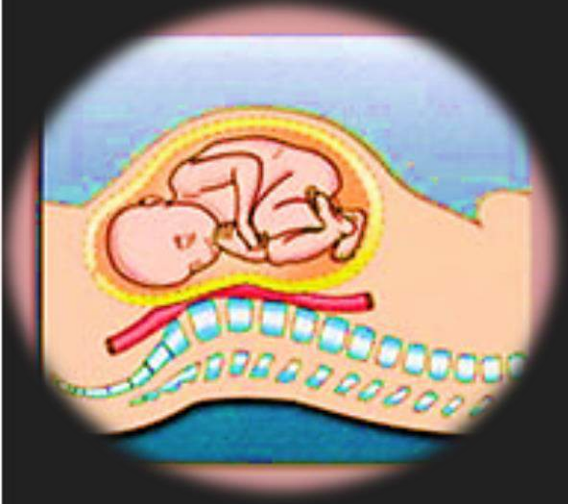
Mohsenabadi Mohsenipour

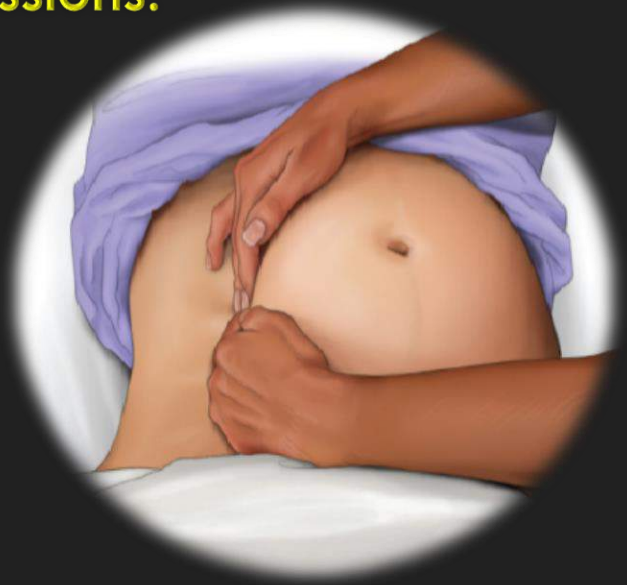
Special Populations

- During pregnancy
- Cardioversion can be performed safely in pregnant women. The fetal heart rate should be monitored during the procedure using fetal monitoring techniques.

Cardiac Arrest in Pregnancy: Provision of CPR

- Priorities for the pregnant woman in cardiac arrest are provision of high-quality CPR and relief of aortocaval compression. If the fundus height is at or above the level of the umbilicus, manual left uterine displacement can be beneficial in relieving aortocaval compression during chest compressions.





Pregnant woman resuscitation

- Gestational age < 20 weeks : no C.S.
- Gestational age 20 - 23 weeks : urgent C.S. fore mother sake
- Gestational age > = 24 - 25 weeks : urgent C.S. for mother and newborn sake

Emergency Cesarean Delivery in Cardiac Arrest

PMCDshould be summoned as soon as cardiac arrest is cognizedin a woman in the second half of pregnancy (Class I,).

Perimortem Cesarean Delivery (PMCD)

Mohsenabadi Mohsenipour

Emergency Cesarean Delivery in Cardiac Arrest

- During cardiac arrest, if the pregnant woman with a fundusheight at or above the umbilicus has not achieved ROSC with usual resuscitation measures plus manual LUD, it is advisable to prepare to evacuate the uterus while resuscitation continues (Class I).
- In situations such as non survivable maternal trauma or prolonged pulselessness in which maternal resuscitative efforts are obviously futile, there is no reason to delay performing PMCD (Class I).

Emergency Cesarean Delivery in Cardiac Arrest

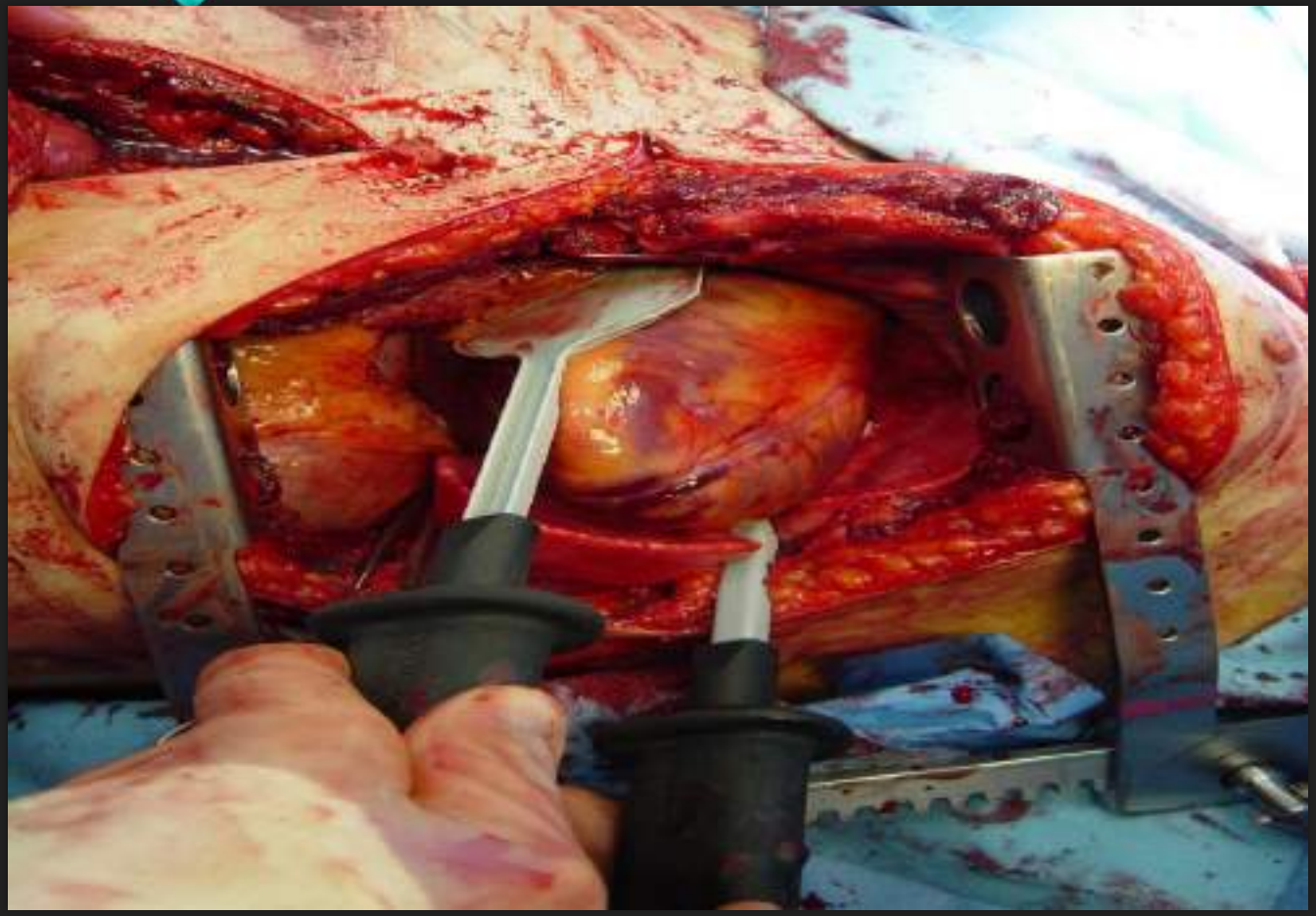
- PMCD should be considered at 4 minutes after onset of maternal cardiac arrest or resuscitative efforts (for the unwitnessed arrest)if there is no ROSC (Class).

Internal defibrillation

- One paddle is placed over right atrium or right ventricle Other paddle is placed over apex of the heart. •

- Energy for internal defibrillation
- 5— 20j for Biphasic defibrillator.
- 10 — 40 j Monophasic defibrillator.

Internal paddles for defibrillation are positioned on the anterior and posterior aspects of the heart.




© Paul Combs

Pacing

- Value of External Pacing

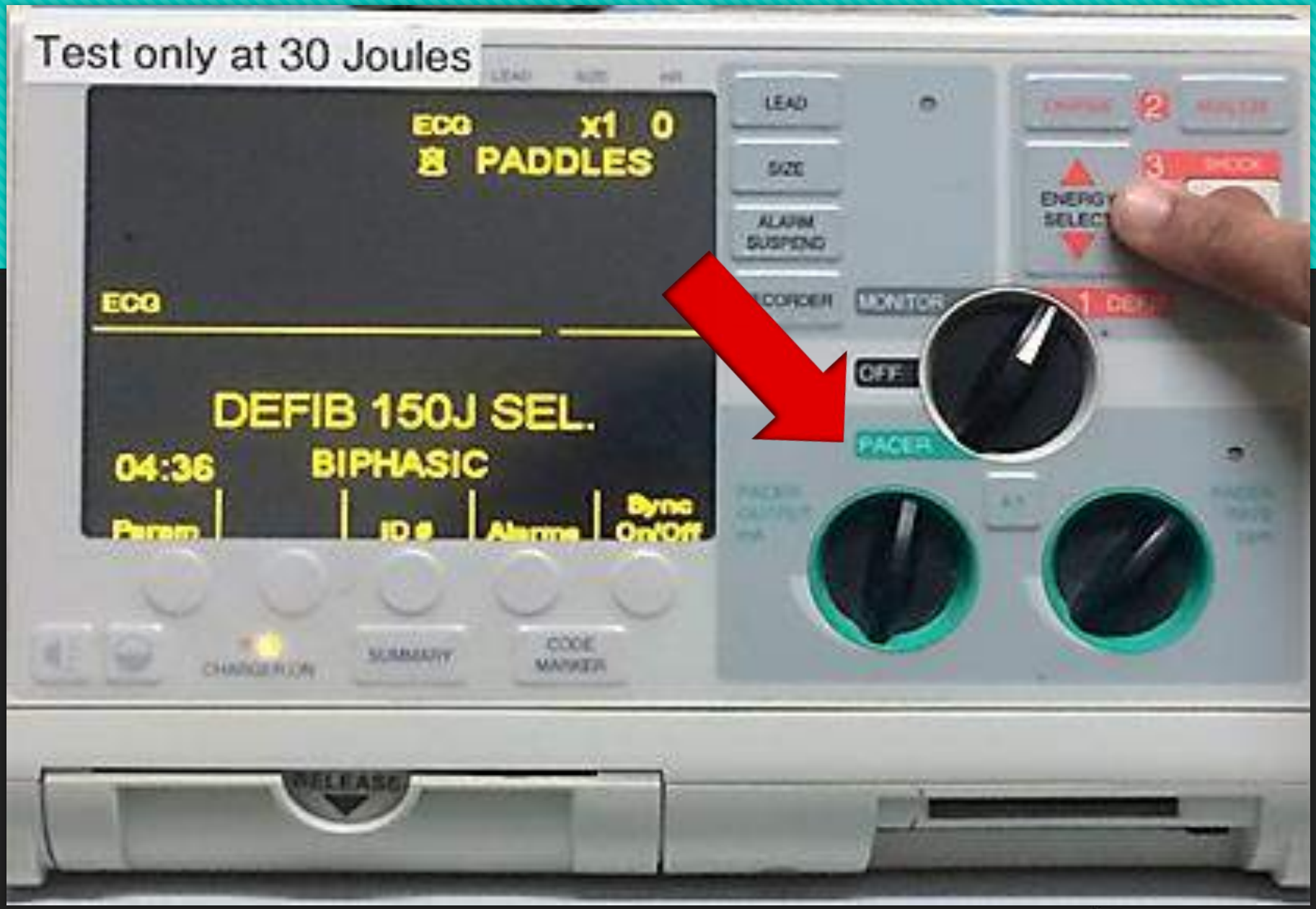
  - 60% of codes do not require defibrillation
  - Survival rates for non-VT/VF rhythms is less than 10%

Mohsenabadi
Mohsenipour

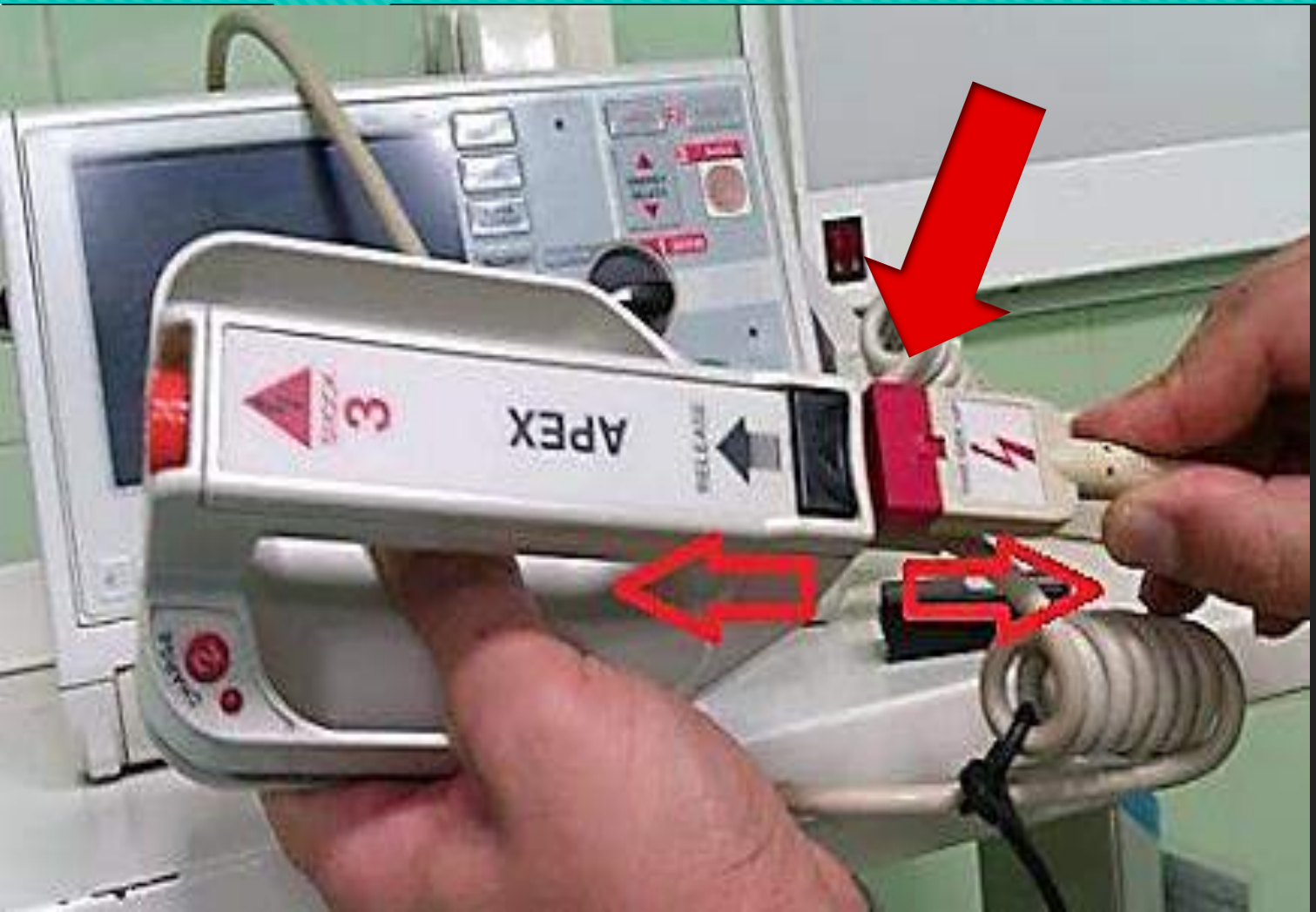

LIFEPAK 20e
DEFIBRILLATOR/MONITOR
1 ON
2 ENERGY SELECT
3 CHARGE
AED MODE
ANALYZE
LEAD
SIZE
SYNC
PACER
RATE
CURRENT
PAUSE
ALARMS
OPTIONS
PRINT
CODE SUMMARY
EVENT
Speed Dial
AC Mains
Service
ECG
SKINTACT
DF20NC
ONLY USE WITH PHYSIO CONTROL
PHYSIO-CONTROL LIFEPAK 9, 10, 12, 15, 20, 500, 1000


LIFEPAK 20e
DEFIBRILLATOR / MONITOR
Recommended
Adult VF Dose: 200-300-360J
1
ON
2
ENERGY SELECT
3
CHARGE
AED MODE
ANALYZE
SYNC
PACER
RATE
ALARMS
CURRENT
OPTIONS
PAUSE
PRINT
CODE SUMMARY
EVENT
Speed Dial
AC Mains
Service

Pacemaker Port



Pacemaker Port



Mohsenabadi Mohsenipour

Pacemaker Port

Mohsenabadi
Mohsenipour

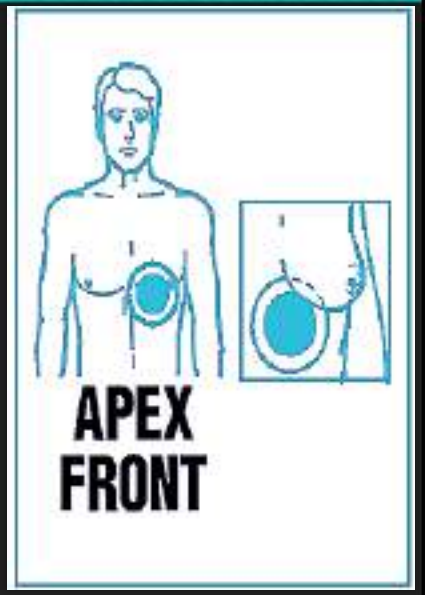
Mohsenabadi Mohsenipour

Pacing

- External Pacing
  - Apply electrodes and MFE pads
  - Select PACER
  - Turn PACER RATE knob clockwise to set rate 10-20 ppm higher than intrinsic rate or 100 ppm
  - Turn PACER OUTPUT knob clockwise to increase mA until capture
  - Press and hold 4:1 button to deliver pacing impulse for 1 out of 4 beat to determine underlying rhythm

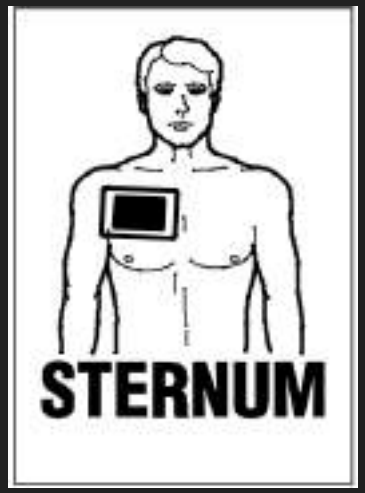
Electrodes

- Anterior-posterior placement is preferred for external, non-invasive pacing. It may provide improved capture and will not interfere with defibrillation if required.



Electrodes

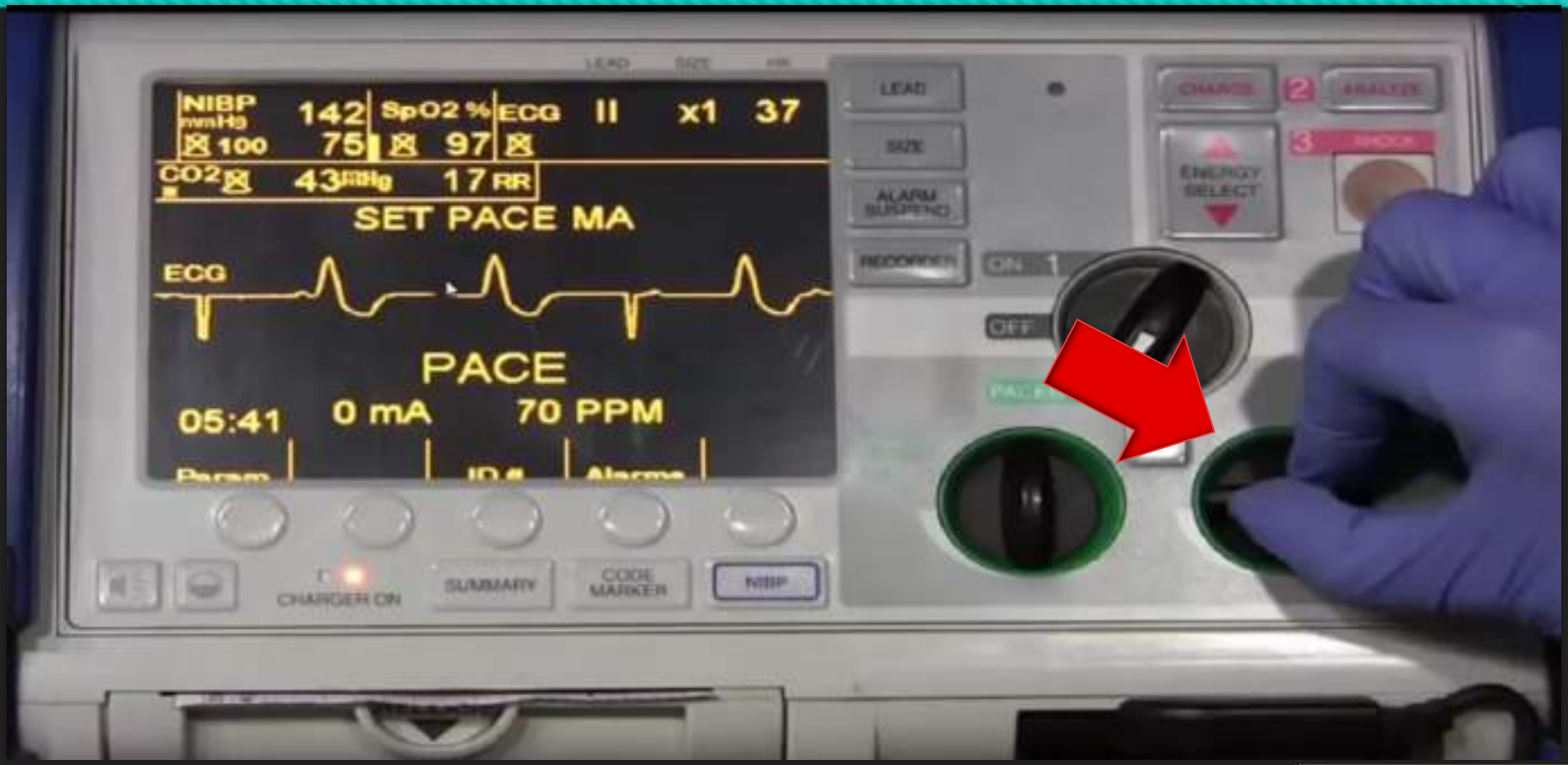
- Anterior-lateral placement requires little patient movement and allows for easy monitoring or defibrillation during transport.



Turn on the monitor and set it to "pacing mode"

Mohsenabadi Mohsenipour

Select the pacing rate using the rate button (generally 60-70 bpm is adequate)



Rate

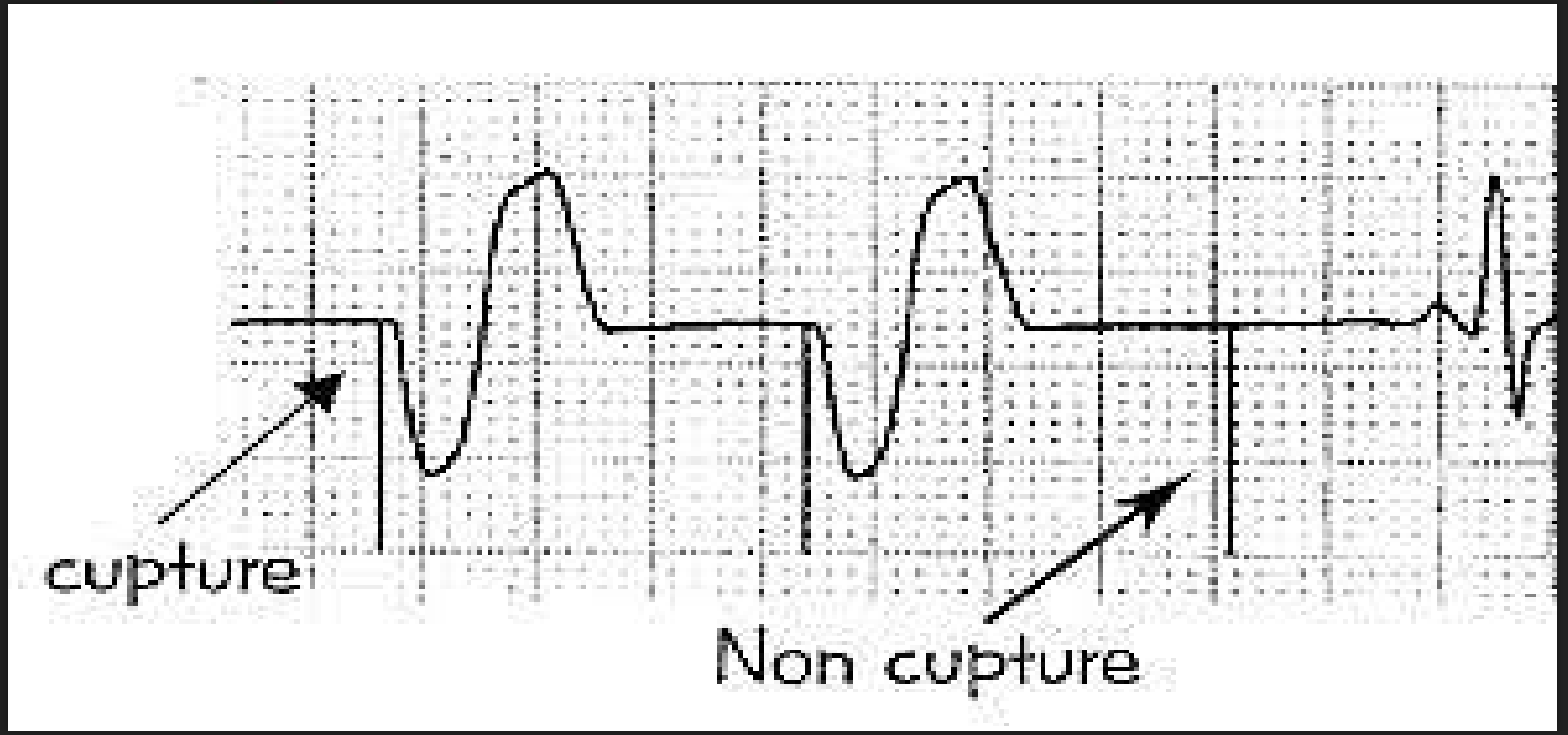
Mohsenabadi Mohsenipour

Increase current output from minimal until capture is achieved

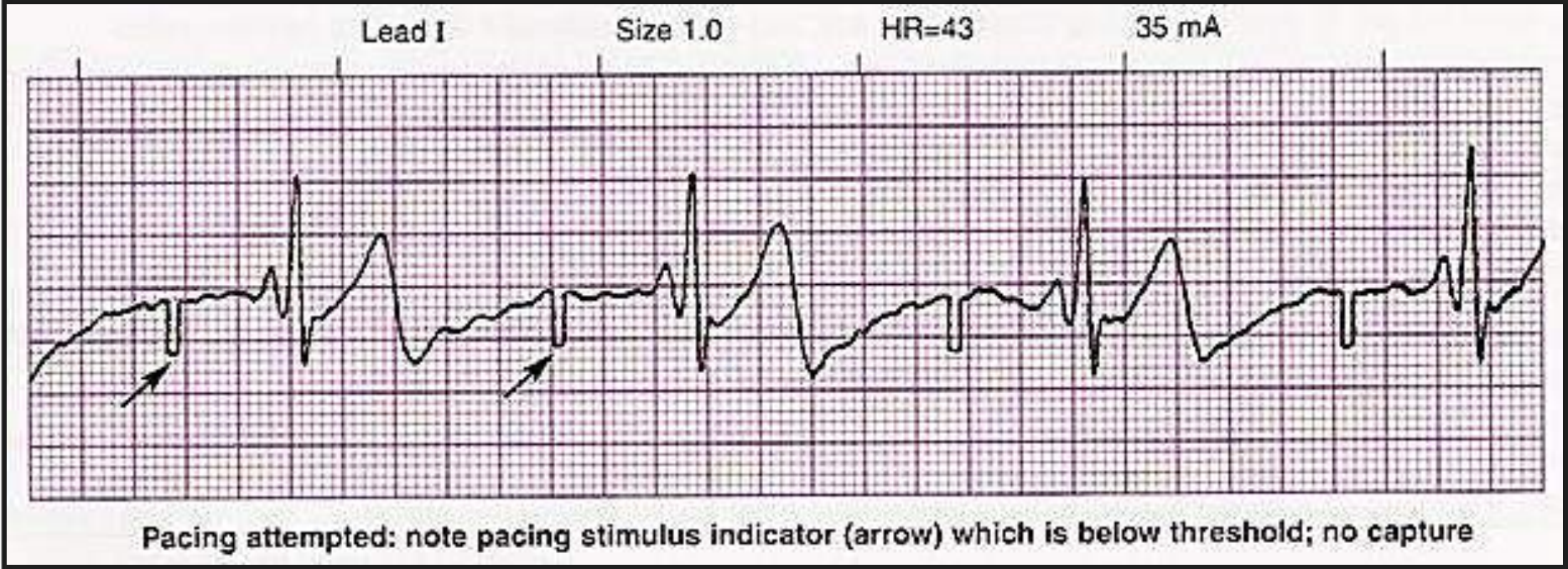
Out Put

Mohsenabadi Mohsenipour

Pacing

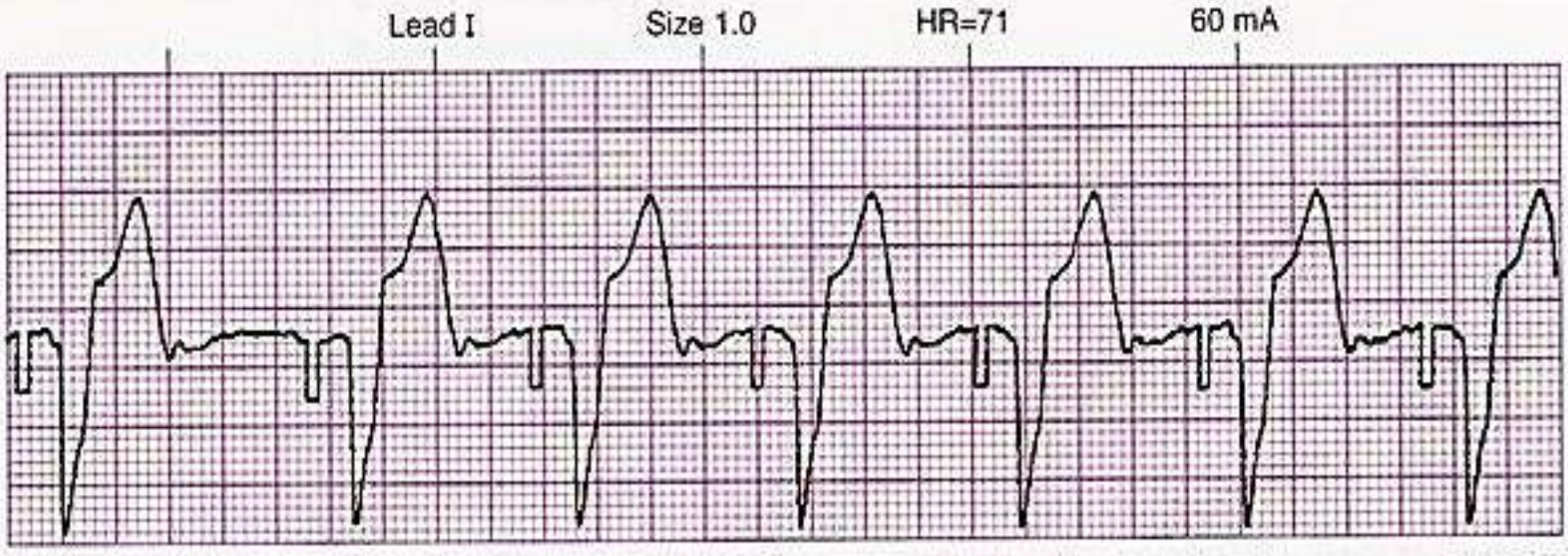


Below is an ECG with incomplete capture.



Pacing attempted: note pacing stimulus indicator (arrow) which is below threshold; no capture

As the mA output is increased, complete capture is achieved



Pacing above threshold (60 mA): with capture (QRS complex broad and ventricular; T wave opposite QRS)

Confirm mechanical capture with pulse or ultrasound

Complication

- Induction of Vfib (rare)
- Patient discomfort, burns

these are rare due to the large pads and lower outputs of today's TC pacing devices

- Failure to recognize an underlying treatable ventricular fibrillation due to obscuration of the ECG by pacer spikes

This can be troubleshooted by hitting the "cancellation button" on your monitor. This will pause the TCP spikes for a few seconds so you can identify the underlying rhythm.

Cancellation button

Check Underline Rhythm With Cancellation Button

Mohsenabadi Mohsenipour

Cancellation button

Mohsenabadi Mohsenipour

مراحل تنظیم TPM

۱	عدد Rate دستگاه TPM را بیست عدد بیشتر از ریت بیمار در مانیتور تنظیم می کنیم (در ریت های زیر ٤٠ حداقل ریت تنظیمی ۶۰ تنظیم می شود)
۲	Sense دستگاه TPMرا روی حداکثر قرار می دهیم
۳	میزان Output دستگاه را افزایش داده تاعددی که Capture و Spike روی مانیتورینگ دیده شود . روی هر عددی که رویت شد (میزان Output را دوبرابر آن عدد تنظیم نهایی می کنیم)
٤	عدد Rate دستگاه TPM را بیست عدد کمتر از ریت بیمار در مانیتور تنظیم می کنیم
۵	میزان Sense را روی حداقل قرار داده وافزایش می دهیم تا Capture و Spike روی مانیتورینگ دیده شود . روی هر عددی که رویت شد (میزان Sense را نصف آن عدد تنظیم و نهایی می کنیم)
۶	میزان Rate را تا جایی که همودینامیک بیمار پایدار باشد بالا می بریم (SBp >110) (حداقل ریت تنظیمی پیس میکر۶۰می باشد)

نکته: عملکرد صحیح پیس میکر زمانی است که به ازای هر اسپایک Capture ایجاد شده و همزمان با آن نبض احساس شود

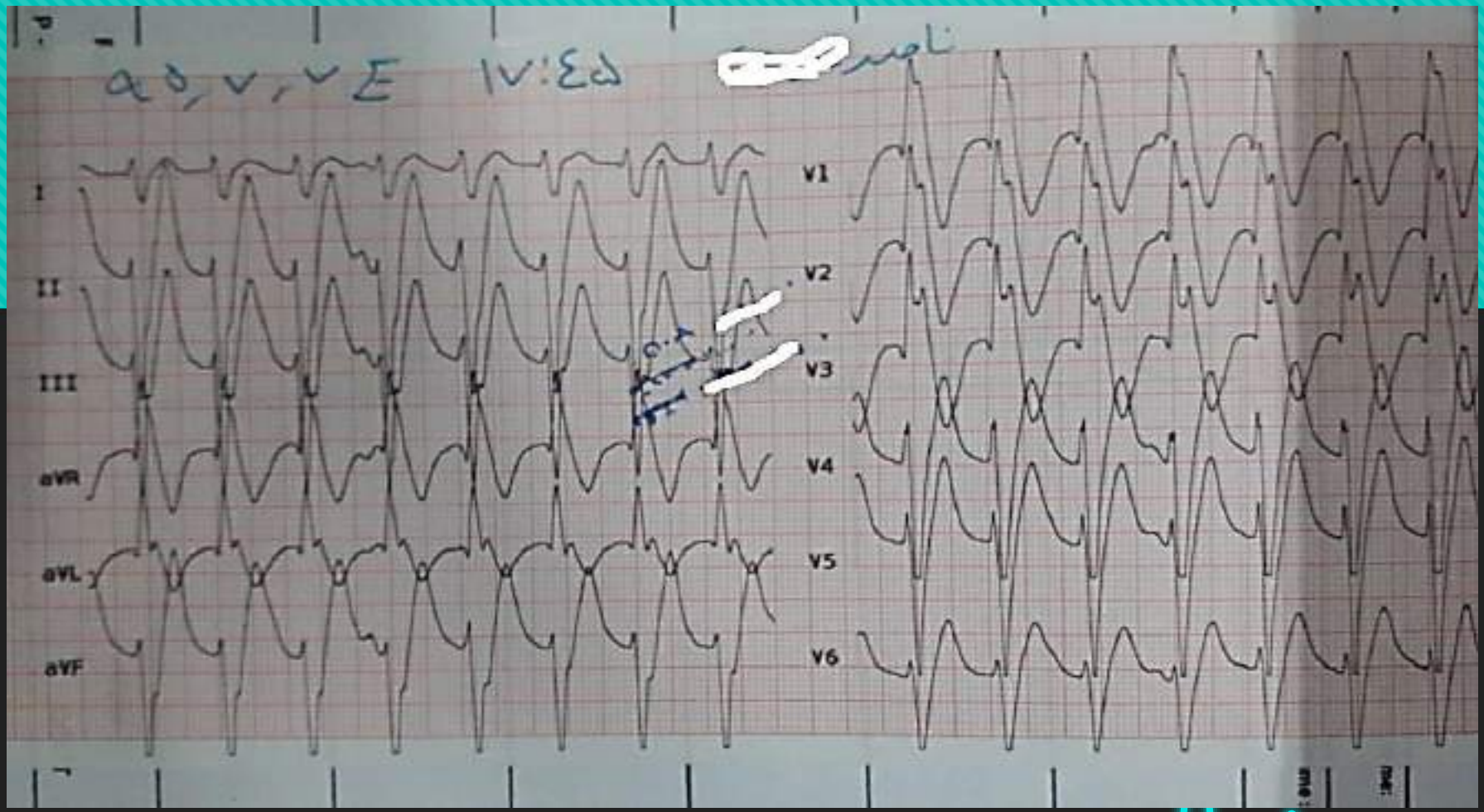
Mohsenabadi Mohsenipour

Case

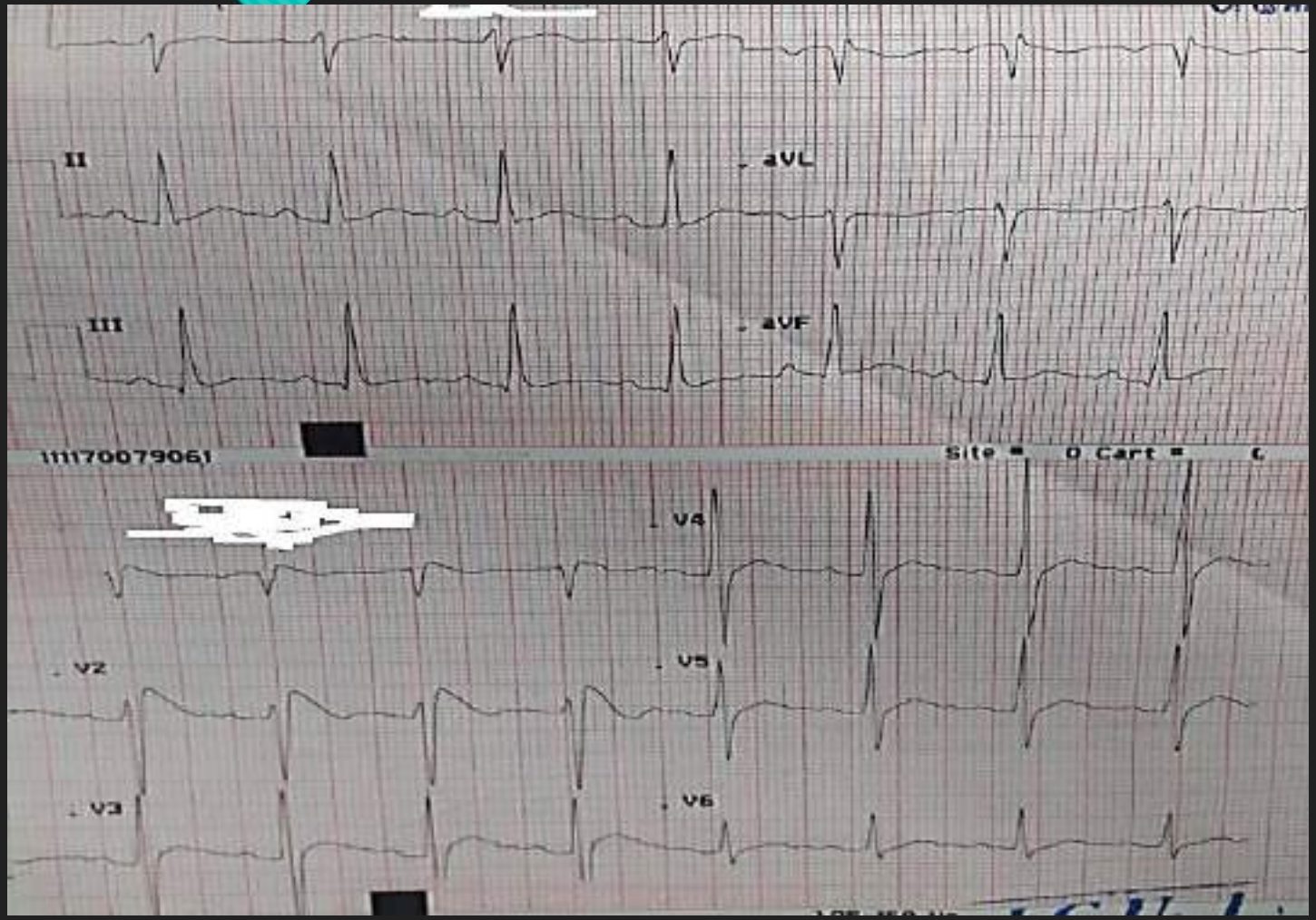
A40 year- old man

CC: weakness & chest discomfort

PMH:MI & SK therapy



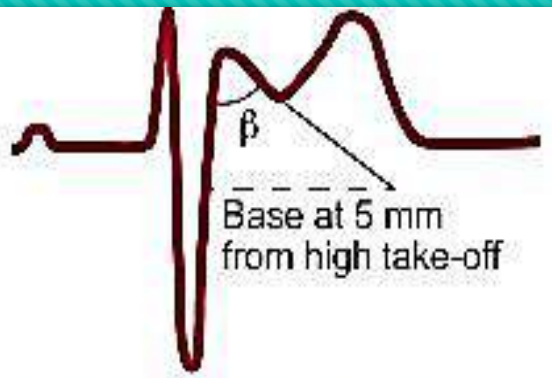
Post treatment ECG



Mohsenabadi Mohsenipour

Brugada Syndrome

This is an ECG abnormality with a high incidence of sudden death in patients with structurally normal hearts. Brugada syndrome is due to a mutation in the cardiac sodium channel gene. This is often referred to as a sodium channelopathy. Familial clustering and autosomal dominant inheritance has been demonstrated. ECG changes can be transient with Brugada syndrome and can also be unmasked or augmented by multiple factors, such as fever, ischemia, drugs, hypokalemia, etc.



Characteristics of pattern 1 in V_1-V_2

- At the end of the QRS, an ascending ST-segment with a high take-off of at least 2 mm followed by a concave or rectilinear downsloping ST-segment. There are a few cases where high take-off is between 1 mm and 2 mm
- There is no clear r' wave
- The high take-off does not correspond to the J point
- At 40 ms of take-off, the decrease in amplitude of ST-segment is 4 mm (it is much higher in in RBBB and athletes)
- ST-segment at high take-off > ST-segment at 40 ms > ST-segment at 80 ms
- ST-segment is followed by negative and symmetric T wave
- The duration of QRS in V_1 is longer than in RBBB and longer than in V_6 (mismatch)

Characteristics of pattern 2 in V_1-V_2

- High take-off (that often does not coincide with the J point) is 2 mm
- The descending arm of r' coincides with beginning of ST-segment (commonly not well seen)
- ST-segment upslope is at least 0.5 mm
- ST-segment is followed by positive T wave in V_2
- The characteristics of the triangle formed by r' enables the different criteria to be defined that are useful for diagnosis: *a)* the duration of the base of the triangle formed by r' at 5 mm from the high take-off is greater than 3.5 mm, and *b)* the duration of the QRS in Brugada type 2 syndrome is longer than in other cases with r' in V_1, and there is a mismatch between V_1 and V_6

Precipitating Factors for BS ECG Pattern and Arrhythmias

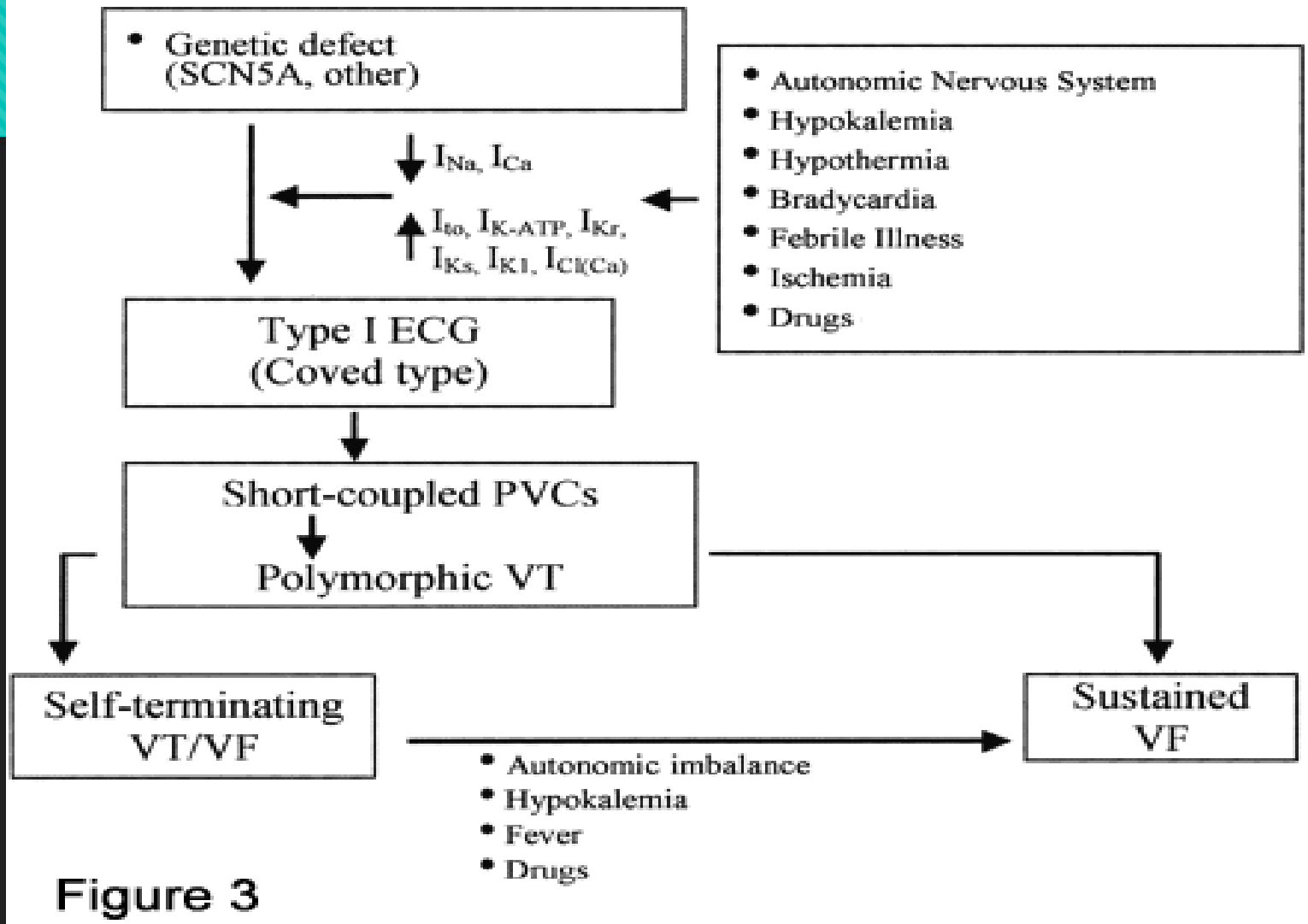


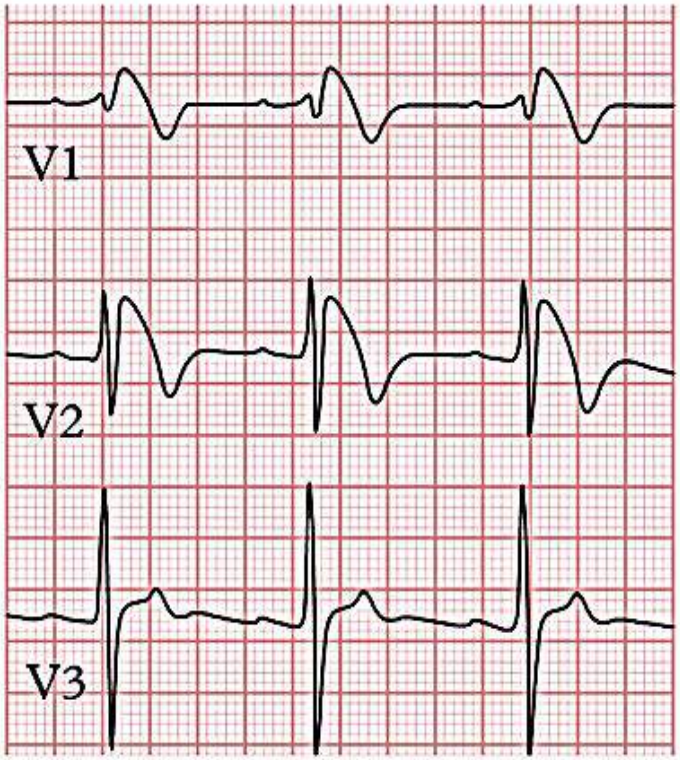
Figure 3

Brugada Syndrome

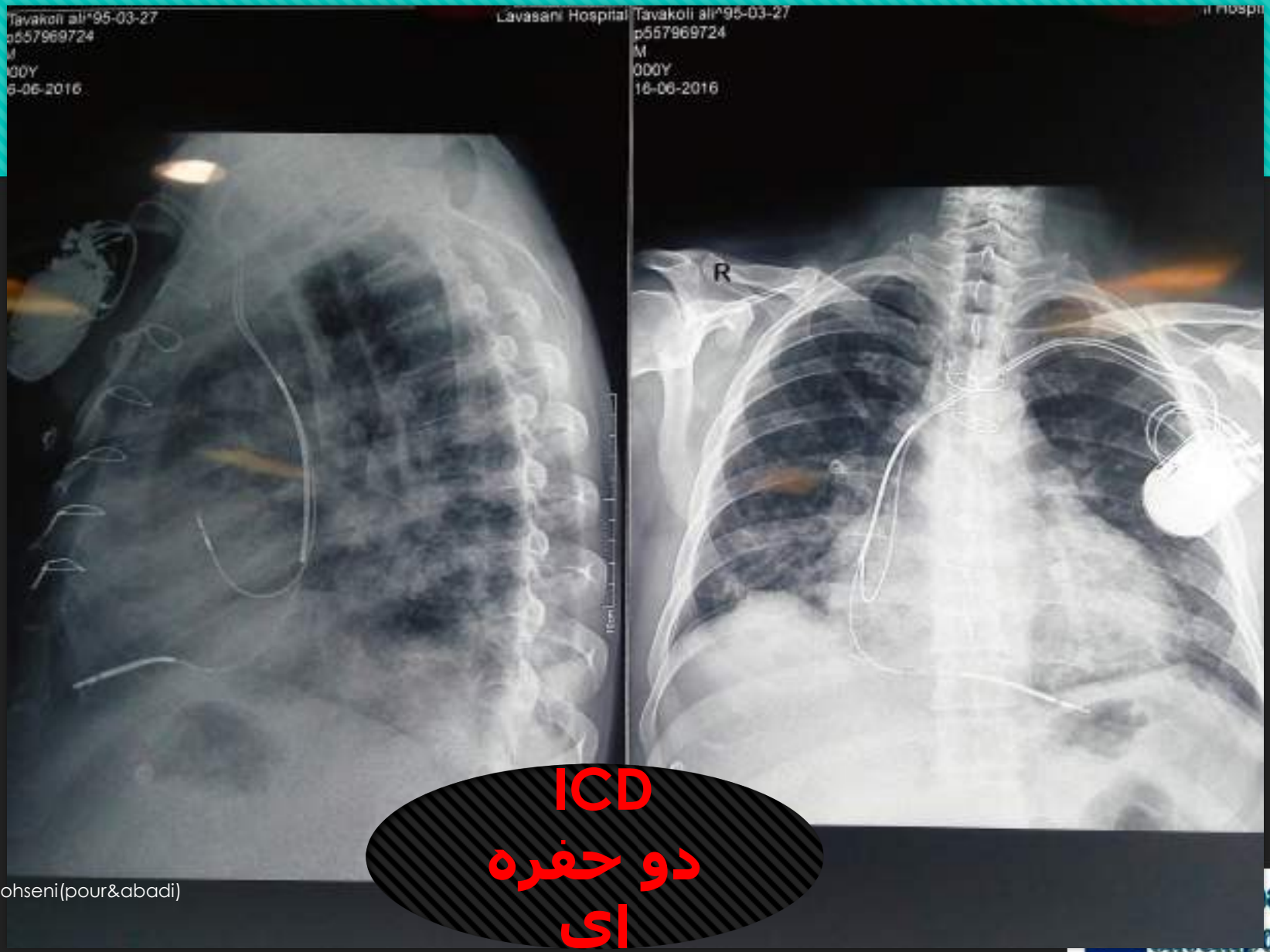
1. **Synonyms:**
   - Pokkuri Death Syndrome
   - SUNDS: Sudden Unexpected Nocturnal Death Syndrome
2. **Na channelopathy:**
   - Familial clustering, autosomal dominant inheritance
3. **Manifestations:**
   - Syncope, VT, VF, sudden death at sleep
4. **Treatment:**
   - ICD (implantable cardioverter-defibrillator), quinidine

5. **Diagnostic ECG**

(coved type STE & TWI in V1~3)

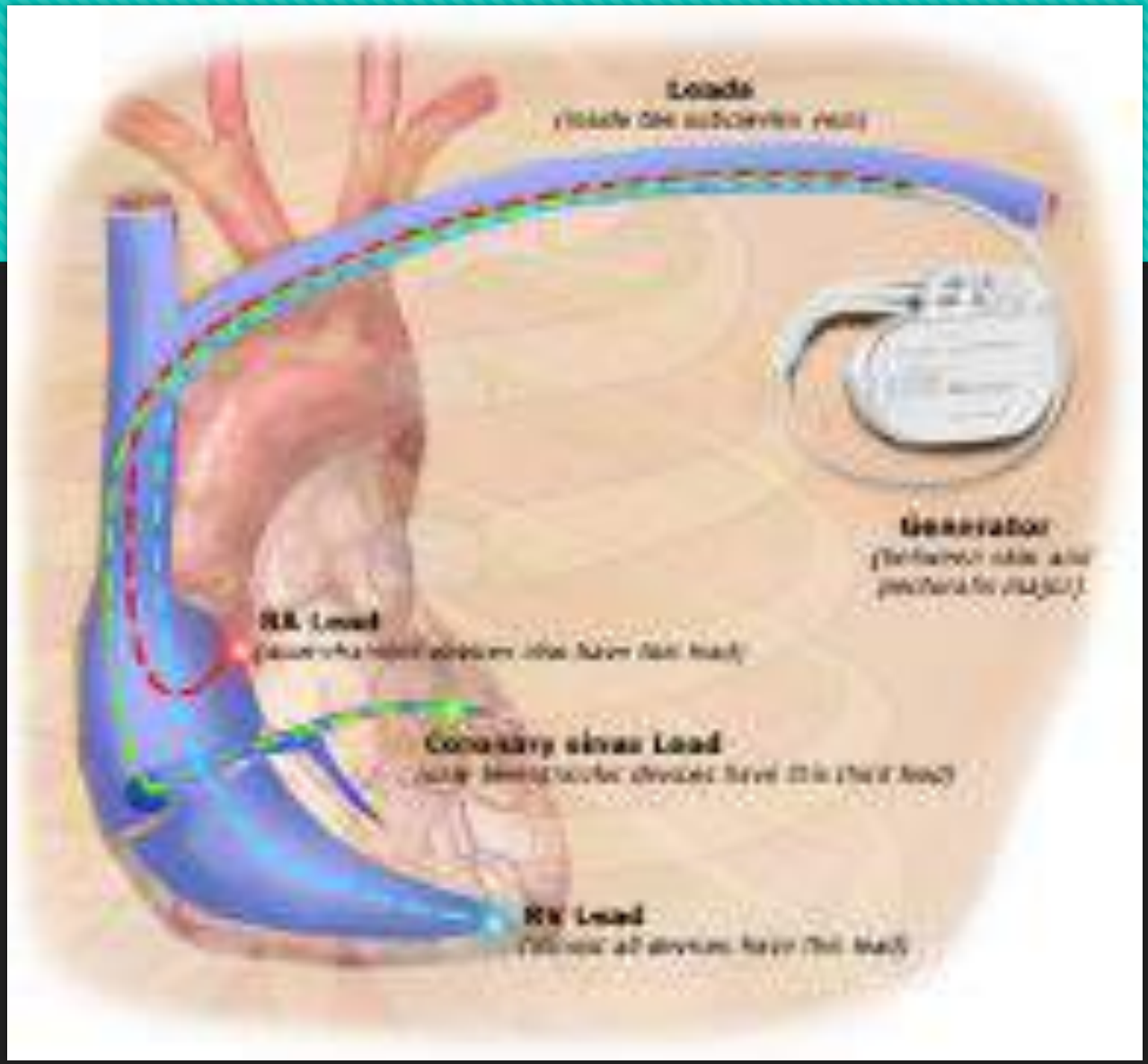


Definitive treatment = ICD.

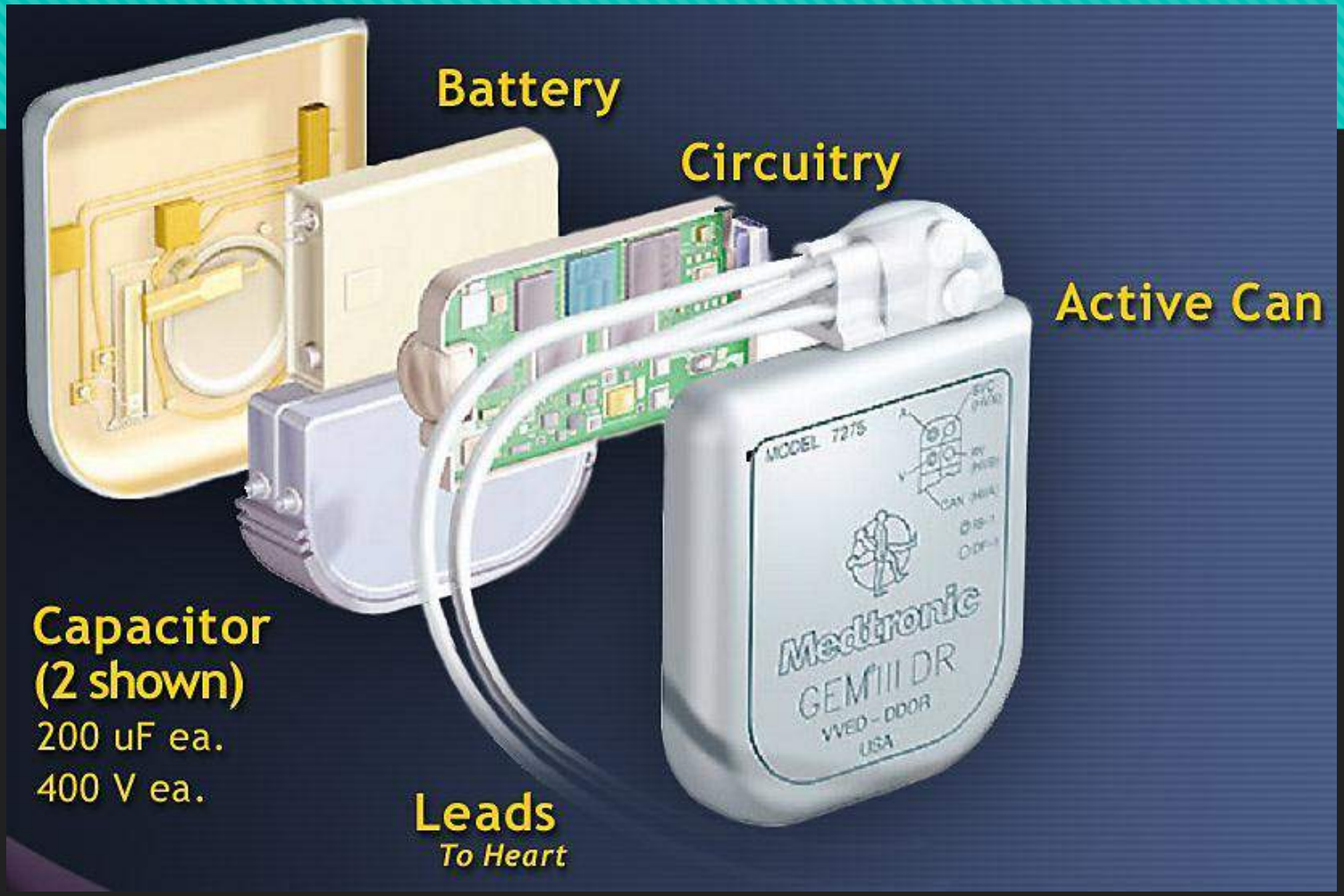


ICD
دو حفره
ای

A/M.Mohseni(pour&abadi)



ICD



Mohsenabadi Mohsenipour

Thanks For Attention

Mohsenabadi Mohsenipour