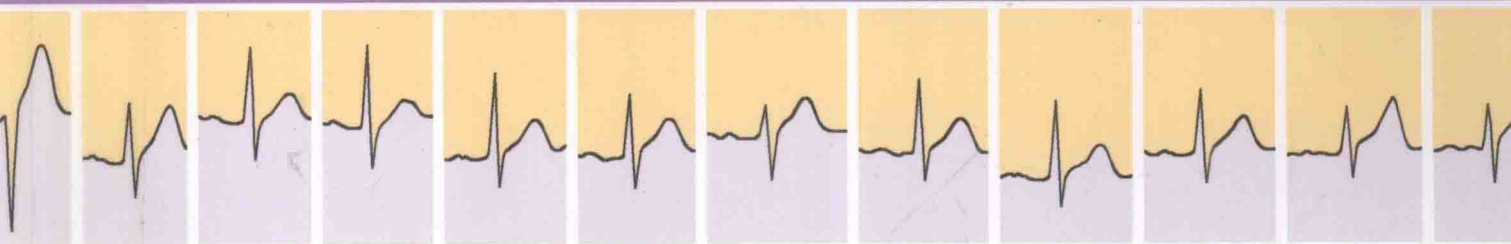


刘霞 编著

CHINESE-ENGLISH
ELECTROCARDIOGRAMS FOR EDUCATION



汉英对照 心电图教学图谱

第2版

经典心电图教学图谱

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汉英对照

心电图教学图谱

(第二版)

Chinese-English

Electrocardiograms for Education

2nd Edition

刘霞 编著

Liu Xia



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内 容 提 要

本书为《汉英对照心电图教学图谱》的修订版。在上一版的基础上,本版依据国内临床诊断学的要求,采用汉英对照的形式,不仅详细描述了正常和异常心电图的最新诊断标准和形成机制,而且收录了典型心电图和一些疑难心电图的案例,并对其特征加以简明扼要的讲解,重点突出,图谱中需注意的异常部分通过标示着重指出,可使读者一目了然,易于掌握。本书可满足医学院校各学制的教学需求,也可为临床医生,尤其是内科医生所参考。



前 言



心电图问世至今已经有 110 多年的历史,是一门古老的学科。心电图曾经是心脏疾病诊断中仅有的两项检查方法之一,而今仍是临床上最为常见的检查方法,其检测范畴除心脏病学外,还涉及其他医学学科。每一位医学生在学习临床诊断学时都必须掌握心电图的基础知识。另外,心电图作为一项基本技能,也是各项考试中的重要组成部分。本书的特点之一是按照临床诊断学中心电图章节的内容和要求,系统地选用典型的心电图图例,并附上形象的图解,详细说明心电图上的特点和形成原理,旨在帮助医学生在学习理论知识的同时,提高对心电图图形的认识能力。本书的特点之二是中英文对照,便于医学生在学习心电图的同时,熟悉心电图的专业英文词汇,有利于今后医学英文文献的学习。本书的特点之三是在临床诊断学的基础上,拓展了国际公认的心电图新概念,有利于心电图新知识的普及。

本书图谱主要来自笔者的长期积累,部分由本科室同事提供,在此表示衷心感谢。本书的制图力求经典和精致,笔者为此付出了很多时间,在此对丈夫和儿子的理解和支持表示衷心感谢。

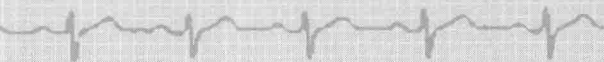
对心电图的认识是无止境的,期盼各位读者对书中的心电图提出更多的宝贵意见,我的邮箱地址是 liuxia9110@163.com。

让我们一起认识变化无穷的心电图!

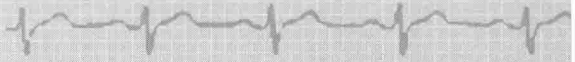
上海交通大学医学院附属瑞金医院心脏科

刘 霞

2015 年 5 月



Preface



Since the invention of electrocardiogram (ECG), the study of it has marked a lengthy history of 110 years. ECG used to be one of the only two methods of diagnosing heart diseases, and it remains the most widely used even today, with its scope of examination ranging from cardiology to other medical fields. Every medical student, when studying the course of “Clinical Diagnostics,” encounters some rudimentary knowledge of ECG. Meanwhile, ECG is also an important component of all kinds of standardized testing as a basic skill to be mastered by medical students. The ECG content in this book is highly correlated with the content of “Clinical Diagnostics.” Selecting typical ECG examples and providing vivid diagram to illustrate the ECG characteristics and elucidate the formation mechanisms in a systematic way, this book is designed to help students develop ECG interpretation skills while gaining a theoretical background. It is written in both languages to familiarize students with the medical terms often used in the profession, benefiting future examination of references and literatures in English. Building upon the material of “Clinical Diagnostics,” this book introduces new concepts recognized internationally in an effort to spread the most updated knowledge on ECG.

The ECG examples provided in this book mainly come from my own accumulation over the years. Some are provided by my colleagues, for whom I am very much thankful. Much time has been devoted

to perfecting the illustration used in this book, and I would like to thank my husband and son for their continuing understanding and support.

The path toward understanding ECG is an infinite one. Thus, I look forward to comments and suggestions regarding the ECG used in this book. My email address is liuxia9110@163.com.

Let's begin our journey of understanding the ever-changing ECG!

Cardiology Department of Ruijin Hospital
Shanghai Jiaotong University Medical School

Liu Xia

May, 2015

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第一章

心电图基本知识

Chapter 1

ABC of Clinical Electrocardiography

心电图是从体表上记录心动周期中心脏的电活动。心电图仪采集和放大心肌组织除极和复极的微小电活动,并转化成波和段的图形。正常时,心脏的电活动起源于窦房结,由窦房结发出的冲动,首先激动右房,然后激动左房。窦房结的冲动在激动心房的同时,经房室结、希氏束和心室内传导系统(希-浦氏系统),最后激动左右心室。这一心脏节律称为正常窦性心律。

一、电极和导联

常规心电图需要10个电极,4个安放在肢体,6个安放在胸前。肢体电极组合构成6个肢体导联(I、II、III、aVR、aVL和aVF导联),从垂直面观察心脏。6个胸前电极构成6个胸前导联(V1至V6导联),从水平面观察心脏。由此组成了常规12导联。

1. 双极肢体导联

- I : RA(-)和LA(+);
- II : RA(-)和LL(+);
- III : LA(-)和LL(+).

2. 加压单极肢体导联

- aVR: RA(+)和[LA+LL](-);
- aVL: LA(+)和[RA+LL](-);
- aVF: LL(+)和[RA+LA](-).

3. 胸前单极导联

Electrocardiography (ECG) is recording of the electrical activity of the heart on skin during each heart beat. ECG device detects and amplifies tiny electrical changes generated by depolarization and repolarization of the cardiac muscle, and translates them into a curve. In a normal heart, the cardiac impulse originates from the sinus node and spreads throughout the atria to activate the atria. After completion of the atrial activation, the impulse reaches and passes through the atrioventricular (A-V) node, and then travels through the His bundle, the right and left bundle branches, the left anterior and left posterior fascicles and the Purkinje fibers (His-Purkinje system) to activate the ventricles. This cardiac rhythm is termed normal sinus rhythm.

Electrodes and leads

For a routine ECG, 10 electrodes are attached, four to the limb and six to the chest wall. The information from the limb electrodes is combined to produce the six limb leads (I, II, III, aVR, aVL, and aVF), which investigate the heart in the vertical plane. The six precordial leads (V1 to V6) investigate the heart in the horizontal plane. The information from these 12 leads is combined to form a standard ECG.

1. Bipolar limb leads (frontal plane)

- I : RA(-) to LA(+);
- II : RA(-) to LL(+);
- III : LA(-) to LL(+).

2. Augmented unipolar limb leads (frontal plane)

- aVR: RA(+) to [LA and LL](-);
- aVL: LA(+) to [RA and LL](-);
- aVF: LL(+) to [RA and LA](-).

3. Unipolar (+) precordial leads (horizontal plane)

- V1: right sternal edge, 4th intercostal space;
- V2: left sternal edge, 4th intercostal space;
- V3: between V2 and V4;

- V1: 胸骨右缘第四肋间;
- V2: 胸骨左缘第四肋间;
- V3: V2和V4导联之间;
- V4: 锁骨中线第五肋间;
- V5: 腋前线 V4导联水平;
- V6: 腋中线 V4导联水平。

(RA=右上肢; LA=左上肢; LL=左下肢)

二、心电图的组成和正常值

心电图是曲线形成的线图,由波和段组成。正负转折的称为波,两波之间的直线称为段。心电图上的组成成分被命名为P、Q、R、S、T和U,见图1。

1. P波代表右心房和左心房的顺序除极。正常值:

- I 和 II 导联直立;
- aVR 导联倒置;
- 时间 < 120 ms;
- 振幅 < 0.25 mV。

2. QRS波代表左右心室除极,通常左右心室同步被激动。正常值:

- II 导联和左胸导联主波向上;
- aVR 和 V1 导联主波向下;
- 胸前导联由主波向下转为主波向上(见图2);
- QRS波时间: 60~100 ms, 代表心室除

- V4: mid-clavicular line, 5th space;
 - V5: anterior axillary line, horizontally in line with V4;
 - V6: mid-axillary line, horizontally in line with V4.
- (RA=right arm, LA=left arm, LL=left foot)

The components of the ECG and the normal values

A normal ECG is a curve with waves or complexes and segments. A wave is a single deflection turned either positive or negative, and a complex comprises of consecutive deflections. A segment is a distance between two waves or complexes. The letters that mark the various components of the ECG are P, Q, R, S, T and U (see Fig. 1).

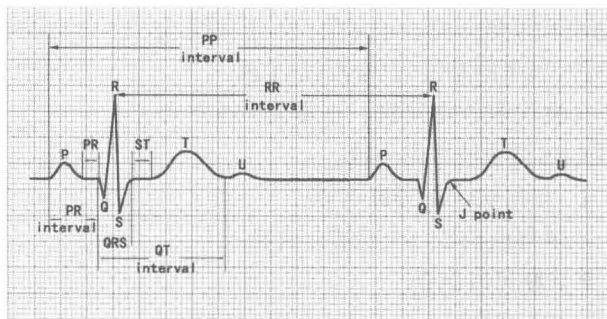


图1 心电图波和段的组成

Fig. 1 Components of the ECG

1. P wave: represents the sequential depolarization of the right and left atria. Normal values:

- upright in leads I and II;
- inverted in lead aVR;
- < 120 ms in duration;



图2 胸前导联QRS波形态

Fig. 2 Patterns of QRS complex in precordial leads

极时间。

3. ST段位于J点和T波开始,代表心室除极结束和复极开始。正常值:位于基线或轻微移位,参考的基线为PR段或TP段。

4. T波代表心室复极。正常值:通常和同导联QRS波主波方向一致。

- I、II和V3~V6导联直立;
- aVR导联倒置,V1通常也倒置;
- III导联可以倒置。

5. U波形成机制不清,许多心电图上不可见。

6. PR间期从P波开始至QRS波开始,代表心房开始除极至心室开始除极。在这间期中电活动在房室结、希氏束、束支、分支和浦氏纤维中传导。正常值:120~200 ms。

7. QT间期从QRS波开始至T波终末,代表心室除极和复极时间。推荐值:350~450 ms。

QT间期随心率变化而变化,心率缓慢,

- < 0.25 mV in amplitude.

2. QRS complex: represents the right and left ventricular depolarization, normally the ventricles are activated simultaneously. Normal values:

- upright in lead II and in left precordial leads (V5 and V6);
- inverted in leads aVR and V1;
- QRS complex changes from mainly negative to mainly positive in precordial leads (see Fig. 2);
- QRS duration: width of QRS complex, 60 ~ 100 ms in

duration, represents the duration of ventricular depolarization.

3. ST segment: between the J point and the beginning of the T wave, represents the period between the end of ventricular depolarization and the beginning of repolarization.

Normal values: lies in the baseline (isoelectric) or slightly above or below it, either the PR or TP segment is used as the reference baseline.

4. T wave: represents the ventricular repolarization.

Normal values: usually follows the QRS complex in orientation in the same lead.

- upright in leads I and II and in V3 ~ V6;
- always inverted in leads aVR and often in lead V1;
- can be inverted in lead III.

5. U wave: origin for this wave is not clear. Many ECGs have no discernible U wave.

6. PR interval: from beginning of P wave to beginning of QRS complex, represents onset of the atrial depolarization to onset of the ventricular depolarization. During this time the electrical impulse is conducted through the A-V node, the bundle of His, the bundle branches, the fascicles and the Purkinje fibers.

Normal values: 120 ~ 200 ms in duration

7. QT interval: from beginning of QRS complex to end of T wave, represents the duration of ventricular depolarization and repolarization. General guide: 350 ~ 450 ms.