

# CV Symptomatology

洪瑞松 教授

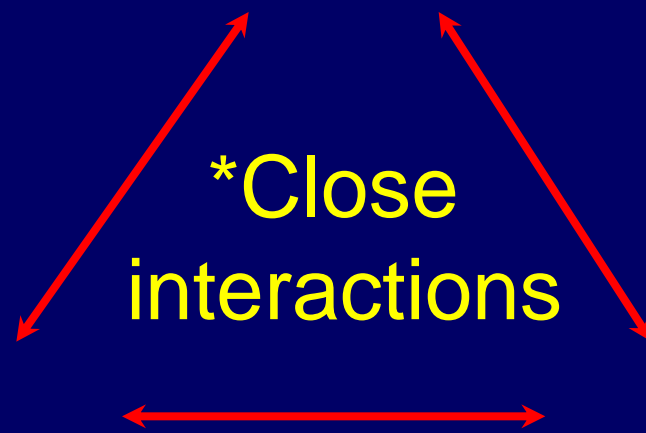
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# Cardiovascular System

## Structure and Function (構造及功能)

Mechanical  
(機械)



Electrical  
(電氣)

Perfusion  
(灌流)

### Neuro-humoral regulations

Autonomic nervous system

Endocrine-humoral – catecholamines,  
RAS, natriuretic peptides, endothelin etc.

## 問題之剖析、診斷 方法 (Means)

1. 病史 (history)

2. 理學檢查

(physical Exam)

3. 實驗室檢查

(laboratory tests)

Proper (適當性)

Timely (適時性)

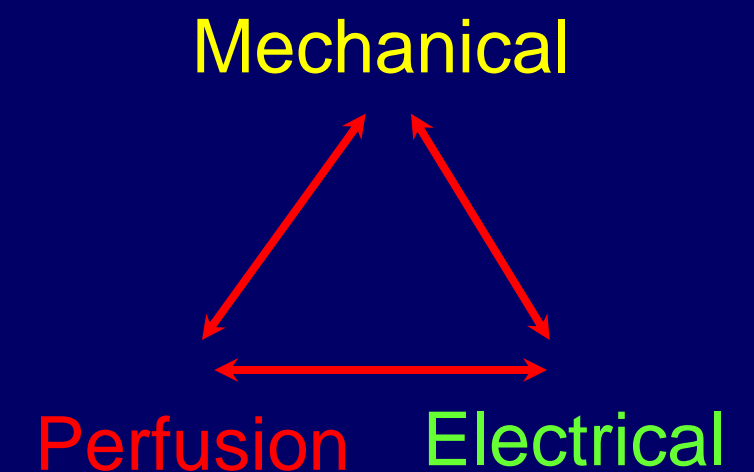
\*緊密的互動



# 心臟血管病之症狀表現

- 心臟病患不一定有症狀
- 若有症狀，基於病態生理學或依其特性，諸多症狀可歸納以下6大類：

- 1) 肺充血 (pulmonary venous congestion) 之症狀
- 2) 全身性充血 (systemic venous congestion) 之症狀
- 3) 低心輸出量 (low cardiac output) 之症狀
- 4) 不適感/痛 (distress, discomfort/pain)
- 5) 心悸 (palpitation)
- 6) 其他 (miscellaneous)



[註] 1) – 3) 屬於心衰竭之表現

症狀為主觀之感覺而沒有特異性 (或專一性)，  
所以需作詳細而有系統的分析

# 1) 肺靜脈充血 (Pulmonary Venous Congestion)

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**機轉:** 肺充血在病理學上屬於心因性肺水腫，其因肺靜脈/毛細管靜水壓力 (hydrostatic pressure) 上昇，而導致水/鈉離子由毛細管內滲出於肺間質組織而引起 (**Cardiogenic pulmonary edema**)

**症狀:**

**常見的為呼吸困難 (dyspnea) :**

症狀有輕到重分別是: exertional dyspnea, dyspnea at rest, orthopnea, paroxysmal nocturnal dyspnea, trepopnea  
最嚴重者為 acute pulmonary edema

(呼吸短促外尚有 cyanosis 及 pink frothy sputum)

**【註】** 呼吸困難之表現不一定依輕重之次序出現

**少見的有** cough、wheezing (cardiac asthma) 及 hemoptysis;

**典型的 cough** 特徵為乾咳，躺下去會咳，坐起來則改善 (與 orthopnea 機轉同);

**【註】** 但肺充血常因感冒而引發，而會有痰

# Trepopnea

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**Definition:** Dyspnea, sensed while lying on one side but not on the other.

## Mechanism

### 1) **Unilateral lung disease** (one lung, or one major bronchus)

Patients Prefer to lie on the opposite side of the diseased lung as the gravitation increases perfusion of the lower lung.

Increased perfusion in diseased lung would increase shunting and hypoxemia, resulting in worsening dyspnea.

To maximize function of the healthier lung, the patient is best to lie on the side of the healthier lung (good side down), so that it receives adequate perfusion.

### 2) **Chronic heart failure**

Patients prefer to lie mostly on the left side (heart side down), to enable a better blood return, whereby CO is augmented

# Platypnea

Platypnea is due to either **hepatopulmonary syndrome** or an anatomical cardiovascular defect increasing positional right-to-left shunting (blood flow from the right to the left part of the circulatory system). These defects include rare syndromes in which 1) the venous blood from the liver does not pass through the lungs, or 2) if venous blood from the portal circulation reaches the inferior vena cava without passing through the liver (type 1).

Insufficiency of abdominal muscles causes lower diaphragm position and dyspnea. In clinostatism, abdominal organs push the diaphragm in its normal, upper position, reducing the respiratory effort.



## 2) 全身靜脈充血 (Systemic Venous Congestion)

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**機轉:** 因右心房壓上昇, 繼而 systemic veins 之靜水壓力上昇, 而導致水/鈉由毛細管內滲出於全身間質組織

**症狀:** 常見者為 1) 下肢浮腫 (pitting edema) 及 2) 肝充血 (congested liver)

肝充血之表現: 其特徵為運動時因右心房壓 (繼而肝靜脈壓) 上升, 造成上腹或右上腹部脹痛感出現或加劇

**必需與狹心症作鑑別** – 1) 與腳浮腫之正向關係 (浮腫加劇則肝充血之症狀更明顯, 反之浮腫減輕 (如利尿後) 則肝充血症狀改善: 2) 狹心症一般不合併腳浮腫

下肢

嚴重者為 GI congestion (anorexia、nausea、vomiting、constipation)、ascites、anasarca and GI bleeding (ischemic colitis、mesenteric thrombembolism) 之表現; Renal vein thrombosis, nephrotic syndrome

# Abdominal Pain and/or GI Bleeding\*

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Acute coronary syndrome

Superior mesenteric syndrome

Congestive liver\*

ischemic colitis\*

AF with Mesenteric embolism

Severe mesenteric arteriosclerosis

Aneurysm rupture\*

Aortic dissection\*

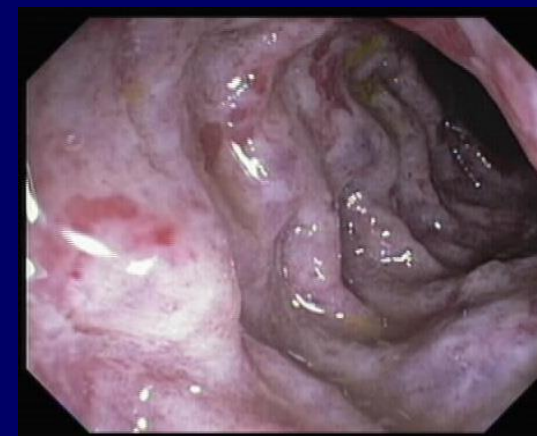
Mesenteric venous thrombosis

\* Risk factors :

CAD

AF

CHF



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Drugs: NSAID, anti-platelets, anticoagulants

Ischemic Colitis\*



### 3) 低心輸出量 (Low Cardiac Output)

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#### 1. 急性 (Acute)

不可逆 (irreversible) :

~~Death~~ (非症狀)

可逆 (reversible) :

dizziness、syncope

#### 2. 非急性 (Non-acute)

Easy fatigability (疲倦), weakness

Hypotension 及 shock 之表現 (包括

symptoms of increased sympathetic tone)

# 頭暈、頭昏、走路不穩

洪祖培教授

以頭暈或頭昏(giddiness, dizziness)就醫的病人為例，必須詳細問病史或誘以了解究竟屬於下列那一種：

- 1) 病人覺得頭暈 (light-headed)、頭飄浮感 (floating)、昏沈 (hazy)、朦朧 (groggy)、不清晰 (blurred)、霧煞煞 (misty);但病人看得事物不會旋轉也沒有眩暈感;可能含有噁心但不會嘔吐，不影響聽力，也不會喪失意識。此感覺有如健康的人在空氣稀薄、氣壓低的高地，感覺頭昏沈不舒服後，經移到低處，給予氧氣後即恢復;在人多的密閉空間或場所，離開密閉處後，昏沈感消失;睡眠不足、熬夜後，隔天感覺飄浮的現象，但經休息後，上述不舒服的感覺消失。臨床上最常見於慢性多重器官衰竭、長期臥床的病人，服用安眠藥、鎮定劑、精神安定劑，也可能是腦循環障礙、貧血、缺氧、中毒所致。
- 2) 因憂鬱、工作壓力、焦慮、幻想等在精神科求診的病人，常用窒悶不清爽(stuffy head)、頭重腳輕 (heavy-headed)、頭內空空(empty-headed)、腦中空白 (blank-minded)、或頭頸部周圍緊縮感 (band-like tightness)來表示。

- 3) 由視覺障礙引起的頭昏，有別於內耳、中樞神經引起的眩暈，通常初戴眼鏡不適應的人，白內障，青光眼，複視的病人，點散瞳劑者或由暗處出來突然遇到強光而引起眼前發亮(glare)或變白(whiteout)伴隨頭昏稱為目眩或眩昏(dazzle)。偏頭痛病人在突然發作前，會有光、光圈的頭昏感覺;特殊癲癇病也會以目眩為前兆。
- 4) 突然頭昏前,眼前一片黑(black)、暗(dark)、灰(gray)，後有失神感，好像昏過去(going to faint away)、飄浮感(Swimming)，嚴重時會失神(syncope)而倒下，即所謂『黑暗暈』(blackout)，意識恢復後，會有盜汗、手脚冰冷、心跳快的感覺。健康人常見於天氣太熱、肚子餓或路蹲太久,突然站立引起立性低血壓(orthostatic postural hypotension)，恢復後不會有神經學障礙。嚴重者,若很快失神、失神時間較長、或引起尿失禁,則考慮有潛伏性病態,如:  
心臟衰竭、服用血管擴張劑、高血壓治療劑、利尿劑等,以及貧血、自律神經障礙、新陳代謝內分泌障礙等。遇到恐怖、緊張、心理壓力·受驚嚇、生氣等心理性表現時,也會失神·昏厥·是由副交感神經過度興奮所致的現象(vasovagal syncope)。



5) 突然間，病人感覺眼前物體在旋轉(spinning around)，整個房間以身體為中心打轉(rotating)，站立不穩(unsteady)或傾斜一側，常伴隨噁心、嘔吐，不敢站立，想閉上眼睛而躺下來，以減輕不適感，此種發作稱之為眩暈(vertigo)與上述頭暈的現象不同，則考慮內耳前庭器官疾病或平衡失調。健康的人也會有此經驗，例如：暈車、暈船，坐在車內往窗外看流動的物體，到兒童樂園玩旋轉木馬，或一直注視旋轉，或由高處往下看海浪、河流，經閉上眼睛後，雖然看不到旋轉，由於平衡不良，身體仍在感覺在轉，躺下或休息後即可恢復。良性陣發性姿勢性眩暈(benign paroxysmal positional vertigo)、前庭神經炎(vestibular neuronitis)以及其他內耳水腫 Meniere氏病，治療 2-3 週後症狀會減輕。若眩暈拖太久尤其是年長者，則要考慮腦幹或小腦病變所致。慢性暈眩病人，也要則考慮罹患腦瘤、藥物中毒或小腦退化症。

# Syncope

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定義：Transient loss of consciousness  
with loss of posture

症狀（問題）之分析

QQOPERA

解決方法：Pathophysiologic approach

transient hypotension (mechanism):

electrical, coronary perfusion, mechanical

鑑別診斷：

seizure, hypoglycemia,

psychiatric disorder – panic disorder (hyperventilation)



## Syncope - Analyses

QQ: near syncope, syncope

O: sudden (blackout, graying out, white out)

P: situational: vasovagal, tussive, glutition, micturition, orthostatic, exertional; positional: orthostatic, supine upward gaze (carotid hypersensitivity)

Drugs: NTG, alpha-blocker etc.

R: spontaneous, rapid recovery

A: 1) Pre: palpitation, chest distress/pain (myocardial ischemia, aortic dissection)

2) During: incontinence (infrequent)

3) Symptoms from inflicted trauma

# Blood Pressure (血壓)

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Non-invasive, indirect assessment of aortic pressure

Assumptions:

- 1) Reliable sphygmomanometer
- 2) Correct technique
- 3) No obstruction between aorta and arm
- 4) Adequate minimal blood flow –  
no extreme arterial vasoconstriction



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Parameters:

Direct: 1) Systolic pressure

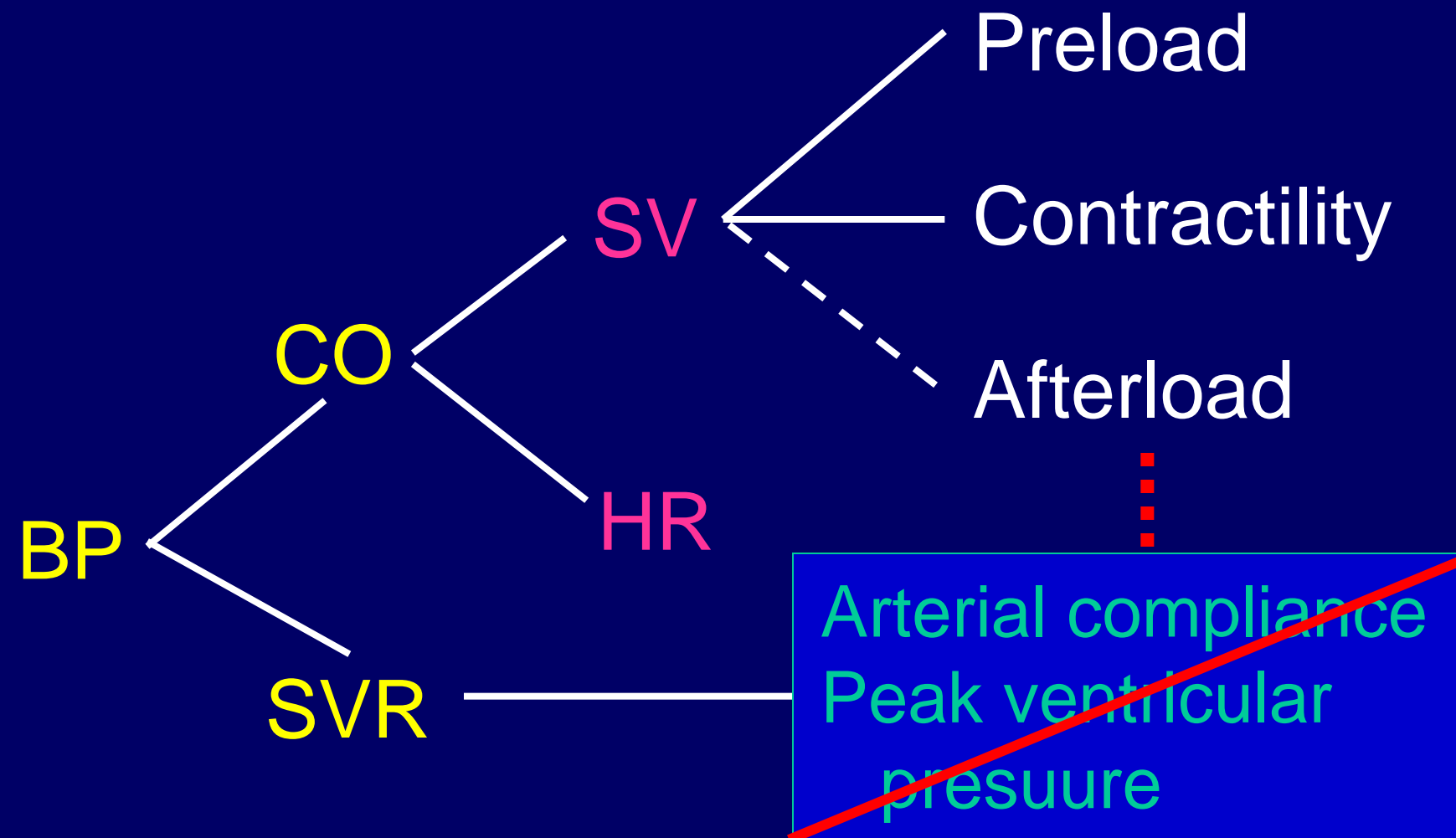
2) Diastolic pressure

Indirect: 3) **Pulse pressure (PP)**

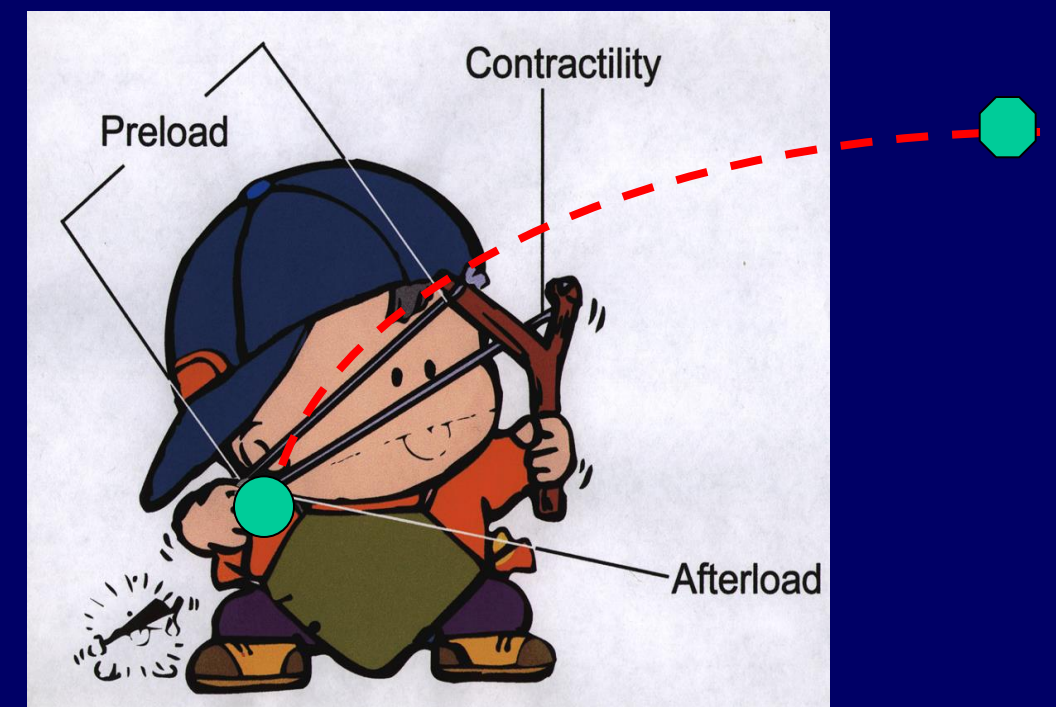
= (systolic – diastolic pressure)

\*Normal range = 30 – 50 mmHg

$$BP = f(SVR, HR, \text{preload}, \text{afterload}, \text{contractility})$$



### Hung's "Slingshot Cardiac Physiology"



Afterload, mainly determined by SVR

Thus, In practicality,

$$BP = f(SVR, HR, \text{preload}, \text{afterload}, \text{contractility})$$

unless presence of significant LV outflow resistance

# Mechanism of Hypotension in Shock

	HR	Preload	Contractility	PVR
1) Hypovolemic		↓		
2) Obstructive		↓		
3) Cardiogenic			↓	
4) Distributive				
a) Anaphylactic		↓		↓
b) Neurogenic	↓	↓		↓
c) Septic		↓	N → ↓	↓ → ↑



## 4) 心血管病胸不適感或痛 (Distress/Pain)

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### 1. 心包囊炎 (pericarditis)：痛在前胸

Pleuritic and positional

“Pleuritic” (吸氣更痛) – 與 thorax and pleuritis pain 同；

Positional (躺下更痛) - 與 pleuritis 不同

Non-tender - 與 thorax pain 不同

### 2. 心肌缺血症候群 (myocardial ischemic syndrome)

狹心症 (angina)，急性冠狀動脈症候群 (ACS)

### 3. 主動脈剝離症 (aortic dissection)：其特徵為

1) tearing; 2) persistent; 3) abrupt or dramatic onset;

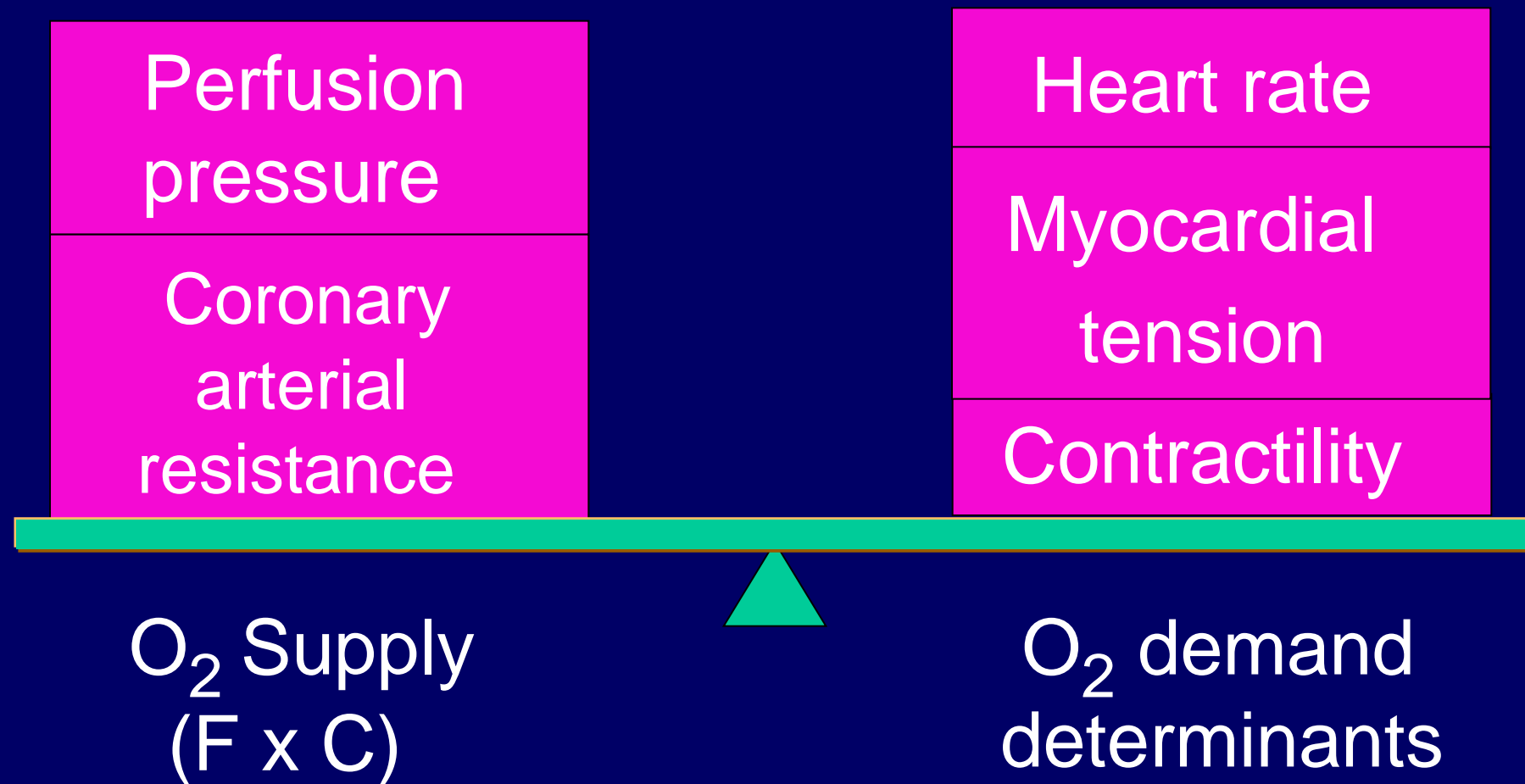
4) migratory;

【註】不一定出現在胸部



# Myocardial Oxygen Economics

## 心肌氧氣經濟學



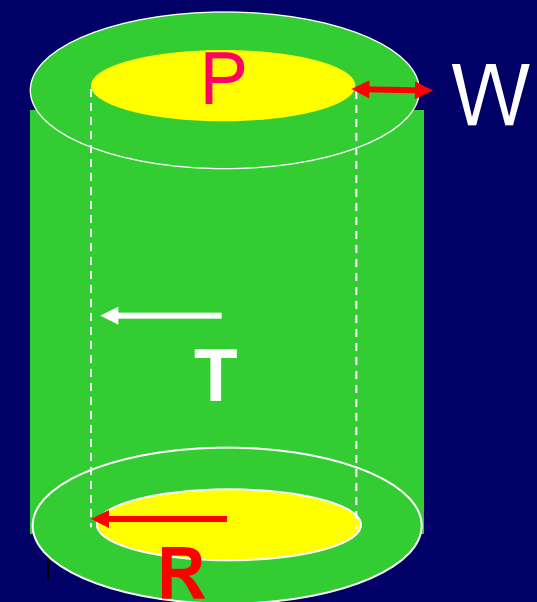
$$\text{Coronary Flow (F)} = \frac{\text{ADP} - \text{LVDP}}{R_c}$$

$$\text{O}_2 \text{ content (C)} = f(\text{Hemoglobin, SaO}_2\%)$$

**Clinical Index**  
Double Product  
SBP x HR

### Laplace's Law

$$T = P \times R / 2 \times W$$



T = tension  
P = pressure  
R = radius  
W = wall thickness

# 心肌氧氣經濟學

冠狀動脈正常  
血氧供、需平衡

冠狀動脈硬化

血氧供、需失衡 - 心肌缺血、缺氧

供應增加 需求增加

供應不足 需求增加

供應驟減 需求不變

動用  
儲備  
流量

儲備流量不足

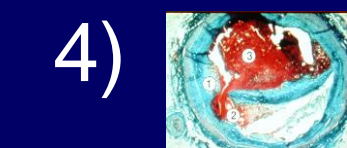
1) Microvasculature disorder



1) Spasm

2) Dissection

3) No-, slow-flow



需求不變

血流  
儲備量

供、需平衡

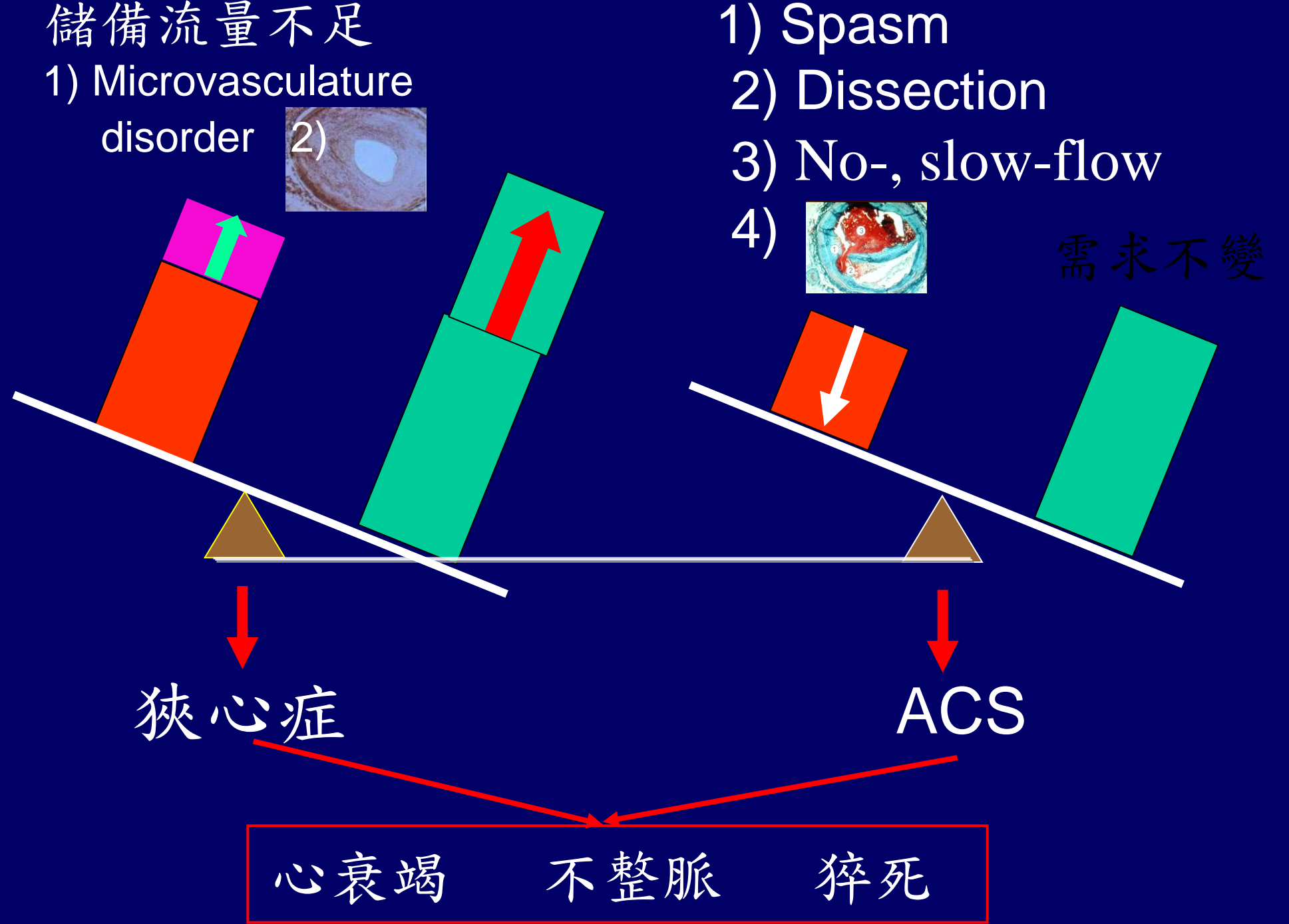
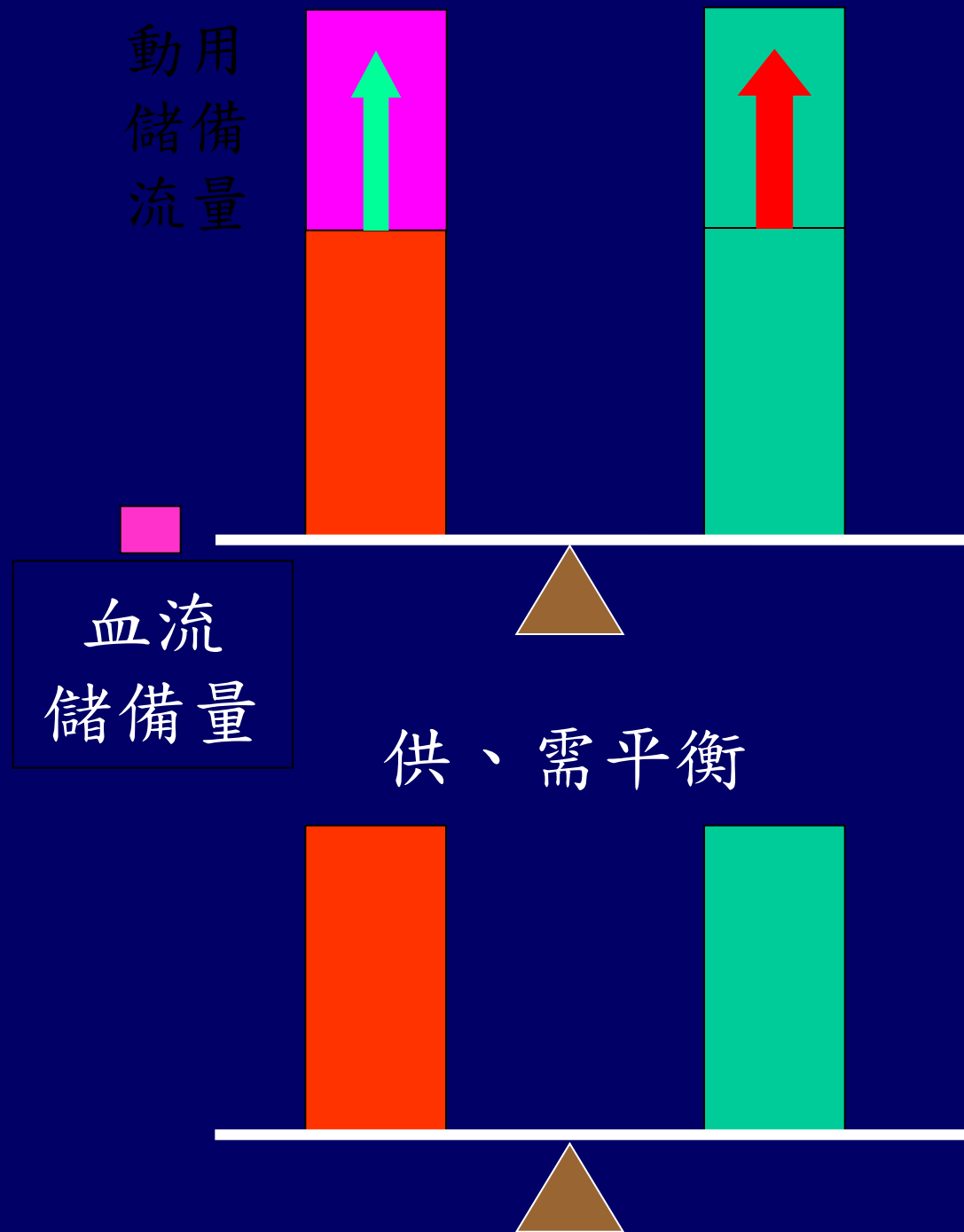
狹心症

ACS

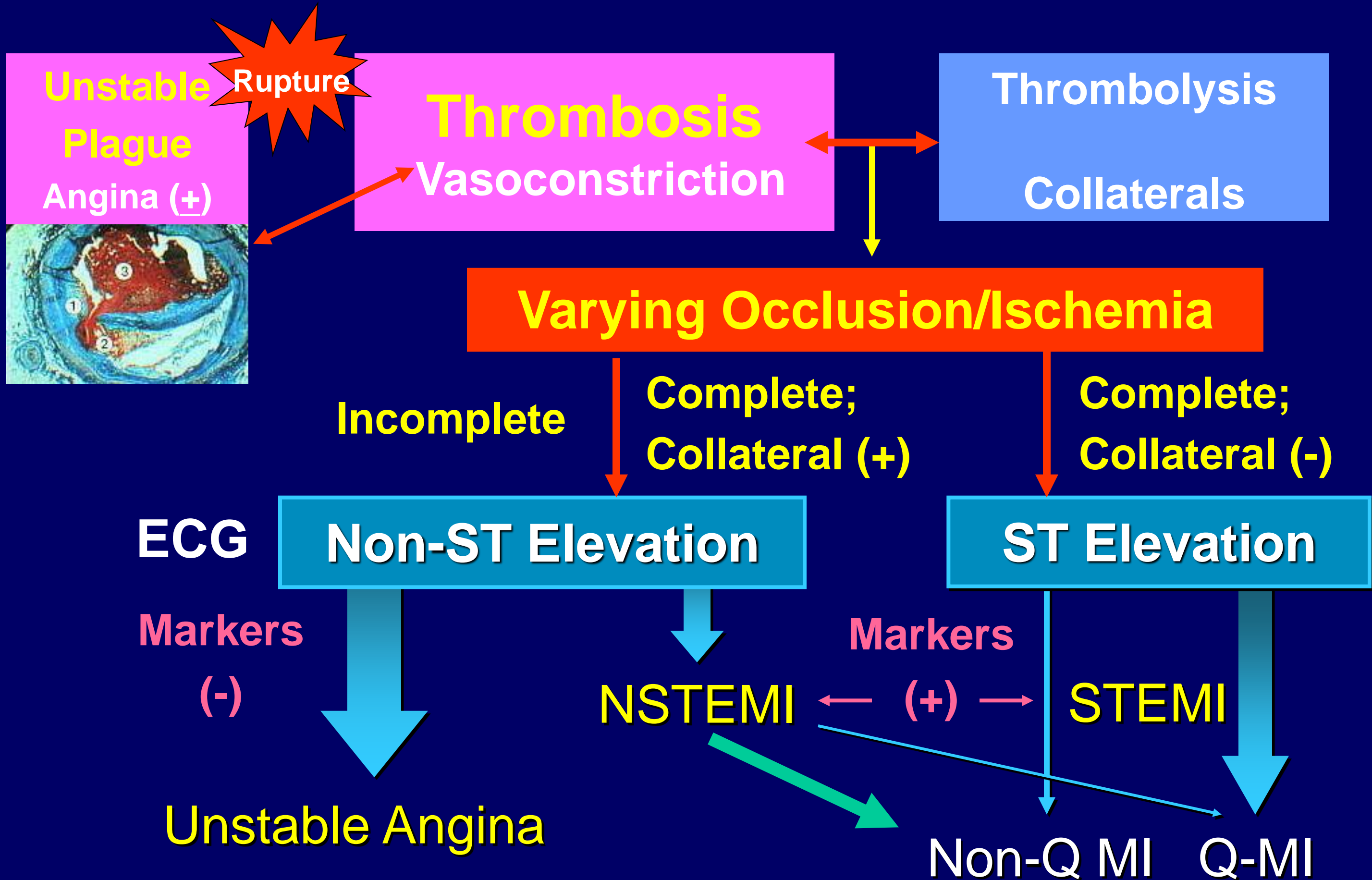
心衰竭

不整脈

猝死



# ACS Pathophysiology



# 心肌缺血症候群 (myocardial ischemic syndrome) 狹心症 (angina)，急性冠狀動脈症候群 (ACS)

## 1) Directly resulting from ischemia

Chest pain/distress

Typical

Atypical

in Location and/or Quality

Non-chest pain/distress\*

Limited to “radiating” sites; epigastrium, head etc.



\* High index of suspicion

## 2) Indirectly resultant Symptoms

Related to acute ventricular dysfunction

Related to arrhythmias (不整脈)

Sudden death

## 3) Silent ischemia



# Classic Angina

Increase in myocardial oxygen demand

**L:** Retrosternal/precordial, diffuse  
with/without radiation

**Q:** Discomfort/pain (oppressive, strangling)

**P:** Effort/mental stress induced

Precipitated by a heavy meal  
or exposure to cold

**O:** Sudden but not abrupt

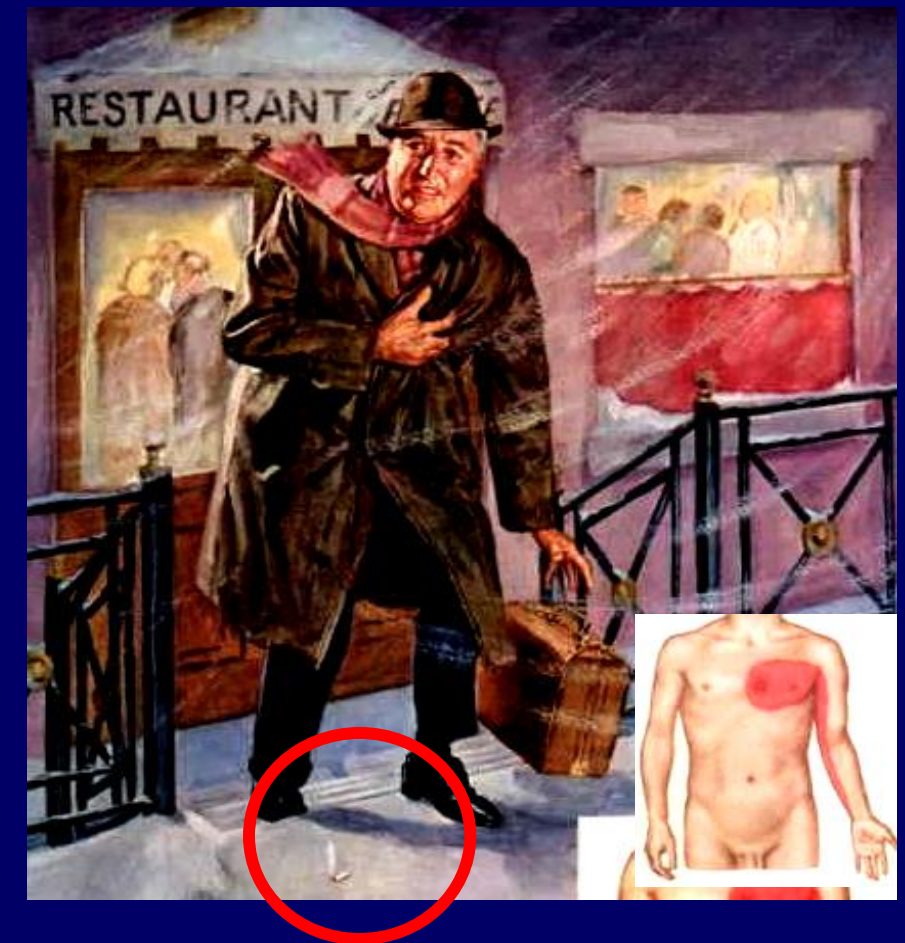
**R:** Rest and/or NTG relief

**Q<sub>2</sub>:** Duration:

Several minutes;

if > 20 min, consider ACS (unstable angina/AMI)

or, unrelated to ischemia





# Atypical Presentations (ACS)

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- Abdominal pain (epigastric etc.)
  - “Ingestion”
  - Shortness of breath
  - Nausea, vomiting or diarrhea
  - Generalized feeling of unwellness or weakness, sweating
  - Back or jaw tightness/pain
- 

Atypical presentations – High-risk groups

1. The elderly; 2. Diabetic patients
3. Heart transplantation recipients

\* High index of suspicion

# Angina Pectoris

- Heberden 1768

A disorder of the breast, marked with strong and peculiar symptoms, considerable for the kind of danger belonging to it, and not extremely rare, of which I do not recollect any mention among medical authors. The seat of it, and sense of *strangling and anxiety* with which it is attended, may make it not improperly be called *angina pectoris*.

Those who are afflicted with it are seized, while they are walking, and more particularly when they walk soon after eating, with a painful and most disagreeable sensation in the breast, which seems as if it would take their life away, if it were to increase or to continue: the moment they stand still, all this uneasiness vanishes.

In all other respects, the patients are, at the beginning of this disorder, perfectly well.

徵候  
症候群

# Arrhythmia

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- Clinical significance?
- Hemodynamic significance?
- Potentially life threatening?
- Where to seek assistance?

# Symptoms Relevant to Arrhythmias

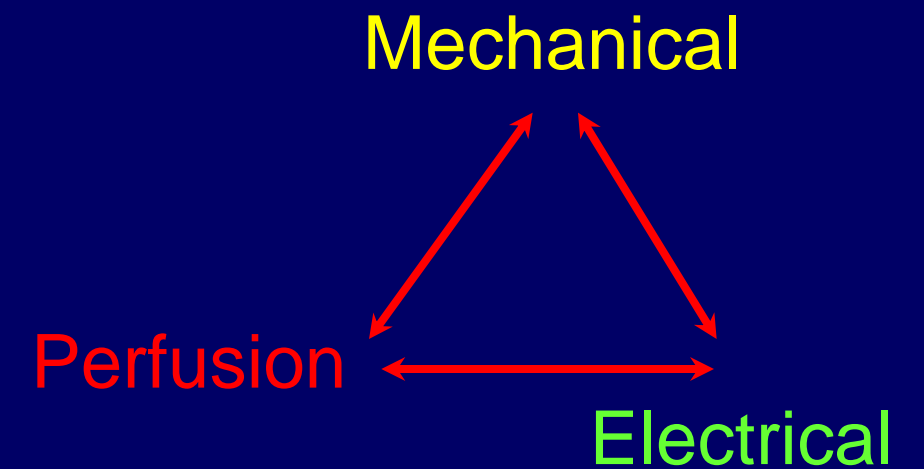
## Direct - 心悸 (Palpitation)

定義: 自覺心臟在跳動

症狀(問題) 之分析 QQOPERA

機轉: 很多種; 有心悸不一定代表有心律不整或心臟病;

No palpitation – normal?



## Indirect

### 1) Hemodynamic consequences

肺充血 (pulmonary venous congestion) 之症狀

2) 全身性充血 (systemic venous congestion) 之症狀

3) 低心輸出量 (low cardiac output) 之症狀

Syncope, Shock, death

### 2) Consequence on impaired coronary perfusion

## 6)其他 (Miscellaneous)

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- 任何症狀皆有可能為心臟病有關之症狀，因此在 **systems review** 中需分析辨別是否與已有之心臟病有關
- 特舉比較有特徵者：
  - Fever (感染性心內膜炎、粘液瘤)
  - Dysphagia (左心房、主動脈擴大，壓到食道)
  - Hoarseness (Ortner syndrome)  
左心房、主動脈或肺動脈擴大，壓迫到左 recurrent laryngeal nerve 導致左聲帶麻痺)



## 6) 其他 (miscellaneous) - I

Any symptom in “Systems Review” may be related to CV disorders\*

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Because symptoms are non-specific and may be related to multiple systems, each symptom is assigned to the system in which it is more or most commonly associated as follows.

1. General : weakness, fatigue, anorexia, fever, insomnia
2. Integument (skin, hair and nails) : changes in color (pigmentation, jaundice, cyanosis), pruritus, rash, hair loss
3. HEENT :
  - Head - headache, dizziness, vertigo
  - Eyes - visual acuity, color vision, corrective lenses, photophobia, diplopia, pain
  - Ears - pain, discharge, hearing loss, tinnitus
  - Nose - epistaxis, discharge, stuffiness, sense of smell
  - Throat - status of teeth, gums, dentures, taste, soreness, hoarseness, lump
4. Respiratory : cough, sputum, hemoptysis, wheezing
5. CV : dyspnea, edema, chest distress/pain, palpitation, intermittent claudication, cold limbs, cyanosis etc;

e.g. \* Headache – rare, angina symptom; vasodilator.

## 6) 其他 (miscellaneous) - II

Any symptom in “Systems Review” may be related to CV disorders

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6. GI : dysphagia, nausea, vomiting, abdominal distress pain, change in bowel habit (diarrhea, constipation, character of stool), hematemesis, melena, bloody stool
7. GU : urinary frequency, hesitancy, urgency, dribbling, incontinence, dysuria, hematuria, nocturia, polyuria, impotence  
**Female** - menarche, menstrual history (including the date of last period), vaginal bleeding or discharge; pregnancy
8. Metabolic and endocrine : growth and development, weight change heat/cold intolerance, nervousness, sweating, polydipsia
9. Hematologic: anemia, easy bruising or bleeding, lymphadenopathy, transfusions
10. Neuropsychiatry : dizziness, syncope, seizures, speech disturbance, loss of sensation, paresthesia, ataxia, weakness or paralysis, tremor, anxiety, depression, irritability
11. Musculoskeletal : joint pain, stiffness, limitation of motion, muscular weakness, wasting

# Acute Limb Arterial Occlusion

## 6 Ps

- Pain
- Paresthesia
- Palsy
- Pale
- Pulseless
- Poikiothermia (cold blooded)



# Elevation Dependency Test

## Detection of subclinical ischemia



Elevation pallor



Delayed filling  
Capillaries and veins  
(normal VFT < 15")



Dependent rubor  
(Ischemic hyperemia)

# Limb Arterial Occlusion

## Chronic

Intermittent claudication, cold limbs, atrophic skin changes, cyanosis, gangrene etc;

## Acute – 6 Ps

- Pain
- Paresthesia
- Palsy
- Pale
- Pulseless
- Poikiothermia (cold blooded)

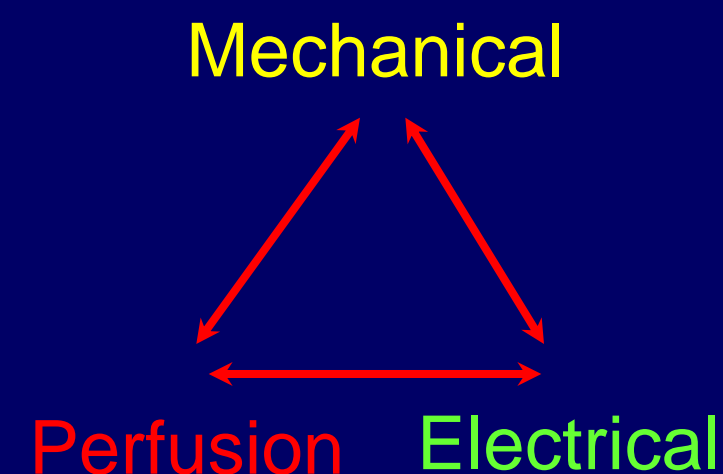


# 心臟病之症狀 - 篩檢性問診

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在無有關心臟血管系統主訴或沒有心血管疾病病史者，初步可只問：

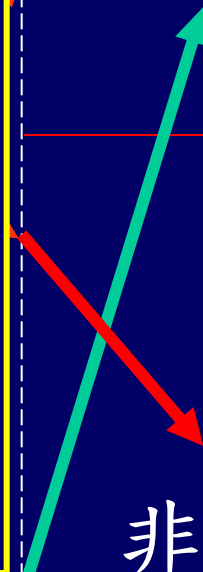
- 1) dyspnea
- 2) legs edema
- 3) dizziness/syncope
- 4) palpitation
- 5) chest distress/pain



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若有上述症狀或理學檢查有異常者，則再進一步詳細問  
如，有legs edema進一步問，運動時上腹部會不會脹痛

# 問題提示分類、剖析、解決

1. 提示	類型	2. 剖析*	3. 解決策略
<b>A. 症狀</b> 1. Dyspnea 2. Legs edema 3. Syncope 4. Chest distress/pain 5. Palpitation	定量 	LQQOPERA法	依質量不減定律或經濟(會計)學法則剖析解決
<b>C. 定量性檢驗</b> Hypoalbuminemia	非定量	LQQOPERA法	Approaches: 1) Systems 2) Anatomic 3) Pathophysiologic 4) Pathologic
<b>D. 症候群/疾病</b> 1. HTN; 2. HF			依指引綱領 (Guidelines) 剖析、解決

\*知己知彼 百戰不殆 《孫子兵法 - 謀攻篇》

# 策略 (Strategy)

## Similarity between Warfare and Clinical Problem Solving



### 戰爭 (Warfare)

知彼

(Intelligence Gathering)

### 戰術策略 (Strategy)

- 地面戰 (ground)
- 海戰 (sea)
- 空戰 (air)
- 飛彈戰 (bomb, missile)
- 生物戰 (biological)
- 化學戰 (chemical)
- 心理戰 (psychological)
- 資訊戰 (e-information)

### 臨床問題解決 (Clinical Problem Solving)

問題剖析

(Problem Analyses)

LQQOPERA

非定量問題 解決策略

(Strategy)

- 1) Systems
- 2) Anatomic
- 3) Pathophysiologic
- 4) Pathologic



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## 2. 問題之剖析 (Problem Analyses)

### 洪氏LQQOPERA 法 - History Taking

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此剖析法原則上應包括 LQQOPERA 8要項，較特殊者可依情略去其中一些項目，如在呼吸困難省略位置 (L)

**L**ocation (位置)

**Q**uality (型態)

**Q**uantity/time course (歷時長短/時相)

**O**nset mode (起病狀態或發作形式)

**P**recipitation factors (情境或誘發因素)

**E**xaggerating factors (加重因素)

**R**elieving factors (緩解因素)

**A**ccompanying symptoms (伴隨症狀)

LQQOPERA: 老匆匆唱歌仔戲 (very old person singing Taiwan opera)

# 疼痛/不適感 (Pain/Distress)

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此症狀的分析應包括下列 LQQOPERA 8項內涵

## 1. 位置 (Location)

局部性 (localized - somatic)

瀰漫性 (diffuse – visceral or diffuse somatic)

移位性 (migratory), 放射性 (radiation) etc.

## 2. 形態 (Quality)

刺痛 (needling), 銳利 (sharp pain), 頓痛 (dull ache)

壓迫性 (oppressive), 難忍的 (excruciating) etc.

## 3. 歷時/時相 (Quantity/Process)

持續性 (persistent)

間歇性 (intermittent):

其頻率 (frequency), 單次持續時間 (duration of each episode),

發作間隔 (intervals between episodes)



# 疼痛/不適感 (Pain/distress)

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## 4. 起病狀態 (Onset mode)

超急性 (abrupt)、突然 (sudden)

緩慢性 (insidious)

## 5. 情境、誘發因素 (Precipitating factors)

## 6. 加重因素 (Exaggerating factors)

## 7. 緩解因素 (Relieving factors)

## 8. 伴隨因素 (Accompanying symptoms)

# 超急性 (晴天霹靂) 發作 (Abrupt/Dramatic Onset)

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超急性發作代表 1) 神經性疼痛; 或 2) 組織、器官連續性突然喪失。如為後者，以系統類歸法舉例如下：

系統類歸法 (systems approach)

1. Integument: laceration
2. HEENT: subarachnoid hemorrhage
3. Respiratory: pneumothorax
4. CV: aortic dissection, rupture of aneurysm, ~~AMI~~
5. GI: 1) Halo/solid organ rupture/perforation:  
          esophagus, stomach, intestines, spleen, liver  
          2) gall stone
6. GU: ureter stone, ectopic pregnancy, ovarian torsion
7. Musculoskeletal: tissue laceration, fracture, tendon rupture

# 疼痛/不適感 (Pain/distress) - 加重因素 (Exaggerating factors)

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- 1) Food intake, swallowing, defecation, urination  
(進食、吞嚥、排便、排尿)
- 2) Inspiration, coughing, sneezing  
(吸氣、咳嗽、打噴涕)
- 3) Body position/motion  
Supine, sitting up, leaning, turning, twisting  
(仰臥、起坐、前傾、側躺、扭動)
- 4) Exercise
- 5) Tenderness 壓痛
- 6) Emotion 焦慮
- 7) Temperature change - Coldness

# 人體構造10系統建議排序

## 位置

包覆全身

1. Integument\*

\*皮膚系統包含毛髮指甲

2. HEENT

胸部

3. Respiratory

4. Cardiovascular

腹部

5. Gastrointestinal

6. Genitourinary

全身

7. Hematology

8. Metabolic/endocrine

9. Musculoskeletal\*\*

10. Neuropsychiatry\*

由上到下

3、4 可對調  
5、6 可對調

\*\*肌肉與神經關係  
密切，故排第9

\*精神系統為抽象，  
故放在最後第10

## B. 非定量問題 (Non-quantitative Problem)

### 4) Pathologic Approach (病理類別法)

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- 1) Infectious (inflammatory) (感染性發炎)
- 2) Non-infectious (inflammatory) (非感染性發炎)
- 3) Neoplasm (新生物)
  - Benign (良性)
  - Malignant (惡性)
- 4) Circulatory (循環)
- 5) Metabolic/endocrine (新陳代謝/內分泌)
- 6) Hematologic (血液)
- 7) Degeneration(退化性)
- 8) Physical/chemical injury (物理/化學性傷害)



- **Trepopnea** is dyspnea (shortness of breath) that is sensed while lying on one side but not on the other. It results from 1) disease of one lung, one major bronchus, or 2) chronic congestive heart failure.

1) Patients with trepopnea from **lung disease** prefer to lie on the opposite side of the diseased lung (good side down), as the gravitation increases perfusion of the lower lung. Increased perfusion in diseased lung would increase shunting and hypoxemia, resulting in worsening shortness of breath.

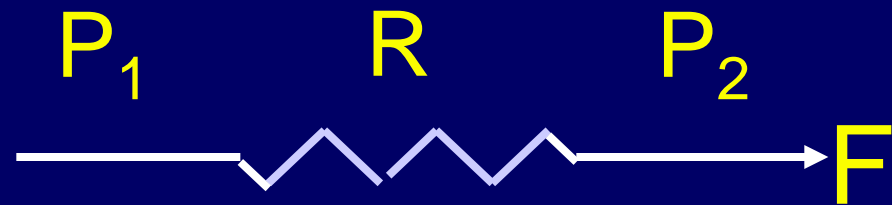
To maximize function of the healthier lung, the patient is best to lie on the side of the healthier lung, so that it receives adequate perfusion.

2) Patients with **chronic heart failure** prefer to lie mostly on the left side, to enable a better blood return, whereby cardiac output is augmented

Other types of positional dyspnea include orthopnea and paroxysmal nocturnal dyspnea. Rates of breathing are described with the terms eupnea, bradypnea (slow), and tachypnea (fast).

# Myocardial Oxygen Economics

## Ohm's Law



$$F = (P_1 - P_2) \times R$$

Perfusion pressure

Arterial resistance

O<sub>2</sub> Supply determinants

Heart rate

Myocardial tension

Contractility

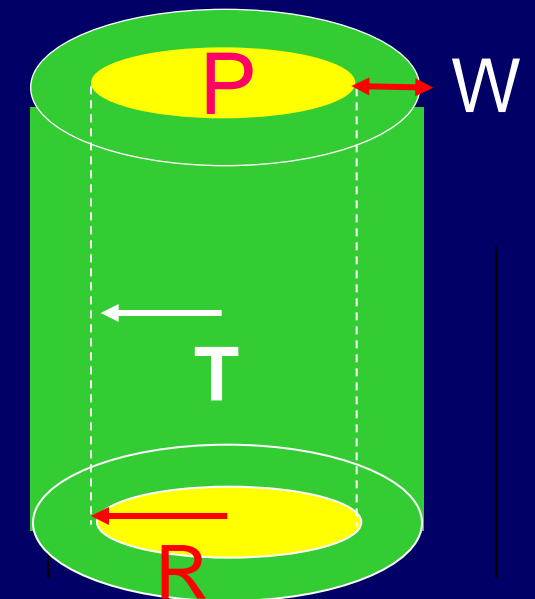
O<sub>2</sub> demand determinants

## Clinical Index

Double Product  
SBP x HR

## Laplace's Law

$$T = P \times R / 2 \times W$$



T = tension

P = pressure

R = radius

W = wall thickness

# Mechanisms of Impaired Coronary Artery Perfusion

Ostial – fibrotic disease, aortic dissection

Epicardial artery

1) Extramural compression

Anomalous origin of coronary artery

Myocardial bridging, enlarged PA, tumor

2) Mural functional – spasm

organic – atherosclerosis, dissection

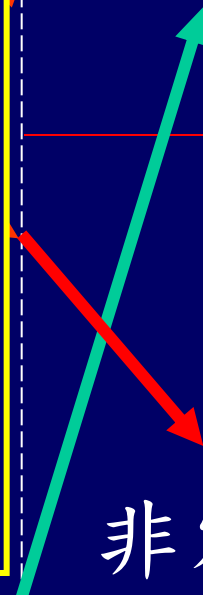
3) Intramural – thrombus, air

Microvascular disorders

LV hypertrophy; Syndrome X

No/slow flow

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臨床問題解決  
(Clinical Problem Solving)

問題剖析

(Problem Analyses)

LQQOPERA

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非定量問題 解決策略  
(Strategy)

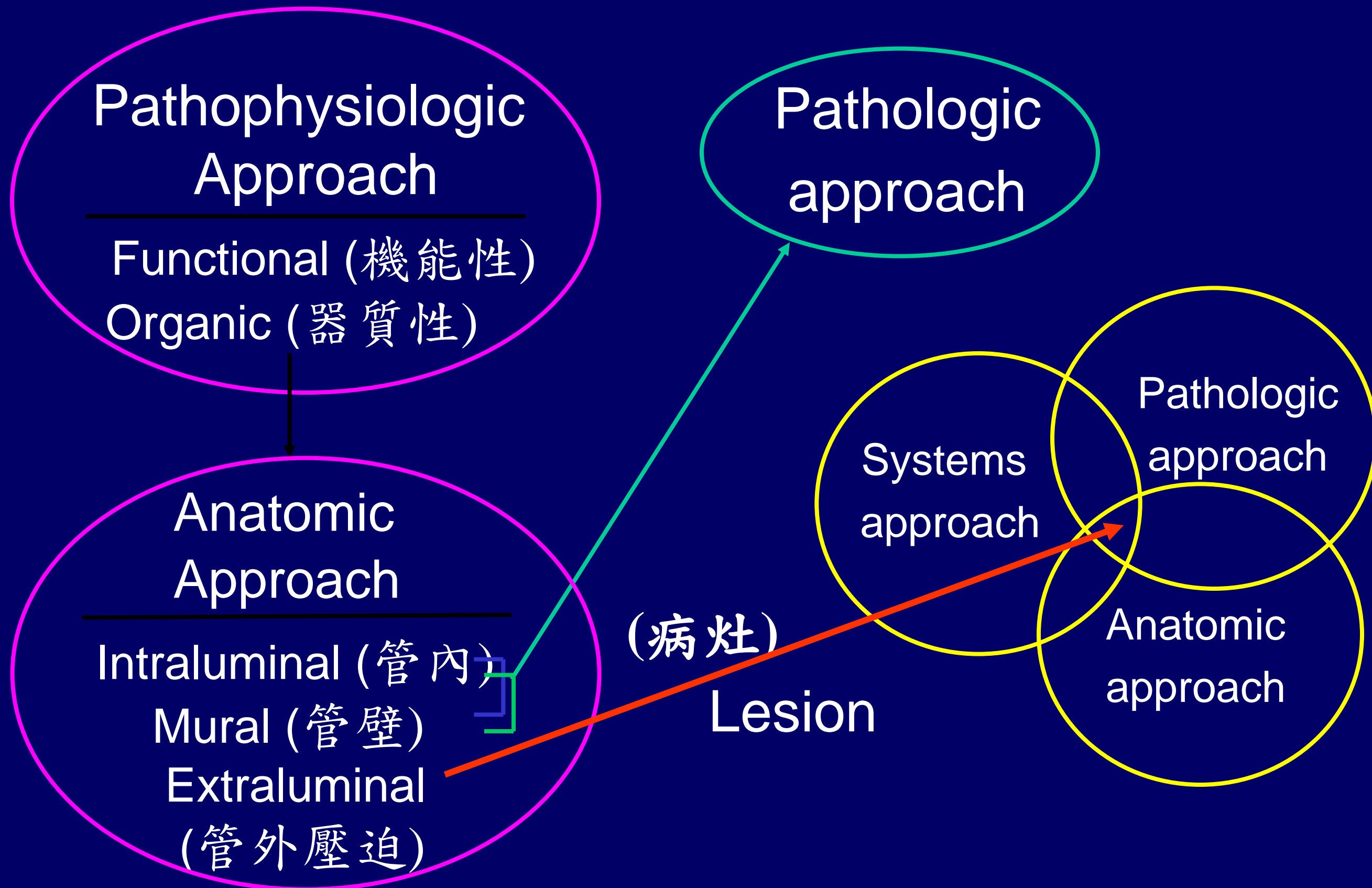
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# Problem Solving - Combined Approaches

## Obstruction of Tubular Structure



# Versatility of Symptomatology in Vascular Diseases

## - Mechanisms of Organ/Tissue Ischemia

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**Functional** resistance to flow - Spasm

**Organic** resistance to flow

### 1) Intraluminal

Thrombosis;

Embolism – thrombus (Af), tumor (e.g. cardiac myxoma),  
calcium, air, fat, cholesterol,

### 2) Mural

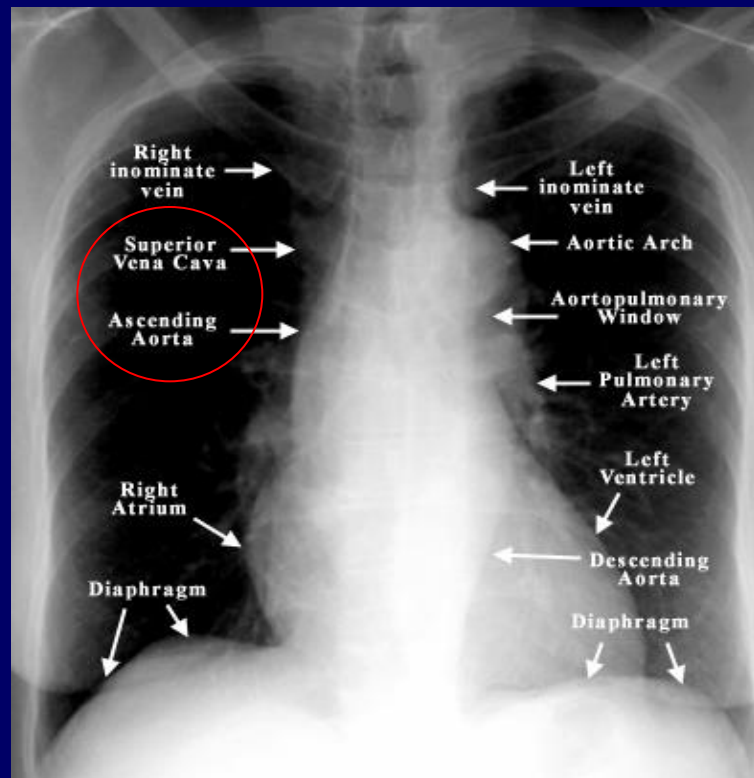
Atherosclerotic plaque, vasculitis, dissection

### 3) Extramural compression

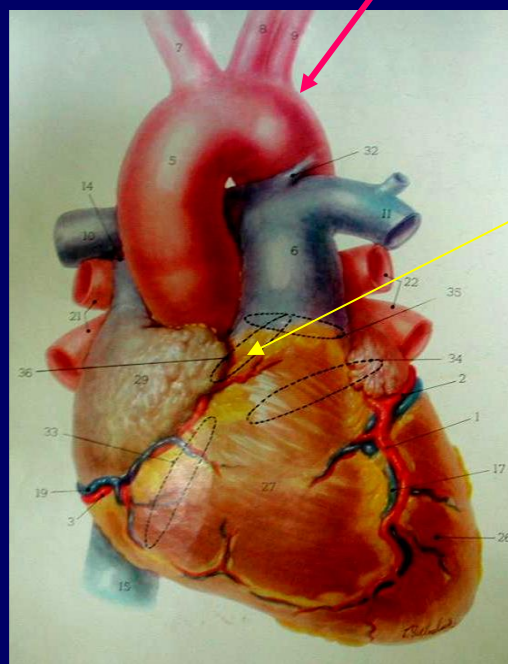
Neoplasm, hematoma, compartment syndrome etc.



# Neighborhood Anatomic Relations



## Aortic Isthmus



Aortic valve annulus

Left recurrent laryngeal nerve



Nerve Palsy  
Ortner syndrome  
Enlarged PA, LA

Esophagus  
食道



LA

Aorta, relatively fixed at **isthmus** in front of vertebra and aortic **annulus**

- 1) Isthmus portion, vulnerable to trauma - transection
- 2) Arteriosclerotic, aorta, elongated to right and anteriorly; heart, lying more horizontally

- 1) TEE
- 2) Dysphagia

Enlarged LA



# Atrial Kick – Atrial Sound (S<sub>4</sub>) in Stiff LV



Shinjuku Station in morning rush hours

What is the consequence of lost “atrial kick” in train station?  
What is the consequence of lost atrial kick in stiff LV,  
onset of Af, or AV dissociation?

# Systems Review (系統環顧評估 - 症狀)

Because symptoms are non-specific and may be related to multiple systems, each symptom is assigned to the system in which it is more or most commonly associated as follows.

1. General : weakness, fatigue, anorexia, **fever**, insomnia
2. Integument (skin, hair and nails) : changes in color (pigmentation, jaundice, cyanosis), pruritus, rash, hair loss
3. HEENT :
  - a. Head - **headache**, dizziness, vertigo
  - b. Eyes - visual acuity, color vision, corrective lenses, photophobia, diplopia,
  - c. Ears - pain, discharge, hearing loss, tinnitus
  - d. Nose - epistaxis, discharge, stuffiness, sense of smell
  - e. Throat - status of teeth, gums, dentures, taste, soreness, **hoarseness**,
4. Respiratory: dyspnea, wheezing, cough, sputum, hemoptysis, chest pain
5. CV : dyspnea, edema, dizziness/ syncope, palpitation. chest distress/pain: intermittent claudication, cold limbs, cyanosis, (gangrene)



# Systems Review (系統環顧評估 - 症狀) - continued

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6. GI : **dysphagia**, nausea, vomiting, **abdominal distress pain**, change in bowel habit (diarrhea, constipation, character of stool), **GI bleeding** (hematemesis, melena, bloody stool)
7. GU : urinary frequency, hesitancy, urgency, dribbling, incontinence, dysuria, **hematuria**, nocturia, polyuria, impotence  
**Female** - menarche, menstrual history (including the date of last period), vaginal bleeding or discharge; pregnancy
8. Metabolic and endocrine : growth and development, weight change\*, heat/cold intolerance, nervousness, sweating, polydipsia
9. Hematologic: anemia\*, **easy bruising or bleeding**, lymphadenopathy, transfusions
10. Musculoskeletal : joint pain, stiffness, limitation of motion, **muscular weakness**, wasting
11. Neuropsychiatry : dizziness, syncope, seizure, speech disturbance, loss of sensation, paresthesia, ataxia, weakness or paralysis, tremor, anxiety, depression, irritability

\* weight change, anemia 為定量問題; 其他為非定量問題