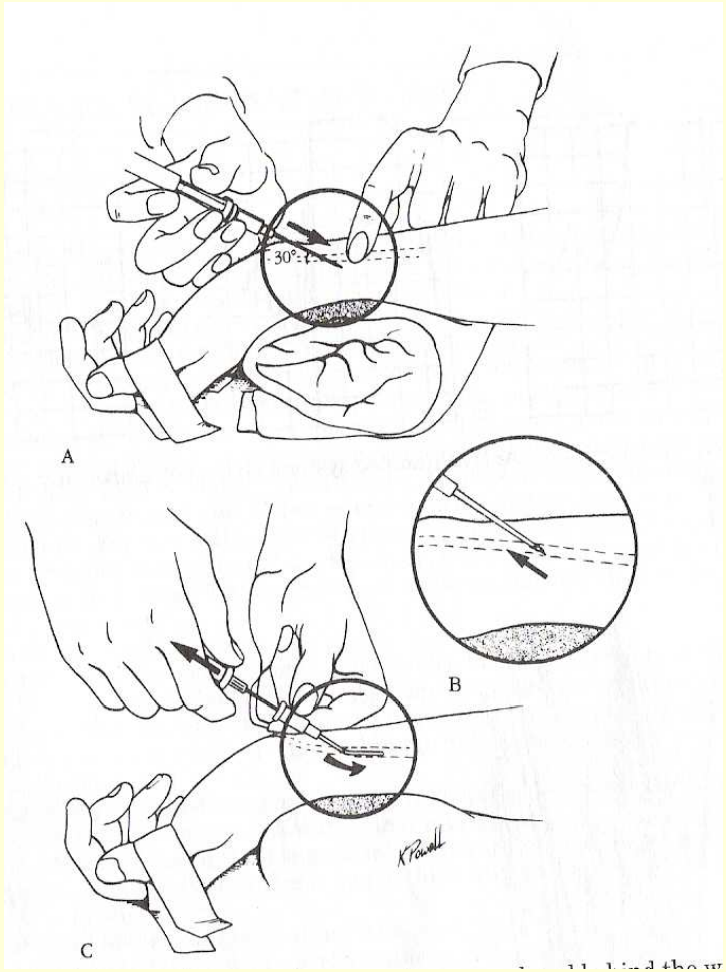
Therapeutic and diagnostic interventions in critically ill patients

ARK

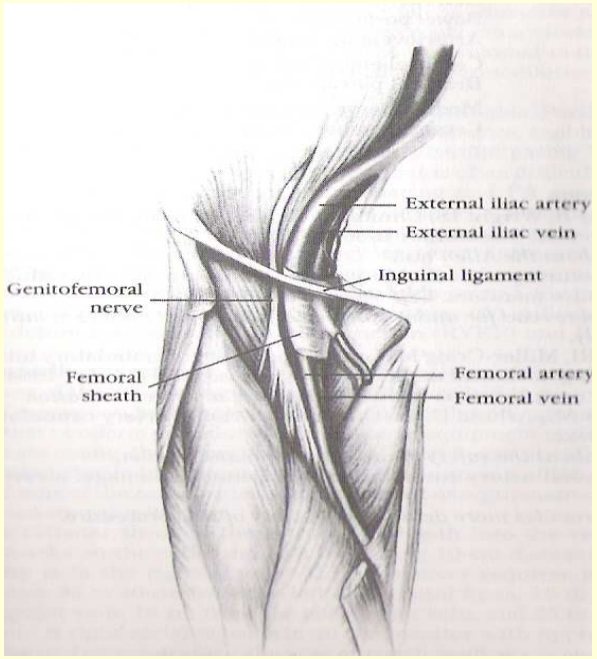


Arterial line placement : a. radialis, femoralis

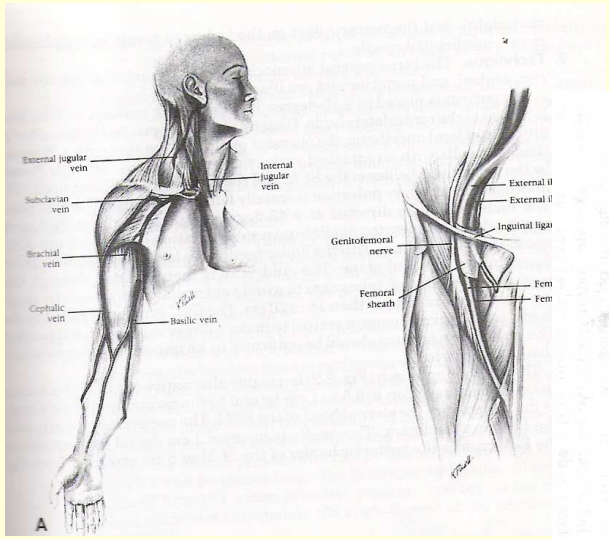
indication : invasive blood measurement, blood sampling for biochemical evaluation and blood gas analysis

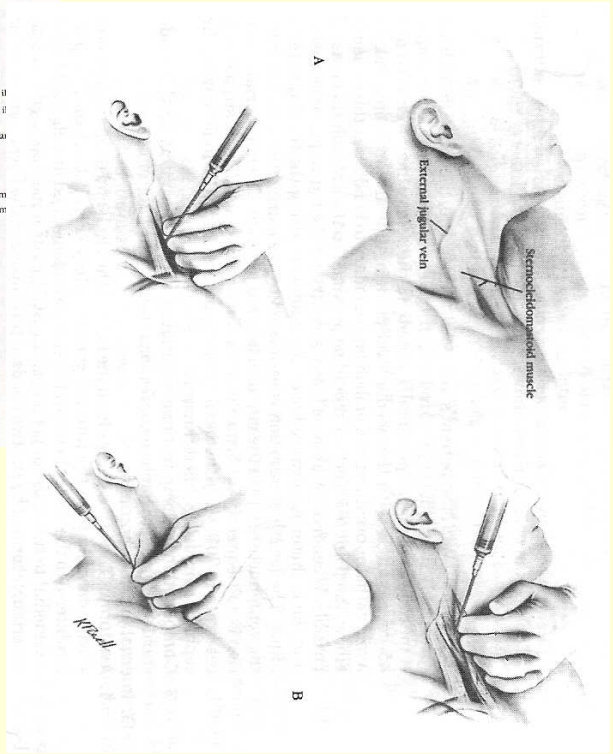
Alen test

complication: infection, bleeding, ischemia

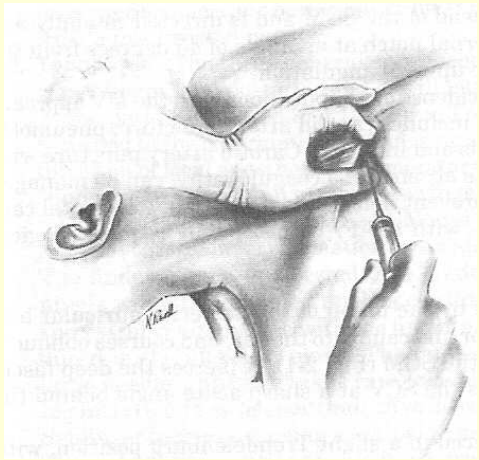


Central venous catheterization





- v. subcl : good fixation, less frequent infection
- v. jugularis: easy access in Swan Ganz canullation
- v femoralis: high flow, more infection



DISORDER	HCO_3^- (mmol/l) (mEq/L)	pCO_2 (mmHg)	SBE mmol/l (mEq/L)
Metabolic acidosis	<22 mmol/l (<22 mEq/L)	= (1.5 x HCO_3) + 8 = 40 + SBE	<−3
Metabolic alkalosis	>26	= (0.7 x HCO_3) + 21 = 40 + (0.6 x SBE)	>+3
Acute respiratory acidosis	= [(pCO_2 − 40) / 10] + 24	>45	= 0
Chronic respiratory acidosis	= [(pCO_2 − 40) / 3] + 24	>45	= 0.4 x (pCO_2 − 40)
Acute respiratory alkalosis	= [(40 − pCO_2) / 5] + 24	<35	= 0
Chronic respiratory alkalosis	= [(40 − pCO_2) / 2] + 24	<35	= 0.4 x (pCO_2 − 40)

!chyba(pCO2-40) u respir alakloz

příklad:

1.chceme vědět jestli má pacient čistou MAC, pH 7.2, HCO3 14 mmol/l, paCO2 3,9 kPa jesti má pacient MAC a 14 HCO3 pak podle vzorce (nahoře):
pCO2 = (1.5*14)+8=29mmHg=3,9kPa, což odpovídá skutečnému pCO2, pacient má čistou MAC

2. chceme vědět jestli má pacient čistou MAC, pH 7.1, HCO3 14 mmol/l, paCO2 5,3 kPa jesti má pacient MAC a 14 HCO3 pak podle vzorce (nahoře):
pCO2 = (1.5*14)+8=29mmHg=3,9kPa, ale pacient ma 5,3 kPA, měl by mít nižší pCO2 (kompenzace), to znamená že má zároveň respirační acidosu

atd…

metabolická acidosa, MAC

INCREASED ANION GAP	
Endogenous acids	**Toxic ingestions**
Renal failure	Ethylene glycol
Ketoses - diabetic, alcohol, starvation	Salicylate
Lactic acid	Paraldehyde
Unknown anions: liver failure, sepsis	Methanol
Non-ketotic hyperosmolar hyperglycaemia	Toluene
	Iron*
NORMAL ANION GAP	
Renal tubular acidosis *Urine SID* $(Na^+ + K^+ - Cl^-) > 0$	**Non-renal** *Urine SID* $(Na^+ + K^+ - Cl^-) < 0$

aninon gap AG = Na+ + K+ – Cl– HCO3
norma AG is 8-12 mmol/l
korigovaný normalní AG = 0.2 (albumin g/l) + 1.5 (phosphate mmol/l).

MAL

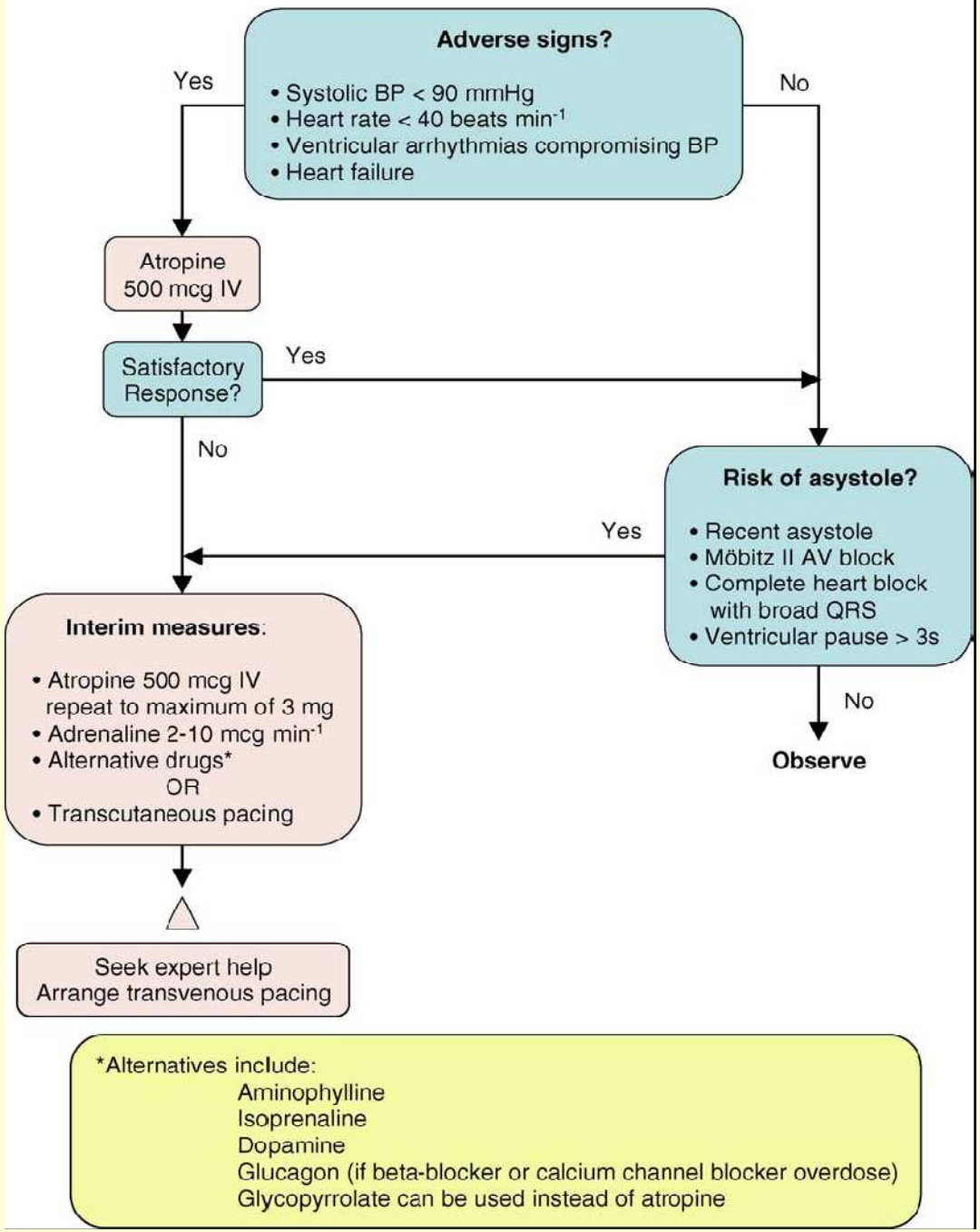
- Severe depletion in free water inducing a parallel increase in Na+ and Cl–. Since the concentration of Na+ > Cl–, the difference between them increases.
- Cl– is lost from the GI tract or urine (diuretic use or abuse) in excess of Na+.
- Na+ is administered in excess of Cl–.
- There is a severe deficiency of intracellular cations such as magnesium or potassium. This decreases intracellular Cl– and secondarily total body Cl– is reduced.

•Diuretic use (or abuse) is perhaps the most common aetiology of metabolic alkalosis.
• Gastrointestinal losses of Cl^- include vomiting, gastric drainage, and rarely, chloride wasting diarrhoea (villous adenoma).
• Administration of non-chloride sodium salts can occur with massive blood transfusions (sodium citrate), parenteral nutrition (sodium acetate), plasma volume expanders (acetate or citrate), Ringer's solution (sodium lactate) or overzealous use of sodium bicarbonate.
• For several hours (or longer) following recovery from hypercarbia, metabolic alkalosis (chloride-responsive) will persist so long as the respiratory failure was chronic enough to induce renal compensation (Cl^- excretion).
• Mineralocorticoid excess: primary hyperaldosteronism (Conn's syndrome), secondary hyperaldosteronism, Cushing's syndrome, Liddle's syndrome, Bartter's syndrome, exogenous corticoids, and excessive liquorice intake.

Bradycardia Algorithm

(includes rates inappropriately slow for haemodynamic state)

If appropriate, give oxygen, cannulate a vein, and record a 12-lead ECG



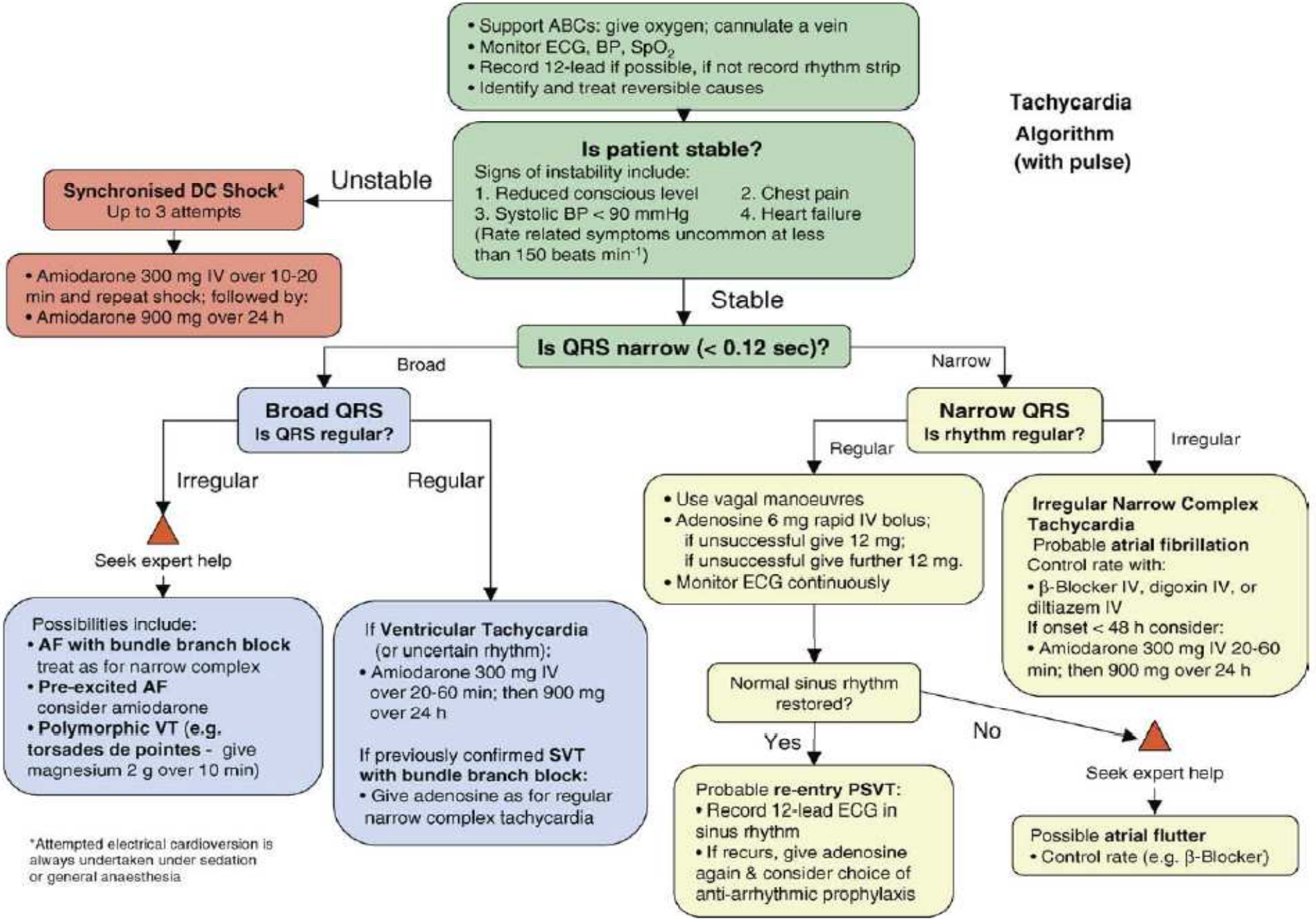


Figure 4.12 Tachycardia algorithm.

Cardial pacing

Indikation

<u>Symptomatic</u> bradyarrythmias

- AV blockade III degree
- bifascicular blockade, Mobitz II in myocardial infarction
- (sinus bradycardia)
- AV disociation
- -torsade points

VVI

rate, mA,mV

technic:

•transvenous : better , but time consuming

•transcutaneous (external stimulation)- method of choice

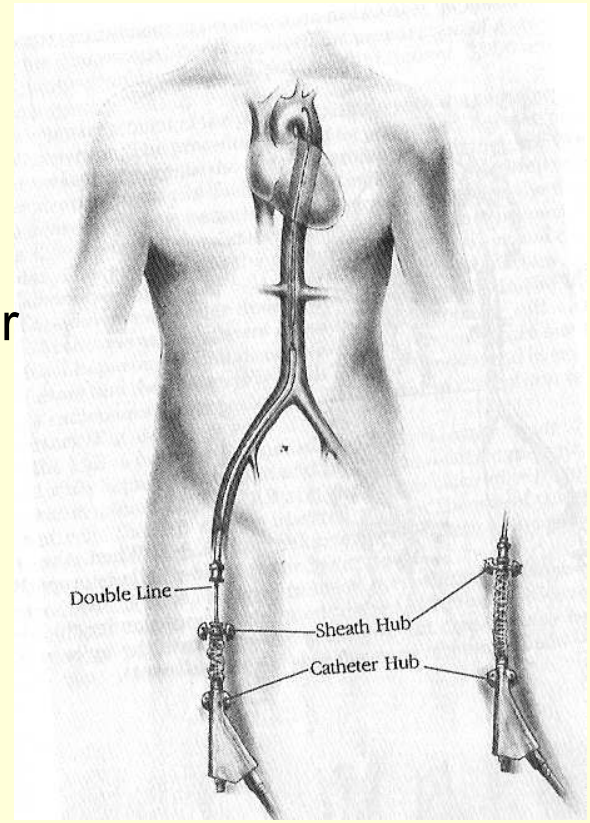
Intra Aortic Balloon Pump (IABP) Counterpulsation

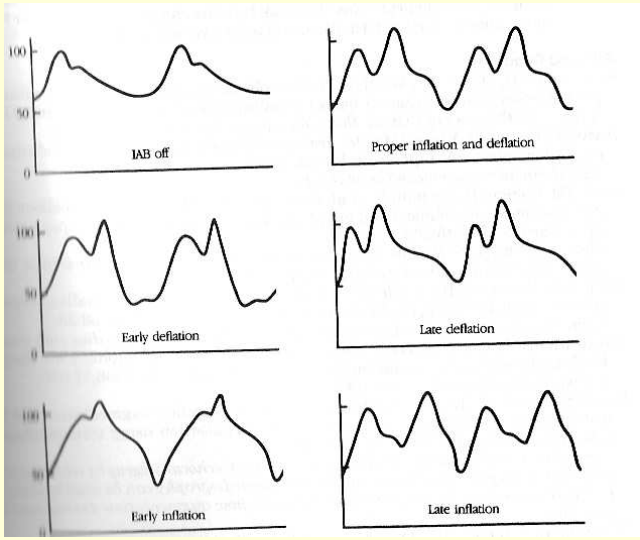
indication: cardiogenic shock in myocardial infarction

Baloon inflation in diastole, improves coronary perfusion

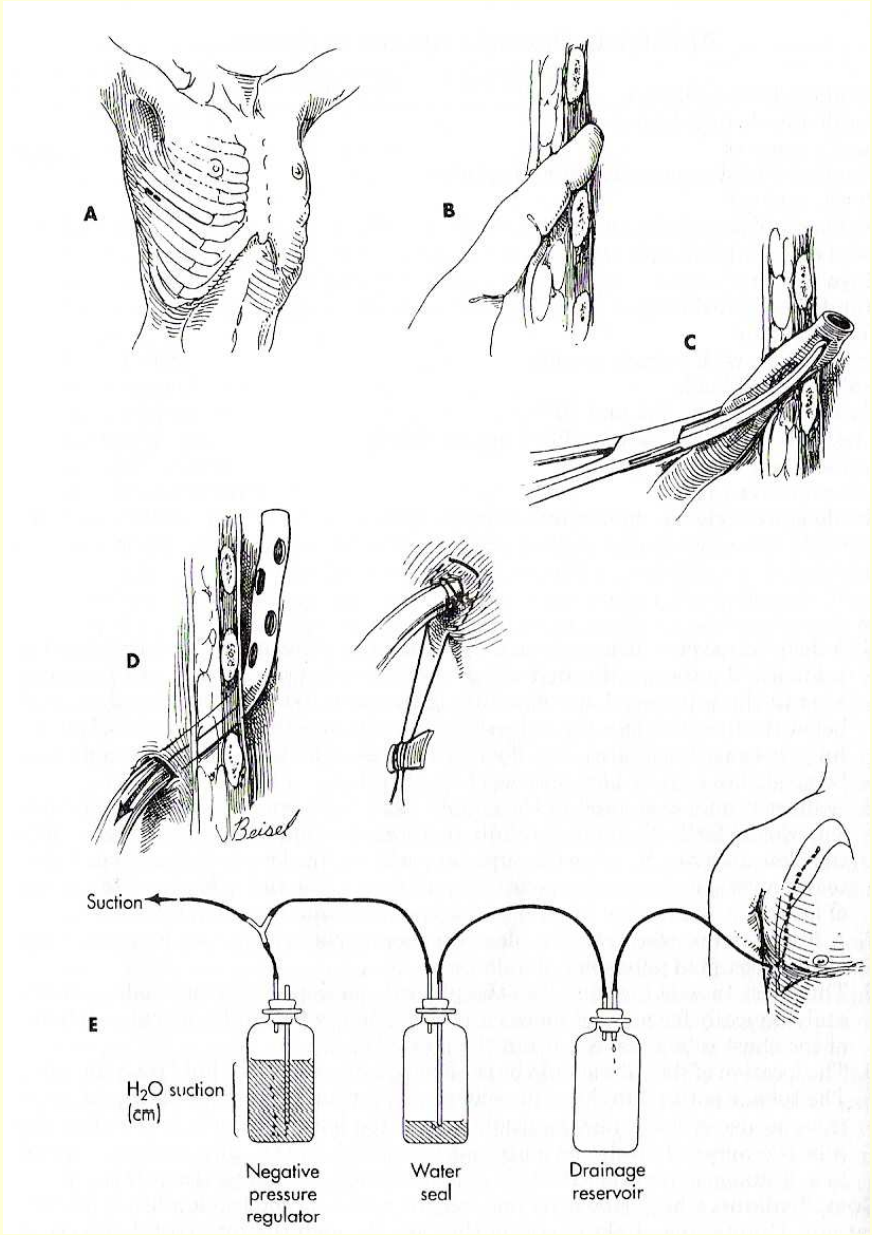
deflation during systole: lowering of systemic vascular resistance

ECG triggering





Chest tube



Indication:

pneumothorax

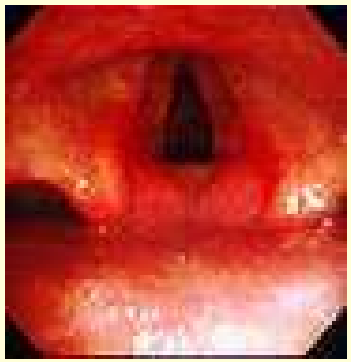
haemothorax

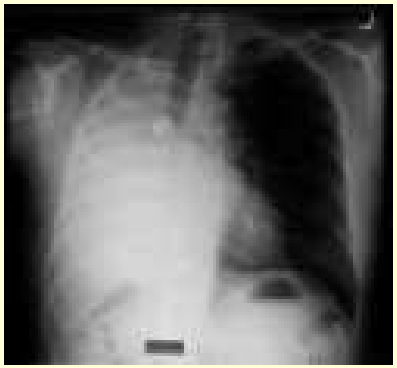
empyema, pleural effusion

How to distinguish between transudate and exsudate (empyema) ?

Transudate : Pleur/Plasma ratio
proteins < 0.5
LD < 0.6
Cholesterol <0,3.

Bronchoscopy



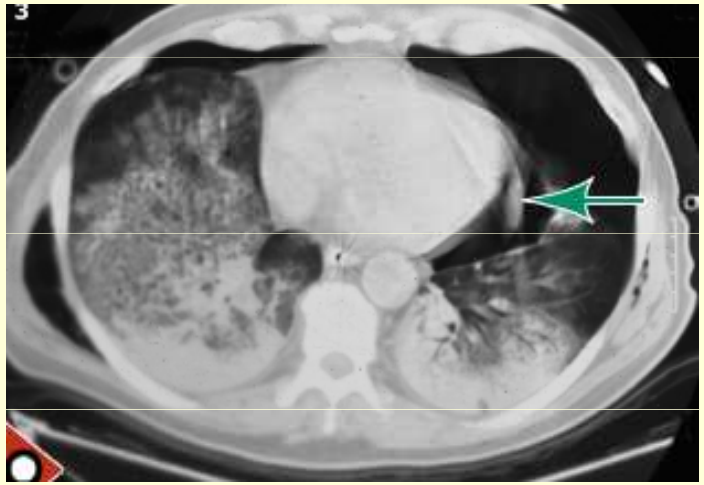


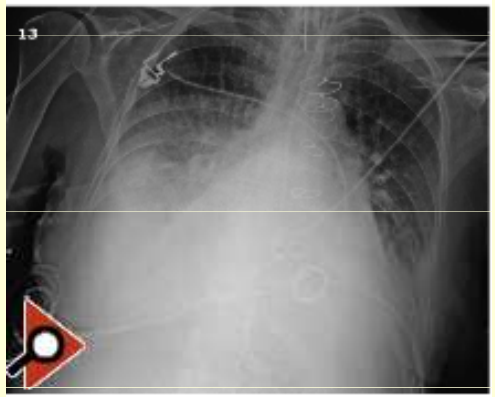
Indication: atelectasis, smoke injury

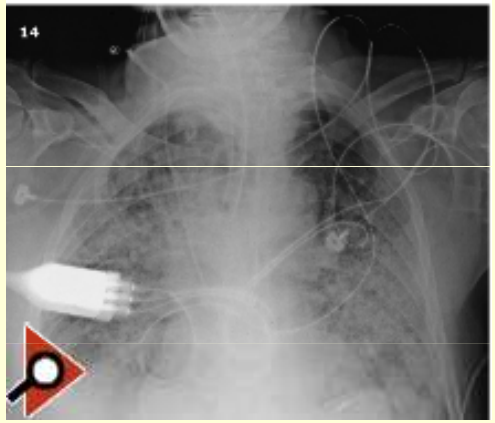
ventilator pneumonia, hemoptysis, foreign bodies

BAL: bronchoalveolar lavage 150-400 ml of fluid, quantitative culture on BAL fluid

Imagining







percutaneous tracheostomy

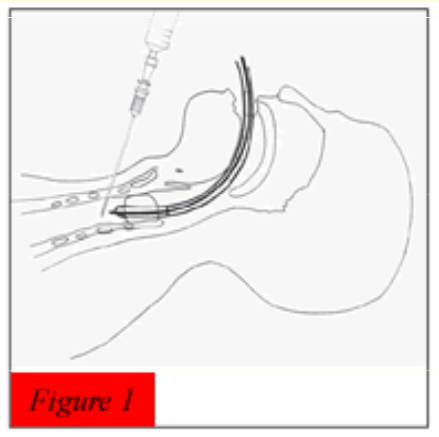


Figure 1

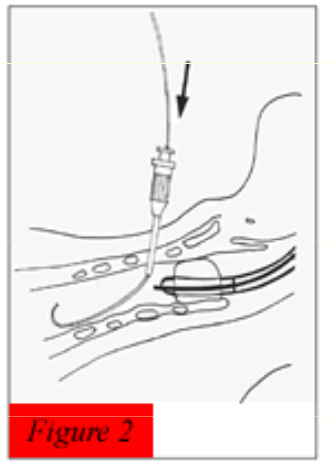


Figure 2


Figure 3

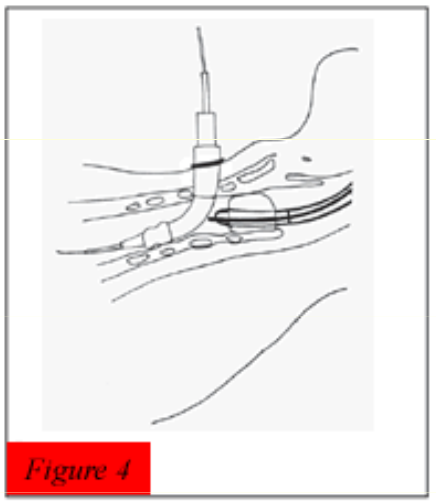


Figure 4