Heart Failure / AF update

Te Anau November 2022

Outline

- Heart failure
  - HFrEF
  - HFpEF
- Atrial Fibrillation

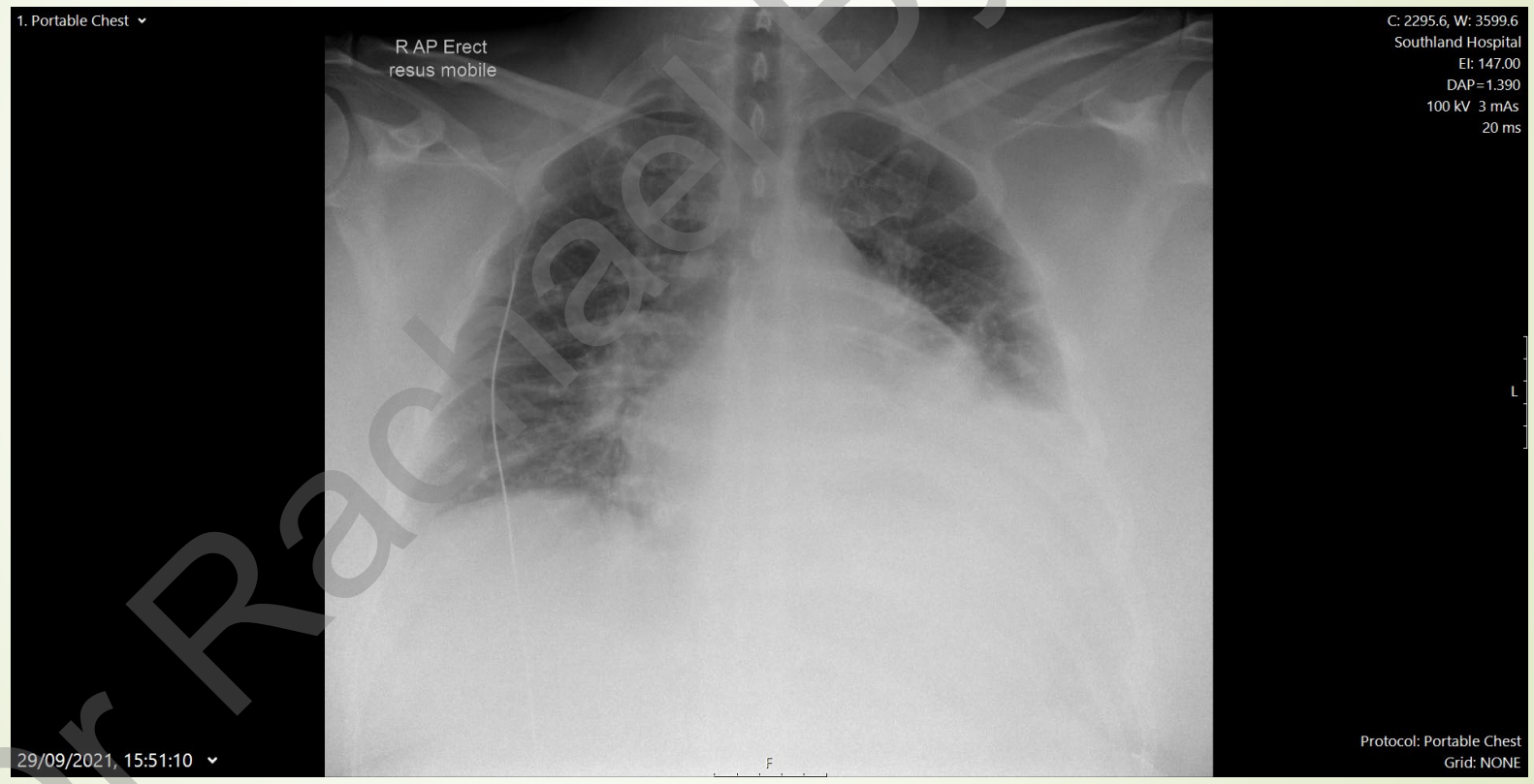
C.D

- 52 yr male
- Presented October 2021
- SOB, orthopnoea, PND
- Past history of mediastinal large B cell lymphoma
  - - 1 x R-CHOP
  - - 6 x DA EPOCH-R
  - XRT to mediastinal mass
- Anxiety, PTSD - home invasion in 1997
- Obesity
- ? OSA - not yet investigated

C.D.

- Initially in rapid a fib
- Fluid overload / pulmonary oedema
- LLL pneumonia
- Echo – dilated LV, severely impaired LV function, global, EF 15-20%
- Significant deterioration since last echo in Feb 2016, LV EF 50-55%

CXR



C.D. Treatment

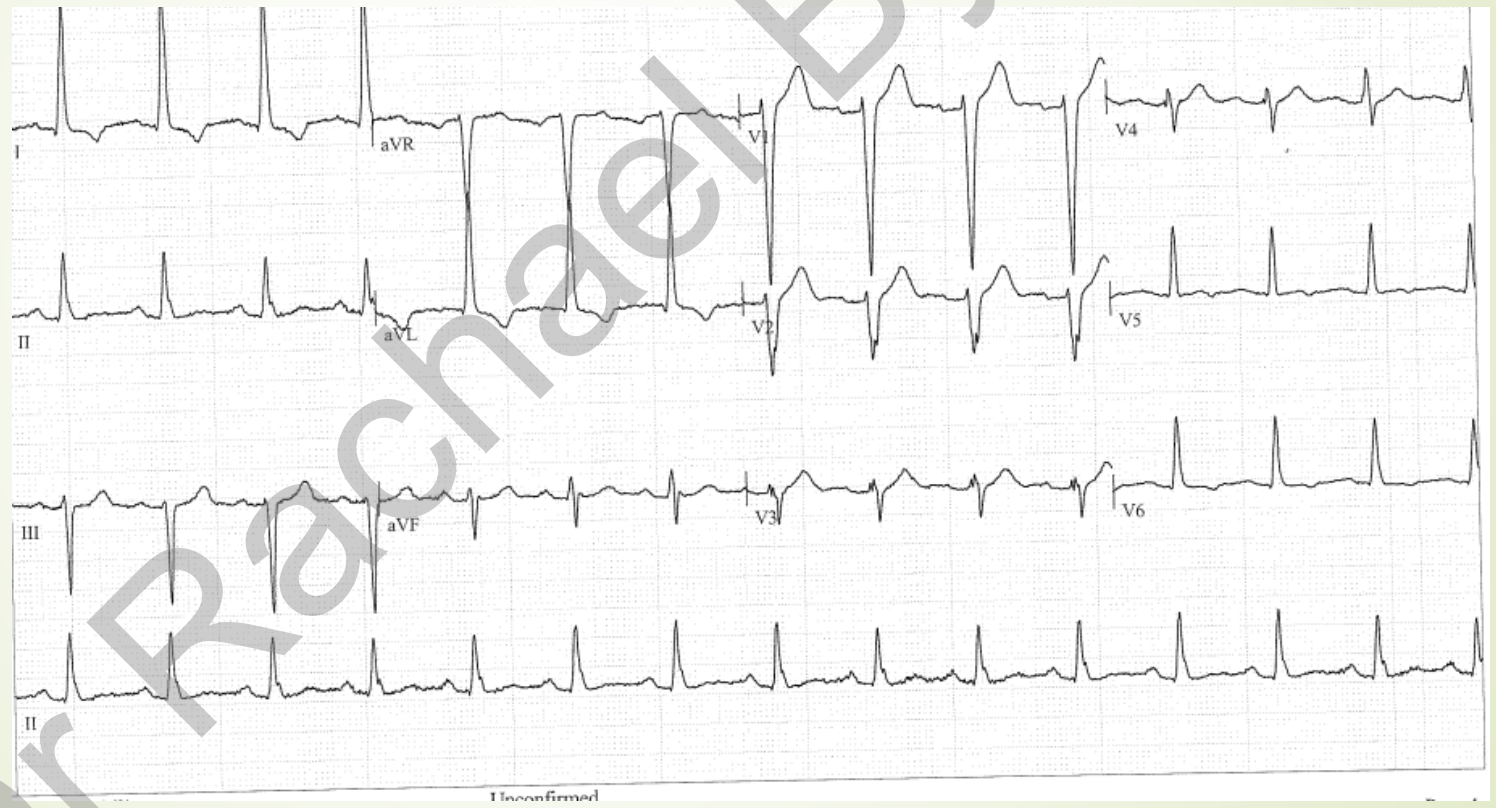
- Frusemide, antibiotics
- CPAP

- Discharge meds
- Frusemide 40 mg – 80 mg
- Spironolactone 12.5 mg
- Dabigatran 150 mg BD
- Losartan 12.5 mg do
- Metoprolol 23.5 mg od

C.D

- Discharged home on meds
- Referred for sleep study
- Referred to heart failure nurse
- Spontaneous reversion to SR

ECG



What's new in Heart Failure

- Definition – complex clinical syndrome with symptoms and signs that result from any structural or functional impairment of ventricular filling or ejection of blood

- Divided up on EF
  - HFrEF < 40%
  - HFmEF 41-49%
  - HFpEF >50%
  - HF with improved EF

Treatment - principles

- Relieve congestion
- Block detrimental effects of renin-angiotensin system
- Reduce mortality and morbidity

Treatment

- Diuretics
- Beta blockers
- MRA – mineralocorticoid receptor blockers
- ARNI – angiotensin, neprolysin receptor inhibitors
- SGLT2inhibitors

Diuretics

- Relieve congestion
  - Loop diuretics- loop of Henle frusemide, bumetanide
  - Thiazides – act on distal collecting ducts – hydrochlorothiazide, chlorthiadone
  - Spironolactone – collecting ducts
  - Metolazone - works across the renal tubules mostly in distal tubules
- Stop once euvolemic
- Monitor electrolytes and renal function

Beta blockers

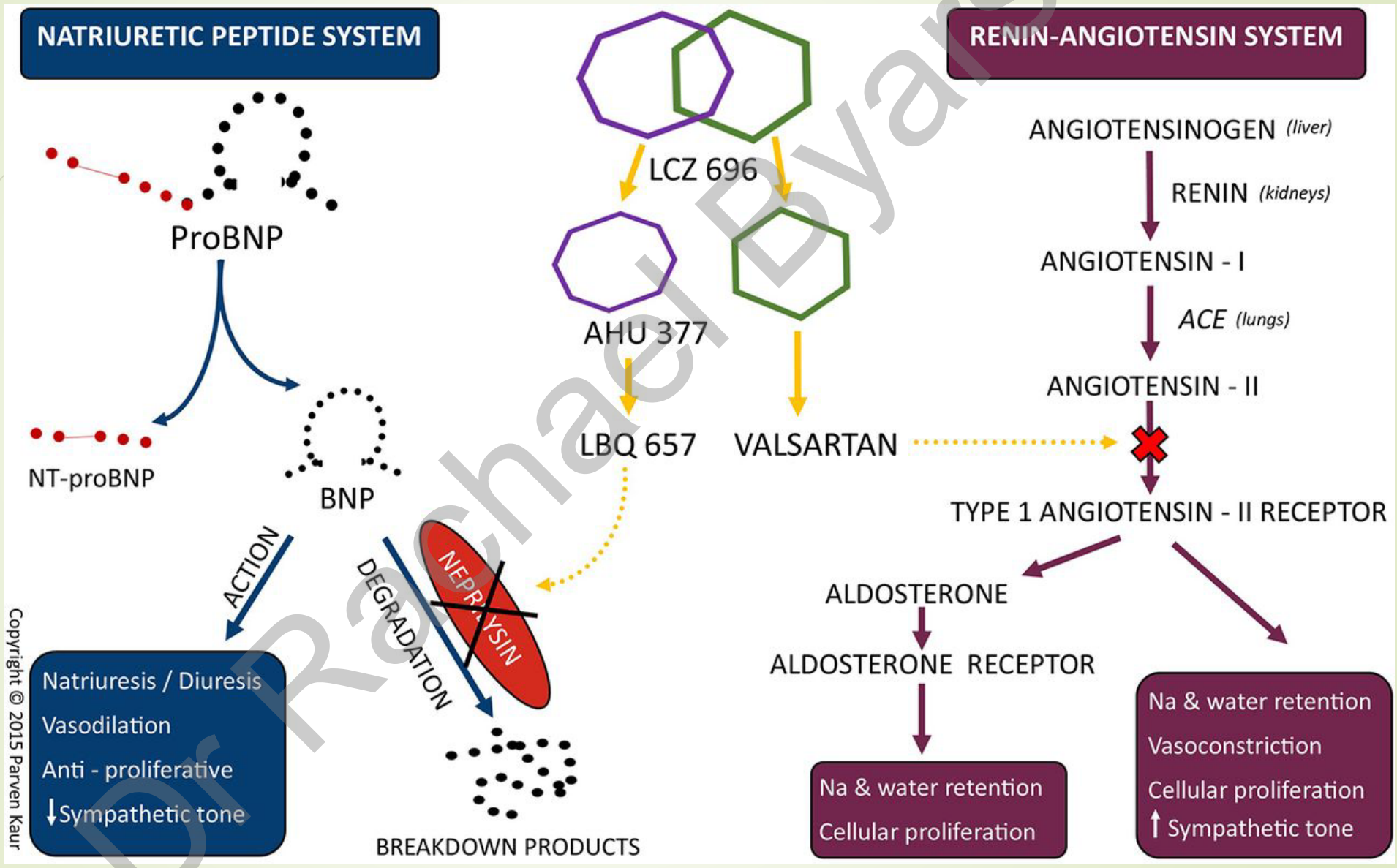
- Block excess sympathetic activity
- 3 recommended by guidelines
  - Metoprolol
  - Bisoprolol
  - Carvedilol (difficult to use with low BP)
- Start low and up titrate

MRA

- Additional blockade of renin-angiotensin system
- Reduce sudden death (probably prevention of hypokalaemia)
- eGFR > 30, k < 5, discontinue if k cannot be kept < 5.5
- Spironolactone 12.5 titrate to 50 mg after 1 month
- Monitor U&E after 1 week, 4 weeks then every 6 months
- Eplererone – fewer hormonal side effects, breast tenderness etc, special authority in NZ

ACE-I, ARB, ARNI

- Entresto – sacubitril / Valsartan
- Angiotensin and neprolysin inhibitor
- Activation of RAAS system in heart failure results in vasoconstriction, hypertension, increased aldosterone levels, increased sympathetic tone -> cardiac remodelling, fibrosis
- Natriuretic peptide system is also activated -> increase in BNP, which is compensatory mechanism -> vasodilation, naturesis and diuresis, lowers BP, reduces sympathetic tone, reduces aldosterone
- Natriuretic peptides broken down by neprolysin (also breaks down bradykinin)
- Sacubritil blocks neprolysin -> increases BNP levels



ARNI - Entresto

- Indicated for chronic heart failure patients on optimal medical treatment with class II or more symptoms
- Now also indicated for acute decompensated heart failure.
- Special authority
- Remember if on ACE-I need 36 hour wash out period
- As increases level of bradykinin increases risk of angioedema
- Don't use if any history of angioedema
- Not in pregnancy - teratogenesis

NYH classification of severity of heart failure

- Class I no symptoms with normal activity, normal functional status
- Class II mild symptoms with normal physical activity, comfortable at rest, slight limitation of functional status
- Class III moderate symptoms with less than normal physical activity, comfortable only at rest, marked limitation of functional status
- Class IV severe symptoms with features of heart failure with minimal physical activity even at rest, severe limitation of functional status

BNP

- Natriuretic hormone
- Released from the heart – particularly the ventricles
- Secreted in response to volume or pressure overload
- Sensitivity 97% good rule out test
- Levels increase with age
- Higher in women, CKD, type 2diabetes, ACS
- Lower in obesity – BMI > 35 = 54
- ESC 50% lower cut off in obese
- Strong predictor for risk of death or hospital readmission, if reduced on GDMT -> improved longterm outcome vs. those persistently elevated

BNP

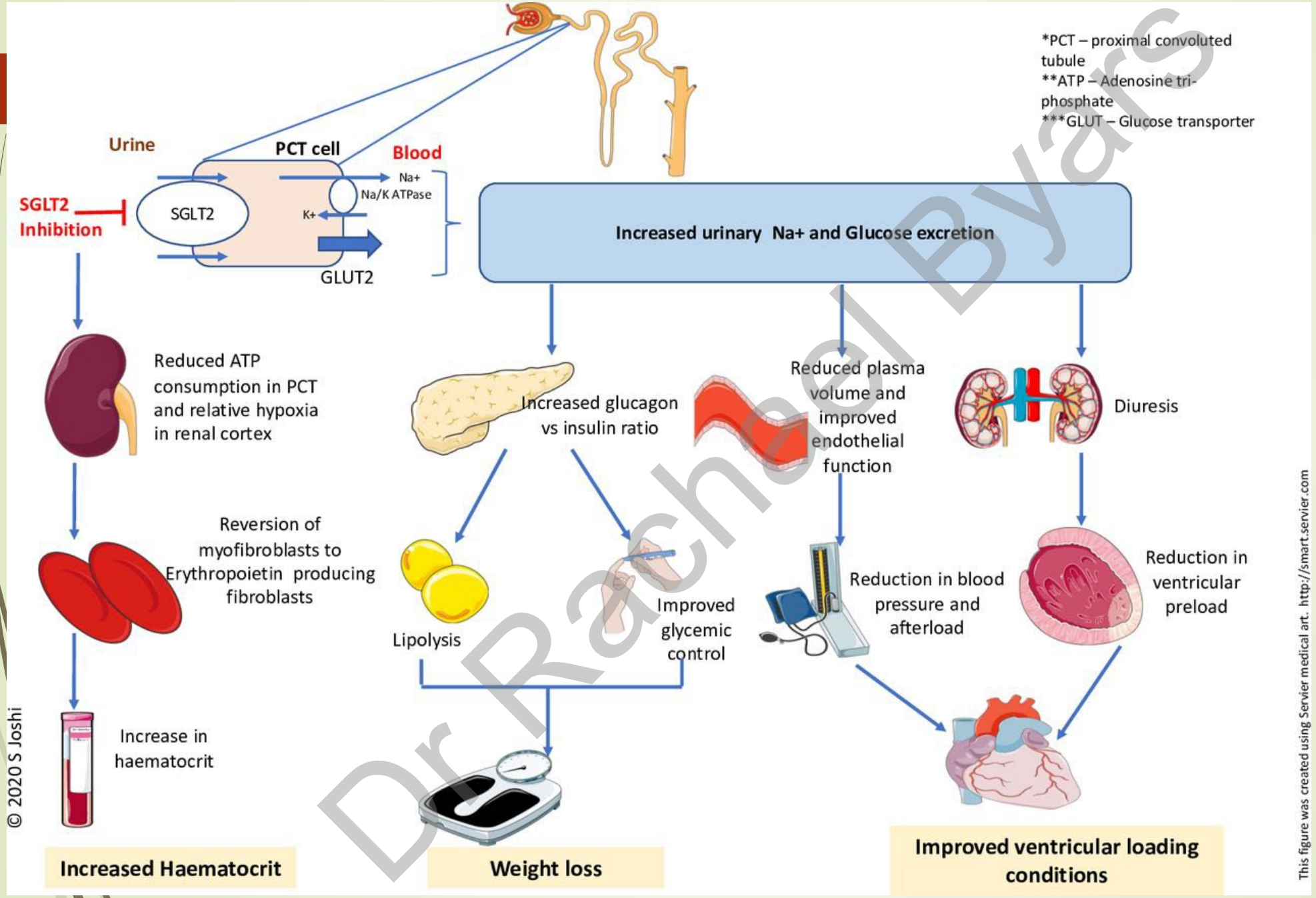
- Also can increase with non cardiac causes
  - Renal failure
  - OSA
  - Severe pneumonia
  - PE
  - Pulmonary artery hypertension
  - Critical illness
  - Bacterial sepsis
  - Severe burns

Sodium- glucose co-transporter 2 inhibitors

- Empaflagozin
- Inhibits sodium glucose co-transporter 2 in proximal tubules kidneys
- Decreases reabsorption of glucose, increase urinary excretion
- Reduces sodium and volume load via diuretic action
- 30 – 35 % risk hospitalisation in those with heart failure
- Independent of glucose lowering effects
- 18% reduction in cardiovascular death

SGLT2I

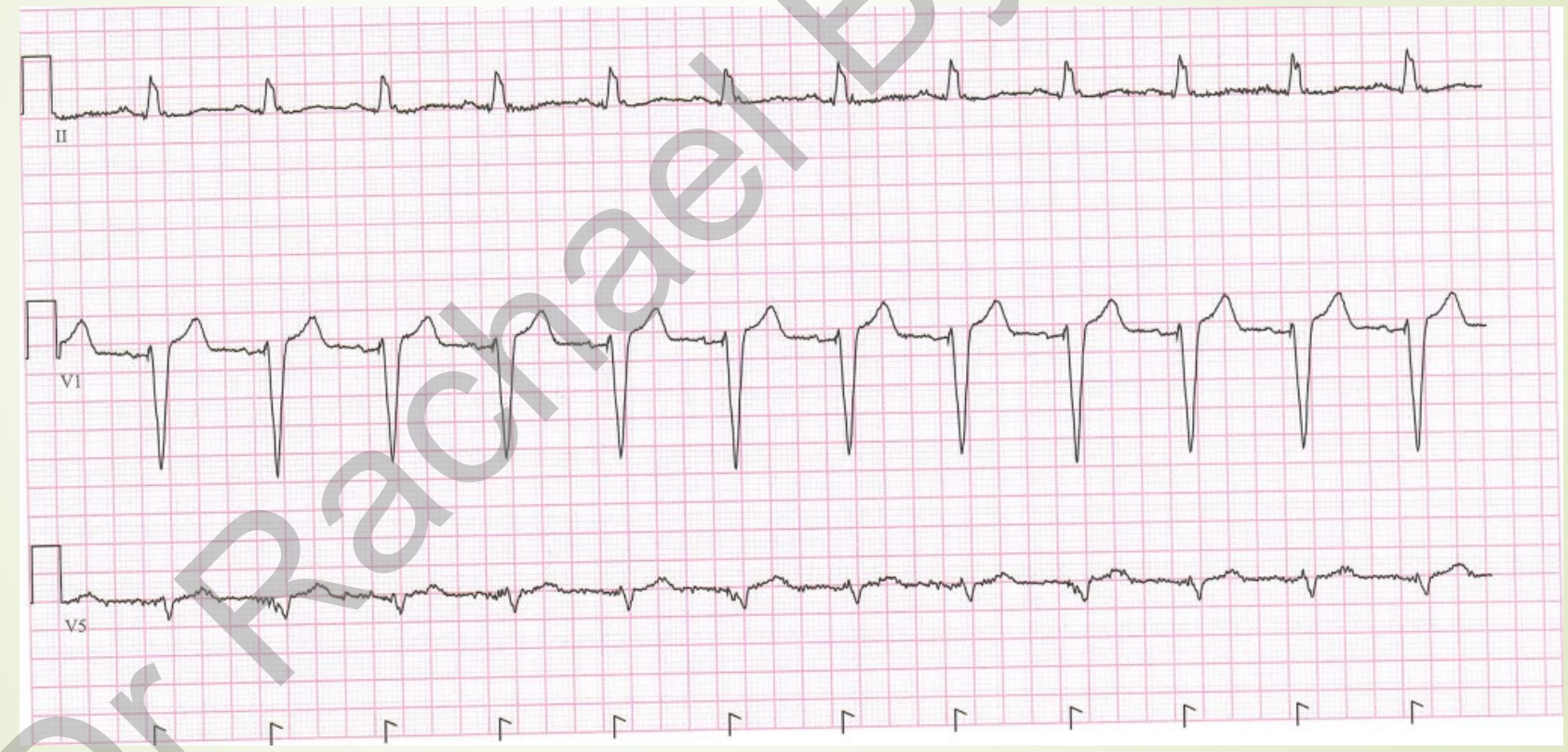
- Mechanism of action not fully understood
- Diuretic and antihypertensive effects, via osmotic diuresis but also acts in those without diabetes
- Antihypertensive effect -> improved endothelial function, decrease arterial stiffness
- Weight reduction and improved glycaemic control but no weight loss in those without diabetes
- Reverses cardiac remodelling, improved cardiac myocardial energetics, improved ionic homeostasis in myocardium



C.D.

- Sleep study – severe OSA with obesity hypoventilation syndrome commenced on CPAP
- Started on Entresto Jan 2022
- Up titration impeded by symptoms and low BP
- Echo Feb 2022 – no improvement in LVEF from October 2022
- Cardiac MRI – consistent with non-ischaemic cardiomyopathy – chemotherapy - doxorubicin
- Referred for cardiac resynchronization and defibrillator
- Implantation July 2022
- Echo September 2022 LV EF 15-20%

ECG post CRT-D



Cardiac MRI

- Useful for diagnosis of underlying cause of heart failure
- Characterisation of myocardium
- Late gadolinium enhancement-> fibrosis
- Infiltrative diseases – amyloid, sarcoidosis
- IHD
- Myocarditis
- Valvular pathology
- Safe in pregnancy but avoid gadolinium

Devices ICD, CRT

- LVEF <= 35% NYHA class II, III symptoms on chronic GMDT with reasonable life expectancy ICD recommended for primary prevention SCD

- Electromechanical dys-synchony from intra-ventricular conduction delay -> haemodynamic inefficiency-> worsens functional MR and LV remodelling
- Biventricular pacing atrium and coronary sinus
- Works best in those with wide QRS – LBBB

CRT - indications

- LVEF < 36%
- SR with LBBB
- QRS duration > 149ms
- NYHA II, III or ambulatory IV on optimal medical therapy

Other stuff

- Start low dose and increase every 2 weeks
- Don't stop the therapy if inpatient unless problematic renal dysfunction
- Digoxin – add in at low dose if still have symptoms despite optimal GDMT
- Useful with additional rate control in A fib
- Optimise treatment of other medical problems – diabetes, OSA, obesity
- Repeat imaging – not required routinely unless there is a change clinical status or there have been treatment interventions
- Repeat echo 90 days after GDMT to determine if improvement
- If LV function improves DO NOT stop meds LV will deteriorate

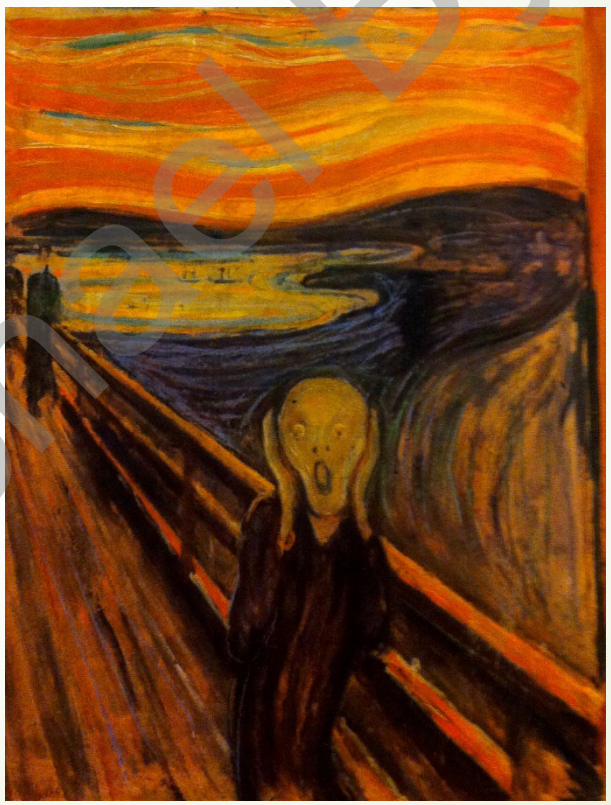
What to avoid

- Dihydropyridine Ca channel blockers –verapamil, diltiazem, nifedipine
- Class 1C antiarrhythmic drugs – flecainide, Sotolol – pro-arrhythmic
- Thiazolidinedione – pioglitazone – fluid retention
- DPP-4 inhibitors – saxagliptin increase risk hospitalisation
- NSAIDS and COX2 inhibitors – fluid retention
- Doxazosin

C.D.

- Echo review – more dys-synchrony than before …
- Requested review for fine tuning
- ? Candidate for heart transplant

Heart Failure preserved ejection fraction



Heart Failure preserved Ejection Fraction

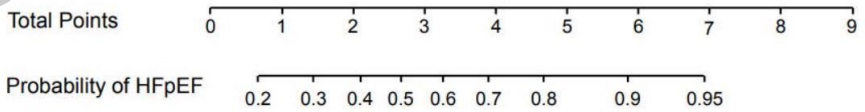
- Clinical syndrome in which patients have signs and symptoms of heart failure as a result of high LV filling pressures despite normal or near normal LVEF
- Diagnosis – evidence of increased LV filling pressures at rest, exercise or other provocations
- Increased BNP, echo diastolic parameters E/ e' >= 15 or other evidence of elevated filling pressures, or invasive haemodynamic measurement at rest or exercise.

H2FPEF - score

- Useful to discriminate non-cardiac dyspnoea from HFpEF
- BNP useful

H2FPEF Score – med calc

	Clinical Variable	Values	Points
H_2	**H**eavy	Body mass index > 30 kg/m^2	2
	Hypertensive	2 or more antihypertensive medicines	1
F	Atrial **F**ibrillation	Paroxysmal or Persistent	3
P	**P**ulmonary Hypertension	Doppler Echocardiographic estimated Pulmonary Artery Systolic Pressure > 35 mmHg	1
E	**E**lder	Age > 60 years	1
F	**F**illing Pressure	Doppler Echocardiographic E/e' > 9	1
H_2FPEF score			Sum (0-9)



HFpEF – treatment goals

- Reduce symptoms
- Improve functional status

HFpEF - treatment

- Diuretics to reduce congestion
- Spironolactone
- SGLT2 inhibitor 10 mg od
- ACEi, ARB, ARNI if hypertensive
- Treat co-morbidities

- Don't use
- Nitrates – decrease physical activity levels
- Intra-atrial shunt – not beneficial

HFpEF - prognosis

- Morbidity – same as HFrEF
- Mortality - lower mortality

Atrial Fibrillation

- Life style disease
- Eat less, move more and lay off the booze
- Treat underlying co-morbidities
- Obesity
- Hypertension
- OSA
- Diabetes

Rate vs. Rhythm control

- Symptom driven
- Symptomatic rhythm control
- Antiarrhythmic therapy
  - Flecainide
  - Amiodarone
- Ablation
  - Obesity, size of atria, may require more than one go
- Buggered ventricle – ablation recommended

Rate control

- Aim resting heart rate < 100 if LV function normal and not symptomatic
- If LV function poor or symptoms then aim for stricter control
- Resting HR < 80
- Holter monitor useful

Stroke risk

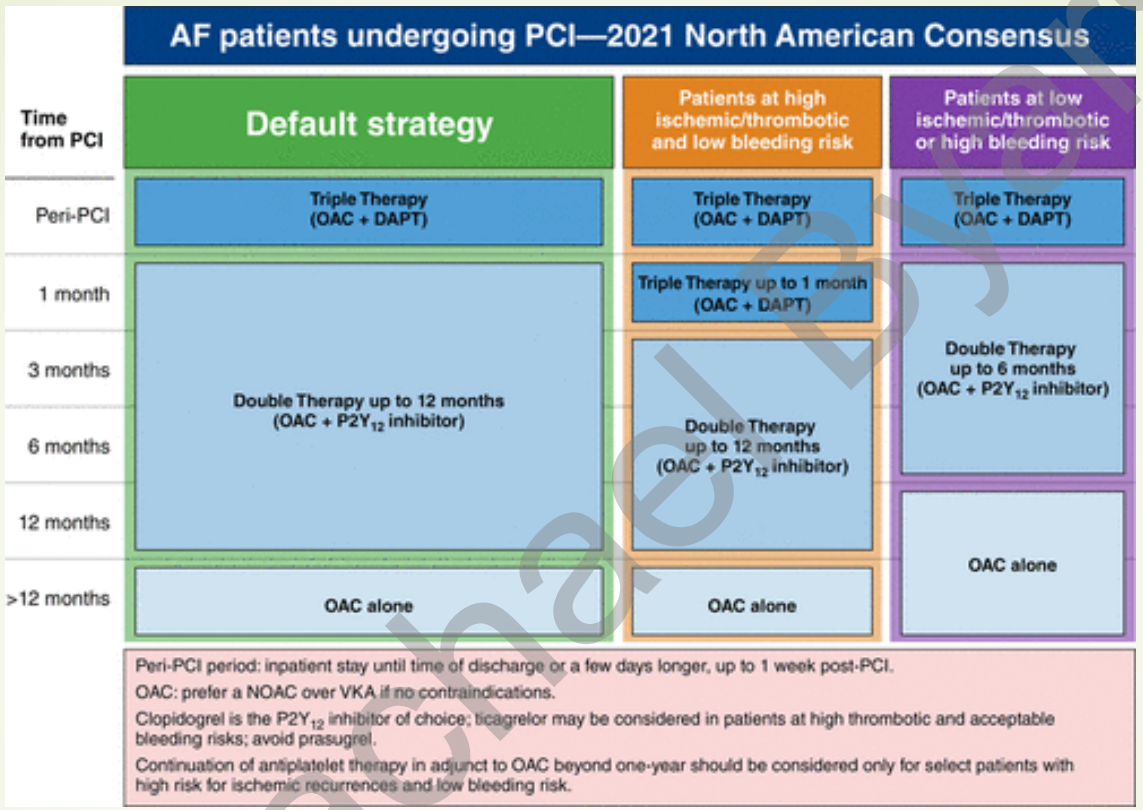
- CHADSvasc score
- > 1 men > 2 women OAC recommended
- NOAC recommended unless
  - Mitral stenosis, mechanical heart valve, poor renal function

Other stuff – stroke on anticoagulation

- No difference with change in NOAC
  - OD to BD dosing
- Don't change to VKA
- Increase risk of bleeding if add in anti platelet agent

ACS and Atrial Fibrillation

- Triple therapy for 1 week to 1 month
- NOAC + clopidogrel for 6 to 12 months
- NOAC only there after
- Can decrease rivaroxaban dose to 15 mg OD, dabigatran 110 mg BD
- Triple therapy increases risk of bleeding 2 to 4 times compared to single therapy



Dominick J. Angiolillo. Circulation. Antithrombotic Therapy in Patients With Atrial Fibrillation Treated With Oral Anticoagulation Undergoing Percutaneous Coronary Intervention, Volume: 143, Issue: 6, Pages: 583-596, DOI: (10.1161/CIRCULATIONAHA.120.050438)