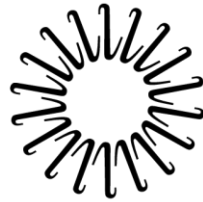


Congestive Heart Failure



Lifespan Cardiovascular Institute

**Rhode Island Hospital • The Miriam Hospital
Newport Hospital**

Delivering health with care.®

The Center For Cardiac
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Congestive Heart Failure

- The number one reason for hospital admissions of adults in the United States.
- The number one consumer of Medicare dollars.
- Predictions for the future suggest it will continue to be the most important problem facing older adults far into the future.

Congestive Heart Failure: Definition and Symptoms

- Definition: The inability of the heart to meet the metabolic (bloodflow) demands of the body at normal “filling pressures.”
- Diminished bloodflow causes symptoms of fatigue, especially with physical activity.
- Elevated pressures in the heart contribute to fluid retention in the lungs, abdomen and legs.

Function of the Heart

- The heartbeat, or cardiac cycle, has two phases
 - Systole – pumping the blood to the body
 - Diastole – receiving blood from the veins in preparation for the next beat
- In congestive heart failure, both phases are often abnormal
 - Systolic dysfunction – diminished amount of forward flow
 - Diastolic dysfunction – blood can't get into the heart normally in preparation for the next beat

What Causes Heart Failure?

Low Ejection Fraction:

- “Systolic Dysfunction” or “Weak Hearts”
 - Heart attacks
 - Poorly controlled high blood pressure
 - Viruses
 - Heart valve problems (leakiness or blockage)
 - Inherited and genetic diseases
 - Toxins – alcohol (excessive), cocaine, some chemotherapeutic drugs.
 - Unknown

Normal Ejection Fraction:

- “Diastolic Dysfunction” or “Stiff Hearts”
 - High blood pressure
 - Aging
 - Diabetes
 - Epidemic in elderly women

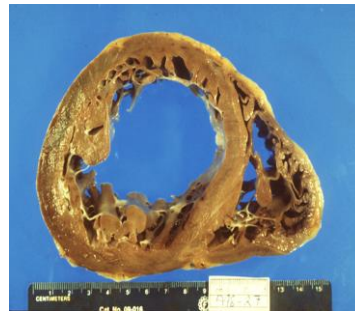
Progressive Heart Failure

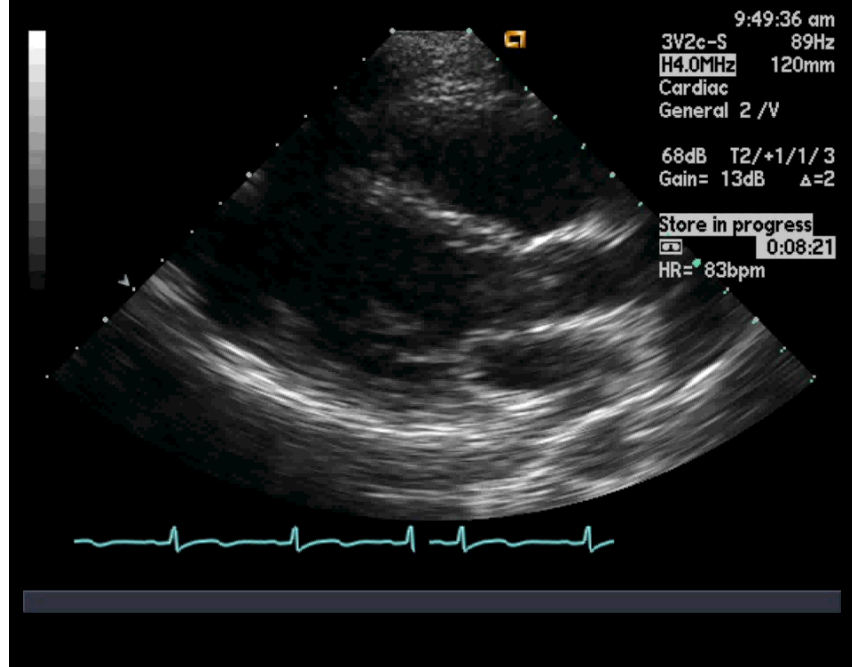
Ventricular Remodeling

A. ISCHEMIC

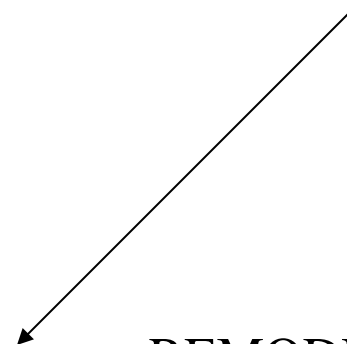
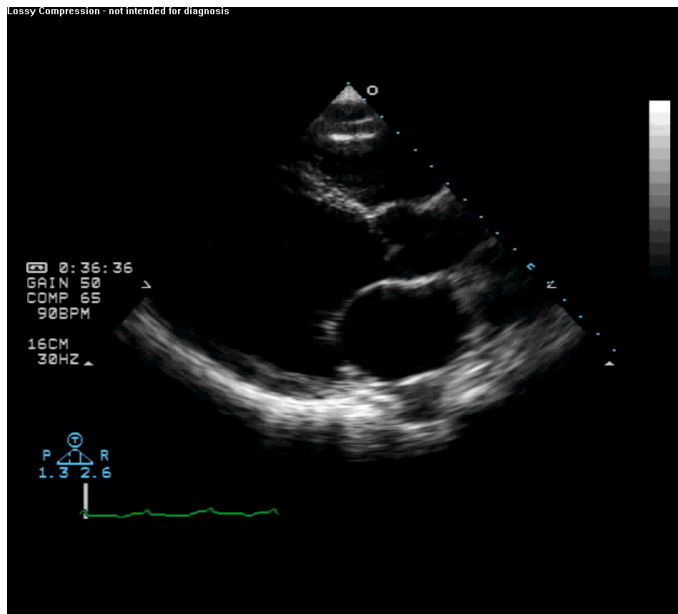
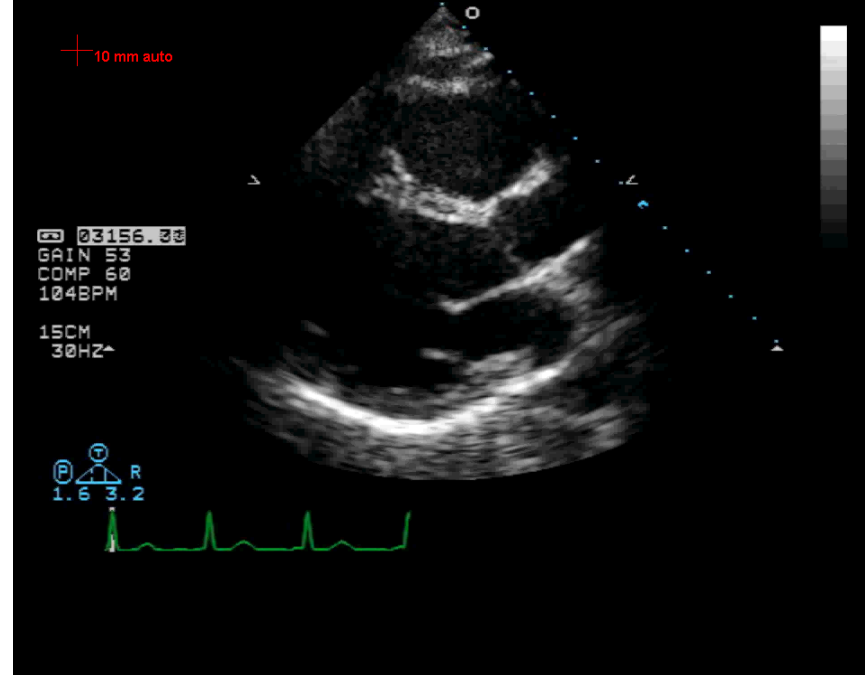
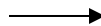
B. IDIOPATHIC DILATED

C. HYPERTENSIVE





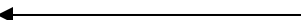
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REMODELING

Prevention is rationale
of modern HF therapy

? THERAPY



Results of Cardiac Dysfunction

- Consequences of systolic dysfunction
 - Diminished flow of blood out of the heart to the body
 - Causes symptoms of fatigue and tired muscles
 - “Tricks” the body into thinking you’re dehydrated
- Consequences of diastolic dysfunction
 - Elevation of the pressure of the blood needed to fill up the heart for the next heartbeat
 - High pressure causes “congestion”
 - Fluid in lungs causes shortness of breath
 - Fluid in the rest of the body causes swelling

The Body's Response to Heart Failure

- The kidneys see low blood flow and think you're dehydrated
 - In response, urine output drops to conserve water
 - This makes fluid retention much worse
- The nervous system sees low blood flow and begins a stress response
 - Blood vessels constrict, making it harder for the heart to pump out blood
 - The brain tells the heart to beat harder and faster, which places more of a burden on the heart

The Body's Response to Heart Failure

- The stress response of the body to the failing heart involves production of many chemicals.
 - These chemicals may make the situation a bit better temporarily, but in general are toxic to the heart and blood vessels and in time make the situation worse.
- The heart enlarges and becomes weaker. Other organs also begin to fail.
 - Patients become swollen, short of breath, and very limited in their ability to do any physical activity.

What to Do?

- Modern therapy of heart failure involves blocking the toxic chemicals from further damaging the cardiovascular system.
- Relief of swelling and shortness of breath is also important, by using water pills to counteract the kidney's tendency to retain salt and water.
 - Low sodium diet is essential.

Blocking Toxic Chemicals

- Effects of Angiotensin II
 - Constrict blood vessels
 - Make kidneys retain fluid
 - Cause enlargement of the heart
 - Promote blocked arteries
- Angiotensin Converting Enzyme Inhibitors (ACE Inhibitors) block production of this chemical and all of these bad effects.

Types of ACE-Inhibitors

- Captopril
- Enalapril
- Lisinopril
- Ramipril
- Quinapril
- Trandolapril
- Fosinopril
- ARB's an acceptable alternative
 - End in “-artan” (ie losartan)
 - More expensive but don't cause cough
- Side Effects
 - Cough
 - Problems with potassium
 - Kidney problems
 - Rare serious allergy
- Benefits far outweigh risk
 - Decrease death by 30%

Beta-Blockers

- Norepinephrine is essentially adrenaline
- Is released by the nervous system into the heart as a stress response to make it beat harder and faster
 - Unfortunately it has detrimental effects
 - Constricted blood vessels
 - Increased workload of heart
 - Death of heart cells
 - Progressive pumping dysfunction
 - Beta-blockers can prevent these harmful effects

Beta-blockers

- Carvedilol
 - Metoprolol
 - Bisoprolol
 - Propranolol
 - Atenolol
 - Nadolol
- Side Effects
 - Fatigue
 - Shortness of breath
 - Worse fluid retention
 - Depression
 - Nightmares
 - Male sexual dysfunction
 - Benefits far outweigh risks
 - 35% reduction in death risk

Relief of Fluid Retention

- Water pills counteract tendency of kidney to retain water
- By getting rid of fluid, pressures in heart fall and symptoms of congestion improve
 - Less swelling
 - Less shortness of breath

Diuretics

- Furosemide
- Torsemide
- Bumetadine
- Ethacrynic Acid
- Zaroxolyn
- Spironolactone – diuretic and blocks a harmful chemical
- Side Effects
 - Dehydration
 - Kidney problems
 - Potassium problems
- Benefits far outweigh risks
 - For many with heart failure, life is barely livable without diuretics

Control of Fluid Retention

- In addition to diuretics, dietary control of sodium intake is essential
 - Sodium must be diluted in water in the body
 - By taking sodium, you increase blood volume
 - Kidney is normally able to get rid of extra salt water, but in patients with heart failure, the kidney mistakenly holds onto salt and water.
 - Diuretics “trick” the kidney into getting rid of salt and water more normally.

Control of Fluid Retention

- Amount of fluid retained generally related to amount of sodium taken in
 - Sodium intake tends to vary from day to day
 - Therefore, dosage of diuretic often needs to vary from day to day
- The daily weight is the best way for patients to estimate their amount of fluid retention
 - As more fluid is retained, weight will increase
- Patients need to feel empowered and comfortable with increasing their diuretic dose if their weight increases to get rid of excess fluid

Digoxin

- Helps the heart beat more strongly
- Blocks harmful chemicals
- Makes people feel better and decreases hospitalizations in heart failure
 - Does not save lives but still an important part of heart failure treatment

Other Therapies

- Defibrillators
 - Annual risk of sudden death is approximately 2-3% with ejection fraction less than 35%
 - Defibrillators can take away this risk
 - They do not make one feel better or improve heart function
- Biventricular Pacemakers
 - Heart contraction is often dyssynchronous (or discoordinated) with heart failure
 - Multiple lead pacemakers can re-synchronize (or re-coordinate) heart motion and improve heart failure symptoms and survival

Other Therapies

- Bypass surgery, angioplasty or stenting if blocked artery is a major cause of the heart failure syndrome
- Valve repair or replacement (most often mitral or aortic) if blocked or leaky valve is a major cause
- Cardiac transplantation in selected patients

Exercise

- Exercise therapy essential for patients with heart failure
 - Improves quality of life and sense of well being
 - Improves efficiency of the circulatory system
 - Decreases hospitalization
 - Probably decreases death rates
- Gone are the days of “bedrest” or major activity limitations for people with cardiac disease
- Best done (at least initially) with professional supervision

Conclusions

- Heart Failure is a major health problem
- It causes fatigue, shortness of breath and swelling
- Without treatment, it tends to get worse over time as the body reacts to the heart failure state
- By interrupting the body's response to heart failure, it can be effectively treated
- Lifestyle changes (reduced sodium intake and regular exercise) are as important as any medication or procedure in treating the disease