노인 심부전의 진단과 치료

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심부전의 정의

- Heart failure is a clinical syndrome in which patients have the following features:

- Symptoms typical of heart failure (breathlessness at rest or on exercise, fatigue, tiredness, ankle swelling)

- Signs typical of heart failure (tachycardia, tachypnoea, pulmonary rales, pleural effusion, raised jugular venous pressure, peripheral oedema, hepatomegaly)

- Objective evidence of a structural or functional abnormality of the heart at rest (cardiomegaly, third heart sound, cardiac murmurs, abnormality on the echocardiogram, raised natriuretic peptide concentration)

Prevalence of heart failure by age and sex
(NHANES: 1999-2004). Source: NCHS and NHLBI.

Hospital discharges for heart failure by sex
(United States: 1979-2004). Source: NHIS, NCHS and NHLBI.
Note: Hospital discharges include people discharged alive, dead and status unknown.
Ventricular Remodeling after Infarction (Panel A) and in Diastolic and Systolic Heart Failure (Panel B)

Atypical clinical manifestation
- Frequent neurologic symptom
- Adverse effect / iatrogenic event
- Poor clinical outcome
- Systolic vs. Diastolic heart failure

Factors associated with symptom of CHF in the elderly patients

Comorbidities
- Diabetes, chronic lung disease, depression

Heart Failure
- SYMPTOMS
- Concurrent Symptoms
  - Nausea, dry mouth, pain, constipation, drowsiness, etc.
- Prototypical Symptoms
  - Cough, fatigue, edema
- Polypharmacy

(1) presence of signs or symptoms of CHF
(2) presence of normal or only mildly abnormal left ventricular systolic function (LVEF 45–50%)
(3) evidence of abnormal left ventricular relaxation, diastolic distensibility, or diastolic stiffness

Characteristics of Patients with Diastolic Heart Failure and Patients with Systolic Heart Failure

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Diastolic Heart Failure</th>
<th>Systolic Heart Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Frequently elderly</td>
<td>All ages, typically 50–70 yr</td>
</tr>
<tr>
<td>Sex</td>
<td>Frequently female</td>
<td>More often male</td>
</tr>
<tr>
<td>Left ventricular ejection fraction</td>
<td>Preserved or normal, approximately 40% or higher</td>
<td>Depressed, approximately 40% or lower</td>
</tr>
<tr>
<td>Left ventricular cavity size</td>
<td>Usually normal, often with concomitant left ventricular hypertrophy</td>
<td>Usually dilated</td>
</tr>
<tr>
<td>Left ventricular hypertrophy on Electrocardiography</td>
<td>Usually present</td>
<td>Sometimes present</td>
</tr>
<tr>
<td>Chest radiography</td>
<td>Congestion / cardomegaly</td>
<td>Congestion and cardomegaly</td>
</tr>
<tr>
<td>Gallbladder present</td>
<td>Fourth heart sound</td>
<td>Third heart sound</td>
</tr>
<tr>
<td>Hypertension</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Previous myocardial infarction</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>Cessation</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>++</td>
<td>0</td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Long-term dialysis</td>
<td>++</td>
<td>0</td>
</tr>
<tr>
<td>Anemia/Neutropenia</td>
<td>+ (usually paroxysmal)</td>
<td>+ (usually persistent)</td>
</tr>
</tbody>
</table>

노인 심부전의 특징

- Atypical clinical manifestation
- Frequent neurologic symptom
- Adverse effect / iatrogenic event
- Poor clinical outcome
- Systolic vs. Diastolic heart failure

이완기 심부전의 정의

1. presence of signs or symptoms of CHF
2. presence of normal or only mildly abnormal left ventricular systolic function (LVEF 45–50%)
3. evidence of abnormal left ventricular relaxation, diastolic distensibility, or diastolic stiffness

노년기 심부전의 혼합 원인

- 근육패혈증: 급성 심근경색증, 혈전성 심근병증
- 심장마약증: 심장장도, 만성 신부전, 심근경색, 심근염, 심장마약중독
- 심근병증: 심장마약증, 심장마약중독
- 정맥형 심부전: 비후성, 관류, 흡수성, 흡수성
- 심근염, 심실형
- 고혈압성 심부전: 고혈압성 심근병증
- 고혈압성 심부전
- 심장마약중독
- 고혈압성 심부전: 비후성, 관류, 흡수성, 흡수성
- 만성 신부전, 이중성, 가정형 심부전

- S530 -
Algorithm for the diagnosis of heart failure or left ventricular dysfunction

- Suspected LV dysfunction because of signs
  - Assess presence of cardiac disease by ECG, X-ray or
    Nuclear medicine test (where available)
  - Normal
    Heart Failure or LV dysfunction unlikely
  - Tests abnormal
    Imaging by Echocardiography
    (Nuclear angiography or
    MRI where available)
  - Normal
    Heart Failure or LV dysfunction unlikely
  - Tests abnormal
  - Additional diagnostic tests
    when appropriate
    (e.g., coronary angiography)
  - Choose therapy

Flow chart for the diagnosis of CHF with BNP

- Clinical examination, ECG, Chest X-ray, Echo
  Cardiography

  - BNP < 100 pg/mL
  - NT pro-BNP < 400 pg/mL
  - Heart failure unlikely

  - BNP 100-400 pg/mL, NT pro-BNP < 400 pg/mL
    - Chronic HF unlikely

  - Chronic HF likely

Stages of heart failure

- Stage A
  - At high risk for developing heart failure
  - No identified structural or functional abnormality; no signs/symptoms

- Stage B
  - Developed structural heart disease that is strongly associated with the development of heart failure, but without signs/symptoms

- Stage C
  - Symptomatic heart failure associated with underlying structural heart disease

- Stage D
  - Advanced structural heart disease and marked symptoms of heart failure at rest despite maximal medical therapy

Recommendations for management of heart failure

- Therapy
  - Atrial fibrillation
  - Quit smoking
  - Treat diabetes
  - Exercise
  - ACE inhibitors
  - β-blockers

- Therapy
  - Stage A therapy
  - Diuretics
  - ACE inhibitors
  - β-blockers
  - Digoxin
  - Salt restriction

- Therapy
  - Stage C therapy
  - Mechanical assist devices
  - Heart transplantation
  - Continuous inotropic infusions
  - Hospice care

Stages of Heart Failure & Treatment Options

- Stage A
  - High risk
  - No symptoms

- Stage B
  - Structural heart disease
  - No symptoms

- Stage C
  - Structural disease
  - Exacerbated or current symptoms

- Stage D
  - Refractory symptoms
  - Requiring special intervention

- Medical therapy
  - Diuretics
  - ACE inhibitors
  - β-blockers

- Non-pharmacological therapy
  - Cardiac revascularization
  - Lifestyle changes
  - Dietary sodium restriction, diuretics, digoxin

- Surgical therapy
  - Cardiac transplantation
  - Cardiac-assist devices
  - Pacemakers

- Interventional therapy
  - Catheter-based therapy
  - Percutaneous valve

- End-stage therapy
  - Hospice care
  - Palliative care

노인 심부전의 치료

- 치료의 목표: 중상의 완화, 산소 요구량 감소
- 비약물적 치료: 체색체 감소, 수면질
- 고혈압, 관상동맥질환, 혈관 질환 등 원인 질환 치료
- 비만, 당뇨, 부정맥, 고혈압 약물, 정비관련 심장, 간질환 기능
- 허리질환, 유전질환 등에 의해 야인된
- 혈압 감소의 적용
- 원자, 가족, 관계자에 대한 교육
- 약물의 선택
  - COST: 복합제트, 인사상전, 전신반응 완화, 브이스프로로리디(bisoprolol, metoprolol, carvedilol, nebivolol), 헤모스테트, 골수체제
  - 중상조절: 디리함, 이노맥

- S531
Recommended components of heart failure management programmes

- Multidisciplinary approach frequently led by HF nurses in collaboration with physicians and other related services
- First contact during hospitalization, early follow-up after discharge through clinic and home-based visits, telephone support, and remote monitoring
- Target high-risk, symptomatic patients
- Increased access to healthcare (telephone, remote monitoring, and follow-up)
- Facilitate access during episodes of decompensation
- Optimized medical management
- Access to advanced treatment options
- Adequate patient education with special emphasis on adherence and self-care management
- Patient involvement in symptom monitoring and flexible diuretic use
- Psychosocial support to patients and family and/or caregiver

Advantages and disadvantages of different models of heart failure programmes

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinic</td>
<td>Home health care</td>
</tr>
<tr>
<td>Convenient with medical expertise, facilitates and equipment available</td>
<td>Access to in-home patient</td>
</tr>
<tr>
<td>Facilitates diagnosis and adjustment of treatment</td>
<td>Few facilities to meet needs of patient</td>
</tr>
<tr>
<td>Home care</td>
<td>Telephonic support</td>
</tr>
<tr>
<td>Access to in-home patient</td>
<td>Low cost, time saving and convenient for the person and the patient</td>
</tr>
<tr>
<td>Physician accessible in their own home environment</td>
<td>Few facilities to meet needs of patient</td>
</tr>
<tr>
<td>Convenient for follow-up and slightly after hospitalization</td>
<td>Few facilities to meet needs of patient</td>
</tr>
<tr>
<td>Time consuming for the HF team</td>
<td></td>
</tr>
<tr>
<td>Few facilities to meet needs of patient</td>
<td></td>
</tr>
<tr>
<td>Home care is more expensive and time consuming</td>
<td></td>
</tr>
<tr>
<td>Telephonic support</td>
<td>Few facilities to meet needs of patient</td>
</tr>
<tr>
<td>Few facilities to meet needs of patient</td>
<td></td>
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<tr>
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<td></td>
</tr>
</tbody>
</table>

Implantable Continuous Hemodynamic Monitor

노인의료 전문팀의 구성원

- Core Members:
  - Geriatrician
  - Nurse
  - Social Worker
  - Occupational Therapist
  - Physiotherapist

- By Consultation:
  - All subspecialties of medicine
  - Other specialties

- Supporting Members:
  - Podiatrist
  - Speech Therapist
  - Dietitian
  - Prosthetic & orthotic specialist
  - Psychogeriatrician
  - Clinical psychologist
  - Volunteer
  - Pastoral care

노인 포괄 평가의 내용

- Medical
  - Problem list
  - Comorbid conditions and disease severity
  - Medication review
  - Nutritional status

- Functioning
  - Basic activities of daily living (ADL)
  - Instrumental activities of daily living (IADL)
  - Activity/exercise status
  - Gait and balance

- Psychological
  - Mental status (cognitive) testing
  - Mood/depression testing

- Social
  - Informal support needs and assets
  - Care resource eligibility/financial assessment
  - Home safety
  - Transportation and telehealth

환자 상태에 따른 인프라서비스 이용

- Day care center
- Home helper
- Home visiting
- Hospital
- Networking
- Referral center
- Nursing home
Common Comorbidities in Older Patients

<table>
<thead>
<tr>
<th>Condition</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal dysfunction</td>
<td>Exacerbated by diuretics, ACE inhibitors</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>Contributes to uncertainty about diagnosis/volume status</td>
</tr>
<tr>
<td>Cognitive dysfunction</td>
<td>Interferes with dietary, medication, activity compliance</td>
</tr>
<tr>
<td>Depression, social isolation</td>
<td>Worsens prognosis, interferes with compliance</td>
</tr>
<tr>
<td>Postural hypotension, falls</td>
<td>Exacerbated by vasodilators, diuretics, β-blockers</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>Aggravated by diuretics, ACE inhibitors (cough)</td>
</tr>
<tr>
<td>Sensory deprivation</td>
<td>Interferes with compliance</td>
</tr>
<tr>
<td>Nutritional disorders</td>
<td>Exacerbated by dietary restrictions</td>
</tr>
<tr>
<td>Polypharmacy</td>
<td>Compliance issues, drug interactions</td>
</tr>
<tr>
<td>Frailty</td>
<td>Exacerbated by hospitalization, increased fall risk</td>
</tr>
</tbody>
</table>

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Polypharmacy

![Polypharmacy Graph](image)

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Drugs to avoid or beware

(i) Non-steroidal anti-inflammatory drugs (NSAIDS) and coxibs
(ii) Class I anti-arrhythmic agents
(iii) Calcium antagonists (verapamil, diltiazem, and short-acting dihydropyridine derivatives)
(iv) Tricyclic anti-depressants
(v) Corticosteroids
(vi) Lithium

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Nutrition, Muscle wasting, and Cardiac cachexia

Cardiac cachexia in CHF patients
1. non-intentional
2. severe loss of body weight
3. muscle wasting
4. fatigue
5. weakness

Definition of Cardiac cachexia:
non-edematous weight loss of 6% or more over a period of 6 months in patients with CHF

Incidence: 13% – 36% (incidence of CC will still rise accordingly in the future)

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Prognosis

![Prognosis Graph](image)

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Body composition change: Sarcopenia

*25-year-old healthy adult*

*75-year-old healthy adult*
Absolute and Relative Contraindications to Resistance Training

- **Absolute**
  - Unstable CHF
  - Decompensated HF
  - Uncontrolled arrhythmias
  - Severe pulmonary hypertension (mean pulmonary arterial pressure > 55 mm Hg)
  - Severe and symptomatic aortic stenosis
  - Acute myocarditis, endocarditis, or pericarditis
  - Uncontrolled hypertension (180/110 mm Hg)
  - Aortic dissection
  - Marfan syndrome
  - High-intensity RT (80% to 100% of 1-RM) in patients with active proliferative retinopathy or moderate to worse nonproliferative diabetic retinopathy

- **Relative (should consult a physician before participation)**
  - Major risk factors for CHD
  - Diabetes at any age
  - Uncontrolled hypertension (>160/100 mm Hg)
  - Low functional capacity (<4 METs)
  - Musculoskeletal limitations
  - Individuals who have implanted pacemakers or defibrillators

Guidelines and Statements Regarding Resistance and Flexibility Training

<table>
<thead>
<tr>
<th>Population</th>
<th>Resistance Training</th>
<th>Flexibility Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy adults</td>
<td>1 set of 10 reps for each exercise</td>
<td>5-15 exercises</td>
</tr>
<tr>
<td>2007 NHMRC Scientific Statement</td>
<td>5-10 exercises</td>
<td>2-3 days</td>
</tr>
<tr>
<td>2006 ACSM guidelines</td>
<td>1 set of 10 exercises</td>
<td>Flexibility exercises</td>
</tr>
<tr>
<td>2006 ACSM guidelines</td>
<td>5-10 exercises</td>
<td>2-3 days</td>
</tr>
</tbody>
</table>

Hemoglobin & survival in ELITE II study (N=3944)

<table>
<thead>
<tr>
<th>Hemoglobin (g/dL)</th>
<th>RR 0.986</th>
<th>RR 1.033</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>8.4</td>
<td>136</td>
<td>2</td>
</tr>
<tr>
<td>8.8</td>
<td>351</td>
<td>2</td>
</tr>
<tr>
<td>9.2</td>
<td>605</td>
<td>2</td>
</tr>
<tr>
<td>9.6</td>
<td>762</td>
<td>2</td>
</tr>
<tr>
<td>10.0</td>
<td>832</td>
<td>2</td>
</tr>
<tr>
<td>10.4</td>
<td>363</td>
<td>2</td>
</tr>
<tr>
<td>10.8</td>
<td>139</td>
<td>2</td>
</tr>
</tbody>
</table>

Cholesterol in CHF patients

Cumulative survival

- Cholesterol<5.2 (200.8 mg/dL)
- Cholesterol<5.2

Rauchaus, JACC 2003
### Treatment

1. Appetite stimulants; megestrol acetate, medroxyprogesterone acetate
2. Ghrelin
3. Anabolic steroids; oxymetholone
4. Growth hormone
5. Nutritional support
6. ACE inhibitor / Beta-blocker

### Summary

- 표준적인 접근으로 환자가 가지고 있는 모든 문제를 파악한다.
- 심부전에 동반된 증상 및 질환에 대한 적절한 관리가 심부전 약물로 인한 채많은 위험을 감소시킬 수 있다.
- 팀 접근법을 적극적으로 활용하고 지역사회资源을 효과적으로 운영할 수 있는 노력이 필요하다.