Überblick

Symptom Angina pectoris
DD
Statistiken
ACS-Definition
EKG
STEMI Erstversorgung/Logistik
Lyse/PCI
Troponin
NSTEMI/IAP
Risikoabschätzung
Pathophysiologie Koronararterie
4 Fallbeispiele im Katheterlabor
Rehabilitation/Prävention
William Heberden's classic description of angina pectoris was first presented to the Royal College of Physicians in 1768. It was published in 1772, in the Medical Transactions of the College. Many aspects of his description are true to this day. He describes both typical exertional angina as well as variant angina which eventually affected a patient only when he was in bed and was relieved by sitting up. He also points out the influence of mental stress. Although it is a classic, it is not the first description of angina. A case was described in 1632 in the memoirs of the Earl of Clarendon.

Pectoris Dolor

published in:
Commentaries on the History and Cure of Diseases
By William Heberden, M.D.
London (1802)
reprinted from:
Heberden W. Some account of a disorder of the breast.

Besides the asthma, hysteric oppressions the acute darting pains, in pleurisies, and the chronical ones in consumptions, the breast is often the seat of pains, which are distressing, sometimes even from their vehemence, oftener from their duration as they have continued to tease the patient for six for eight, for nine, and for fourteen years. There have been several examples of their returning periodically every night, or alternately with a headache. They have been called gouty, and rheumatic and spasmodic. There has appeared no reason to judge that they proceed from any cause of much importance to health (being attended with no fever,) or that they lead to any dangerous consequences and if the patient were not uneasy with what he feels, he needs never to be so on account of anything which he has to fear.

If these pains should return at night and disturb the sleep, small doses of opium have been found serviceable, and may be used alone, or joined with an opening medicine, with a preparation of antimony, or with the fetid gums. Externally, a small perpetual blister applied to the breast has been successful, and so has an issue made in the thigh. A large cumin plaster has been worn over the seat of the pain with advantage. The volatile, or saponaceous liniment, may be rubbed in over the part affected. Bathing in the sea, or in any cold water, may be used at the same time.

But there is a disorder of the breast marked with strong and peculiar symptoms, considerable for the kind of danger belonging to it, and not extremely rare, which deserves to be mentioned more at length. The seat of it, and sense of strangling, and anxiety with which it is attended, may make it not improperly be called angina pectoris.

They who are afflicted with it, are seized while they are walking, (more especially if it be up hill, and soon after eating) with a painful and most disagreeable sensation in the breast, which seems as if it would extinguish life, if it were to increase or continue; but the moment they stand still, all this uneasiness vanishes.

In all other respects, the patients are, at the beginning of this disorder, perfectly well, and in particular have no shortness of breath, from which it is totally different. The pain is sometimes situated in the upper part, sometimes in the middle, sometimes at the bottom of the os sterni, and often more inclined to the left than to the right side. It likewise very frequently extends from the breast to the middle of the left arm. The pulse is, at least sometimes, not disturbed by this pain, as I have had opportunities of observing by feeling the pulse during the paroxysm. Males are most liable to that disease, especially such as have passed their fiftieth year.

After it has continued a year or more, it will not cease so instantaneously upon standing still; and it will come on not only when the persons are walking, but when they are lying down, especially if they lie on their left side, and oblige them to rise up out of their beds. In some inveterate cases it has been brought on by the motion of a horse, or a carriage, and even by swallowing, coughing, going to stool, or speaking, or any disturbance of mind.
Such is the most usual appearance of this disease; but some varieties may be met with. Some have been seized while they were standing still or sitting; also upon first waking out of sleep: and the pain sometimes reaches to the right arm, as well as to the left, and even down to the hands, but this is uncommon: in a very few instances the arm has at the same time been numbed and swelled. In one of two persons the pain has lasted some hours, or even days; but this has happened when the complaint has been of long standing, and thoroughly rooted in the constitution: once only the very first attack continued the whole night.

I have seen nearly a hundred people under this disorder, of which number there have been three women, and one boy twelve years old. All the rest were men near, or past the fiftieth year of their age.

Persons who have persevered in walking till the pain has returned four or five times, have then sometimes vomited.

A man in the sixtieth year of his life began to feel, while he was walking, an uneasy sensation in his left arm. He never perceived it while he was traveling in a carriage. After it had continued ten years, it would come upon him two or three times a week at night, while he was in bed, and then he was obliged to sit up for an hour or two before it would abate so much as to suffer him to lie down. In all other respects he was very healthy, and had always been a remarkably strong man. The breast was never affected. This disorder, its seat excepted, perfectly resembled the angina pectoris, gradually increasing in the same manner, and being both excited and relieved by all the same causes. **He died suddenly without a groan** at the age of seventy-five.

The termination of the angina pectoris is remarkable. For, if no accidents intervene, but the disease go on to its height, the patients **all suddenly fall down, and perish almost immediately**. Of which indeed their frequent faintnesses, and sensations as if all the powers of life were failing, afford no obscure intimation.

The angina pectoris, as far as I have been able to investigate, belongs to the class of **spasmodic**, not inflammatory complaints.

For,

1. The access and the recess of the fit is sudden.
2. There are long intervals of perfect health.
3. Wine, and spirituous liquors, and opium afford considerable relief.
4. It is increased by disturbance of the mind.
5. It continues many years without any other injury to the health.
6. In the beginning it is not brought on by riding on horseback, or in a carriage, as is usual in diseases arising from scirrhus or inflammation.
7. During the fit the pulse is not quickened.

Lastly, Its attacks are often after the first sleep, which is a circumstance common to many spasmodic disorders.

Yet it is not to be denied that I have met with one or two patients, who have told me they now and then spit up matter and blood, and that it seemed to them to come from the seat of the disease. In another, who fell down dead without any notice, there immediately arose such as offensive smell, as made all who were present judged that some foul abscess had just then broken.
On opening the body of one who died suddenly of this disease, a very skillful anatomist could
discover no fault in the heart, in the valves, in the arteries, or neighboring veins, excepting some
small rudiments of *ossification in the aorta*. The brain was likewise every where sound. In this
person, as it has happened to others who have died by the same disease, the *blood* continued fluid
two or three days after death, not dividing itself into crassamentum and serum, but *thick, like
cream*. Hence when a vein has been opened a little before death, or perhaps soon after, the blood has
continued to ooze out as long as the body remained unburied.

With respect to the *treatment* of this complaint, I have little or nothing to advance: Nor indeed is it
to be expected we should have made much progress in the cure of a disease, which has hitherto
hardly had a place or a name in medical books. *Quiet and warmth*, and spirituous *liquors*, help
restore patients who are nearly exhausted, and to dispel the effects of a fit when it does not soon go
off. *Opium* taken at bed-time will prevent the attacks at night. I knew one who set himself a task of
sawing wood for half an hour every day, and was nearly cured. In one also the disorder ceased of
itself. Bleeding, vomiting, and purging, appear to me to be improper.

**William Heberden, 21. Juli 1768:**

„Es gibt eine Störung im Thoraxbereich - gravierend wegen der ihr eigenen
potentiellen Gefahr - die durch heftige und eigentümliche Symptome
gekennzeichnet und nicht einmal extrem selten ist.

Ihr Sitz, das Gefühl der Strangulation und die Angst, von der dieses
Engegefühl begleitet wird, rechtfertigen die Bezeichnung "Angina pectoris".

Bei den von ihr Betroffenen kommt es zu einem Anfall beim *Gehen*, und ganz
besonders dann, wenn sie bald nach dem Essen aufbrechen, wobei die
Beschwerden mit einer schmerzhaften und höchst unangenehmen
Missempfindung im Brustraum verbunden sind, die das *Leben auszulöschen*
scheinen, sofern sie sich steigern oder fortsetzen würden.

*In dem Augenblick, in dem die Patienten stehen bleiben, klingen alle
diese Symptome ab.*
Chest-Pain-Unit!

Prozent der interviewten Patienten

Erbrechen
Übelkeit ohne Erbrechen
Todesangst
Atmungsstörungen
 kalter Schweiß
Schmerzausstrahlung:
Oberbauch
Kiefer-Hals-Winkel
linkes Schulterblatt
rechter Arm
linker Arm
Typischer Brustschmerz
Prazipitalität < 4 h

Frauen (n = 486)
Männer (n = 1431)

*p-Wert < 0,05

Akute Symptomatik in Prozent (95-Prozent-Konfidenzintervalle; *p-Wert < 0,05) bei interviewten 25- bis 74-jährigen Patienten mit Erst- oder Reinfarkt nach Geschlecht, altersadjustiert. MONICA/KORA-HERZINFEKTIONSTERT-register 2001-2003
Angina pectoris

- schwere anhaltende Schmerzen im Brustkorb
- starkes Engegefühl, heftiger Druck im Brustkorb
- blasse, fahle Gesichtsfarbe, kalter Schweiss (insb. bei Männern)
- Schmerzausstrahlung in Rücken (insb. bei Frauen), Kiefer und Bauch
- plötzliche Übelkeit, häufig mit Erbrechen (insb. bei Frauen)
- Luftnot, flache Atmung
- Schwächeanfall (auch ohne Schmerz), evtl. Bewusstlosigkeit
Risikofaktoren

beeinflussbar

Hypertonie
HDL/LDL/TG
Rauchen
Stress
Bewegungsmangel
Übergewicht
Typ II Diabetes

nicht beeinflussbar

Alter
Postmenopause
familiäre Belastung mit
- KHK<55a
- Hypertonie
- Fettstoffwechsel
Typ I Diabetes
Mehr als 50% erleben den nächsten Tag nicht!
**EKG bei Ischämie**

- **Ventricel**
  - Verletzung
  - Nekrose
  - Ischämie

- **Infarktzeichen**
  - direkte Infarktzeichen
  - indirekte Infarktzeichen

**Spiegelbilder**

**EKG**

- Akuter Brustschmerz in Ruhe
  - Instabile Angina
    - nitro-sensitive
    - Trop+ / Nitrit
      - >20 min 2 benachbarte Ableitungen
  - NSTEMI
    - Trop+ / Nitrit
      - >20 min nitro-resistant
  - STEMI
    - Trop+ / Nitrit
      - >20 min 2 benachbarte Ableitungen
  - NSTE-ACS
  - Schock

**ACS**
Cabrera Ableitungen für den inferioren Infarkt
The Optimal Cardiovascular Diagnostic Evaluation
Enabling Faster Treatment of Myocardial Infarction (OCCULT-MI) trial

The 80-lead mapping system detected 27.5% more patients with STEMI than the standard 12-lead ECG.

ST-Morphologie

Red = ST elevation
Blue = ST depression
Green = No deflection
LVHT LSB Perikarditis Hyperkalämie VWI RSB Brugada

Figure 2. Electrocardiograms Showing ST-Segment Elevation in Various Conditions.
Tracing 1 is from a patient with left ventricular hypertrophy, and tracing 2 is from a patient with left bundle branch block. Tracing 3, from a patient with acute pericarditis, is the only tracing with ST-segment elevation in both precordial leads and lead II and PR segment depression. Tracing 4 shows a pseudoinfarction pattern in a patient with hyperkalemia. The T wave in V1 is tall, narrow, pointed, and indexed. Tracing 5 is from a patient with acute antemortem infarction. The distinctive features of tracing 6, from a patient with acute antemortem infarction and right bundle branch block, include the remaining R’ wave and the distinct transition between the downslopes of R’ and the beginning of the ST segment. Tracing 7, from a patient with the Brugada syndrome, shows rSR’ and ST-segment elevation limited to V1 and V2. The ST segment begins from the top of the R’ and is downsloping.
Normvarianten

- normale konkave ST-Hebung
- frühe Repolarisation
- terminale T-inversion

http://www.mdcalc.com/timi-risk-score-for-stemi
<table>
<thead>
<tr>
<th>Killip I</th>
<th>keine Herzinsuffizienz</th>
<th>3-5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Killip II</td>
<td>feinblasige RG 3.HT Jugularvenenstauung</td>
<td>6-10%</td>
</tr>
<tr>
<td>Killip III</td>
<td>Lungenödem</td>
<td>20-30%</td>
</tr>
<tr>
<td>Killip IV</td>
<td>Kardiogener Schock Zyanose Oligurie</td>
<td>&gt;80%</td>
</tr>
</tbody>
</table>


![Mortality at 30 Days](image)

Figure 2. TIMI risk score for STEMI for predicting 30-day mortality. STEI indicates ST elevation; h/o, history of.

(Circulation, 2000;102:2031.)
© 2000 American Heart Association, Inc.
Untersuchung

• **Palpation**
  Pulse radial/Carotiden/femoral
  Aortendissektion
  Herzspitzenstoss Perikarderguss
  Ventrikelskruptur

• **Auskultation**
  Systolikum Aortenstenose/HOCM
  Mitralinsuffizienz
  Septumdefekt
  4. Herzton

Priorität der Massnahmen

• Was ist zu erwarten?
  z.B. Kammerflimmern

• Was brauche ich dann, um helfen zu können?
  EKG, Defibrillator, Intubation, Beatmung,
  Katecholaminperfusion

• Wie transportiere ich in welcher Zeit in welches Herzkatheterlabor?

• Ist dieses einsatzbereit?
Ischämie-Arrhythmie

Was tun bei STEMI?
Beruhigen
bequem lagern
Nitrospray (außer bei Schock)
Sauerstoff
ASS 250 mg
iv Leitung/Analgosedierung Morphin
Morphin/Benzodiazepin
Transport organisieren PCI/Lyse
Betablocker
UFH Bolus 4000E (60mg/kg)i.v.
Clopidogrel 600mg/Prasugrel 60mg/Ticagrelor 180mg
Aufklärung/Anamnese
Volumen/Katecholamine
Defibrillator
Nach initialer Dysfunktion breitet sich die Nekrose schnell von innen nach außen aus (abhängig vom Ausmaß vorhandener Kollateralen) und erreicht im Allgemeinen nach wenigen Stunden ihr Maximum.

Aufnahmezeiten der steirischen Herzkatheterplätze

Universitätsklinik Graz:
Regeldienstzeit Mo-Fr östlich der Mur,
Nachtdienst Mo, Mi, Do, Sa und jeden 2. So

LKH Graz West:
Regeldienstzeit Mo-Fr westlich der Mur,
Nachtdienst Di, Fr und jeden 2. So

LKH Bruck: Obersteiermark,
Regeldienstzeit Mo-Fr,
Wochenenddienst Fr-So
Lysetherapie

Absolute Kontraindikationen

- Zn Hirnblutung
- RR > 200/110
- OAK
- rezente Ulcusblutung
- Gravidität

<table>
<thead>
<tr>
<th>kgKG</th>
<th>Tenecteplase (Metalyse) U</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;60</td>
<td>6000</td>
</tr>
<tr>
<td>60-70</td>
<td>7000</td>
</tr>
<tr>
<td>70-80</td>
<td>8000</td>
</tr>
<tr>
<td>80-90</td>
<td>9000</td>
</tr>
<tr>
<td>&gt;90</td>
<td>10,000</td>
</tr>
</tbody>
</table>
Zur Vermeidung einer Rebound-Thrombose ist anschliessend die aPTT mit Heparin zwischen 50-70 Sek. zu halten!
Lyseindikation

**STEMI**
>20 Minuten anhaltender nitroresistenter Schmerz
>20 Minuten anhaltende ST-Hebung
Schmerzbeginn vor <3 Stunden
Contact to balloon time >2 Stunden
PCI erst in mehr als 90 Minuten möglich
Keine Ausschlusskriterien für Lyse
Sensible Schlüsselstellen im Herz und Folgen von Ischämie

Arrhythmie-Kammerflimmern-Tod
Sinusknotenarterie Asystolie
AV-Knotenarterie AV Block III Asystolie
Reizleitungssystem HisBündel
Schenkelblock AV Block III
Papillarmuskeldysfunktion/-abriss Mitralinsuffizienz
Septumruptur ischämisch
Ventricelruptur Tamponade Tod

Akuter Brustschmerz in Ruhe

Nitro-sensibel

>20 min nitro-resistent
Troponine im Blut sind sehr spezifisch für NSTEMI und STEMI

Man findet sie aber auch bei Myokarditis, Niereninsuffizienz, akuter Herzinsuffizienz, langdauernden Tachykardien, hypertensiver Krise, Sepsis, Thoraxtrauma, akuter Pulmonalembolie und nach Reanimation!

Reperfusionsschaden? Cooling 33° vor Reperfusion
PCI-Dringlichkeit bei NSTE-ACS

**dringlich<2h**
- nitroresistente oder wiederkehrende AP mit ST-Senkung>2mm
- oder koronaren Thämodynamisch instabil
- Herzinsuffizienz
- Kammerflimmern
- Kammertachykardie

**früh<72h**
- Trop pos
- ST/T Dynamik
- Diabetes
- GFR<60 (hydrieren)
- EF<40%
- Postinfarkt-AP
- Z.n. PCI (6 Mon)
- Z.n. CABG
- mittleres bis hohes Risiko
- GRACE Risk Score

**elektiv**
- Trop neg/EKG normal
- Aufnahme und 6-12h keine AP mehr

http://www.mdcalc.com/timi-risk-score-for-uanstemi

www.outcomes-umassmed.org/grace/
Life history of an atheroma

Libby; Nature 2002; 420:868-674
4 Fallberichte

• Was hätte ich getan?
  als Patient
  als Angehöriger
  als Hausarzt
  als Notarzt
  als Turnusarzt im Peripheriespital

• Fragen sind willkommen!

---

Fall 1

Pat. männlich, 49 a
Vor einer Woche erstmals Belastungs-AP
bei hohen Blutdruckwerten
heute seit 13 Uhr massive Ruheangina anhaltend
Risiko:
art. Hypertonie, Nikotinabusus, Hyperlipidämie, Stress
bekannte geringe Niereninsuffizienz
23.5.2011
13:24
Peripherie spital

Spastische A. rad. dext.  Diffus sklerosierte RCA
LAD verschlossen
R. int. 50%

Vorderwand α-/dyskinetisch

Thrombusabsaugung
LAD offen

Infusionsballon Abciximab

DE-Stent

TIMI 3 Fluss
R. int. 50%

A rad. entspannt
Welche Bedeutung hat der Schenkelblock?
Fall 2

Heiliger Abend
Pat. weibl., 63 a
seit 18 Uhr heftiger retrosternaler Schmerz
Suizidgedanken, vor einigen Tagen Tod des Ehemannes
anamn. seit Jahren supraventrikuläre Tachykardien
bek. Struma, art. Hypertonie
Therapie mit Inderal 2x40mg
Koronarangiographie:
glattwandige Koronararterien
keine Stenose

Echo:
apical ballooning
Einige Tage später heftige nächtliche Angina pectoris

27.12.2004 2:26

Takotsubo

Fall 3

Pat. weibl., 75a
am 31.5.2011 seit 11 Uhr
heftige Ruheangina
Keine kardialen Risikofaktoren
ASS-Dauertherapie
EKG beim Hausarzt, 11:30

I .................................. V1
II .................................. V2
III .................................. V3
aVR .................................. V4
aVL .................................. V5
aVF .................................. V6

RCA glattwandig
LCA anguliert, glattwandig, CX verschlossen

Thrombusabsaugung
Glattwandige CX offen, ohne Stent!
EKG-Ko 1.6.2011 7:25

Echo:
gute LVF, LVHT, LVEDP hoch
Hypokinesie posterolateral
Aortenklappensklerose
t riesiger linker Vorhof

Fall 4
Männlich, 79a
Stubenbergsee
Schmerzbeginn 17.5. 2011 mittags
Pat. geht schlafen
16 Uhr: Hubschrauber

Risiko:
NIDDM, art. Hypertonie, Zn Nikotin vor 30a
Dominante RCA zu LAD 90%/CX 90%
<table>
<thead>
<tr>
<th>Drahtrekanalisation</th>
<th>Stent</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="" /></td>
<td><img src="image2" alt="" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluss distal schlecht</th>
<th>RCA wieder zu</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="" /></td>
<td><img src="image4" alt="" /></td>
</tr>
</tbody>
</table>
2. Stent

Thrombusabsaugung

distale Stenose

3. Stent
Dominante RCA rekanalisiert

Echo nach PCI
Einige Tage später ...

LAD und CX 90%  LAD Stent

CX Stent  LAD und CX frei
Rehabilitation/Prävention

Lebensstil
Bewegung
Ernährung
Entspannung

Ausdauertraining
bewirkt EF-Zunahme (Haykowsky, JACC 2007)
verbessert Koronarperfusion (Gielen S, Circ 2001)
reduziert Rehospitalisierungsrate (Piepoli M, BMJ 2004)

William Heberden
über einen Patienten, der an Angina pectoris litt,
am 21. Juli 1768:

Ich habe einen kennengelernt, der es sich zur Aufgabe machte,
jeden Tag eine halbe Stunde lang Holz zu sägen,
er wurde beinahe geheilt.
Danke für Ihre Aufmerksamkeit!