Guideline Chest Pain

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Guideline Chest Pain

Why was this guideline chosen?

• frequent complaint in Pediatrics and Pediatric Cardiology: 6 - 8% of healthy children (3-17 years) within 3 months

• overwhelming majority: no cardiac and no other organic reason et al

  Cardiac reason = “Needles in Hay”
  Kane DA Congenit Heart Dis 2010: 366-373
Etiology

**10-15 cardiac**
- Myocarditis
- Pericarditis
- Aortic dissection
- Acute myocardial ischaemia
  - anomalous coronary artery
    - Bland-White-Garland syndrome
    - bigger fistulae
    - intramural course (inside the aortic wall)
    - origin from the opposite sinus and
    - a interarterial course
- coronary spasm
- Kawasaki syndrome
- Takotsubo cardiomyopathy

**> 30 non cardiac differential diagnoses**
- Pneumonia, Bronchitis, Pleuritis
- Tracheitis, Tuberculosis, Asthma, Pneumothorax
- Coxackie type B infection
- Acute chest syndrome in sickle cell disease
- Vitamin D deficiency
- Costochondritis
- Slipping rib-syndrome
- Tietze-syndrome
- Gastrointestinal: reflux, oesophagitis, ulcer,
  - foreign body, pancreatitis, tumor
- Herpes zoster, traumatic injury, charley horse
- Neoplasm
- Addiction-forming drugs (cocaine, cannabis,
  - opiate, amphetamine, energy drinks)
- Therapeutic agents (triptane, methylphenidate)
Daniel Kahnemann: Nobel price 2002
“Thinking fast and slow” 2011, Farrar, Straus and Giroux, New York

System 1: automatically and quickly
= intuitive thinking
System 2: effortful mental activities

Chapter 3: ... The busy and the depleted
System 2

Chapter 7: What you see is all there is

Chapter 20: The Illusion of validity

Daniel Kahnemann = Eugene Higgings Professor of Psychology Emeritus at Princeton University and Professor of Psychology and Public Affairs Emeritus at Princeton’s Woodrow Wilson School of Public and International Affairs.
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Etiology

10-15 cardiac and > 30 non cardiac differential diagnoses

Crucial: History and Clinical Impression
History taking in chest pain: Red flags

- Syncope (Light-headedness)
- Palpitation
- Duration of chest pain less than 48 hours or 2-7 days
- Chest pain during exercise
- Recent fever

- Family history positive
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History taking in chest pain

• Beginning of the pain
  – < 48 hours acute and persistend → possible acute heart disease
  – 2-7 days → possible heart disease

• Intensity of pain
  - high in coronary ischemia, aortic dissection, pneumothorax peri-, sometimes in myocarditis

• Localization
  - often diffuse with cardiac aetiology
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History taking in chest pain

- Radiation
  - coronary ischemia
  - aortic dissection

- Pain during exercise
  - possible, but not always in coronary anomalies
  - painful crying und cold sweat in infants with Bland-White-Garland-Syndrome
  - most children with chest pain during exercise have no cardiac disease
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History taking in chest pain

- Awakening from pain: not characteristic
- Breath-dependent: pneumonia, musculoskeletal cause
- Dyspnea: probable organic reason
- Synkope (light-headedness): probable cardiac reason
- Palpitation: cardiac disease possible: dysrhythmia: primary or symptomatic in myocarditis, infarction, transplant rejection
History taking in chest pain

- Additional pain in the legs:
  - vitamin D deficiency
  - pulmonary embolism

- Hyperventilation:
  - anxiety disorders
  - (elevated anxiety sensitivity, perhaps depression)
History taking in chest pain

- Preceding febrile illness peri-/myocarditis
  Kawasaki-syndrome

- Underlying cardiac disease heart operation
  connective tissue disease (Marfan syndrome)
  hypertrophic cardiomyopathy

- Family history Marfan-syndrome, HOCM,
  sudden unexpected death < 40 years three
generations backward
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Clinical picture

- Pale?
- Looking ill?
- Cold sweat?
- Dyspneic?
- Reduced general condition?

- Unknown heart murmur
- Pathological auscultation sound

\{ Emergency !! \}

\{ Clarify \}
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Vorstellungsgrund Thoraxschmerz

**Basismodiagnostik - Kinderarztpraxis**
- **Anamnese:** Schmerzduer, Atemabhängigkeit, Begleitsymptome (siehe Tab. 1)
- **Klinischer Befund:** Gesamtzustand, Herzgeräusch
- **Blutdruck:** bei erhöhten Werten → RR alle 4 Extremitäten (Isthmusstenose? arterielle Hypertonie?)
- **ggf. Laborwerte** (Vitamin D-Spiegel, Troponin)

**Notfall:**
- **EPLS-Leitlinie** (European Paediatric Life Support)

**Erweiterte Diagnostik – Kinderkardiologie** (Praxis, Klinik)
- **EKG**
- **Echokardiographie**
- **ggf. Holter-EKG, Event-Recorder**
- **ggf. Ergometrie, Spiroergometrie**

**V.a. kardiale Ursache bei**
- reduziertem AZ, Palpitationen, Synkopen, Schwindel
- Schmerzen unter Belastung
- Beginn vor höchstens 7 Tagen
- vorausgehendem Infekt
- positiver Familienanamnese

**V.a. Myokardischämie**
- Koronaranomalie
- schwer verlaufende Myokarditis
- Herzinsuffizienz
- symptomatische Kardiomyopathie
- Transplantatabstoßung

**Keine weitere Diagnostik**

**Sonstige Diagnostik**
- **Pulmologie**
- **Gastroenterologie**
- **Kinderpsychologie**
- **Orthopädie**

**Hoch spezialisierte Versorgung (Kinderkardiologisches Zentrum)**
- Komplettierung der Diagnostik
- Herzkatheter, Angiographie, Myokardbiopsie, MRT-Angio
- Therapie
Pericarditis (often Perimyocarditis) and Myocarditis

- variable clinical presentation:
- from asymptomatic to fulminant cardiac failure and sudden death
- chest pain often in pericarditis
- chest pain seldom in younger children with myocarditis *May LJ, Cardiol in the young; 2011*
- myocarditis can masquerading as acute coronary syndrome *Kern J, J Pediatr; 2009, n= 7*

4 9/12 year old girl after mycoplasma pneumonia

- Medline research 1950 – 2012
- 8299 articles
- 7 studies
- In 2 studies the presence of chest pain more than doubled the probability of *M. pneumoniae*

*Mycoplasma pneumoniae* is known to cause myocarditis as well.
Acute myocardial ischemia
Kawasaki-Syndrome

**Normal** RCA and LCA

**discrete dilatation** of RCA and LCA in a child with confirmed Kawasaki disease
Acute myocardial ischemia

• Kawasaki-Syndrome

Multiple fusiform Aneurysms in the left main, Circumflex, and LAD

„Echocardiography in Pediatric Heart Disease“
A.R. Snider, 1997

Thrombus in a giant RCA aneurysm

Echocardiography in Pediatric and Congenital Heart Disease, W.W.Lai, Wiley-Blackwell 2009. page 643
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Coronary anomalies (particularly with origin from the opposite sinus)

Paolo Angelini: Conceptual diagram with the most possible paths by which the RCA, LAD and LCx can potentially connect with the opposite coronary cusps. Circulation 2007;115:1296-1305

Anomalous origin of the LCA from the right aortic sinus
Roberts WC, Shirani J, Am J Cardiol 70: 120, 1992
Coronary anomalies

Coronary magnetic resonance angiographic image with Soap-Bubble reconstruction

Anomalous left coronary artery originating from the opposite sinus, with an interarterial course

Paolo Angelini: „HEMODINAMIADELSUR“, zuletzt aktualisiert 12.08.2014
Coronary anomalies: Intramural course

Intramural (aortic) origin of a right coronary artery (RCA) originating superior to the left sinus of Valsalva
Coronary magnetic resonance angiographic image with Soap-Bubble reconstruction

The intramural proximal LCA is severely stenotic (A) with respect to the extramural distal LCA (B).

Paolo Angelini: Newer concepts for imaging anomalous aortic origin of the coronary arteries in adults „HEMODINAMIADELSUR“, zuletzt aktualisiert 12.08.2014
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Coronary anomalies: Bland–White–Garland syndrome: origin of the LCA from pulmonary artery
Coronary spasm

• Lane JR. 2007: Myocardial infarction in Healthy Adolescents
  – n = 9 (8 boys) over a period of 11 years (Akron children’s hospital Ohio)
  – no drug abuse in all, n= 1 methylphenidate
  – no abnormal coronary anatomy (all selective coronary angiographies were normal)
  – All responded to nitroglycerin therapy
  – → guideline recommendation: sublingual 0.4 mg nitroglycerin (spray)
    in adolescents with stable blood pressure

• Triggered by drugs:
  – cocain
  – synthetic cannabinoid (6.9% with chest pain of 305 adolescents in Austin Texas, Forrester M.2012)
  – Amphetamin (4/8 adolescents with vasospasm, chest pain and elevated troponin taking stimulant medication for ADS, Schwartz M. 2012)
  – (triptan use for migraine)
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Tacotsubo cardiomyopathy = stress-induced cardiomyopathy

Hernandez L.E.: Cardiology in the Young (2014), 24, 580–592

Tacotsubo cardiomyopathy = stress-induced cardiomyopathy

_Hernandez L.E.: Cardiology in the Young (2014), 24, 580–592: “ST elevation in just over half the patients”_
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Aortic Dissection

- Fikar C. et al. 2009:
  - \( n = 45/12,142 (=0,37\%) \) cases of aortic dissection in persons <= 21 years old in the database of New York State in 10 years
  - 37/45 (82%) male
  - 6/45 (13%) died
  - 19/45 (42%) trauma
  - 11/45 (24%) Marfan syndrome
  - 10/45 (22%) no apparent risk factor

Norbert Tadeusz, Strohpyramide, Öl/Leinwand, 1987
Aortic Dissection

- Circulation December 2005 vol. 112 no. 24 3802-3813
- Figure 1. The most common classification systems of thoracic aortic dissection: Stanford and DeBakey. Reproduced with permission from Reference 54, Copyright 2003, American Heart Association. All rights reserved.
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www.kinderkardiologie.org
Vielen Dank für Ihre Aufmerksamkeit!