



Ein Unternehmen der LUKS Gruppe

Luzerner Kantonsspital

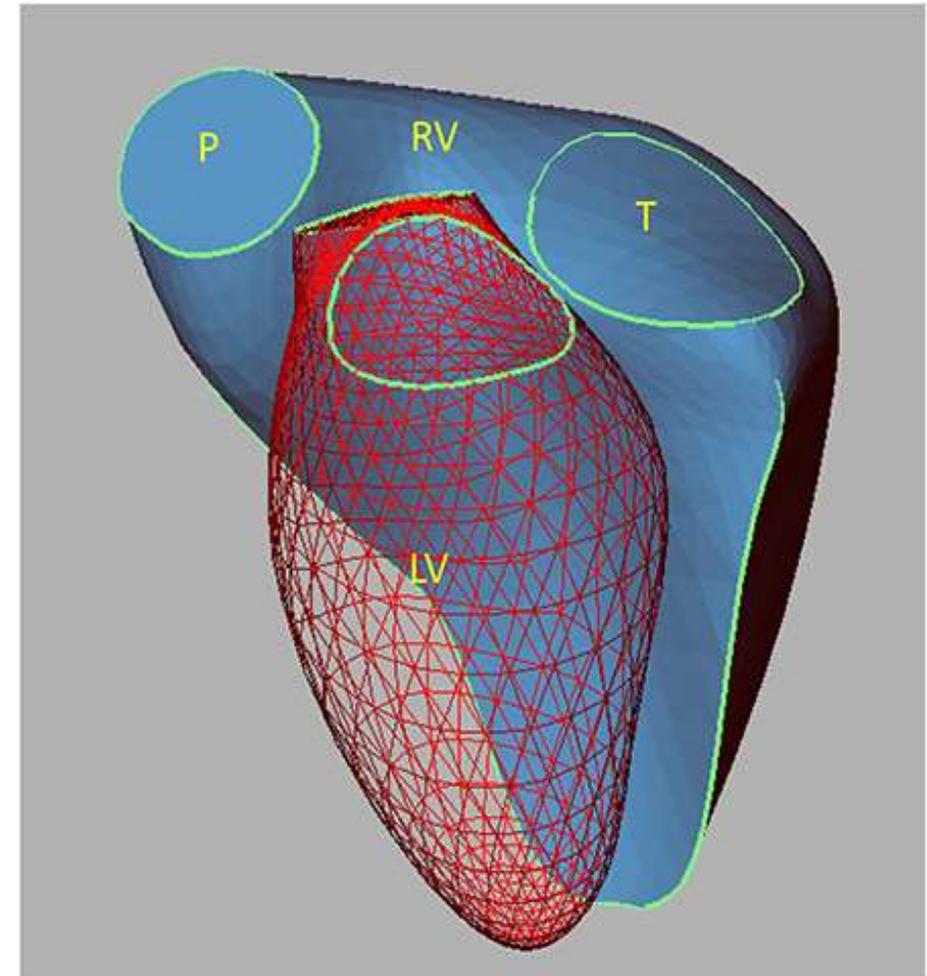
Rechtsventrikuläre Funktion

...and the story of the snake in the grass

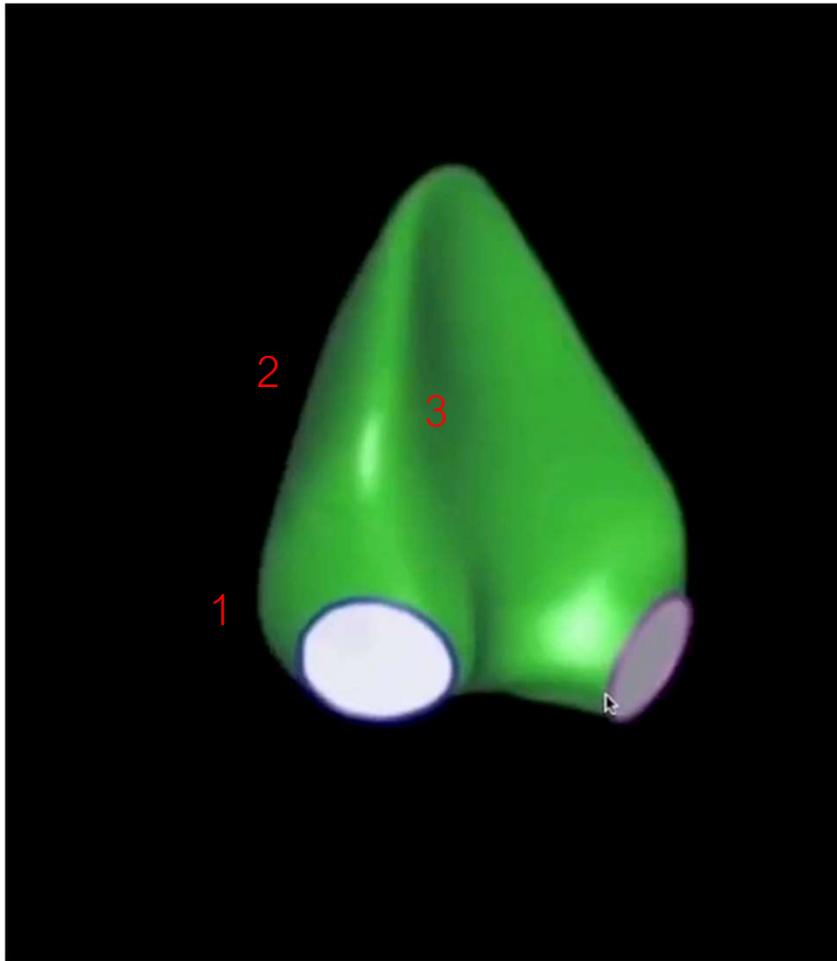
herzlich, kompetent, vernetzt

Anatomie und Physiologie

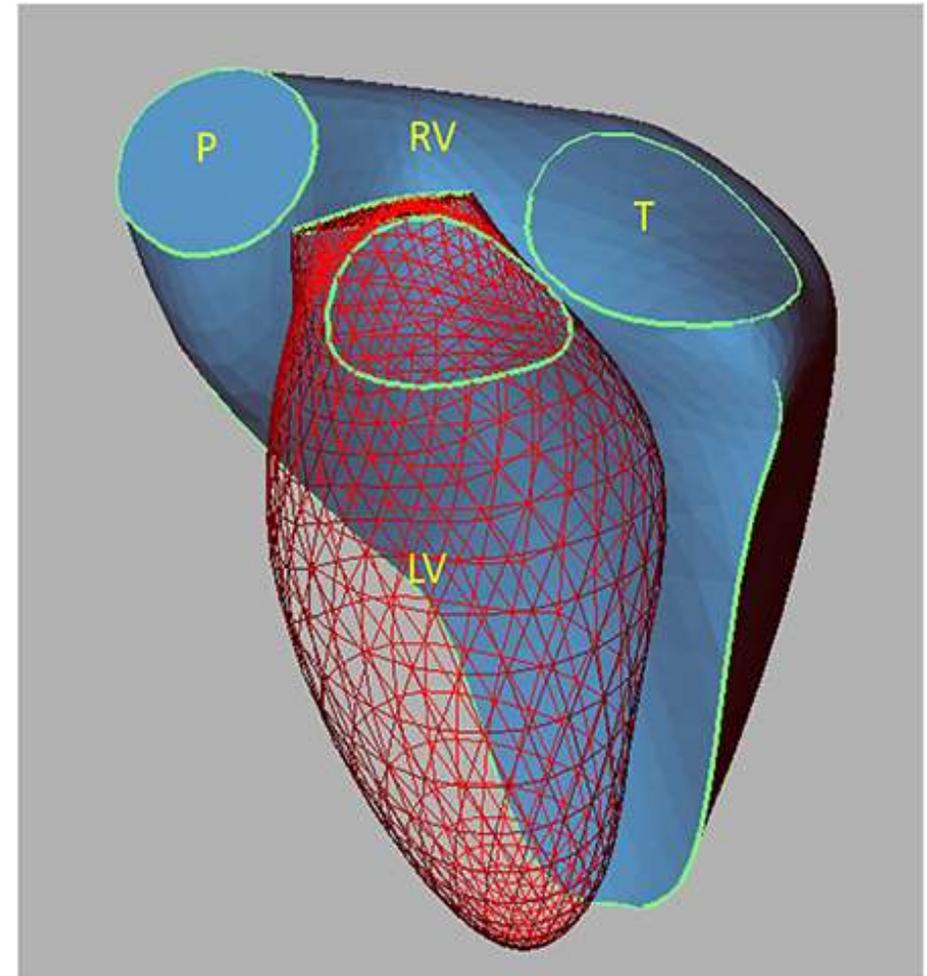
- Form des Ventrikels
- Dünnwandig
- Komplexe Geometrie (=Assessment)
- Longitudinale (und radiale Kontraktion)
- IVD (interventrikuläre Dependenz)
- low-pressure / high-volume System



Anatomie und Physiologie



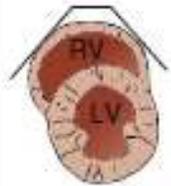
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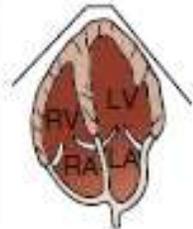
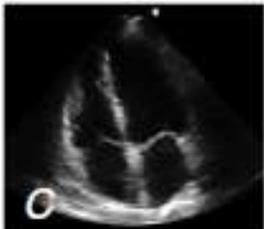
Anlotungen des rechten Ventrikels



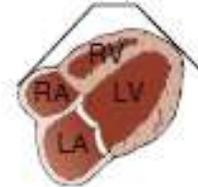
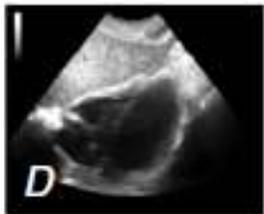
Nur RVOT sichtbar
Keine Beurteilung der Funktion



Größenverhältnis zwischen RV:LV
Interventrikuläres Septum (IVS)



Größenverhältnis zwischen RV:LV
Größe und systolische Funktion
Klappenpathologien



Größenverhältnis zwischen RV:LV
Größe und systolische Funktion
Messung Wanddicke

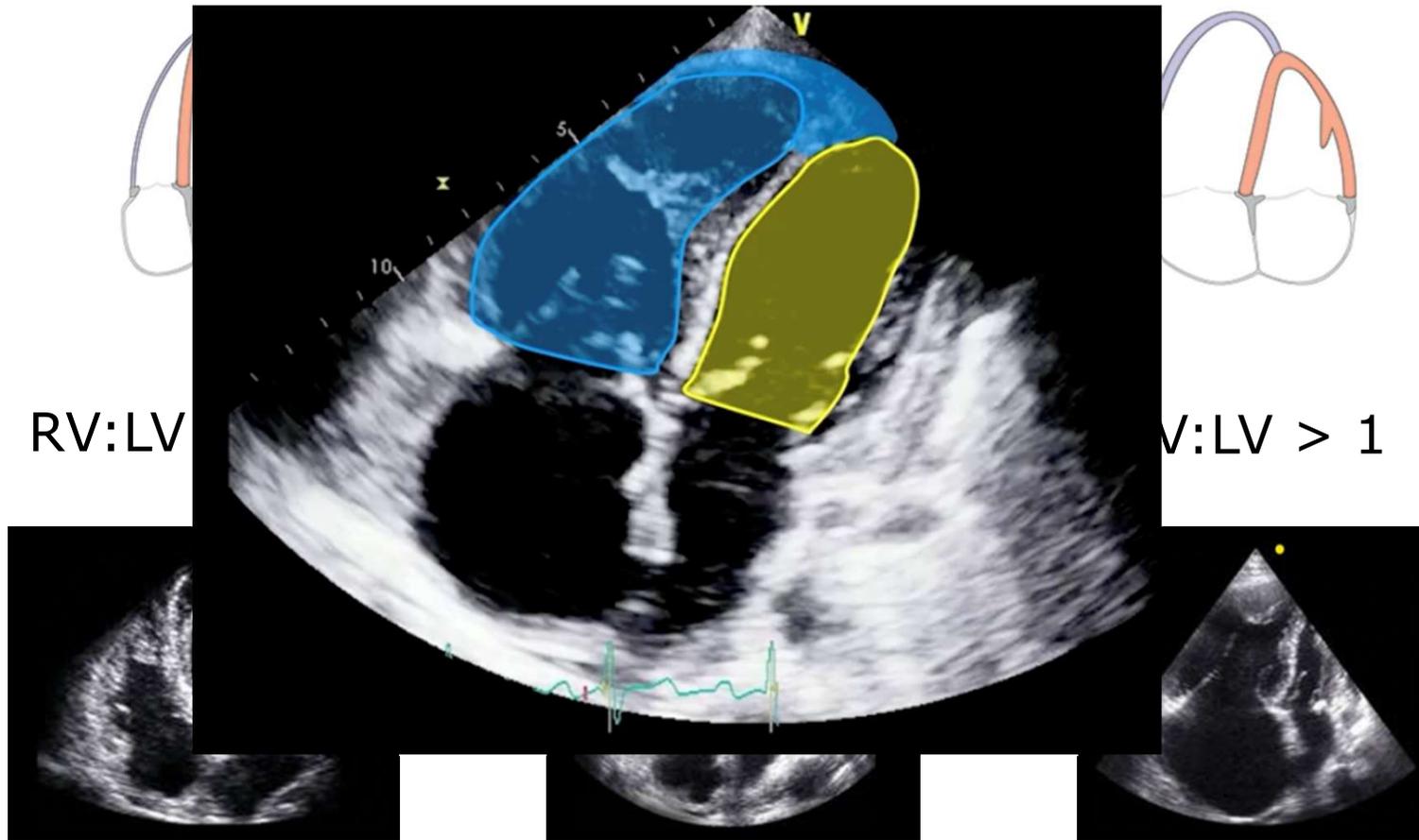
Beurteilung des rechten Ventrikels

- RV-Grösse
 - Vergleich zu LV
 - Form? Apex?
 - RV-Diameter
 - Septum (IVS)
- RV-Funktion
 - Longitudinal = TAPSE
 - FAC
- RV-Wanddicke ("Free-Wall")
- Klappenpathologien

"Loading-State"

"Kontraktile Funktion"

Beurteilung des rechten Ventrikels



Beurteilung des rechten Ventrikels

- Cave: Abhängigkeit der Anlotung
- "RV-focused 4-Kammer"
- Immer Interpretation in mehr als einer Anlotung, "Rule of Thirds"

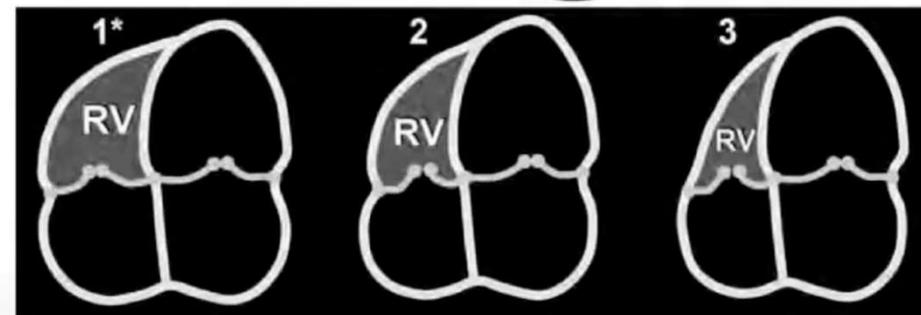
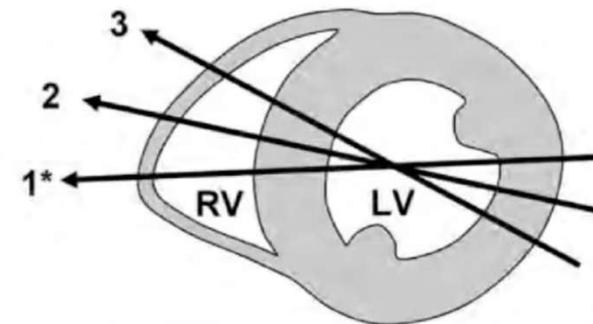
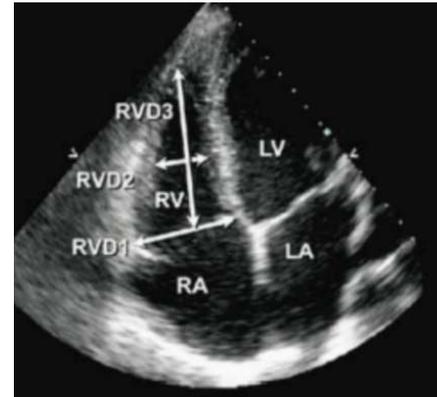
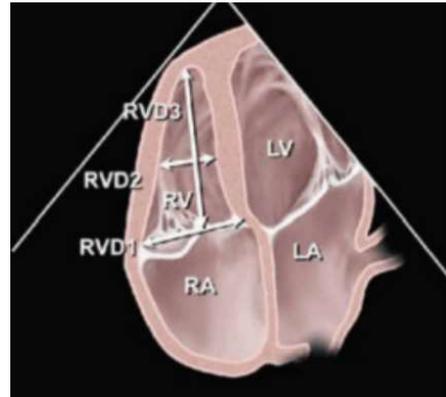


Figure 6 Diagram showing the recommended apical 4-chamber (A4C) view with focus on the right ventricle (RV) (1*) and the sensitivity of right ventricular size with angular change (2,3) despite similar size and appearance of the left ventricle (LV). The lines of intersection of the A4C planes (1*,2,3) with a mid left ventricular short-axis are shown above and corresponding A4C views below.

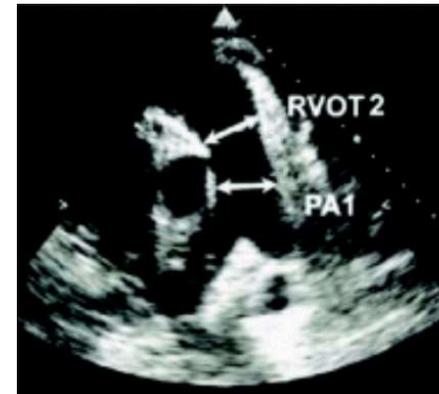
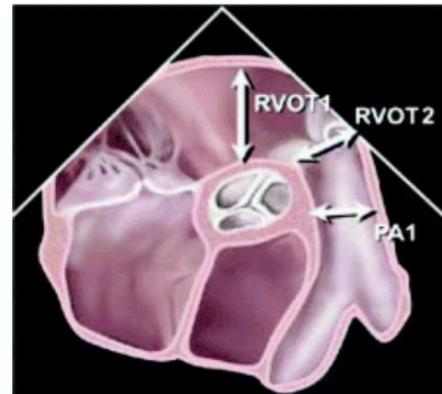
Beurteilung des rechten Ventrikels

Pathologisch

- RVD1 >42mm
- RVD2 >35mm
- RVD3 >86mm

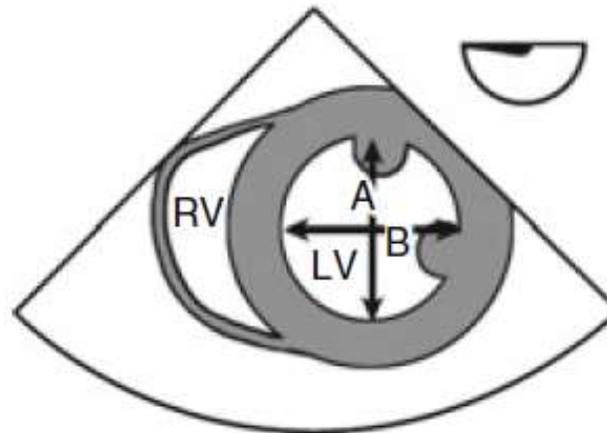


- RVOT1 >35mm
- PA \approx Aorta

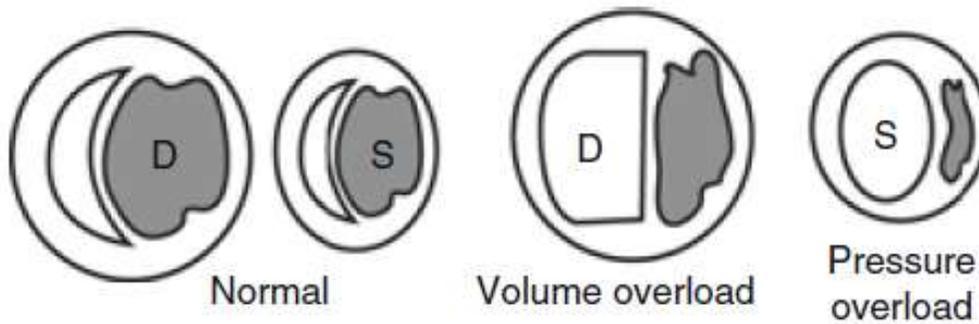


Beurteilung des rechten Ventrikels

- Eccentricity Index (EI) = A/B



Pathologisch
>1.0



Beurteilung des rechten Ventrikels

- Normal, “halbmondförmig”

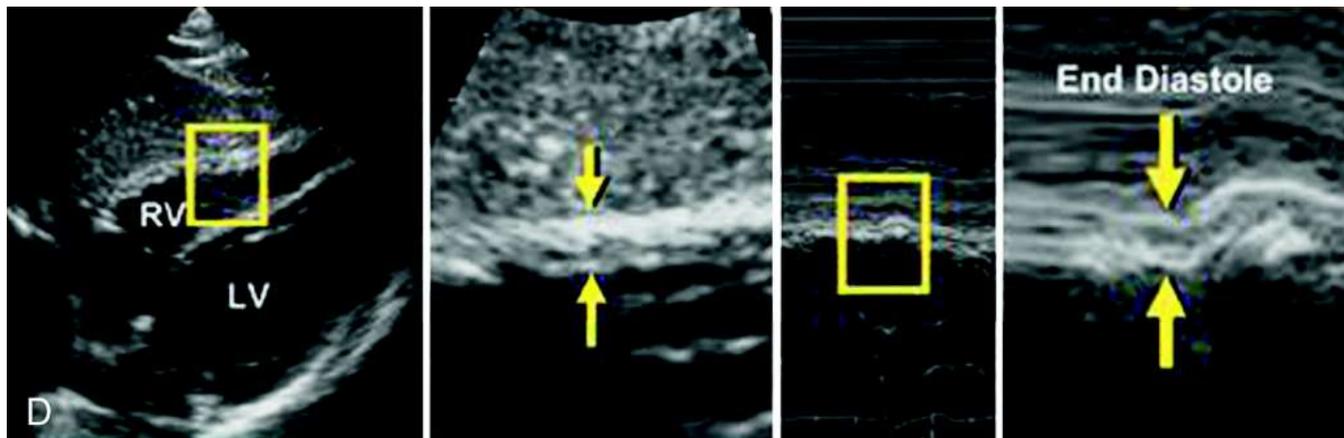
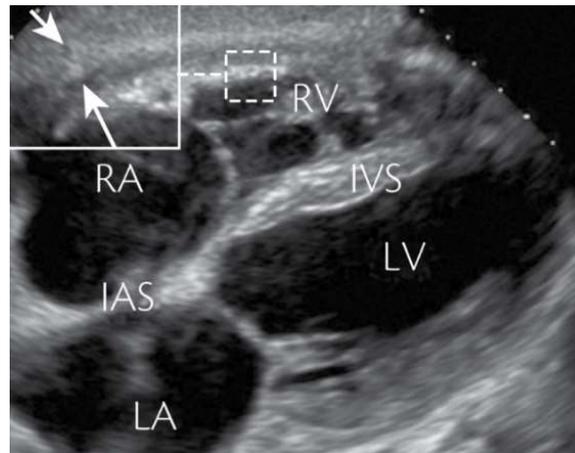


- Abgeflachtes Septum, “D-Shaping”



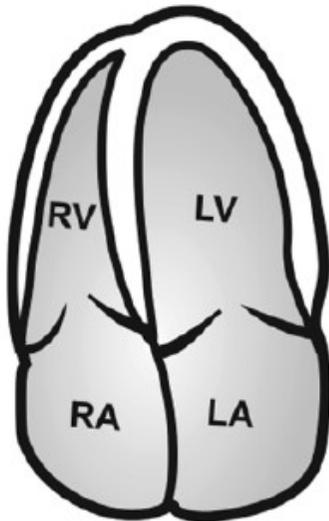
Beurteilung des rechten Ventrikels

- Subcostal 4-Kammer
- Dünnwandig
- Pathologisch ab $>5\text{mm}$

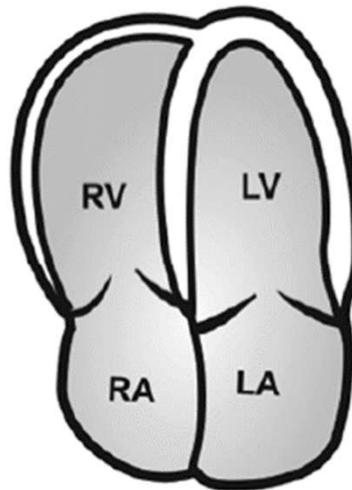


Beurteilung des rechten Ventrikels

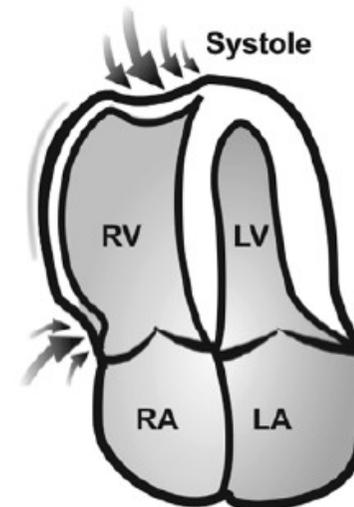
- Beurteilung des Apex



Normalbefund



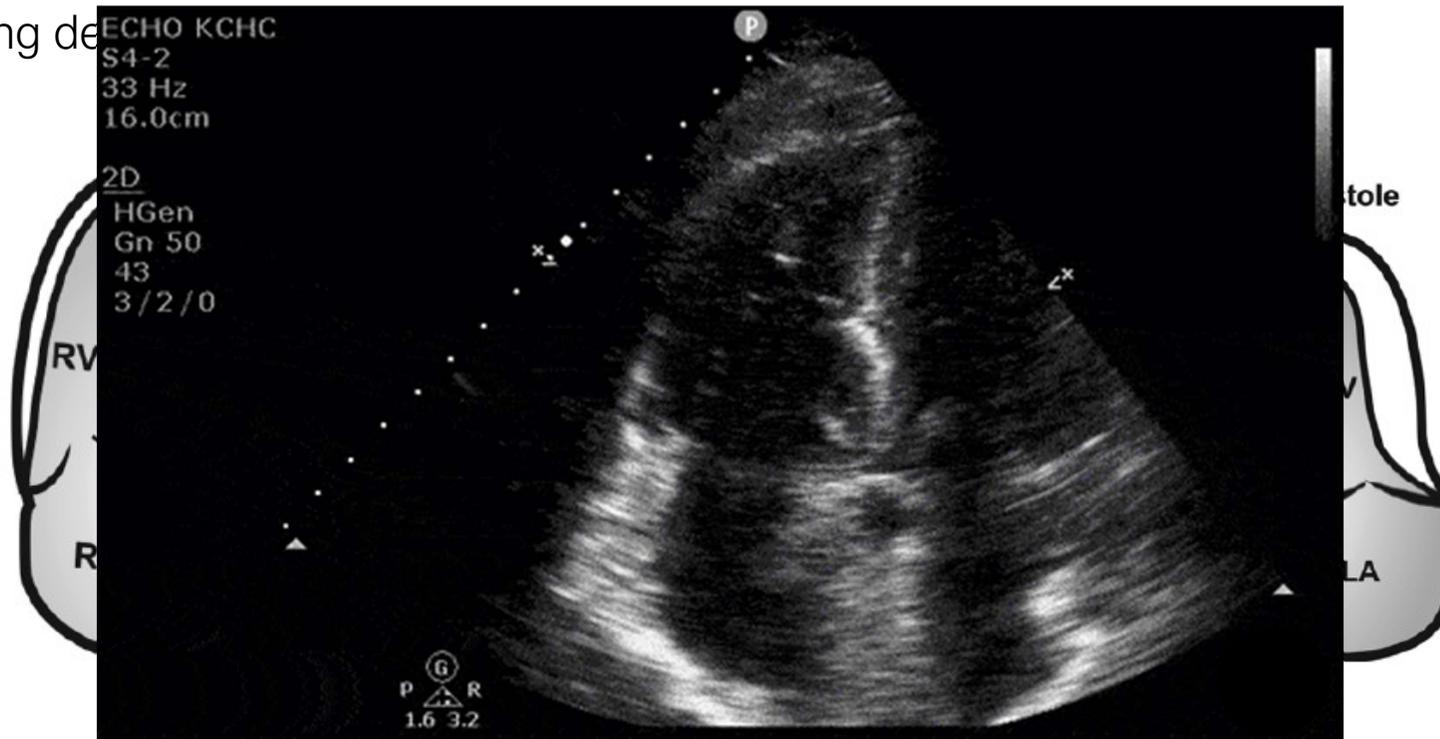
Akute Dilatation



McConnell Sign

Beurteilung des rechten Ventrikels

- Beurteilung des



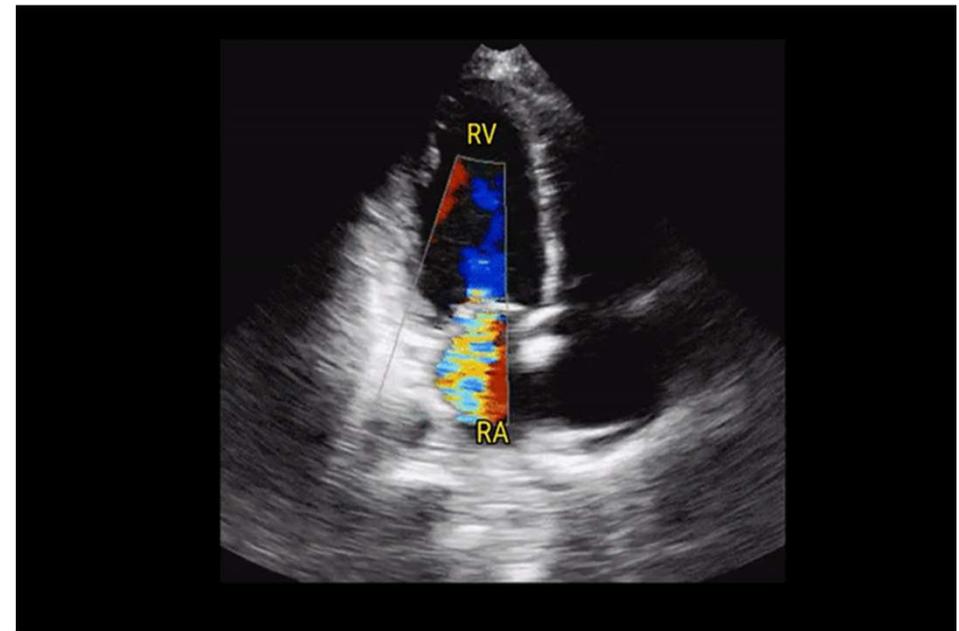
Normalbefund

Akute Dilatation

McConnell Sign

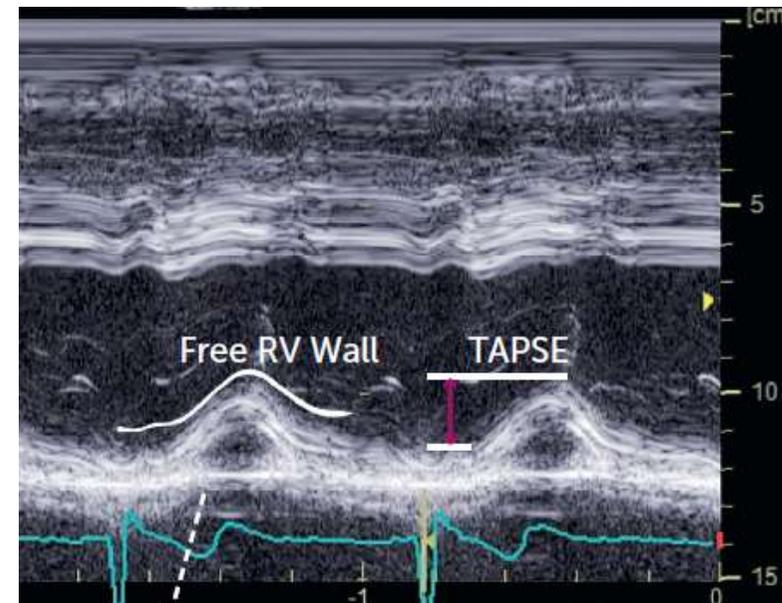
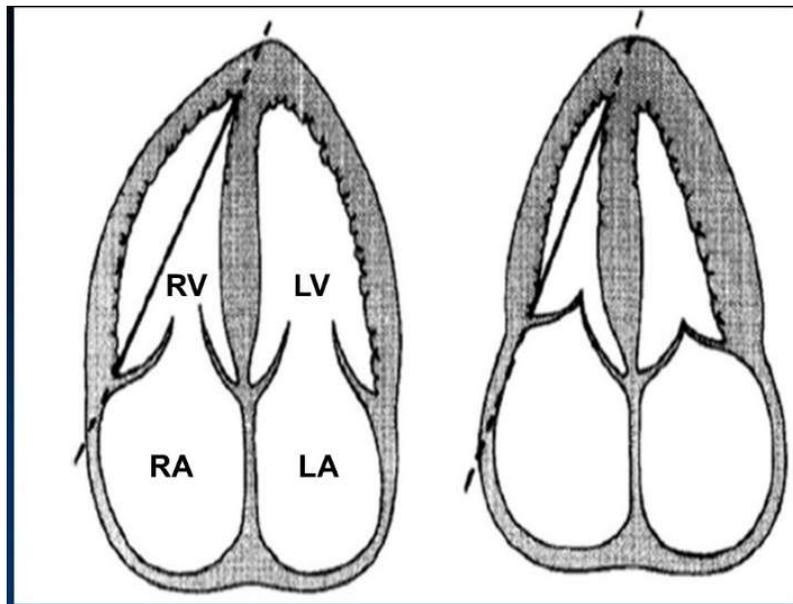
Zeichen Rechtsherzdysfunktion

- RV Dysfunktion
- Akute Dilatation $RV:LV > 0.6$
- Paradoxe Septumbewegungen - D-Sign/D-Shape/D-Zeichen
- McConnell´s Zeichen
- Neu entstandene TI oder Vergrößerung der TI
- Gestaute Vena cava inferior oder superior



Beurteilung der Funktion (longitudinale Funktion)

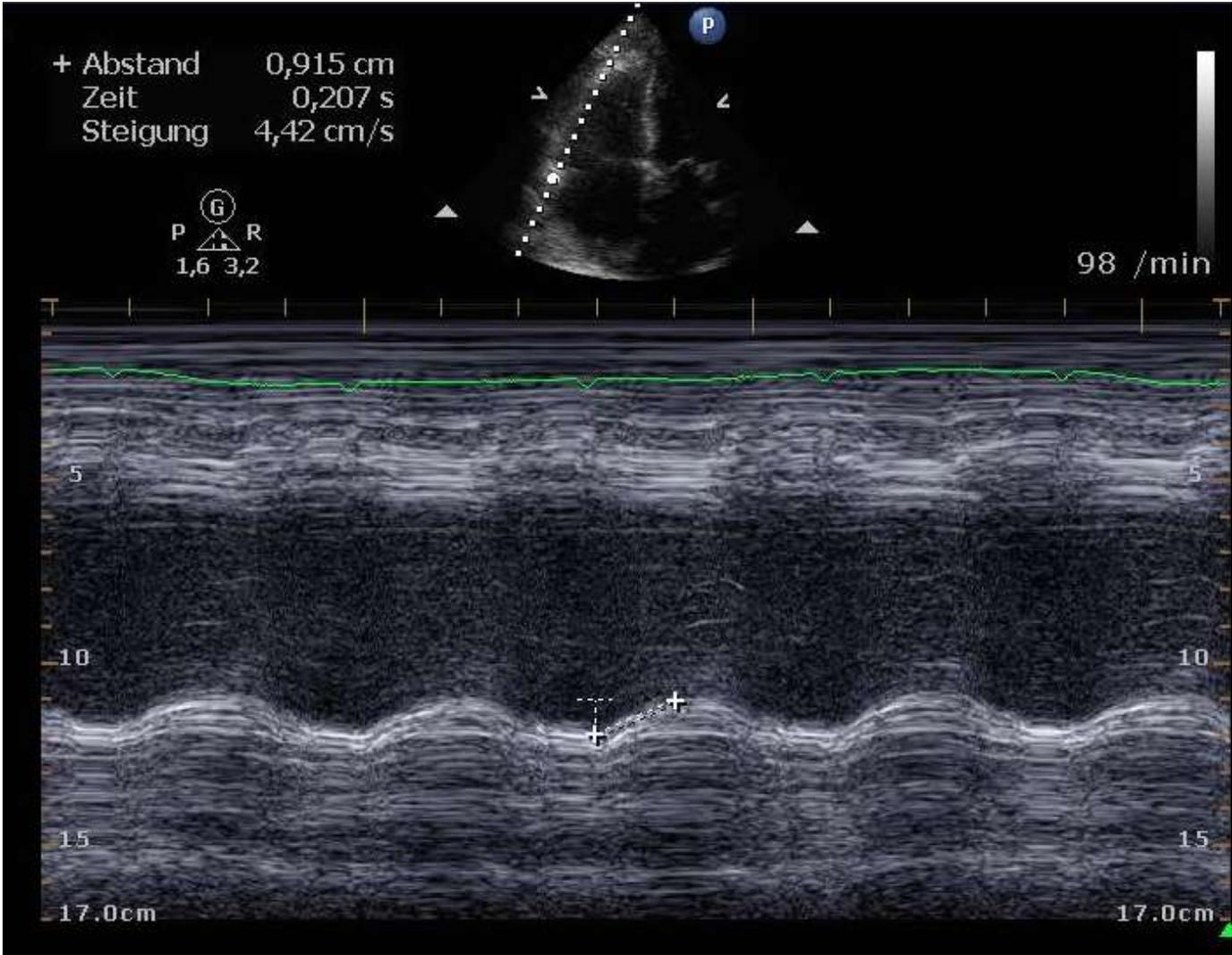
- TAPSE (Tricuspid annular plane systolic excursion)
- Longitudinale Funktion des rechten Ventrikels
- Cut Off Wert < 17 mm
- Normal Werte 24 ± 4



TAPSE

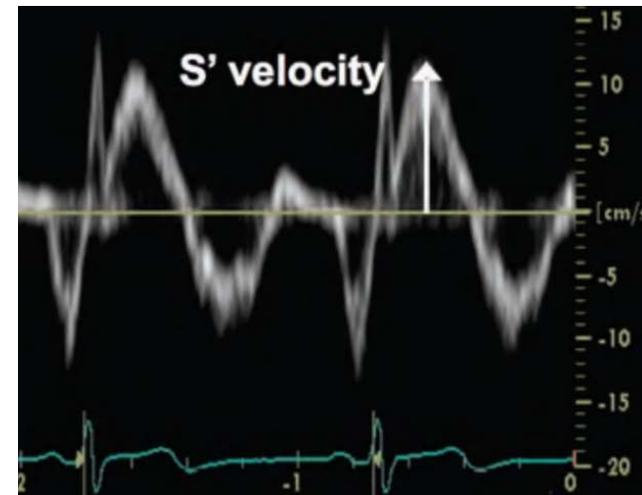
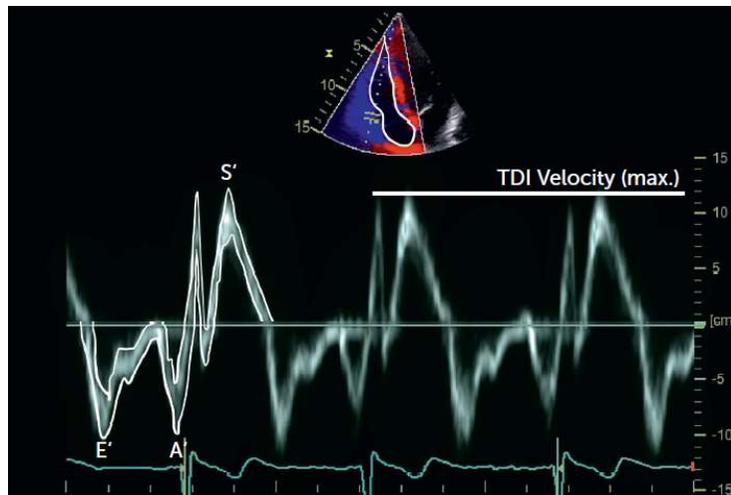
Tricuspid annular plane systolic excursion





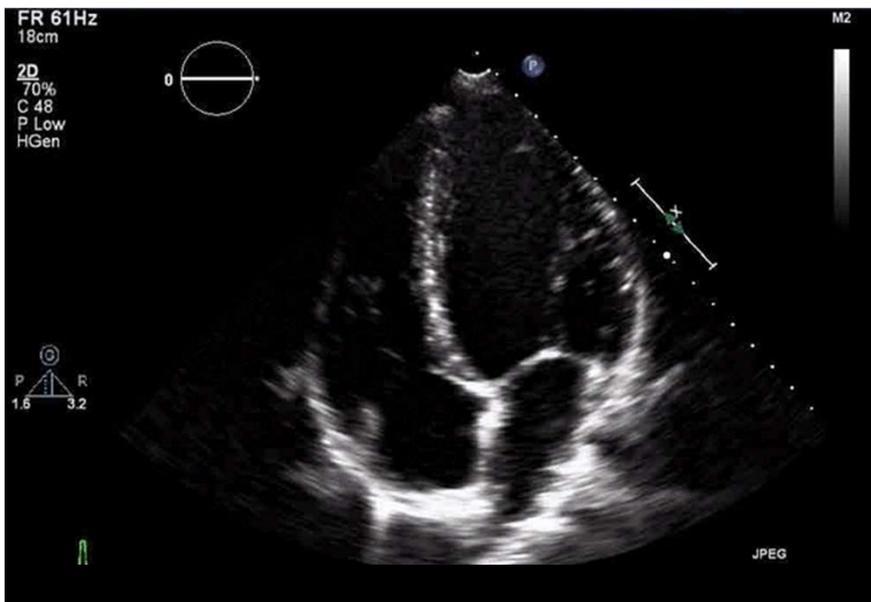
Beurteilung der Funktion, TDI = Tissue Doppler Imaging

- Messung der longitudinalen Geschwindigkeit des Myokards
- Gute Korrelation mit RV Funktion gemessen im CMR
- Cut-off Wert < 9.5 (10) cm/s

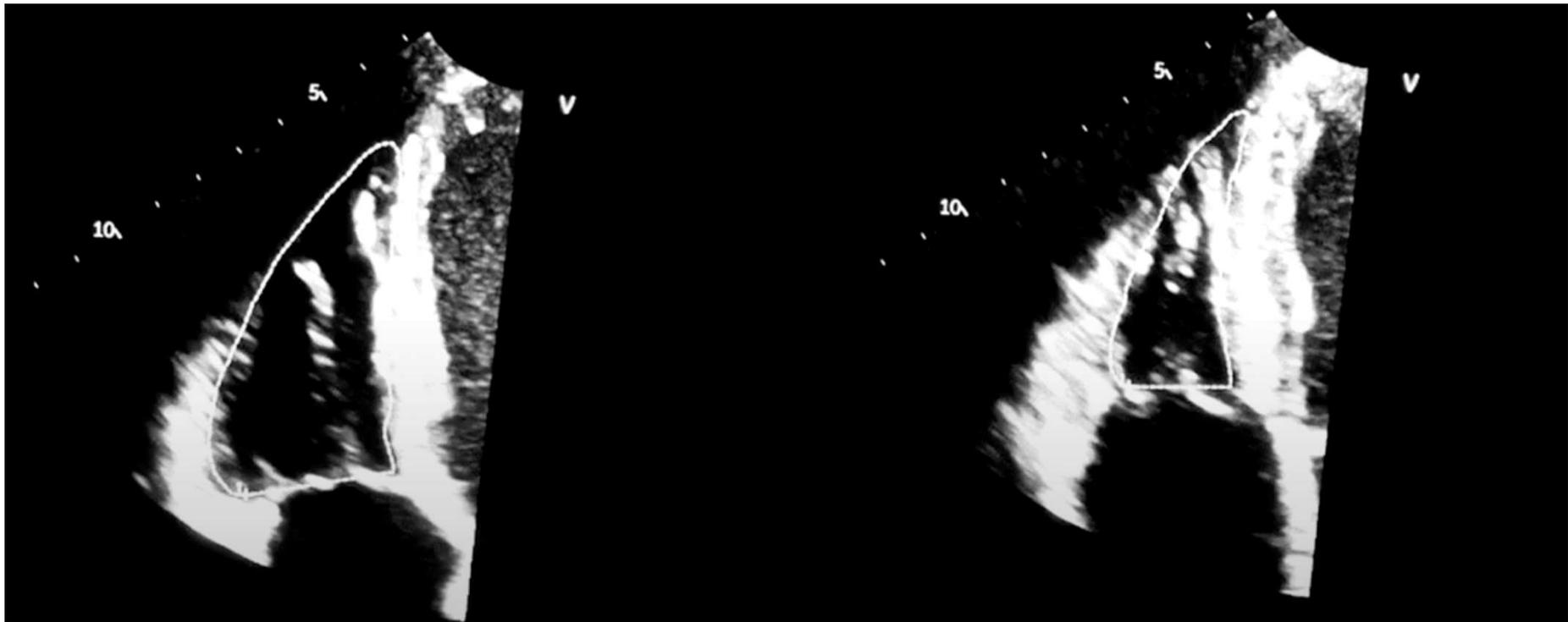


Beurteilung der Funktion (inkl. Radialer Kontraktion)

- Qualitative Beurteilung der Kontraktion entlang der "free-wall"
- Tracing entlang Endokardium in Diastole und Systole = FAC in %, Norm > 35% (30%)
- Eyeballing in der Regel ausreichend



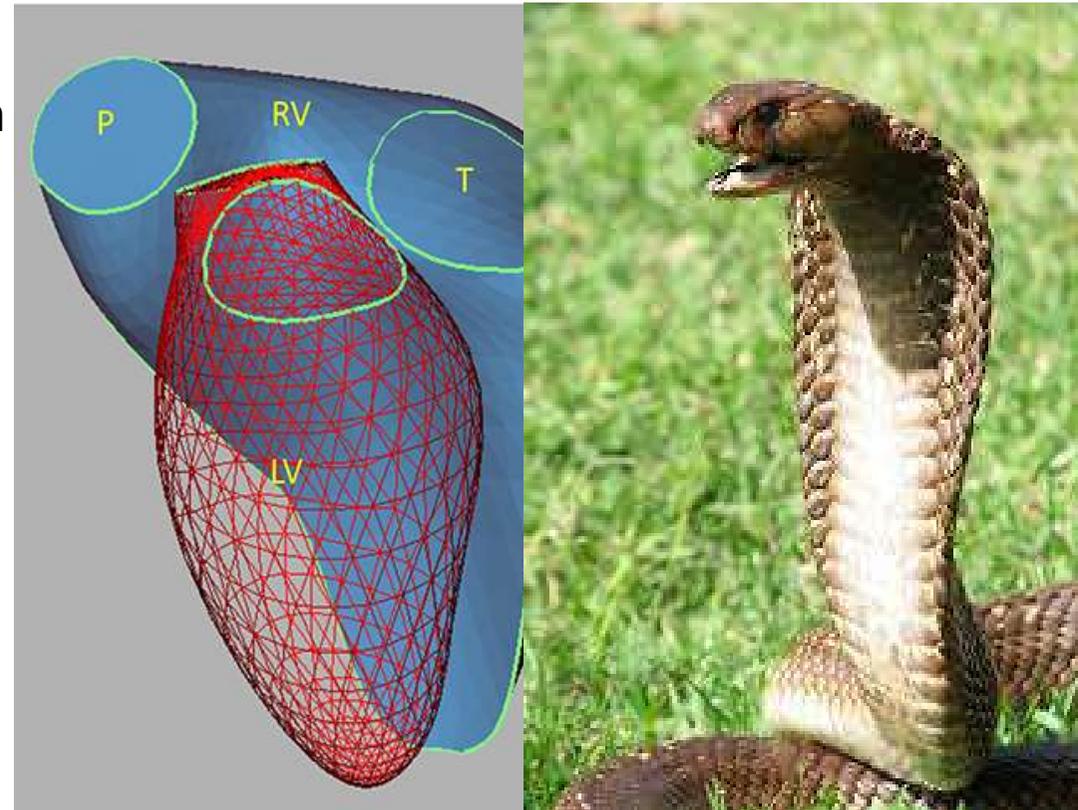
Beurteilung der Funktion (inkl. Radialer Kontraktion)



$$FAC = (RVA_{diastole} - RVA_{systole}) / RVA_{diastole} \times 100$$

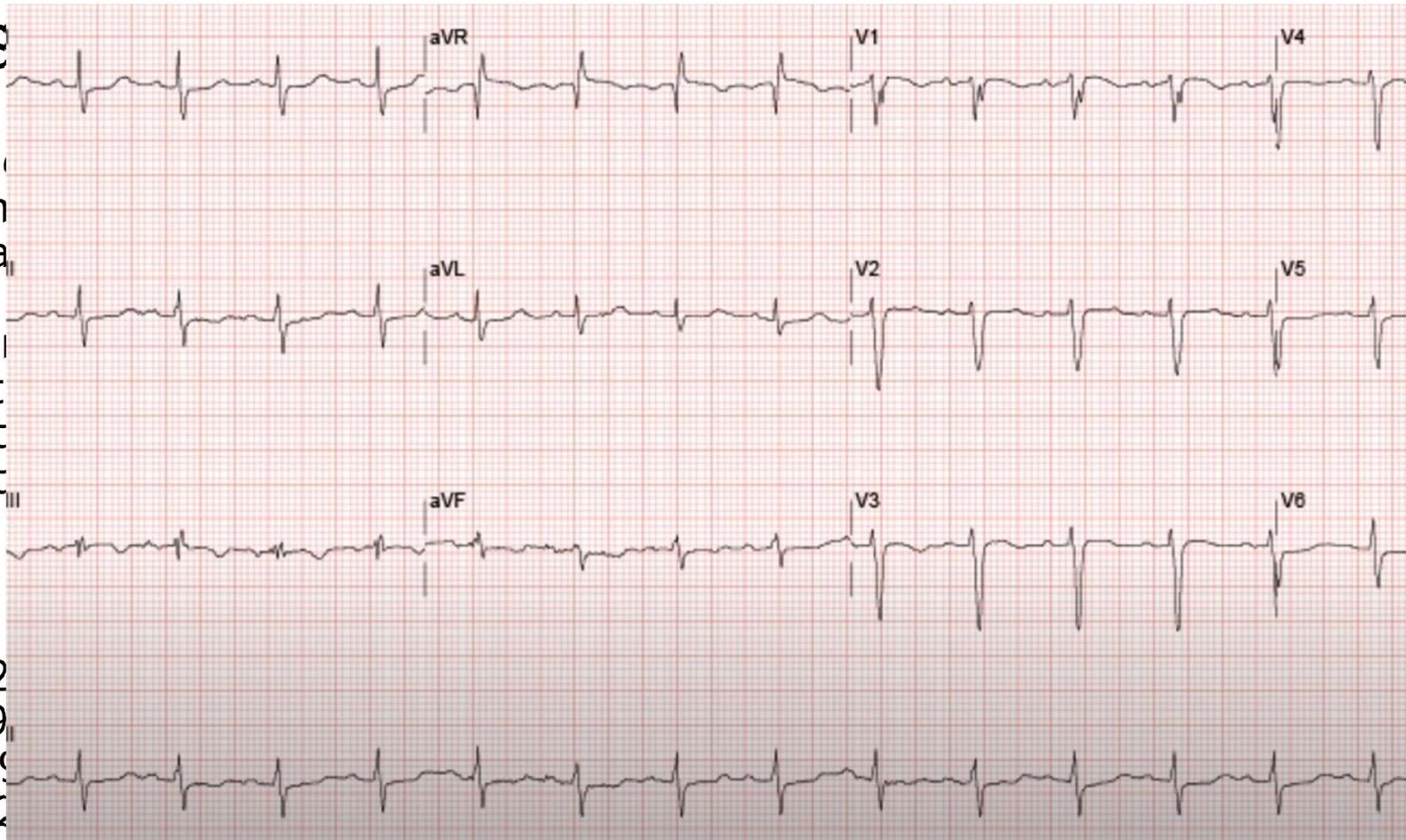
Case: „Snake in the grass“

- 37 jährige Patientin
- Vorabend "im Ausgang"
- Tuna-Sandwich zuhause vor Schlafengehen
- Symptome:
 - Vomitus
 - Leichte Luftnot
 - Leicht Reduzierter AZ
 - Keine AP Beschwerden
- VP:
 - HR 125/min
 - RR 99/71
 - So2: 93%
 - AF: 22/min



Case: „S

- 37 jährig
- Vorabem
- Tuna-Sa
- Symptom
 - Vomit
 - Leicht
 - Leicht
 - Keine
- VP:
 - HR 12
 - RR 99
 - So2: 9
 - AF: 22

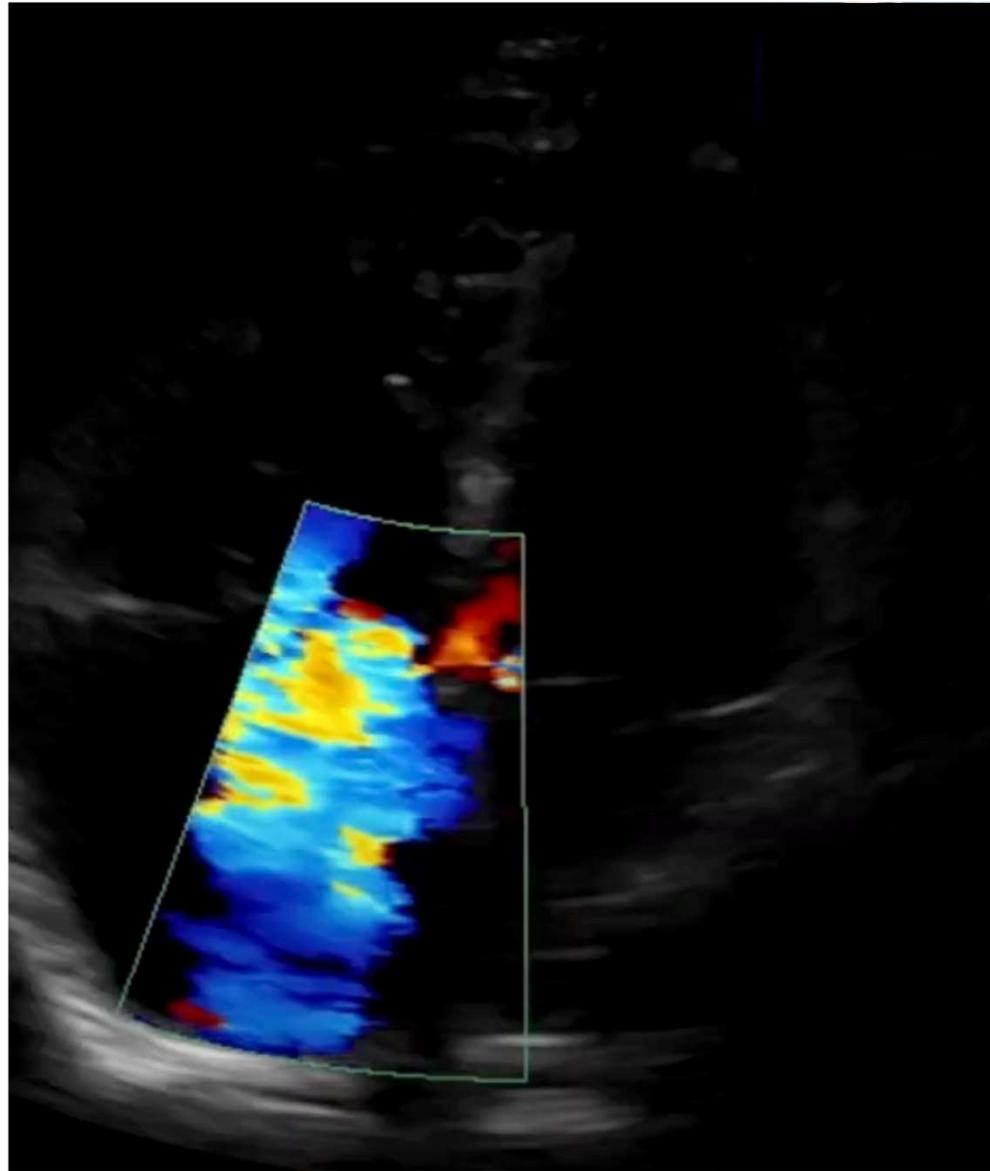


Case: „Snake in the grass“



Case: „Snake in the grass“





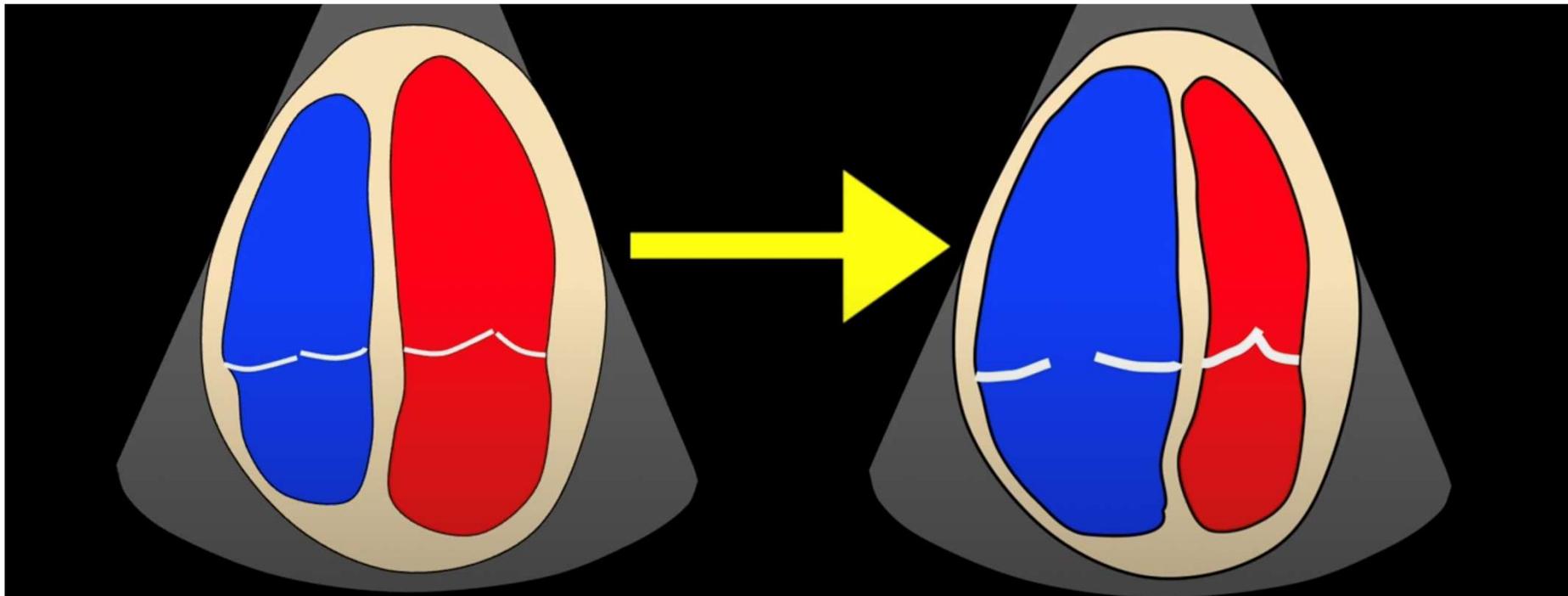
Case: „Snake in the grass“

- Was jetzt? Initialtherapie?
- Volumen?



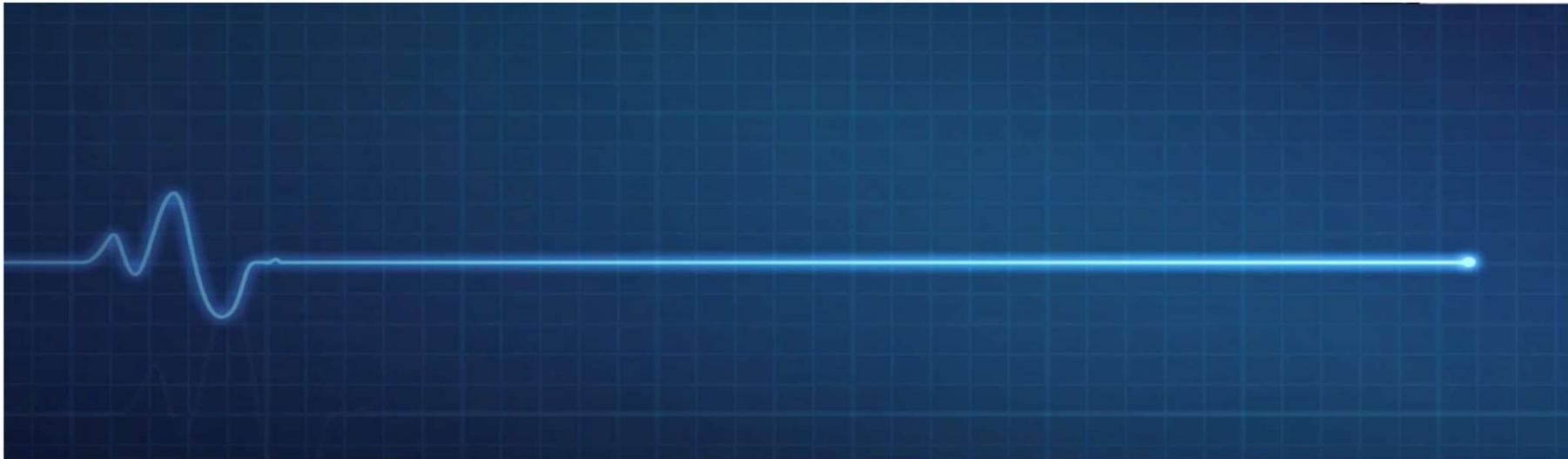
„Volumen geht immer“??

- Nach 1000ml Ringerfundin i.v.:



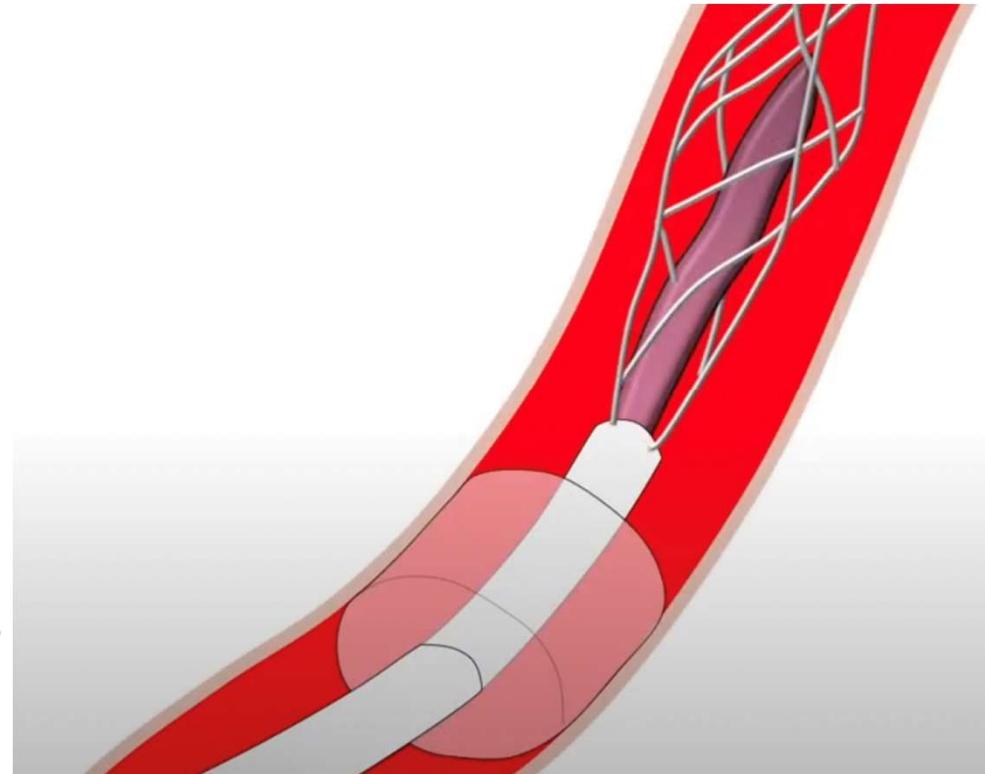
„Volumen geht immer“??

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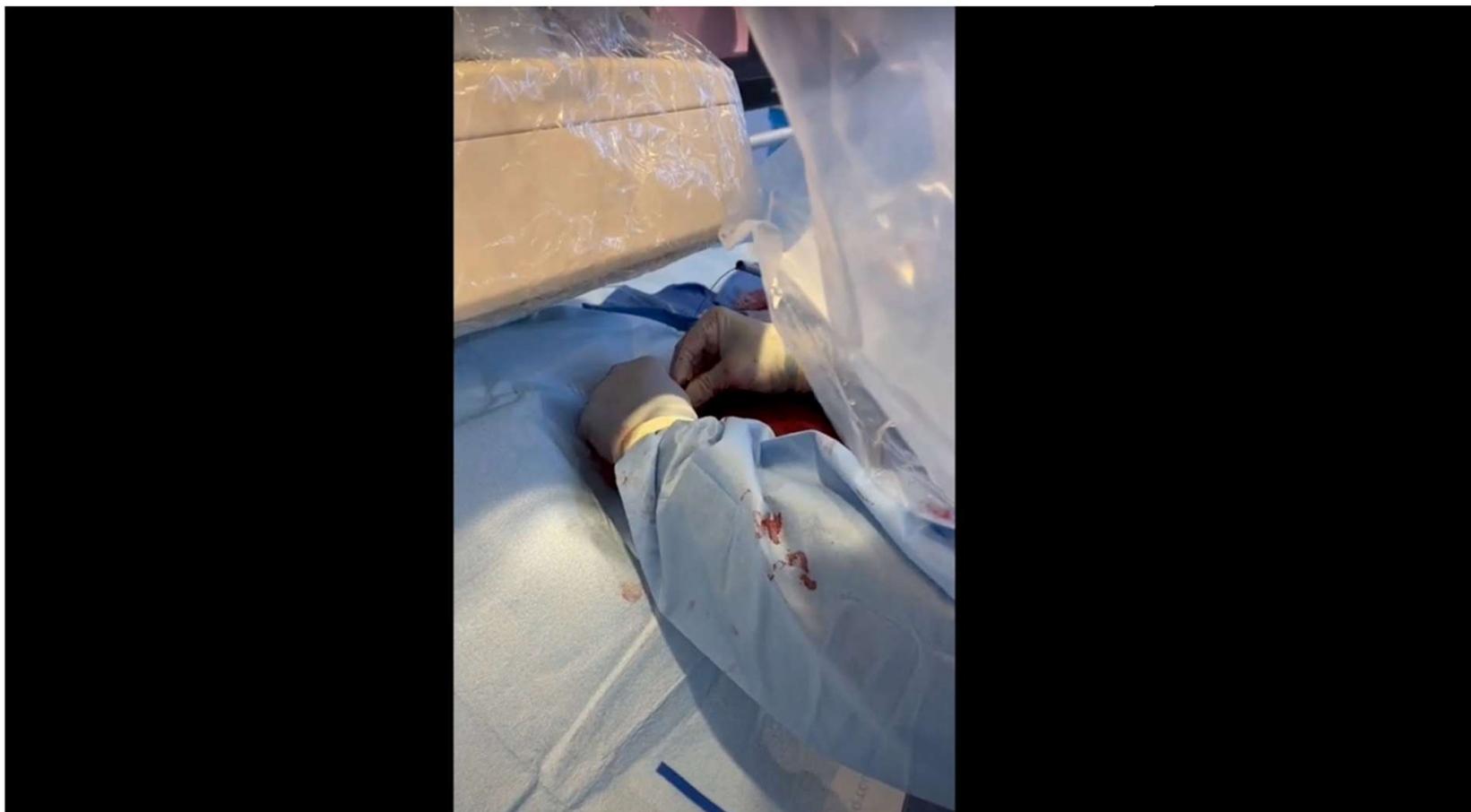


Es geht natürlich weiter...

- Initialtherapie:
 - 1. Noradrenalin
 - 2. Heparin
 - 3. rtPA (REA/SHOCK)
 - Siehe Kontraindikationen
- PERT („Submassive“ PE)
 - Pulmonary embolus response team
 - Je nach Hausinternen Ressourcen / SOP



Es geht natürlich weiter...



Snake in the grass

