

Towards a paradigm shift in diagnosing venous compression syndromes

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Conflict of interest:

Prof. Dr. med. habil. Thomas Scholbach
together with his son ,
Prof. Dr. rer. nat. habil. Jakob Scholbach
created the PixelFlux technique and
4D-PixelFlux volume flow measurement
technique.

His son is the owner of the company
Chameleon Software

www.chameleon-software.de

Current paradigm

vascular compression syndromes are

1. rare

„Nutcracker“-; May-Thurner-; Dunbar-; Wilkie-syndrome

2. single entities

3. circumscribed

4. characteristic symptoms

5. threshold values (size, flow velocities) define the diagnosis

6. morphology + local symptoms

create a diagnosis of VCS

7. Examination in lying posture

Conflicting observations in many thousands of diagnosed patients from 1990-2026 VCS are

1. Frequent : 1502 patients from 2020-2026 90% female

2. Multiple

3. Developing – starting in pubertal growth spurt

4. Devastating – **starving**, extreme **pain** leads to suicides

5. Somatic – **not psychogen**

6. **Holistic** – affecting from head to toe

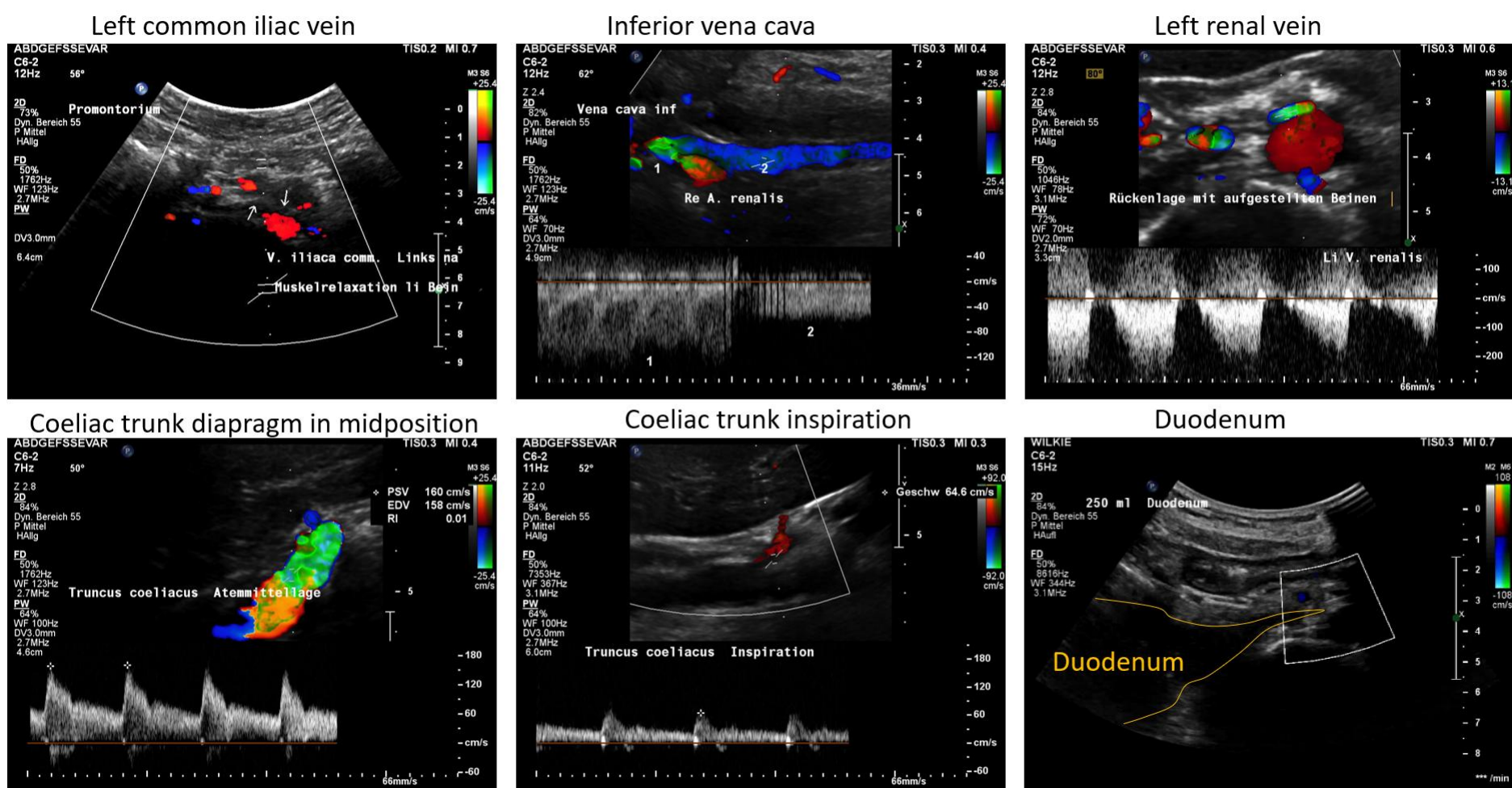
7. Overlapping - connected by **collaterals**, clustering at the **midline**

8. parts of a **midline** syndrome – lordotic compression

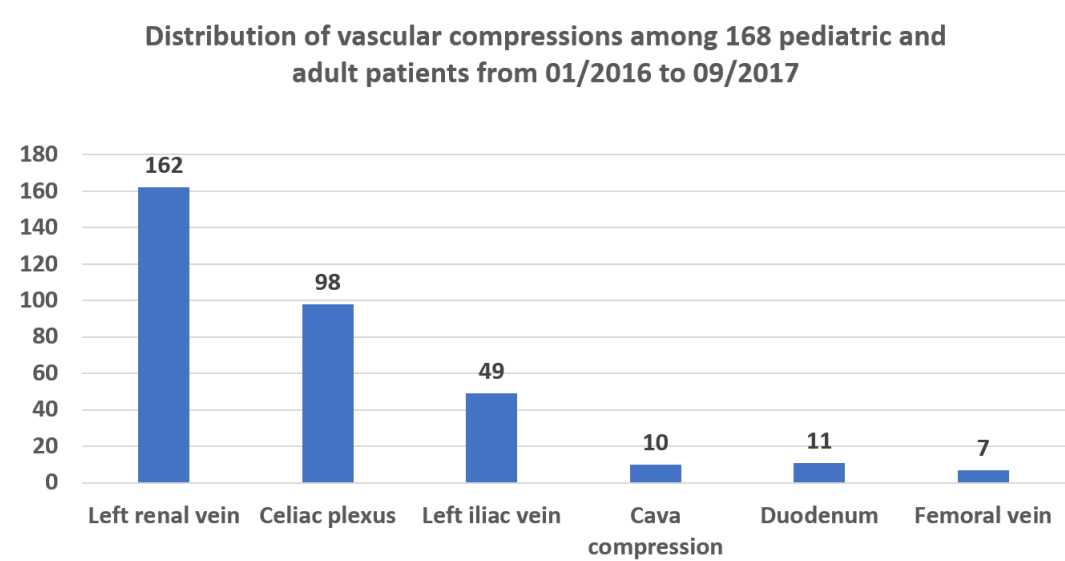
Arguments for a new paradigm

Vascular compressions are synchronous multiple facets of midline syndrome

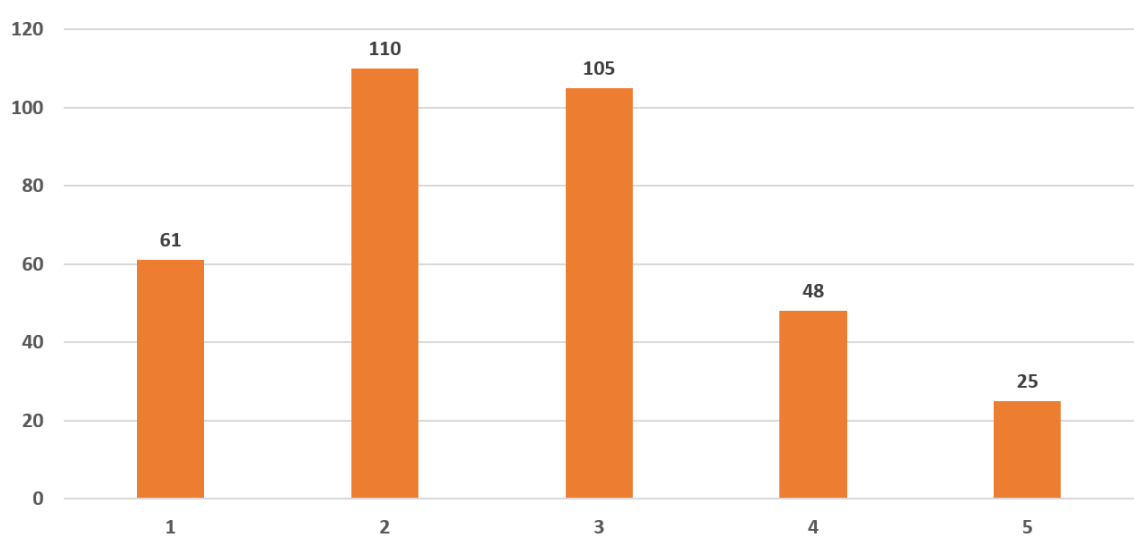
5 compressions in 1 patient



Compression syndromes run together since they have the same origin – lumbar lordosis



Number of compressions in patients with 1 to 5 simultaneous compressions from 01/2016 to 09/2017



Functional

Orthostatic effect on central circulation due to additional orthostatic venous pooling in front of the compression sites blocking the venous return to the heart

Trunk position	Aortic flow volume(ml/min)	Heart rate (1/min)	v sys (cm/s)	Abdominal fraction of left ventricular stroke volume (ml)
horizontal	1873	83	154	23
upright	1146	103	69	11
orthostatic difference (%)	-39%	24%	-55%	-51%

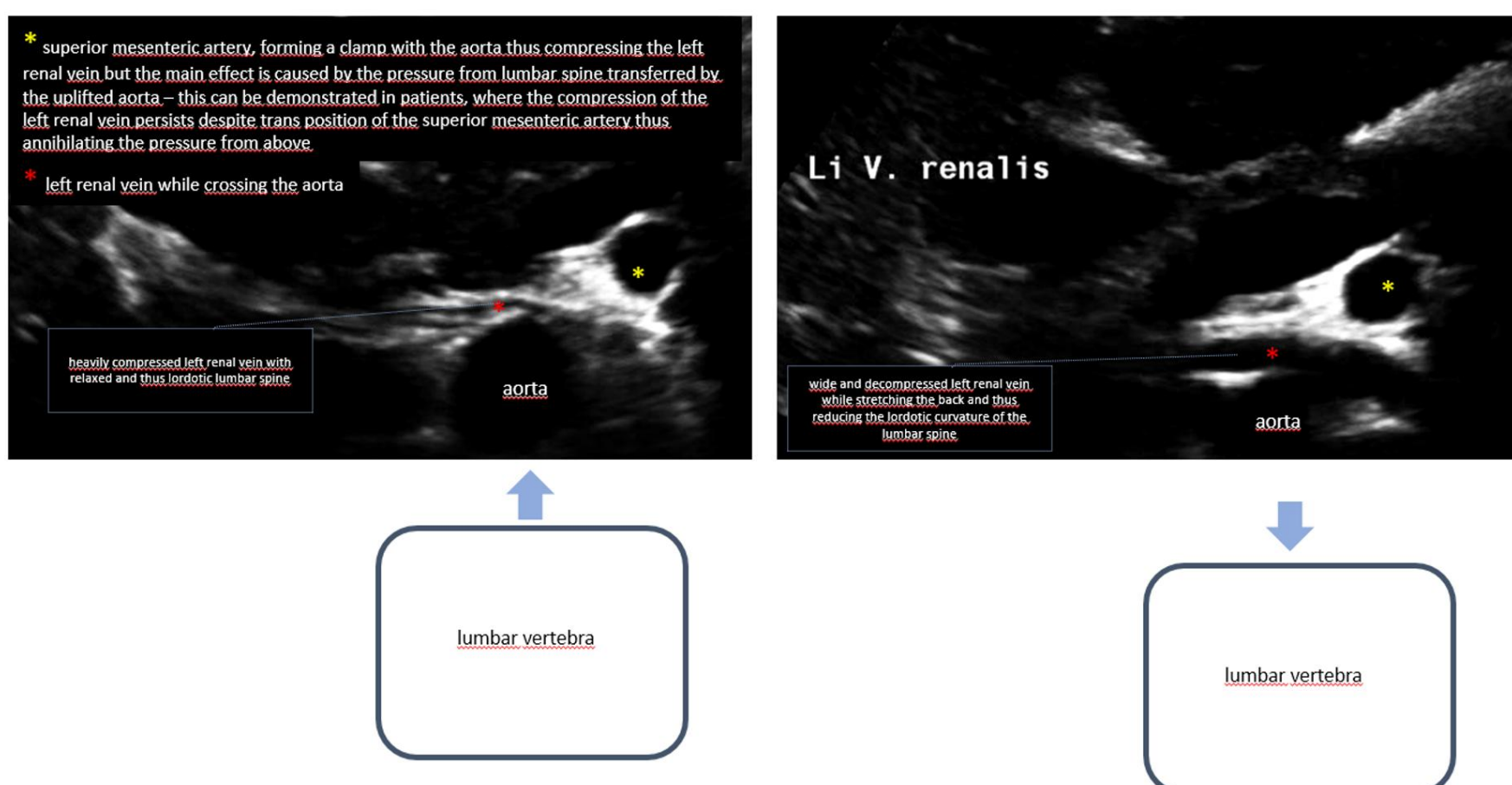
Updated Paradigm

- Vascular compression syndromes are frequent
- Anyone with chronic pain, especially women, require a thorough workup for all vascular compressions
- Multiple compressions usually occur simultaneously in an individual
- VCS deteriorate over time
- VCS symptoms overlap
- Symptoms occur far away from the compression site due to collateral circulation effects
- Symptoms are multifaceted due to the impact on the function of multiple organs
- Diagnosis requires in addition to morphology, flow velocities and local symptoms flow volume and tissue perfusion measurements (PixelFlux) to define local and remote perfusion changes that needs to be correlated to the remote symptoms**

Morphology

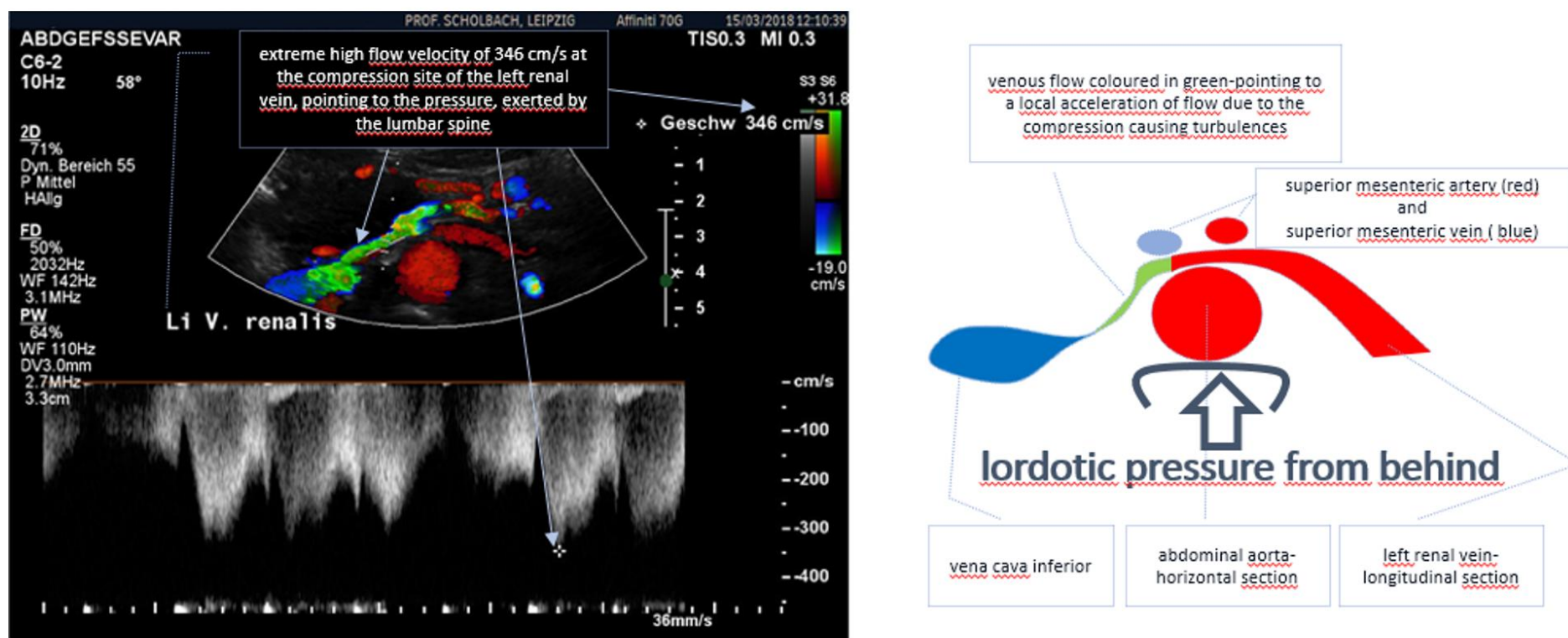
All compressions belong together

Lordosis is the driver of all vascular compressions



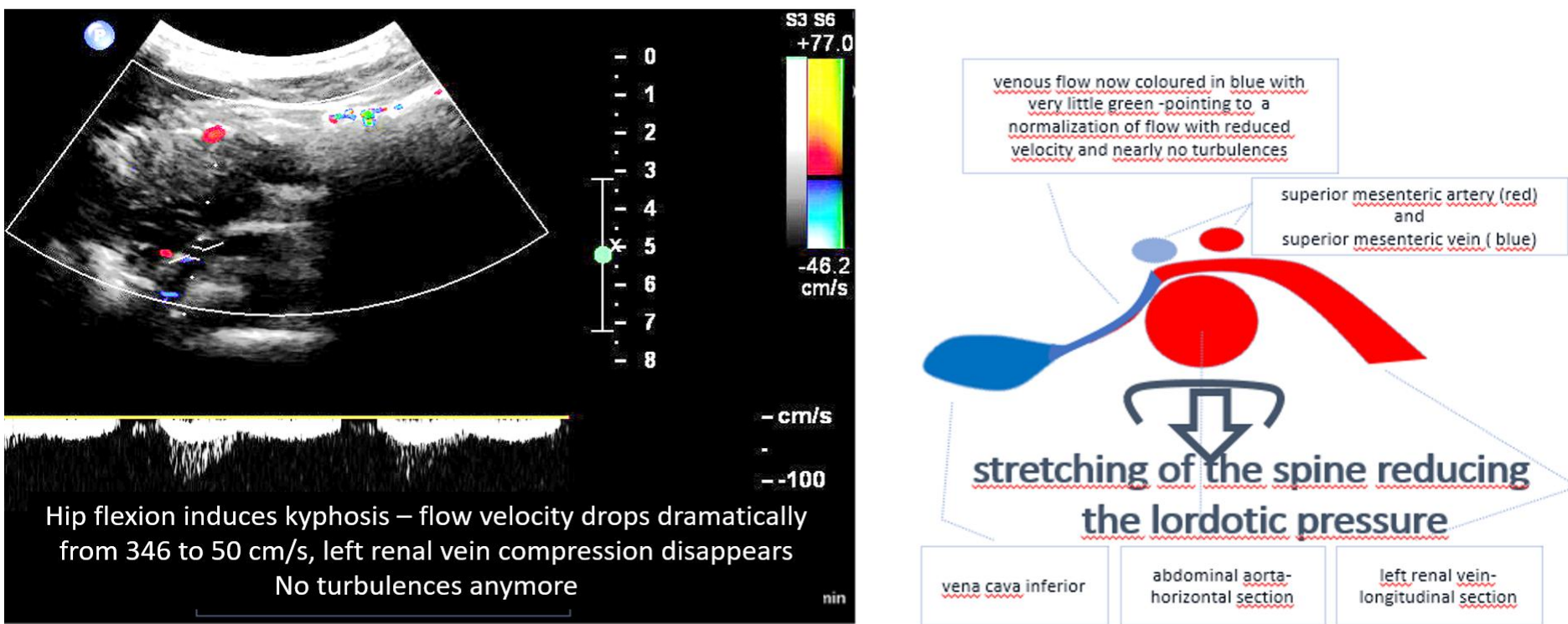
Flow acceleration

Nutcracker syndrome –stretched hips



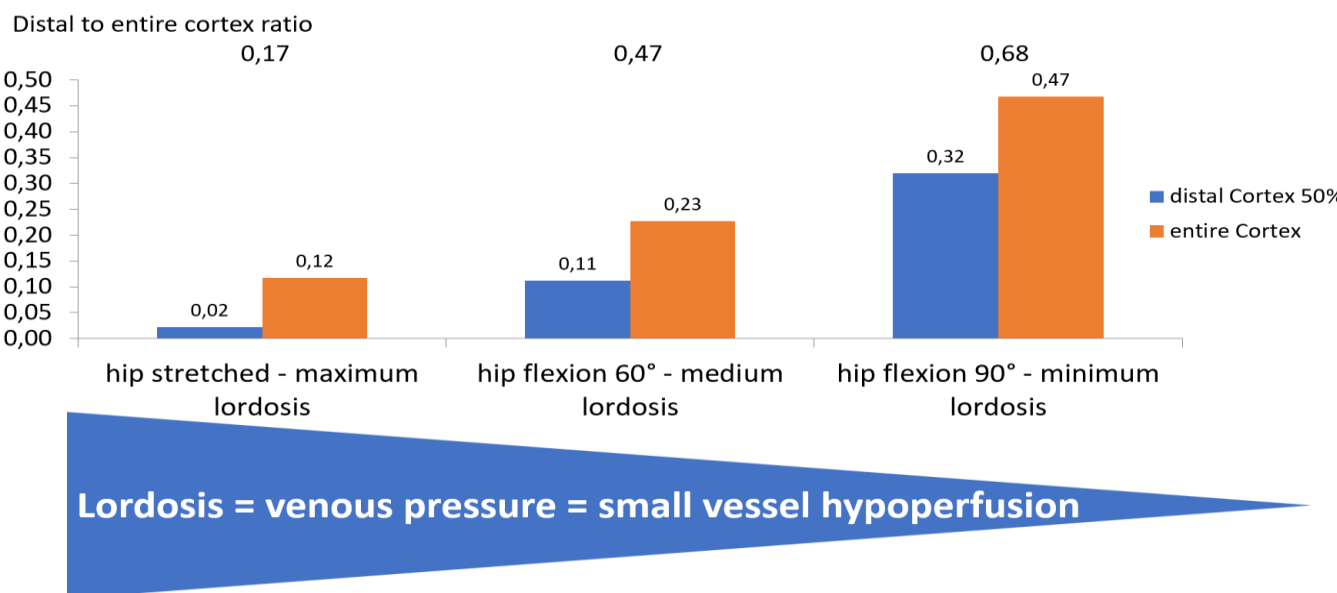
Need for a dynamic examination

Nutcracker syndrome –flexed hips



PixelFlux renal tissue perfusion measurements

Left renal perfusion (shown below [cm/s/cm²]) is directly dependent on the degree of lumbar lordosis: less lordosis– less venous pressure – better small vessel perfusion- higher overall perfusion



The diagnosis of multiple compression syndromes requires a new approach

Focusing on **morphology** (narrowing of the vessel), **local symptoms** (pain at the compression site, haematuria in left renal vein compression, left leg thrombosis in the left common iliac vein compression) and **simple flow velocity measurements do not reflect the systemic and functional nature of simultaneously occurring multiple compressions** in one individual.

The collateral network is causing a fancy array of remote symptoms. The disturbed perfusion of organs needs to be quantified and correlated to remote symptoms. This requires a

New paradigm of vascular compressions:

Vascular compression syndromes are

- **frequent**
- **female (90%)**
- **multifaceted function dependent** (varying with body posture, uptake of food and physical activities)
- **compressions of various abdominal structures** (veins, arteries, intestines, nerves) that require the measurement of
- **flow volumes and tissue perfusion** of the affected organs in order to
- **correlate** perfusion changes with the respective
- **organs symptoms** - functional deficits and
- **pain – the predominant symptom anywhere.**