Influence of a mobilization of the mesentery on the hepatic portal vein capacity measured with Echo-Doppler

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Questions asked

Overall question

Can an osteopath influence the physiology of an organ by applying a manual technique on this organ ?

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Specific research question	Is there a measurable change of the portal capacity after mobilization of the mesentery ?

Study Design

- Multicentric
- Subject and evaluator blinded
- Randomized
- Observational
- Experimental

Experimental Design

T1	➢ Doppler measurement before intervention
MT/NST	➢ Intervention
T2	➢ Doppler measurement after intervention
T3	➢ Doppler measurement 60 minutes after intervention

Every Doppler measurement is the mean of 3 consecutive measurements (Lafortune et al., 1998)

Mobilization Technique (MT)

- 15 Subjects
- Position: left side
- Mobilization of the mesentery
- Painless
- Duration: 3 minutes

Non-Specific Technique (NST)

- 15 Subjects
- Position: left side
- Stretching of the iliopsoas muscle
- Painless
- Duration: 3 minutes

Exclusion Criteria

- Women
- Medication
- BMI > 27
- Alcohol > 60 gr/day
- Smoking
- Inflammatory pathologies
- Hepatic and/or cardiac diseases

Inclusion Criteria

- 30 Men
- BMI 20 – 27
- Age 20 – 45 years
- Light dinner the night before and no food or fluid intake after midnight

Blinding and Randomization

- The 2 operators: 2 experienced radiologists of two different university hospitals
- Distribution NST-group and MT-group at random
- Distribution hidden to radiologists and subjects

Choice of Echo-Doppler

- Non invasive
- Relatively low cost
- Easy repetition of measurement
- Visualisation in colour
- Acoustic Information

Echo-Doppler, type ATL (Philips), HDI 5000, Bothell, USA, frequency of the medical transducer: 2.5 MHz

Primary Outcome

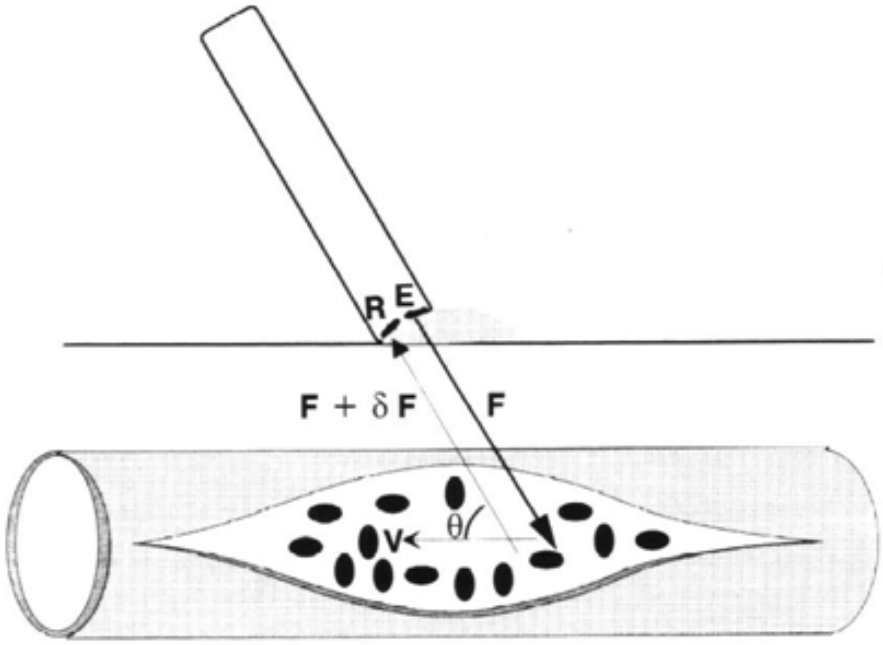
$$Q = V \cdot A \cdot 60$$

Q = Capacity of the portal vein (ml/min)

V = Mean blood flow velocity (cm/sec)

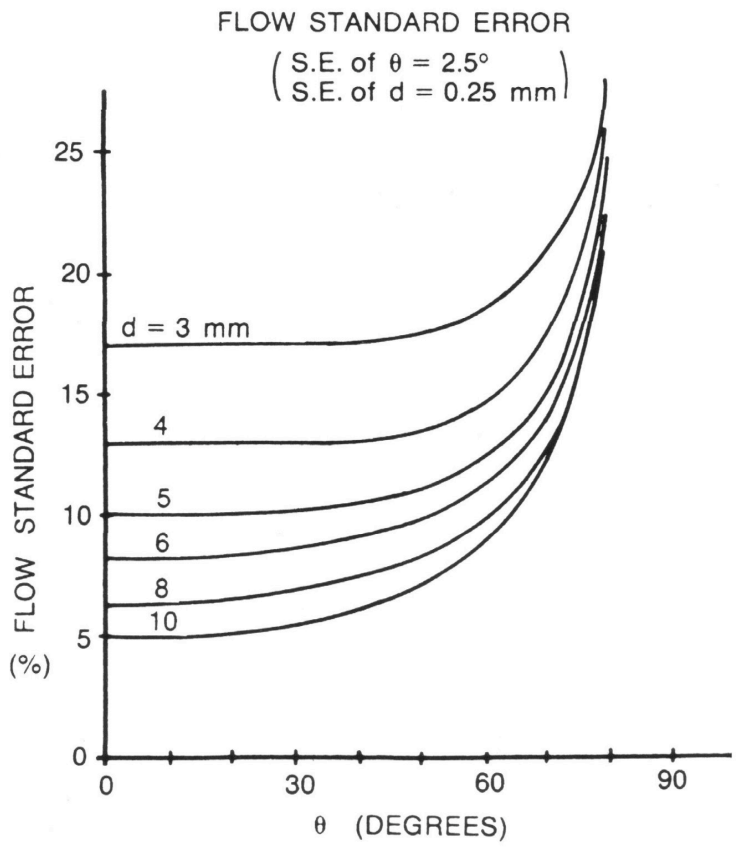
A = Area of the portal veins cross section (cm^2); $(D/2)^2$ with D = diameter

Limitations of the flow measurement by Echo-Doppler

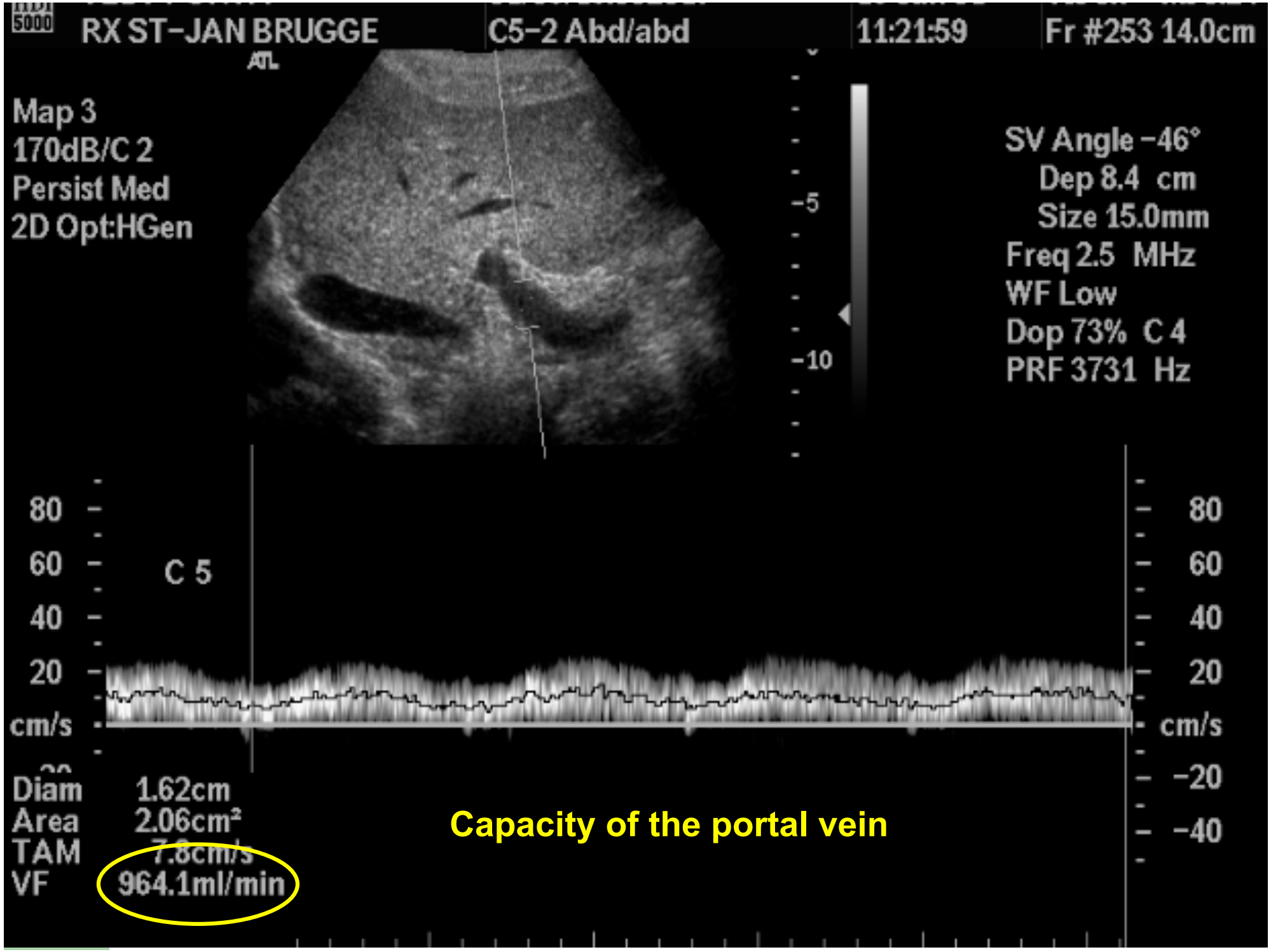


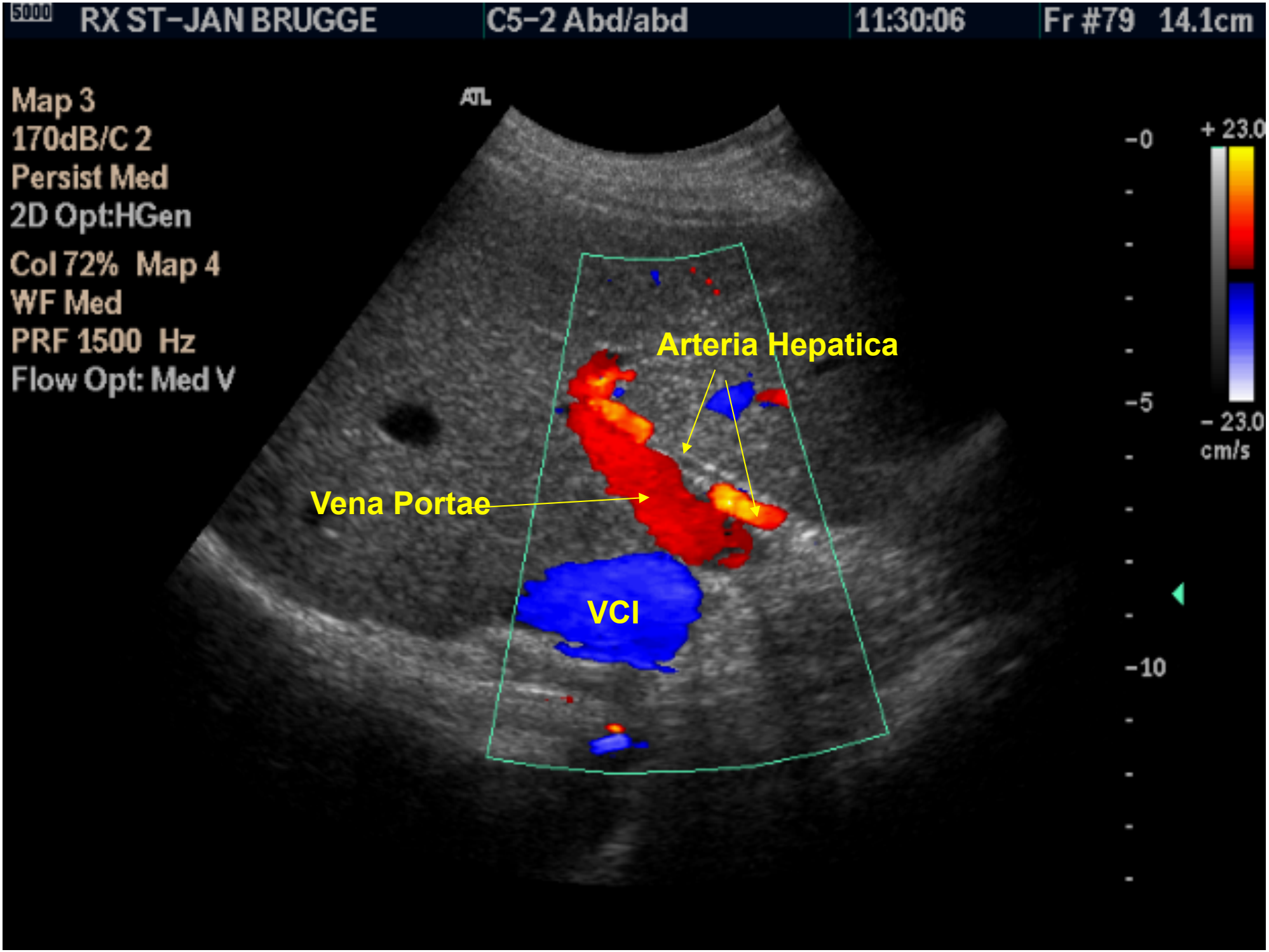
- Angle of measurement
- Cross section of the vessel

Flow Standard Error



- Ideal angle to measure flow velocity = 55° (Sabba et al., 1990)
- No valid flow velocity can be made at angles > 70° (Dauzat et al., 1984; Gill, 1985)
- This study: mean angle was 58° (min: 48°, max: 70°)


RX ST-JAN BRUGGE
C5-2 Abd/abd
11:21:59
Fr #253 14.0cm
Map 3
170dB/C 2
Persist Med
2D Opt:HGen
SV Angle -46°
Dep 8.4 cm
Size 15.0mm
Freq 2.5 MHz
WF Low
Dop 73% C 4
PRF 3731 Hz
C 5
cm/s
Diam 1.62cm
Area 2.06cm²
TAM 7.8cm/s
VF 964.1ml/min
Capacity of the portal vein


5000
RX ST-JAN BRUGGE
C5-2 Abd/abd
11:30:06
Fr #79
14.1cm
Map 3
170dB/C 2
Persist Med
2D Opt:HGen
Col 72%
Map 4
WF Med
PRF 1500 Hz
Flow Opt: Med V
ATL
Arteria Hepatica
Vena Portae
VCI
+ 23.0
- 23.0
cm/s
-0
-5
-10

Adapted Research Question

Is there a difference between the NST-group and the MT-group, regarding the three moments of measurement ?

Influence of Radiologist?

R/T	T1	T2	T3
R1 n (14)	755.71 (176.57)	878.05 (227.07)	751.51 (246.40)
R2 n (16)	764.38 (359.53)	1079.04 (374.24)	1039.87 (281.43)
	p = .752	p = .980	p = .023

Table 2: The mean portal vein capacity in ml/min (standard deviation) for the two radiologists for measurements at T1, 2 and 3

Influence of Radiologist?

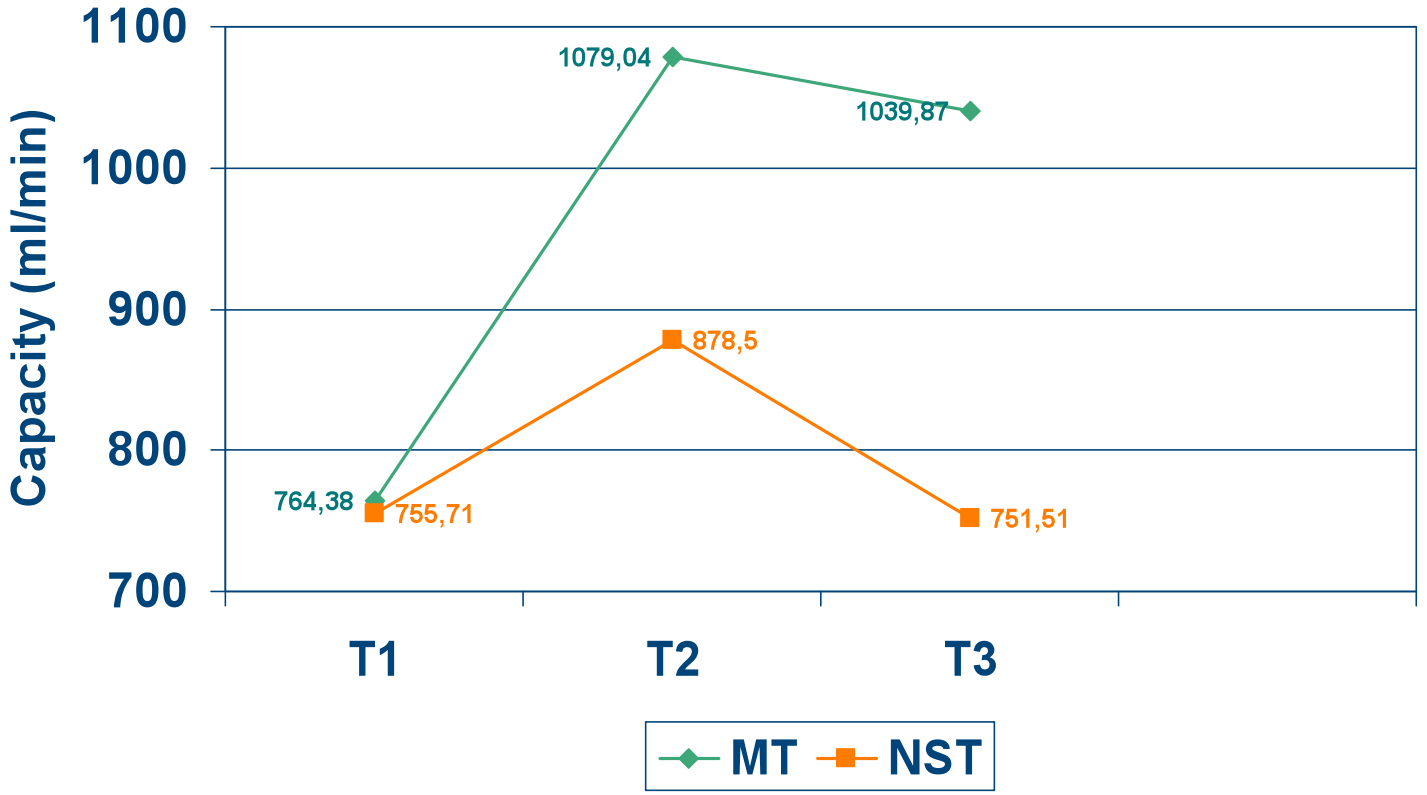
- R1 had 9 subjects in the MT-group while R2 had only 6
- After statistical correction for condition (MT and NST) there was no significant difference found between R1 and R2

Results

Group/T	T1	T2	T3
NST	755.71 (176.57)	878.05 (227.07)	751.51 (246.40)
MT	764.38 (359.53)	1079.04 (374.24)	1039.87 (281.43)
	p = 0.934	p = 0.86	p = 0.006

Table 1: The mean portal vein capacity in ml/min (standard deviation) for the NST and MT group for measurements at T1, 2 and 3

Results


1100
1000
900
800
700
Capacity (ml/min)
1079,04
1039,87
878,5
764,38
755,71
751,51
T1
T2
T3
MT
NST

Conclusion

A multivariate analysis shows a statistical difference between the NST-group and the MT-group when the results of T1 are compared with those of T2 and T3

$$F\,(1,28) = 4.726,\ p = 0.038$$

Contribution to capacity

T (Group)	n	Flow velocity (cm/s)	Diameter (cm)	Capacity (ml/min)
T1 (MT & NST)	30	11.25	1.21	760
T2 (MT)	15	12.12	1.38	1079
T3 (MT)	15	10.75	1.42	1040

Table 3: Mean values of flow velocity, diameter and capacity for measurements at T1, 2 and 3

Contribution to capacity

T	Flow velocity (cm/s)	Diameter (cm)
T1	0.81	0.88
T2	0.89	0.61
T3	0.66	0.64

Table 4: Standardized regression coefficients for the MT-group at T1, 2 and 3

Conclusion

- This study supports the hypothesis that manipulation of visceral organs in the abdominal cavity has a physiological effect.
- Further studies will be needed to confirm the outcome of this study, and more knowledge is needed regarding the specific mechanisms that are involved with visceral manipulation.

Thank you for your kind attention!