

Contrast-Enhanced Ultrasound Assessment of Arterial-Portal Arrival Interval: Implications for Post-Transplant Portal Vein Stenosis

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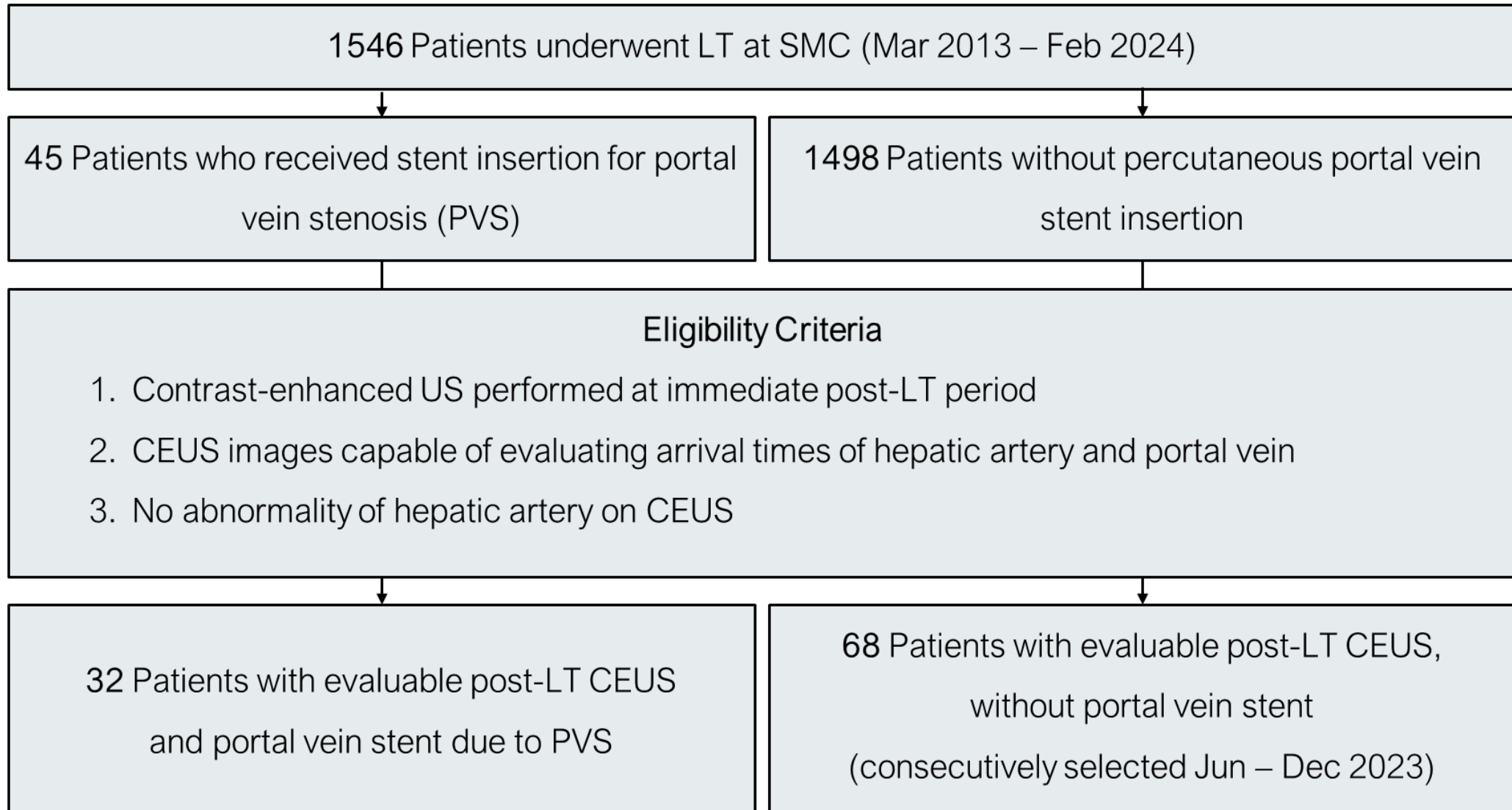
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Conflict of Interest

- Nothing to declare

Patient Selection



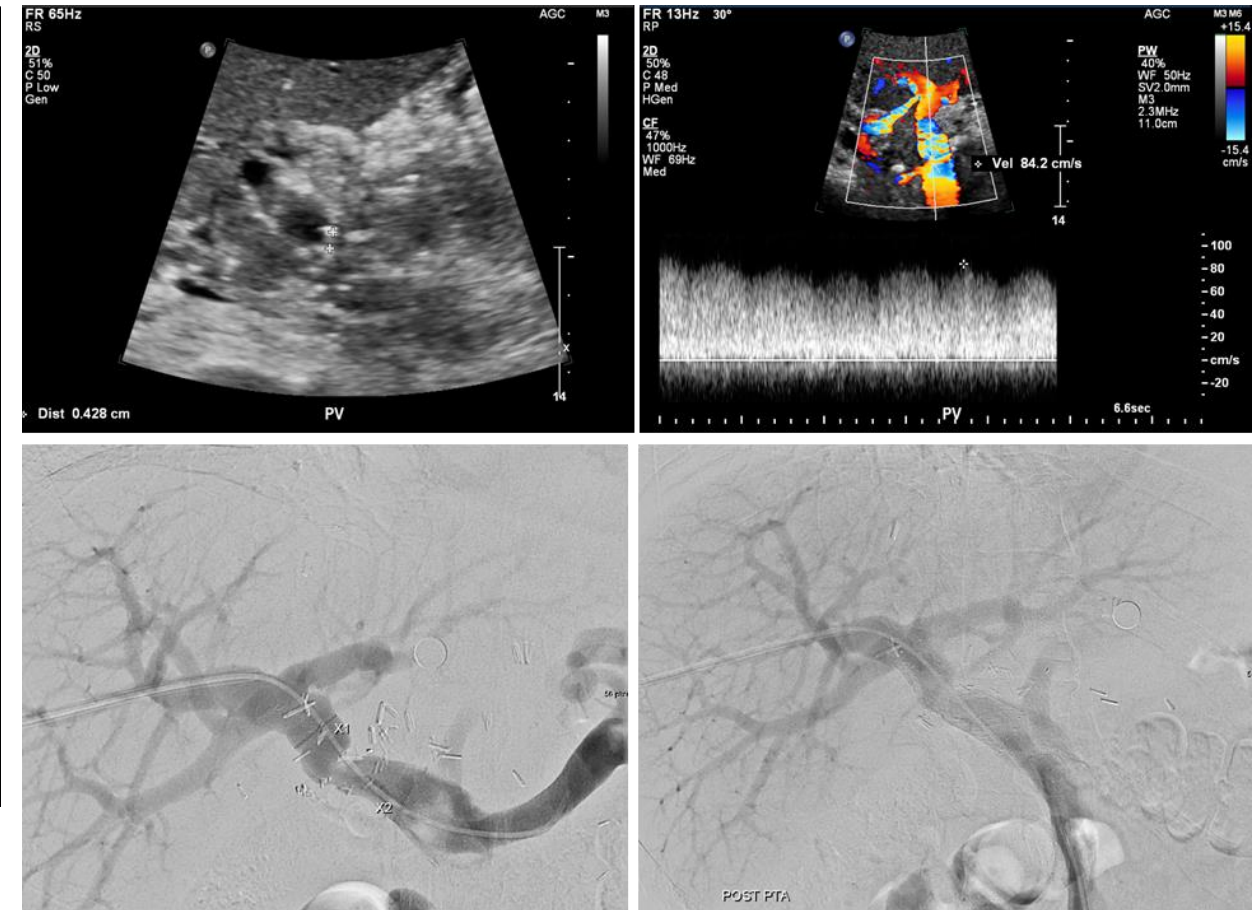
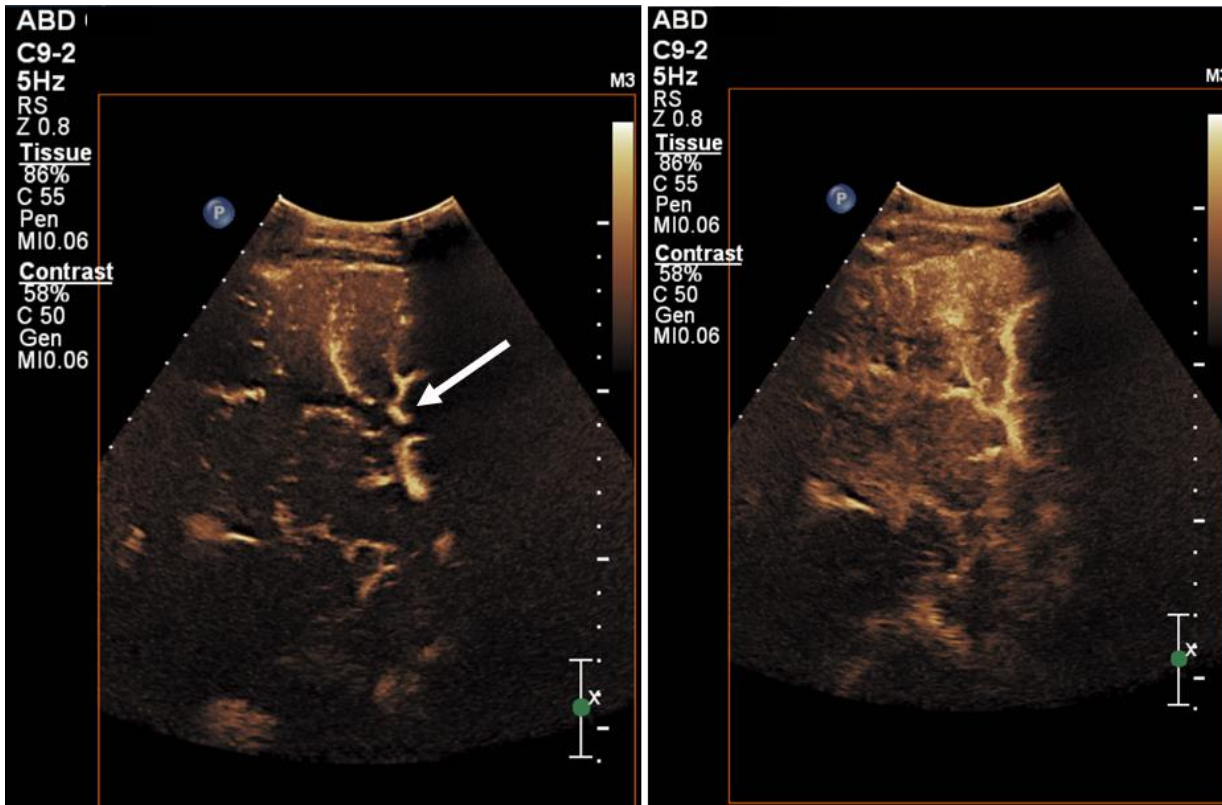
PV Stent group vs. Normal group

| | Total (n=100) | PV stent group (n=32) | No stent group (n=68) | p-value |
|----------------------------------|----------------|-----------------------|-----------------------|--------------|
| Age | 55 [51.75, 62] | 55.5 [52.75, 62.25] | 55 [50.75, 61.25] | 0.51 |
| Male sex | 61 (61) | 20 (62.5) | 41 (60.3) | >0.99 |
| MELD score | 16 [10, 31] | 17 [14.5, 33] | 15 [9, 30] | 0.18 |
| Deceased donor | 20 (20) | 9 (28.1) | 11 (16.2) | 0.26 |
| Graft type | | | | 0.20 |
| Whole | 20 (20) | 9 (28.1) | 11 (16.2) | |
| Split – Right | 71 (71) | 19 (59.4) | 52 (76.5) | |
| Split – Left | 9 (9) | 4 (12.5) | 5 (7.4) | |
| Double lumen PV | 7 (7) | 7 (21.9) | 0 (0) | <0.001 |
| ABO incompatible | 17 (17) | 6 (18.8) | 11 (16.2) | 0.97 |
| Hepatic artery AT | 10 [8, 13] | 11 [7.75, 12] | 10 [8, 13] | 0.79 |
| Portal vein AT | 13 [11, 17] | 13 [11, 17] | 14.5 [10, 19] | 0.43 |
| Arterial-portal arrival interval | 3 [2, 4] | 4 [2.75, 5.25] | 3 [2, 4] | 0.003 |

Factors Predicting Future PV Stenting

| Portal vein stenting due to PVS | | | | | Portal vein stenting due to PVS (Living donor) | | | | |
|----------------------------------|----------------------|---------------|----------------------|--------------|--|----------------------|---------------|----------------------|--------------|
| Univariable | | Multivariable | | | Univariable | | Multivariable | | |
| Variable | OR (95% CI) | p-value | OR (95% CI) | p-value | Variable | OR (95% CI) | p-value | OR (95% CI) | p-value |
| Sex, male [female] | 1.1 (0.46, 2.61) | 0.83 | 0.99 (0.35, 2.84) | 0.99 | Sex, male [female] | 0.98 (0.36, 2.64) | 0.96 | 1.33 (0.36, 5.0) | 0.67 |
| Age, year | 1.02 (0.98, 1.07) | 0.31 | 1.02 (0.96, 1.07) | 0.57 | Age, year | 1.01 (0.96, 1.06) | 0.76 | 0.99 (0.93, 1.04) | 0.64 |
| Deceased donor | 2.03 (0.74, 5.54) | 0.17 | 2.63 (0.85, 8.2) | 0.09 | Left liver graft [right] | 2.19 (0.53, 9.02) | 0.28 | 7.28 (1.21, 43.7) | 0.03 |
| Double portal lumen | | 0.99 | | 0.99 | Double portal lumen | | 0.99 | | 0.99 |
| Arterial-portal arrival interval | 1.53 (1.17, 2.0) | 0.002 | 1.57 (1.17, 2.1) | 0.003 | Arterial-portal arrival interval | 1.5 (1.1, 2.04) | 0.01 | 1.7 (1.2, 2.41) | 0.003 |
| ABO-incompatible | 1.2 (0.4, 3.58) | 0.75 | 1.27 (0.33, 4.9) | 0.73 | ABO-incompatible | 1.31 (0.39, 4.35) | 0.66 | 1.82 (0.36, 9.21) | 0.47 |

Representative Case



52/M, DDLT for chronic hepatitis-HBV
POD #1 CEUS: Arterio-portal arrival interval 7 sec

POD #93 US: Severe narrowing of PV anastomosis
→ Balloon angioplasty followed by stent placement

Discussion

CEUS after LT Arterio-portal arrival interval

Information on delayed
complication?

- Useful in evaluating immediate complication
- Hemodynamic disturbance → might elongate arrival interval
 - Stress-induced tissue remodeling
 - Vascular endothelial cell and smooth muscle cell reaction
 - Elasticity, fibrosis
- Arrival interval on immediate post-LT CEUS may predict future risk of PV stenosis