

Case Report: Early Systolic Notching (ESN) in Incidental Pulmonary Emboli – Discussion on Doppler Assessment of Pulmonary Artery Flow in Acute PE

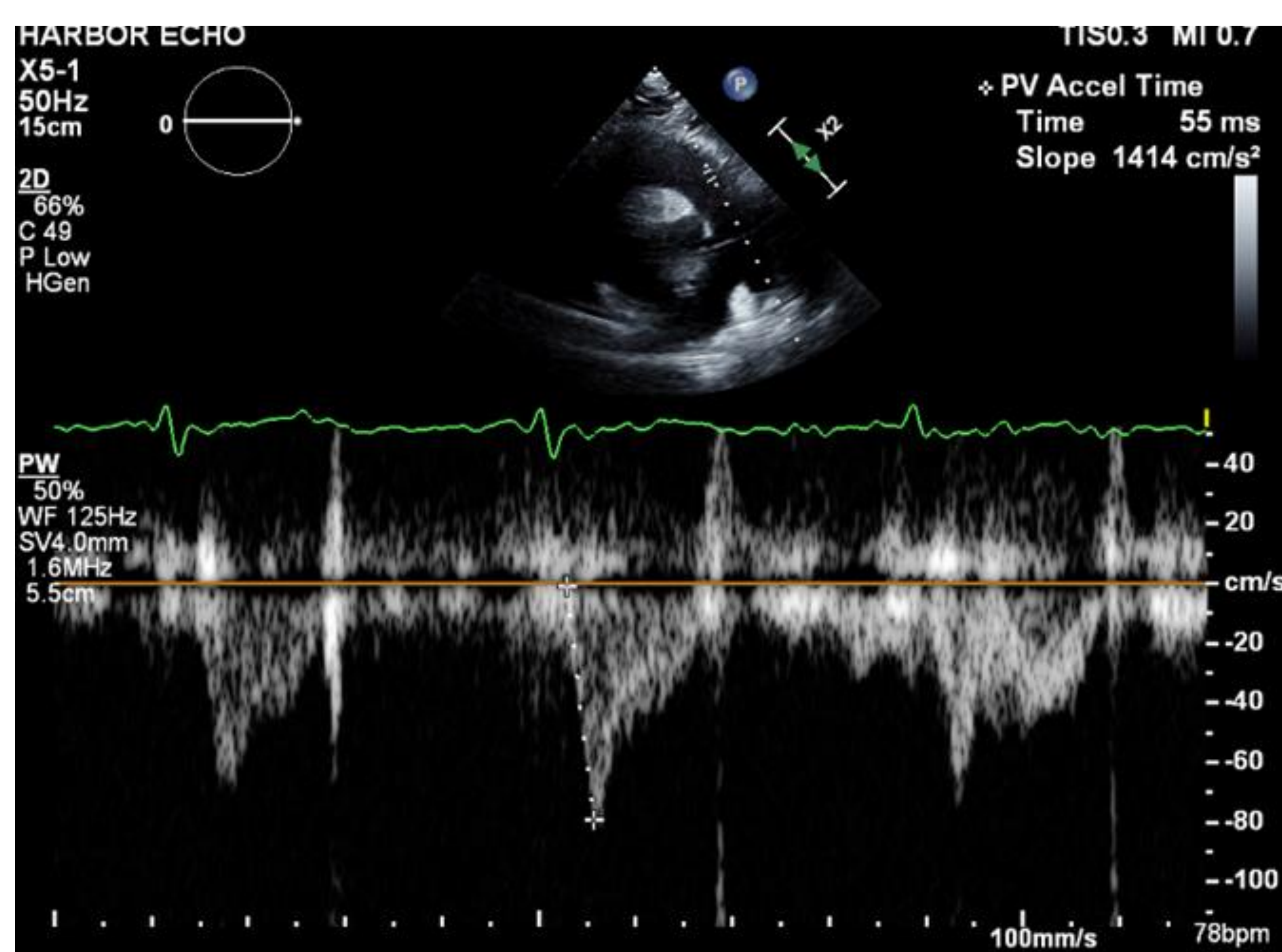
Vivek Shah MD¹, Manpreet Singh MD MBE¹, and Janine Vintch, MD²

¹ Department of Emergency Medicine, Harbor-UCLA

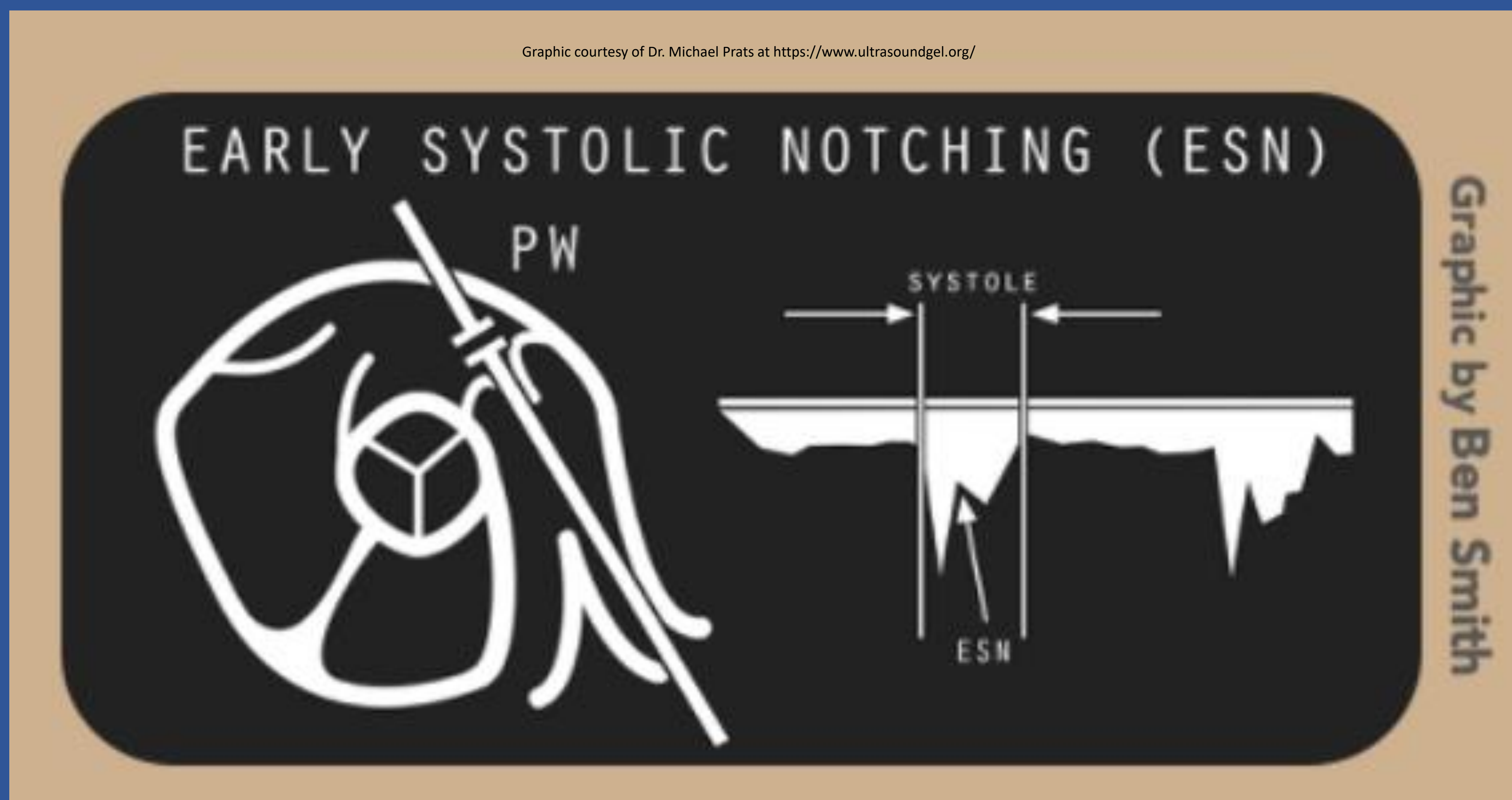
² Department of Medicine, Division of Pulmonary and Critical Care Medicine, Harbor-UCLA

Case Presentation:

- 82-year-old female with a significant past medical history of COPD without known pulmonary hypertension is brought in by ambulance for 2 days of altered mental status
- Found to be septic from an infected sacral decubitus ulcer – admitted for IV antibiotics
- Pt was incidentally found to have right distal main and right upper lobe segmental pulmonary emboli
- Risk stratification demonstrated elevated biomarkers and echocardiogram interpreted mild pulmonary hypertension
- Pt was started on a Heparin drip, though after anticoagulation complications, was transitioned to comfort care

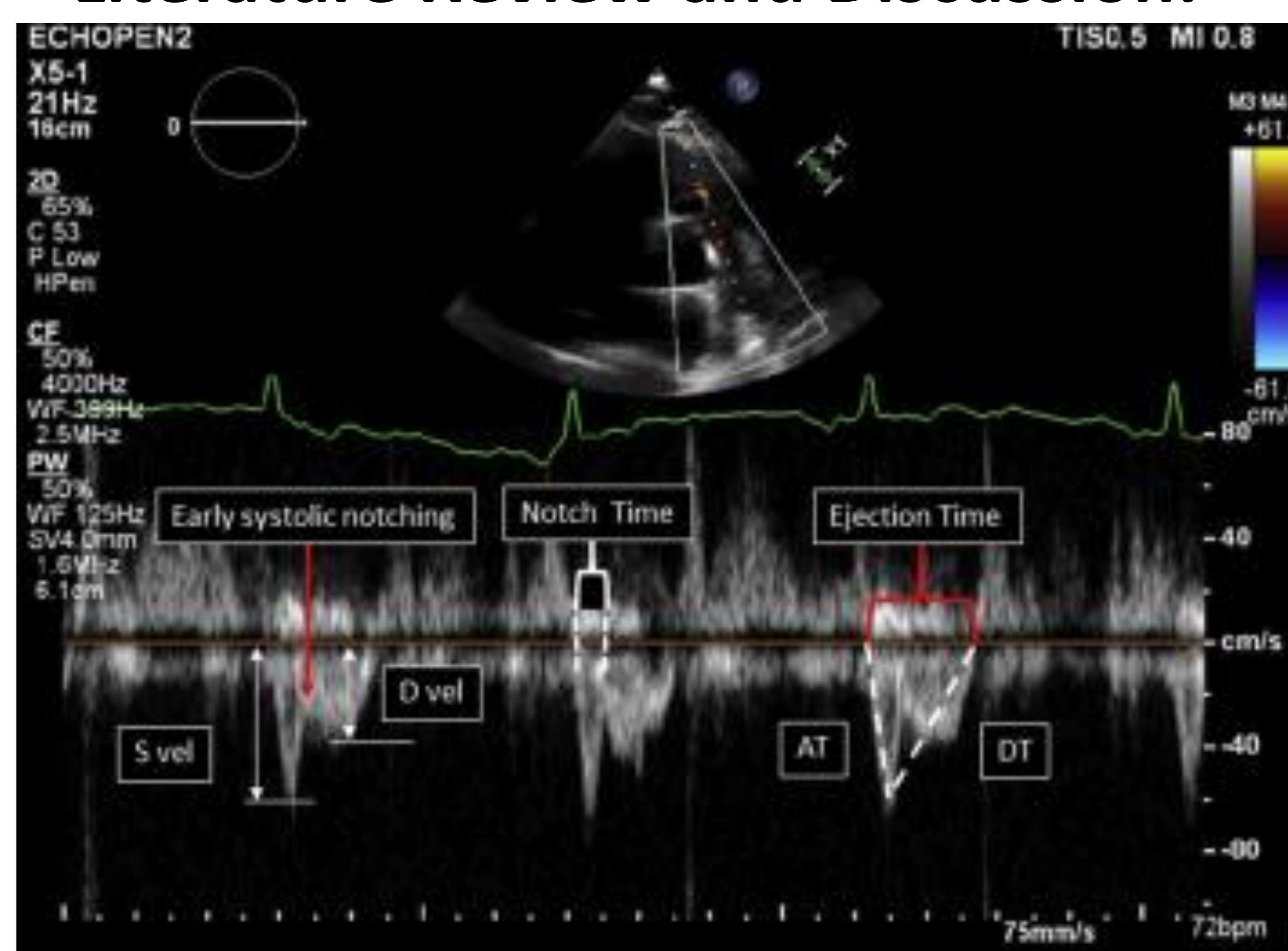


RV Functional Assessment	Patient's Result	Reference Range
RV Dilation	None	N/A
McConnell's Sign	None	N/A
Septal Flattening	None	N/A
RV S'	10 cm/s	>10 cm/s
Pulmonary Artery Accel Time	55ms	>130ms
RVSP	36mmHg	< 35mmHg
Pulmonary Artery Systolic Notching	Present	N/A



Pulmonary artery doppler assessment findings of early systolic notching may be a non-invasive method to understand hemodynamic effects of acute pulmonary emboli in patients without known pulmonary hypertension.

Literature Review and Discussion:



Variable	Sensitivity, %	Specificity, %	Positive predictive value, %	Negative predictive value, %	AUROC
60/60 sign *	51 (40–62)	96 (91–99)	93 (81–99)	70 (61–77)	0.74 (0.68–0.79)
McConnell's sign	52 (40–63)	97 (94–99)	90 (77–97)	82 (76–87)	0.75 (0.68–0.80)
ESN pattern	92 (84–97)	99 (96–100)	98 (91–100)	96 (92–98)	0.96 (0.92–0.98)
AT ≤ 87msec	91 (83–94)	77 (70–83)	60 (52–69)	91 (88–94)	0.84 (0.79–0.88)
AT/ejection time ratio ≤ 0.38	90 (84–94)	59 (51–66)	54 (46–62)	91 (86–95)	0.77 (0.73–0.82)
DT ≥ 200 msec	64 (53–73)	70 (63–76)	49 (39–58)	81 (74–87)	0.67 (0.61–0.73)
DT/AT ratio ≥ 2.36	83 (74–90)	79 (71–83)	67 (57–75)	90 (85–93)	0.80 (0.76–0.85)
Acceleration slope ≥ 810 cm/sec ²	89 (80–94)	67 (60–73)	53 (46–63)	91 (87–96)	0.78 (0.73–0.81)
Deceleration slope ≤ 232 cm/sec ²	66 (55–76)	74 (67–79)	53 (43–62)	83 (76–88)	0.70 (0.64–0.75)
Slope ratio ≥ 4 (S/D)	81 (72–89)	83 (79–88)	73 (63–81)	90 (85–93)	0.83 (0.80–0.86)

Reproduced from Alfonso L, Sood A, Akintoye E, et al. A Doppler Echocardiographic Pulmonary Flow Marker of Massive or Submassive Acute Pulmonary Embolus. J Am Soc Echocardiogr Off Publ Am Soc Echocardiogr. 2019;32(7):799-806. doi:10.1016/j.echo.2019.03.004

- This case report highlights that pulmonary doppler assessment, at times, may be the only abnormality that indicates RVOT obstruction from PE
- Alfonso et. al. demonstrated that in a retrospective cohort of patients with known PE, ESN was both highly sensitive and specific in differentiating between MPE/SMPE and SSPE (low risk).
- Early systolic notching may be a noninvasive modality to risk stratify patients
- However, pulmonary doppler flow notching can also be seen in other causes of precapillary pulmonary hypertension
- Further studies are warranted that evaluate in a prospective, all-comer population of patients with PE's

