



Use Of PET-CT Imaging To Guide Treatment Of Ventricular Tachycardia



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Learning Objective

- Determine the utility of PET-CT in guiding management decisions for ventricular tachycardia.

Background

- Cardiac inflammation plays a significant role in the development of ventricular tachycardia (VT).
- However, the optimal treatment strategies remain unknown.
- PET-CT imaging can reveal underlying inflammation and select patients who may benefit from immunosuppression.

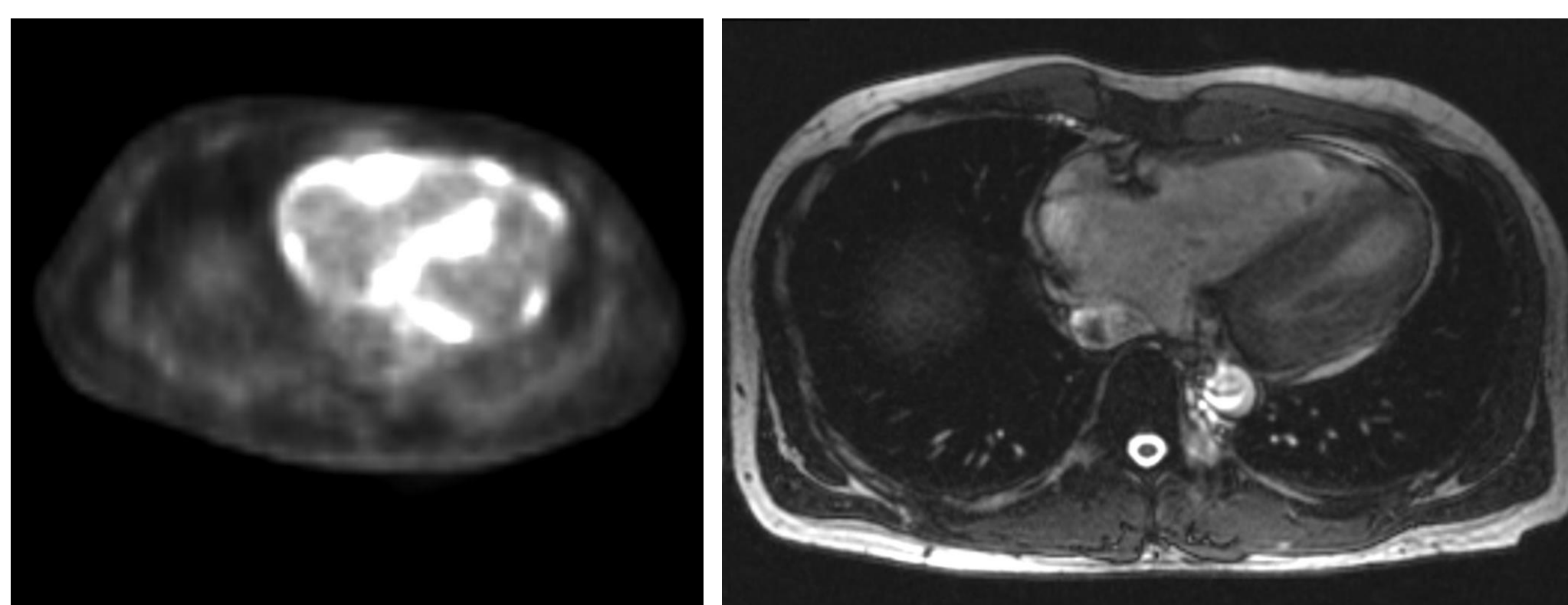


Figure 1: PET-CT (left) showing cardiac hyperenhancement, and cardiac MRI (right) showing delayed enhancement; both findings are consistent with cardiac inflammation/scar.

Methods

- We retrospectively reviewed all patients who underwent PET-CT for VT at UCLA between 2012-2019.
- Clinical characteristics including PET-CT results, treatment, and outcomes were collected.
- Exclusion criteria: pre-existing autoimmune disease or taking immunosuppressive medication prior to evaluation.

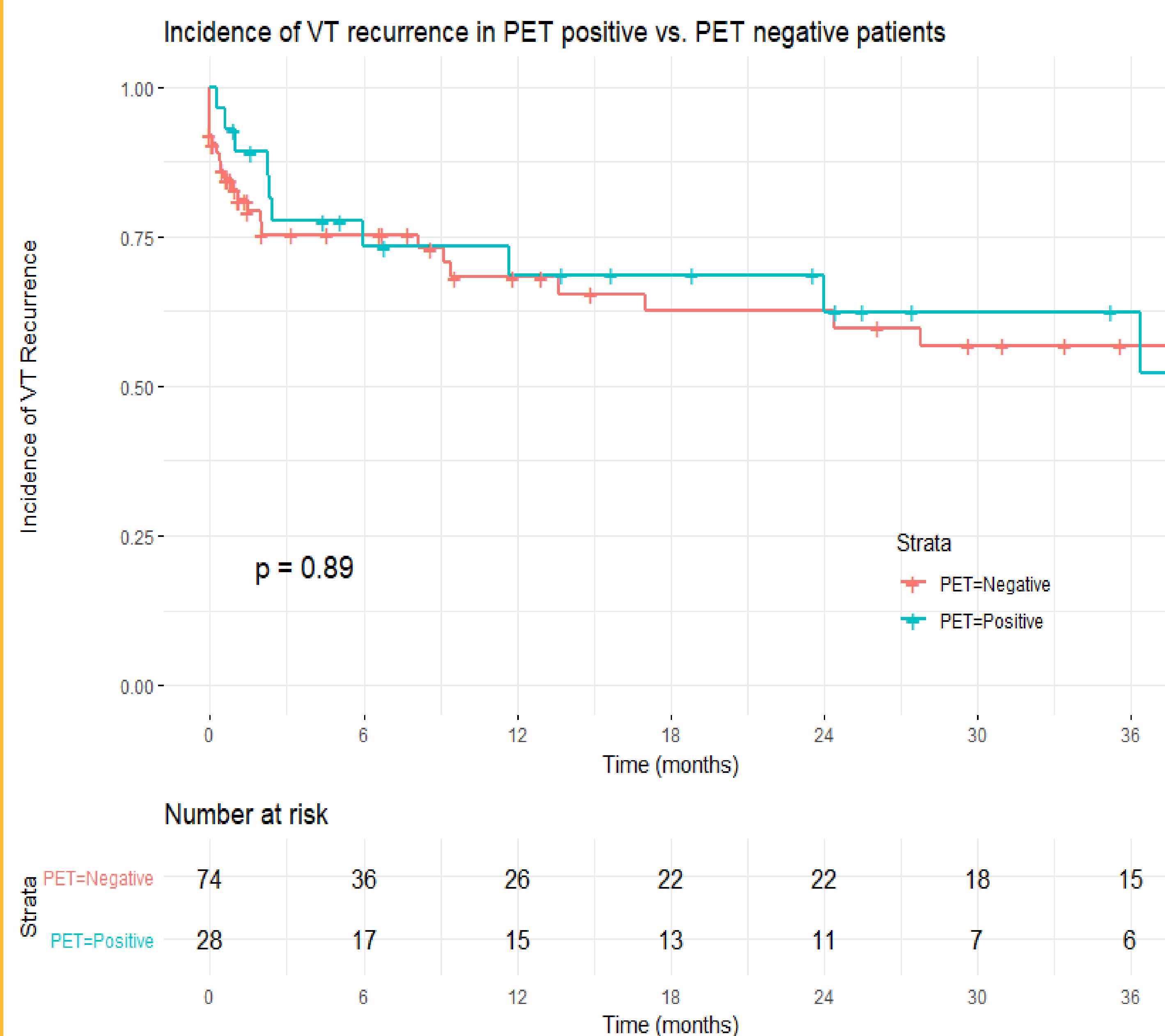
Figures/Tables

Table 1: Study Population Demographics

Feature	N = 137 (%)
Age (years)	56.3 (SD: 13.5)
Sex	
Male	109 (79.6%)
Female	28 (20.4%)
Median follow-up (months)	27.6 (IQR: 3.3, 54.9)
PET Results	
Positive for Inflammation	33 (24.1%)
Negative/inconclusive	104 (75.9%)
Treatment (PET-positive)	
Immunosuppression alone	21 (63.6%)
Immunosuppression + Ablation	6 (18.2%)
Other*	6 (18.2%)

*See discussion for details

Figure 2:



Results/Discussion

- PET-CT was performed in 137 patients (median age 58 years, 79.6% male) for VT. A cardiac inflammatory process was found in 33 scans, while 104 were negative or inconclusive. Patients were followed for a median of 27.6 months (IQR: 3.3, 54.9).
- Of the patients with positive PET scans:
 - 21 were initially treated with immunosuppression (3 developed recurrent VT requiring a subsequent ablation).
 - 6 were treated with concurrent ablation and immunosuppression.
 - 1 was treated with ablation alone (patient ended up receiving a heart transplant), and 5 were managed with antiarrhythmic medications.
- There was no significant difference in recurrence between PET-positive and PET-negative groups (39.3% vs 32.4%; $p = 0.50$) or time to recurrence ($p = 0.89$).
- Of the PET-positive patients receiving immunosuppression, 8/21 (38.1%) had recurrence. Of the PET-negative patients who underwent ablation, 22/54 (40.7%) had recurrence. There was no significant difference in outcomes comparing PET-positive immunosuppression only versus PET-negative ablation patients ($p=0.83$).

Limitations

- Single-institution study; limited sample size.
- 32 patients lost to follow-up.
- Difficulty in interpretation for patients with "nonspecific inflammation" PET-CT reads ($n = 12$)

Conclusion

- PET-CT can identify patients with a cardiac inflammatory process who may benefit from immunosuppression.
- In patients with PET-positive imaging, treatment with immunosuppression yielded similar results as in patients without inflammation who underwent ablation in this series.
- The incorporation of PET-CT imaging into the evaluation for ventricular arrhythmias can potentially obviate the need for invasive procedures.

References

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2. Lakkireddy D, Turagam MK, Yarlagadda B, Dar T, Hamblin M, Krause M, Parikh V, Bommana S, Atkins D, Di Biase L, Mohanty S, Rosamond T, Carroll H, Nydegger C, Wetzel L, Gopinathannair R, Natale A. Myocarditis Causing Premature Ventricular Contractions: Insights From the MAVERIC Registry. *Circ Arrhythm Electrophysiol*. 2019 Dec;12(12):e007520. doi: 10.1161/CIRCEP.119.007520. Epub 2019 Dec 16. PMID: 31838913.