

RATIONALE

To analyze the results of our experience in the utilization of SISCOM (Substraction Ictal SPECT coregistered on MRI) in intractable pediatric epilepsy.

METHODS

62 patients underwent Ictal SPECT as part of their presurgical evaluation between 2004 and 2006. The study utilized Neurolyte® with 20 mCi dosing calibrated twice per day and usually administered within 30 seconds of electrical seizure onset. A follow up interictal SPECT study was completed, subtracted and superimposed on volumetric 1.5T MRI utilizing the Analyze software (SISCOM). Hyperperfusion and Hypoperfusion coregistrations were obtained. The data was analyzed in conjunction with standard digital Video-EEG, state of the art anatomic MRI and neuropsychological data for selection of surgical candidates. EEG and SISCOM data were considered localizing when one side/one region or one side/2 contiguous regions were active. Lateralization of EEG was defined as abnormal activity limited to one side, even if multifocal. All others were considered not lateralizing or localizing.

RESULTS

Patients range in age from 2 to 21 years. MRI was abnormal in 52% of patients (9% non-focal), and normal in 48% (intractable non-lesional epilepsy).

Interictal EEG was non-lateralizing or localizing in 74% of patients, lateralizing and localizing in 26%. Ictal EEG was non-lateralizing or localizing in 71%, localizing in 26% of the patients.

SPECT studies were abnormal in 89% of the interictal studies and 97% of the ictal studies. When the data was coregistered, SISCOM hyperperfusion studies were abnormal in 60% of patients, and SISCOM hypoperfusion were abnormal in 23% of cases.

SISCOM data offered unifocal hyperperfusion in 78 % of patients and multifocal lateralized hyperperfusion in 19 % of patients. It was bilateral in only one patient.

Hypoperfusion SISCOM offered localization in only 23% of patients.

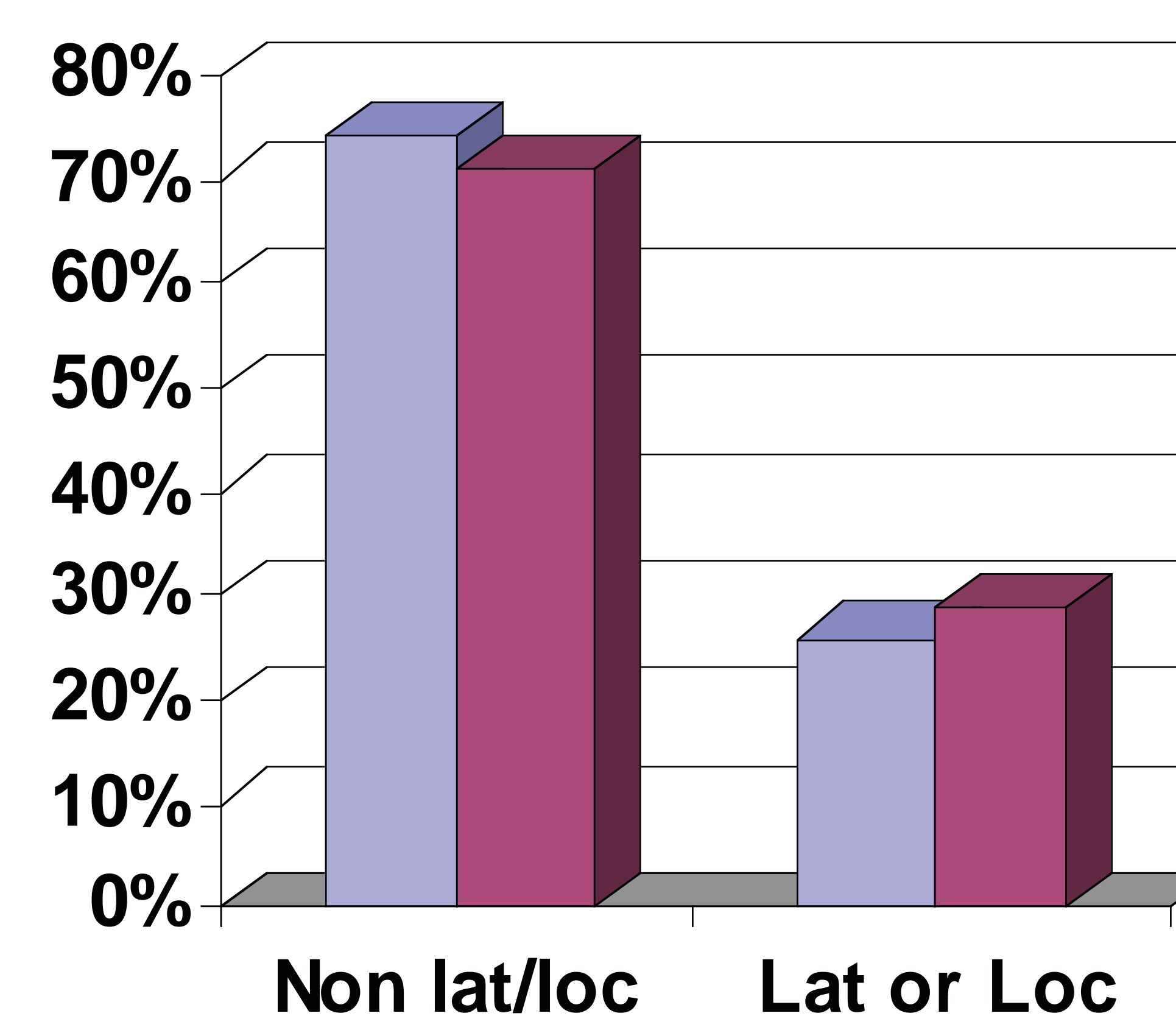
Overall the concordance between SISCOM and EEG lateralization/localization was significant at a $p=0.0232$. There was a higher statistical significant correlation between hyperperfusion SISCOM images and MRI with focal abnormalities ($p=0.0022$)

Overall, 55% of patients underwent epilepsy surgery. When intracranial recordings were done, SISCOM data helped plan the localization of subdural electrodes. Surgical outcome based on localization of SISCOM and resection showed Engel I in 12%, Engel II in 54%, and Engel III in 27% of patients.

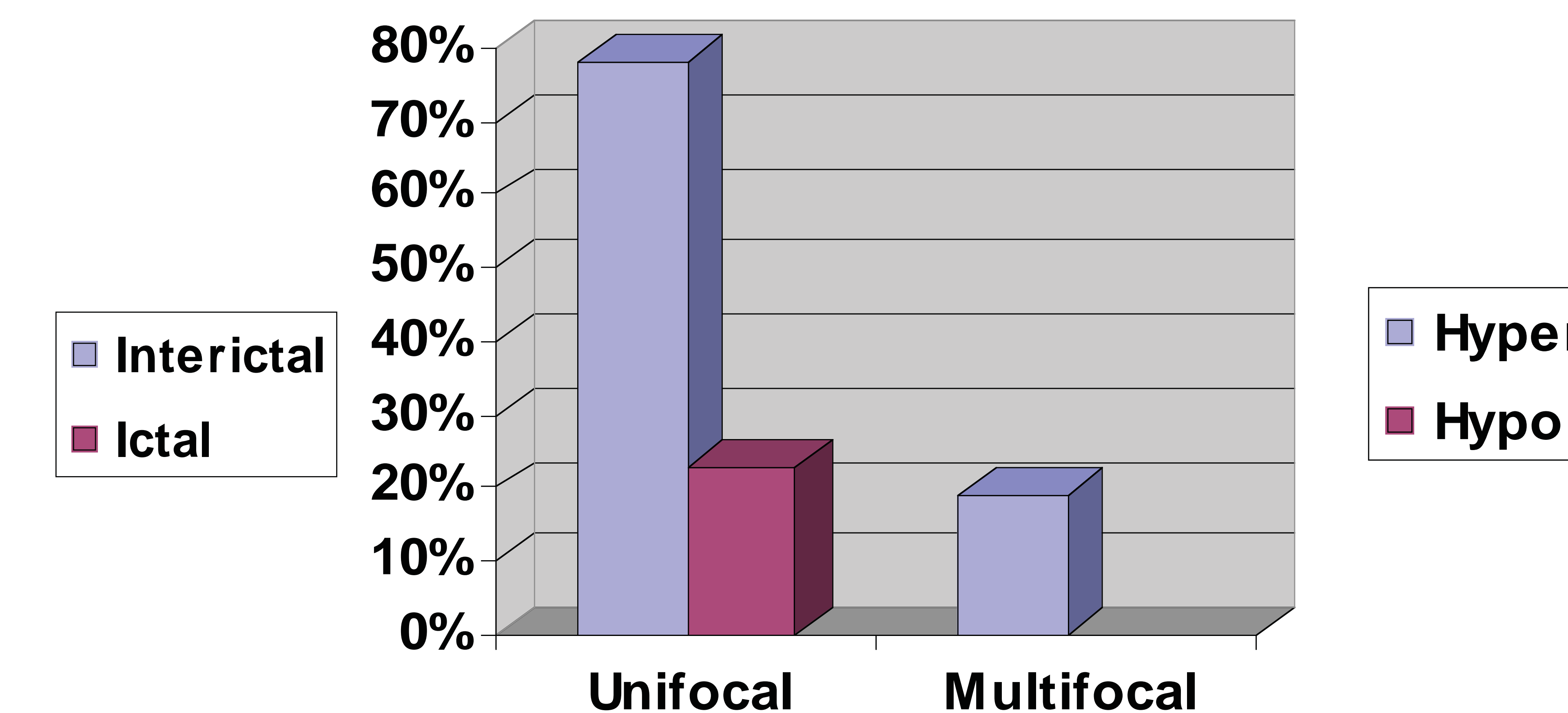
CONCLUSIONS

In selected pediatric patients, SISCOM is a very helpful test in localization of the epileptogenic zone. Hyperperfusion SISCOM localizes more frequently than other techniques. Statistically significant correlation occurred between ictal EEG, hyperperfusion SISCOM, and focal MRI abnormalities. For non lesional epilepsy, the test helps in patient surgical selection and electrode coverage for intracranial recordings. Patient outcome was favorable. For the patients with bi-frontal non-lesional epilepsy however, the test appears to lack enough power for lateralization/localization. These patients will be further evaluated with Dense Array EEG in the future for further comparison.

DISCUSSION



EEG



SISCOM

- SISCOM and EEG lateralization / localization concordance was significant ($p=0.0232$).
- Hyperperfusion SISCOM and focal MRI correlation was significant ($p=0.0022$)
- The test has limitations in localization for frontal non-lesional epilepsy

