A Retrospective, Single Institution Study of Tumefactive Multiple Sclerosis

Anastasie M Dunn-Pirio MD, MSc, Suma Shah, MD, Christopher Eckstein, MD

Duke University Medical Center, Durham, NC USA

INTRODUCTION

Tumefactive (TF) multiple sclerosis (MS) is an uncommon variant of MS that clinically and radiographically mimics a brain tumor. Risk factors, disease course, and management have not been well established given its rarity.

OBJECTIVES

We describe our institutional experience of TFMS in terms of patient demographics, clinical presentation, treatment, prognosis and radiologic and laboratory correlates.

METHODS

An IRB-approved retrospective analysis was conducted on adult patients (>18 years of age) treated for TFMS at Duke University Medical Center between 01/01/2004 and 10/09/2017.

Subjects were identified using the Duke Enterprise Data Unified Content Explorer. Brain lesions were considered TF and included in analysis if ≥ 2 cm in diameter.

Basic patient information including gender, race, age, and details of disease modifying therapies (DMTs), disease course, magnetic resonance imaging (MRI) findings, pathology and cerebral spinal fluid (CSF) analysis were collected from the hospital electronic medical record.

RESULTS

TABLE 1. Patient Demographics

Demographics		All (N=12) N	%
Gender	Male	2	16.7
	Female	10	83.3
Race	Caucasian	10	83.3
	African American	2	16.7
Age (years)	Median: 36.6, Range: 24-54		

TABLE 2. Tumefactive lesion location

Tumefactive lesion locations		All (N=12) N	%
TF lesion location	Frontal/parietal	12	100
	Temporal	0	0
	Occipital	0	0
	Posterior fossa	1	8.3
Multifocal TF lesions	Yes	2	16.7
	No	10	83.3

*One patient had bilateral frontal and posterior fossa TF lesions

CSF analysis:

- CSF oligoclonal bands (OCBs) were assessed in 8/12 pts, and CSF-specific OCBs were present in 5/8 pts
- 7 pts had CSF cell counts available for review: 4/7 had a CSF pleocytosis (ranged 8-29/cmm)
- 7 pts had CSF protein levels available: 2/7 had mildly elevated protein (52, 88, RR: 15-50 mg/dl)

TABLE 3. MRI features

MRI features (11/12 pts had MRI images/reports from time of presentation available)	N	%
Enhancement		
• Cortical/gyriform enhancement	1	9
• Rim enhancement	7	63.6
• Heterogenous enhancement	1	9
• Homogenous enhancement	1	9
• No enhancement	1	9
Restricted diffusion	4	36.6

4 pts had brain biopsy: All biopsy samples showed myelin loss, reactive gliosis, infiltrating macrophages, intact axons (+neurofilament staining) although 1 sample had 1 swollen axon

MRI spectroscopy was conducted for 1 pt: Showed a significant increase in the choline peak, a decrease in the N-acetylaspartate peak, and a slight increase in the lactate peak.

Clinical course:

- TFMS was the initial presentation in 8/12 pts
- 1 pt had a clinically isolated syndrome (CIS) (optic neuritis) 1 year before TFMS
- 3 pts had a preexisting diagnosis of RRMS prior to TF development (These all continued with RRMS, but 1 also had recurrent TFMS)
- Time from CIS/previous RRMS diagnosis to TF MS ranged from 1-20 years

- **Of the 8 pts who had TF MS at onset:**
  - 1 pt was immediately lost to follow-up
  - 2 pts later developed RRMS
  - 1 pt died from recurrent TFMS
  - 4 pts had no further relapses (follow-up ranged from 1-12 years)

❖ *Of note: 2 pts were documented to have had recurrence of TF lesions*

TABLE 3. Frequency of neurologic symptoms at presentation

Symptoms at presentation	N/Frequency (%)
Headache	5/41.7
Sensory changes	5/41.7
Weakness	5/41.7
Aphasia	4/33.3
Dysarthria	2/16.7
Vision loss	2/16.7
Dysphagia	1/8.3
Confusion	1/8.3
Vertigo	1/8.3

**Symptoms at presentation greatly varied based on lesion location*

Treatment history:

DMTs for pts with RRMS were taking when they developed TF lesions (N=3):

1. Off DMTs x 2 months (pt was stable on natalizumab x 2 years and switched to interferon beta-1b 4 months before TFMS, then DCed interferon beta-1b after 2 months

2. Off DMTs for unknown duration

3. Natalizumab (had just received first 2 treatments prior to TFMS)

DMTs following TFMS event of all pts:

- None (followed with surveillance MRIs) x 2 pts
- Lost to follow-up
- interferon beta-1b only
- interferon beta-1a x 2 pts
- glatiramer acetate only
- glatiramer acetate→ natalizumab
- interferon beta-1a→ glatiramer acetate
- natalizumab only
- natalizumab→ fingolimod→ natalizumab
- cyclophosphamide→alemtuzumab

DISCUSSION/CONCLUSION

- TFMS had a variable disease course.
- TFMS was more common in women than men.
- There was a predilection for frontal and parietal lobes.
- The most common radiologic features included rim enhancement and restricted diffusion occurred in over a third of cases.
- A minority of cases were monophasic, but longer follow-up will be required to assess for future relapses.
- There were no clear risk factors for development of aggressive disease, but the pt who died from recurrent TF lesions was unique in that there was no MRI enhancement, and there was evidence of there axonal injury on pathologic analysis.
- In cases that began with RRMS, TF lesions occurred during times of transition between DMTs or off DMTs all together.
- DMT approaches following TFMS onset varied widely, with more aggressive strategies employed by MS specialists.
- Further studies are warranted to investigate efficacious long-term therapies and develop markers to predict recurrent MS following TFMS onset.

DISCLOSURES

Dr. Dunn-Pirio and Dr. Shah have no disclosures. Dr. Eckstein receives honoraria from Biogen Idec and Genzyme.

CONTACT

Anastasie Dunn-Pirio, MD, MSc
Anastasie.dunn-pirio@duke.edu
Duke University Medical Center
Department of Neurology
122 Baker House
Durham, NC 27710