

Diagnoses of Non-Tuberculous Mycobacterium (NTM) in patients with granuloma on lung biopsy

Singh V¹, Kim A¹, Hayes L¹, Rasul R², Schwartz R³, Epstein M¹

1.Division of Infectious Disease, Donald & Barbara Zucker School of Medicine at Hofstra/Northwell, Manhasset, NY, USA
2.Biostatistics unit, Feinstein Institute for Medical Research and Zucker School of Medicine at Hofstra/Northwell

3.Department of Occupational Medicine, Epidemiology and Prevention, Feinstein Institute for Medical Research, Donald and Barbara Zucker School of Medicine at Hofstra/Northwell



BACKGROUND

- The prevalence NTM lung disease has increased from 8.7 to 13.9/100,000 from 2008-2013
- Patterns of NTM lung disease include fibrocavitary, bronchiectatic or nodular
- Our study focused on NTM disease that was found incidentally after surgical resection performed during malignancy work up
- Aims of our study:
 - To identify the proportion of NTM in resected lung lesions with granulomatous inflammation (necrotizing and non-necrotizing) on pathology
 - To compare differences in characteristics of patients with incidentally found NTM on lung lesion versus those with other diagnoses

METHODS

- This was a retrospective chart review of patients from 1/2013-3/2019
- Patients included were:
 - Adults who underwent resection of lung nodules/mass during malignancy work up
 - Resected lung had granulomatous (necrotizing or non-necrotizing) inflammation on pathology
- 497 patients met these criteria
- Patients with culture confirmed NTM on lung tissue or bronchoalveolar lavage/ sputum (at time of resection) were classified as "NTM" group
- Patients with a different diagnosis were classified as "Non-NTM" group
- Patients who had both NTM and a different diagnosis (for example NTM + malignancy) were classified within the NTM group
- Study variables were compared by the dichotomous NTM group using Chi-square test for categorical variables and T-test for continuous variables

RESULTS

- Most common diagnosis among resected lesions was lung cancer (21.93%)
- There were 81 (16.3%) patients with NTM (*Table 2*)
- Within the NTM group, Asians, presence of necrotizing granuloma, placement on airborne precautions and prior history of tuberculosis were significantly higher
- The NTM group also had a higher proportion of both COPD and lung cancer as their underlying condition (*Table 1*)
- 161 patients had non-diagnostic biopsies

TABLE 1
Characteristic of patients with NTM on granuloma vs patients with other diagnosis

CATEGORY	NTM/NTM+ Other		Other		Total		P Value
	n	%	n	%	n	%	
Age (years), Mean SD	69.43	10.23	67.66	12.3	67.95	11.99	0.2251
Race							
Caucasian	52	65.8	254	68.1	306	67.70	
African American	2	2.5	35	9.4	37	8.19	.
Asian	18	22.8	27	7.2	45	9.96	*0.0002
Other	4	5.1	29	7.8	33	7.30	.
Not specified	3	3.8	28	7.5	31	6.86	.
Sex							0.9193
Male	33	40.7	172	41.3	205	41.25	
Female	48	59.3	244	58.7	292	58.75	.
Smoking Status							0.1344
Current Smoker	11	13.6	26	6.3	37	7.47	
Former Smoker	37	45.7	194	46.9	231	46.67	.
Non-Smoker	25	30.9	165	39.9	190	38.38	.
Passive Smoker	2	2.5	7	1.7	9	1.82	.
Data Not Available	6	7.4	22	5.3	28	5.66	.
Airborne Isolation							
No	40	49.4	380	92.5	420	85.37	*<0.0001
Yes	41	50.6	31	7.5	72	14.63	.
Necrotizing Granuloma on Pathology (NGL)							
No	12	14.8	206	50.1	218	44.31	*<0.0001
Yes	69	85.2	205	49.9	274	55.69	.
Past Medical History							
DM	11	13.6	48	11.5	59	11.87	0.6032
HTN	33	40.7	221	53.1	254	51.11	0.0414
CAD	6	7.4	52	12.5	58	11.67	0.1915
Malignancy	16	19.8	57	13.7	73	14.69	0.1593
Autoimmune Disease	7	8.6	28	6.7	35	7.04	0.5385
Other	0	0	5	1.2	5	1.01	0.3213
HIV	0	0	1	0.2	1	0.20	0.6587
History of Prior TB	4	4.9	5	1.2	9	1.81	* 0.021
Underlying Lung Conditions							
Asthma	8	9.9	41	9.9	49	9.86	0.9954
COPD	24	29.6	75	18	99	19.92	*0.0168
Other Malignancy Involving Lung	1	1.2	3	0.7	4	0.80	0.6361
Bronchiectasis	0	0	3	13.214	3	0.60	0.4433

REFERENCES

Hosp Pract (1995). 2018 Dec Infection control measures to prevent hospital transmission of candida. *Ture Z, Alp E.*
Can Commun Dis Rep. 2018 Nov Something wicked this way comes: What health care providers need to know about *Candida auris*. *Schwartz IS, Smith SW, Dingle TC.*
Can Commun Dis Rep. 2017 Jul First reported case of multidrug-resistant *Candida auris* in Canada. *Schwartz IS, Hammond GW.*
MMWR Morb Mortal Wkly Rep. 2016 Investigation of the First Seven Reported Cases of *Candida auris*, a Globally Emerging Invasive, Multidrug-Resistant Fungus - United States, May 2013-August 2016. *Vallabhaneni S, Kallen A, et al.*

TABLE 2
Final Diagnosis of Resected Lung Granuloma

	N	%
Mycobacteria	86	17.30
TB	6	1.21
NTM:	81	16.3
MAC	77	15.49
M. abscessus (2), M. xenopi (1), M. kansasii (1)	4	0.80
Fungal	34	6.84
Pneumonia	10	2.01
Aspiration	5	1.01
Bacterial	4	0.80
Post Obstructive Pneumonia	1	0.2
Autoimmune	18	2.41
Granulomatosis with Polyangiitis	6	1.21
CTD	1	0.2
Rheumatoid	1	0.2
Vasculitis	3	0.6
Autoimmune, unspecified	7	1.41
Sarcoidosis	40	8.05
Pneumonitis	29	5.84
Fibrosing Pneumonitis	3	0.6
Granulomatous	2	0.4
Hypersensitivity	16	3.22
Interstitial	2	0.4
Other Pneumonitis	6	1.20
Inflammatory Disease other than pneumonitis	22	4.42
Bronchiolitis	7	1.40
Eosinophilic Pneumonia	1	0.2
Organizing Pneumonia	14	2.82
Interstitial Lung Disease	10	2.01
Chronic Obstructive Pulmonary Disease (COPD)	1	0.2
Cancer	119	23.94
Lung Cancer	109	21.93
Metastatic to Lung	5	1.01
Benign Lung Tumor	6	1.21
Other Pneumonitis	2	0.4
Other	4	0.8
Non diagnostic	161	0.32

CONCLUSION

- Mycobacterial infections made up a significant percentage of incidental diagnosis among lung nodules/masses resected for malignancy evaluation
- NTM were isolated with greater frequency than M. Tuberculosis even with necrotizing granulomatous inflammation on lung pathology. This reflects the changing epidemiology of NTM
- The significant proportion of Asians with NTM found during a malignancy work up without NTM is interesting and deserves further investigation