Amikacin susceptibility and treatment outcomes of Mycobacterium avium complex pulmonary disease

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Background/Aims: Current guidelines recommend parenteral amikacin or streptomycin for patients with advanced Mycobacterium avium complex pulmonary disease (MAC-PD). However, the evidence for susceptibility-based treatment of aminoglycosides is weak.

Methods: We retrospectively reviewed the patients with MAC-PD who received treatment including parenteral aminoglycosides for ≥8 weeks between October 1st, 2005, and December 31th, 2018, in Severance Hospital. Patients without drug-susceptibility test results were excluded.

Results: Among 951 patients diagnosed with MAC-PD, 306 patients received ≥6 months of treatment; 46 patients administrated intravenous aminoglycosides for ≥ 8 weeks. Finally, 30 patients with antibiotics susceptibility test results were enrolled in this study. The median age was 57 years (IQR 50–62), and 70% were female. Four patients underwent prior treatment for MAC-PD. M. intracellulare was the most common causative species (46.7%), followed by M. avium (43.3%); 10% of patients were co-infected with both species. Patients were followed for a median of 41.3 months (IQR 7.6–68.7) after treatment initiation. Sputum acid-fast bacilli smear was positive in 43.3%, and cavities were present in 73.3%. The median duration of treatment was 16.4 months (IQR 13.5–27.0). Culture conversion was achieved at 60.0%, and the all-cause mortality rate was 20.0%. Amikacin was susceptible in 80.0% of identified MAC; however, the rate of culture conversion appeared to be similar regardless of in vitro susceptibility results of amikacin (P =0.926).

Conclusions: We did not find evidence supporting the use of susceptibility-based treatment with intravenous amikacin in patients with MAC-PD. Further research is required.

Table 1 Baseline characteristics

	Total (N = 30)
Age, y	57 (50–62)
Sex, female	21 (70.0)
BMI, kg/m^2	20.3 (18.6–21.6)
BMI <18.5 kg/m^2	6 (20.0)
Smoking, current or past	9 (30.0)
History of tuberculosis	23 (76.7)
History of NTM treatment	4 (13.3)
Comorbidity	
Bronchiectasis	22 (73.3)
COPD	10 (33.3)
Diabetes mellitus	3 (10.0)
Chronic kidney disease	1 (3.3)
Malignancy	4 (13.3)
Causative species	
M. avium	13 (43.3)
M. intracellulare	14 (46.7)
M. avium + *M. intracellulare*	3 (10.0)
Radiologic type	
Fibrocavitary	10 (33.3)
Cavitary NB	12 (40.0)
Non-cavitary NB	8 (26.7)
Smear, positive	13 (43.3)
Presence of cavity	22 (73.3)
Follow-up after treatment, mo	41.3 (7.6–68.7)

Data are presented as No. (%) or median (interquartile range), unless otherwise indicated.
Abbreviations: BMI, body mass index; COPD, chronic obstructive pulmonary disease; NB, nodular bronchiectatic; NTM, nontuberculous mycobacteria.

Table 2 Treatment regimen and outcome

	Total (N = 30)
Treatment duration, mo	16.4 (13.5–27.0)
IV amikacin	9 (30.0)
IV amikacin duration, wk	38.9 (15.1–51.0)
IV streptomycin	21 (70.0)
IV streptomycin duration, wk	15.0 (12.9–28.0)
Macrolide	
Azithromycin	15 (50.0)
Azithromycin to Clarithromycin	0 (0.0)
Clarithromycin	4 (13.3)
Clarithromycin to Azithromycin	10 (33.3)
Other drugs	
Rifampin	28 (93.3)
Ethambutol	26 (86.7)
Surgical resection within 1yr	0(0.0)
Culture conversion	18 (60.0)
All-cause mortality	6 (20.0)

Data are presented as No. (%) or median (interquartile range).

Table 3 Antibiotic susceptibility profile and treatment outcome among patients treated with the corresponding antibiotics

	Susceptible	Intermediate	Resistant	*P* value	
Amikacin (n = 30)	24 (80.0)	5 (16.7)	1 (3.3)		P value for S vs (I+R)
Culture conversion	15 (62.5)	3 (60.0)	0 (0.0)	0.926	
Clarithromycin (n = 30)	27 (90.0)	1 (3.3)	2 (6.7)		
Culture conversion	15 (55.6)	1 (100.0)	2 (100.0)	0.385	