

Impact of Adjunctive Lung Resection for Treatment of *M. abscessus* complex Pneumonia on Quality of Life (QOL) at 12 Months

C.A. Czaja^{1,2}, A.R. Levin¹, C.W. Cox^{1,2}, C.L. Daley^{1,2}, J.D. Newell³, G.R. Cott^{1,2}

¹National Jewish Health, Denver, Colorado, ²University of Colorado Health Sciences Center, Aurora, Colorado; ³University of Iowa.

Abstract

Background: We evaluate whether lung resection added to combination antibiotic therapy for *M. abscessus* complex pneumonia improves QOL.

Methods: Saint George's Respiratory Questionnaire (SGRQ) and chest CT data were prospectively collected at baseline and 12 months from 42 patients referred for individualized antibiotics ± surgery. The minimal clinically important difference (MCID) in SGRQ Total score was 4. A chest radiologist graded severity of 7 CT findings by lobe.

Results: Patients were mean age 66±11 years, 83% female, 95% white, 45% former smokers, 17% had cystic fibrosis, and all had nodules and bronchiectasis on CT. Enrollment sputum AFB cultures were positive in 81%. Patients received a mean of 11±3 months of oral therapies, 4±3 months IV therapies, and 6±5 months nebulized therapies. 13 (31%) had lung resection (lobectomy, lingulectomy). Surgical patients received a longer course of IV antibiotics (5±3 months vs. 4±2 months, p=0.11), were less likely to have lung cavities (31% vs. 66%, p=-.05), and had more severe baseline bronchiectasis (p=0.03), atelectasis (p<0.01), and mucus plugs (p<0.02) on chest CT. Mean baseline SGRQ Total score was 35±19, and was similar in surgical and non-surgical patients (33±20 vs. 35±19, p=0.71). Total score improved 8±13 points overall (p<0.01), with greater improvement in surgical patients (18±12 (p<0.01) vs. 4±11 (p=0.07), (p-difference<0.01). 92% of surgical patients had improvement in Total score >MCID versus 41% of non-surgical patients (p<0.01). 34% of non-surgical patients had worsening >MCID. Improvement >MCID was associated with greater baseline FEV1 %predicted (73±16 vs. 64±17, p=0.09) and greater baseline severity of mucus plugs (0.04). The adjusted OR for improvement in Total score >MCID was 27 (95%CI 1.5, 502). Among 24 patients with follow-up CT data, only surgical patients had improvements in bronchiectasis, small nodules, consolidation, atelectasis, and mucus plugs (p≤0.01 each). Only small nodules improved in un-resected lobes (p=0.02). Change in CT scores did not correlate with change in SGRQ Total score.

Conclusions: Lung resection was associated with improvement in QOL. Surgery removed focal disease, and allowed antibiotics to address nodules in un-resected lobes.

Rationale

- Mycobacterium abscessus* complex causes chronic pneumonia.¹⁻³ The optimal treatment regimen is not known,⁴ and cure rates are low.^{2,4-5}
- Surgical resection of focal lung disease improves microbiologic outcome.²⁻³
- Because cure rates are low, other treatment goals, including improvement in quality of life (QOL), may be appropriate.
- We evaluated whether lung resection added to antibiotic therapy for *M. abscessus* complex pneumonia improves QOL.

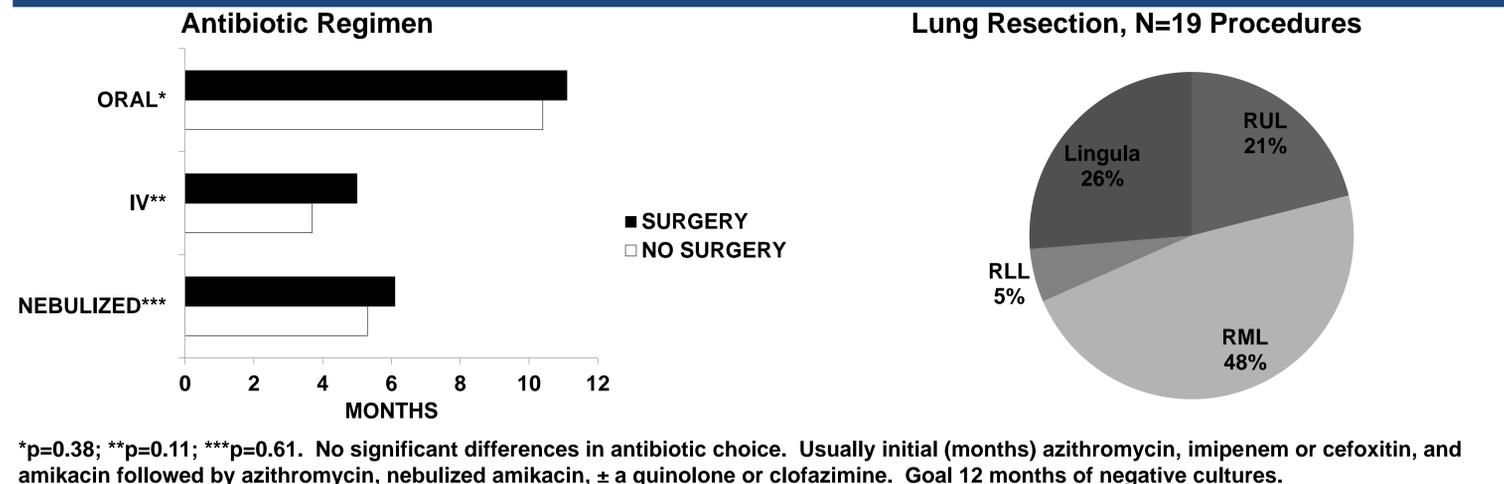
Methods

- Patients recommended to receive intravenous antibiotic therapy for *M. chelonae-abscessus* pulmonary infection within 30 days were enrolled in a 2-year prospective cohort study.
- Surgery to remove focal lung disease (bronchiectasis, cavity) was considered on a case-by-case basis.
- Clinical, microbiologic, and chest CT data were collected at enrollment (baseline) and 12 months.
- The Saint George's Respiratory Questionnaire (SGRQ) was administered at baseline and 12 months. Total Score ranges 0-100, with higher score indicated worse QOL.⁵⁻⁶ A 4-point change in SGRQ Total score was considered the minimal clinically important difference (MCID).⁷
- A chest radiologist graded the severity of 7 CT findings (0=0%, 1=0-25%, 2=26-50%, 3=51-75%, 4=76-100% involvement) by lobe (+lingula). A summary score for each finding was equal to the score of the most severely affected lobe.
- Student's and Paired T-tests, X² and Fisher's Exact Tests, and logistic regression were performed using SAS® v. 9.2.

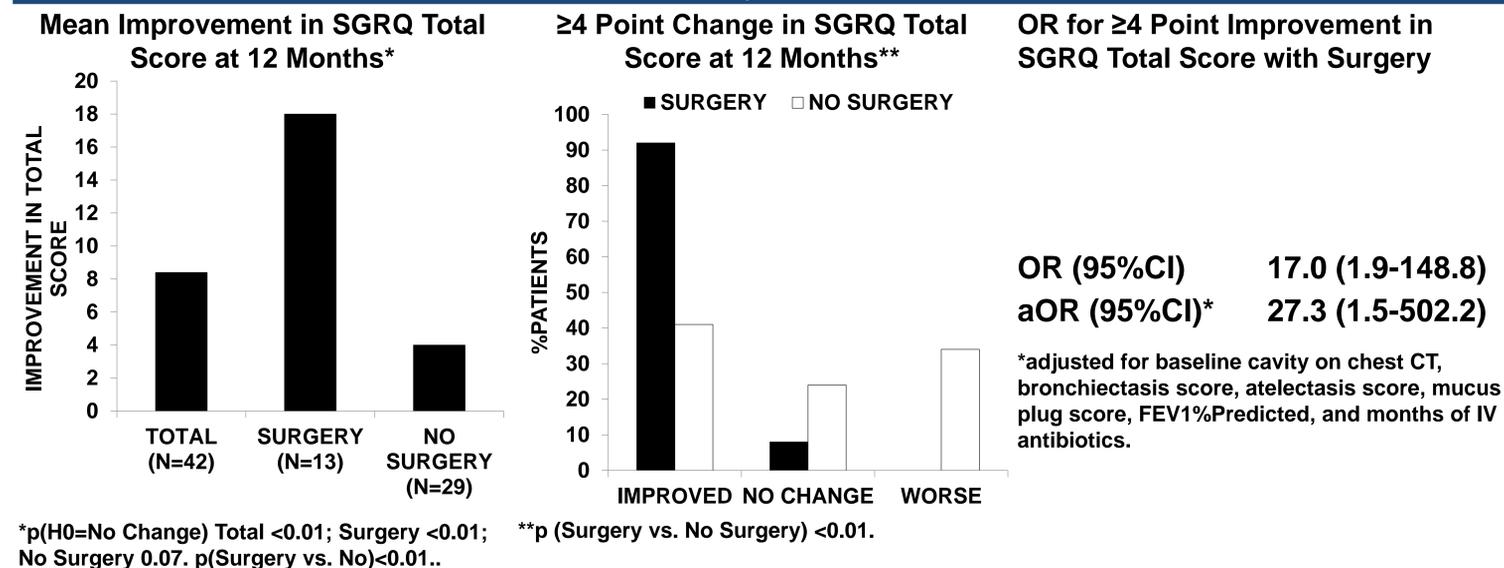
Baseline Characteristics

Demographics and Comorbidities				Chest CT							
	TOTAL N=42 (%)	SURGERY N=13 (%)	NO SURGERY N=29 (%)	P	FINDING, N (%)			CT SCORE, MEAN (SD)			
FEMALE GENDER	35 (83)	11 (85)	24 (83)	1.00	SURGERY (Y/N)	Y, N=13	N, N=29	P	Y, N=13	N, N=29	P
WHITE RACE	40 (95)	13 (100)	27 (93)	1.00	BRONCHIECTASIS	13 (100)	29 (100)	-	3.5 (0.9)	2.9 (0.9)	0.03
AGE (Y, (SD))	65.6 (11.4)	63.9 (8.7)	66.3 (12.6)	0.54	SML NODULES	13 (100)	29 (100)	-	2.6 (0.5)	2.9 (0.7)	0.19
FORMER SMOKER	19 (45)	5 (38)	14 (48)	0.55	LRG NODULES	12 (92)	28 (97)	0.53	1.2 (0.6)	1.3 (0.5)	0.50
CYSTIC FIBROSIS	7 (17)	3 (23)	4 (14)	0.66	CAVITY	4 (31)	19 (66)	0.05	0.4 (0.7)	0.8 (0.7)	0.11
SMEAR POSITIVE	9 (21)	3 (23)	6 (21)	1.00	CONSOLIDATION	13 (100)	28 (97)	1.00	1.6 (0.7)	1.4 (0.7)	0.37
AFB CX POSITIVE	34 (81)	9 (69)	25 (86)	0.23	ATELECTASIS	13 (100)	29 (100)	-	3.2 (1.1)	1.9 (1.0)	<0.01
MAC	13 (31)	3 (23)	10 (34)	0.72	MUCUS PLUGS	12 (92)	27 (93)	1.00	1.7 (0.9)	1.1 (0.6)	0.02
PSEUDOMONAS	11 (26)	3(23)	8 (28)	1.00	SGRQ TOTAL SCORE						
FVC%PREDICTED		77.6 (13.5)	71.9 (15.3)	0.27	TOTAL, N=42	SURGERY, N=13	NO SURGERY, N=29	P			
FEV1%PREDICTED		74.4 (16.0)	66.4 (17.3)	0.18	MEAN (SD)	MEAN (SD)	MEAN (SD)				
					35 (19)	33 (20)	35 (19)	0.71			

Treatment



Quality of Life



Secondary Analyses

Chest CT at 12 Months

- 24 patients had follow-up chest CTs (9 status-post surgery).
- In surgical patients, CT scores improved for bronchiectasis (mean improvement 1.56, p<0.01), small nodules (mean improvement 0.89, p<0.01), consolidation (mean improvement 0.78, p<0.01), atelectasis (mean improvement 2.22, p<0.01), and mucus plugs (mean improvement 0.89, p=0.01).
- There were no significant improvements in CT scores for non-surgical patients.
- When resected lobes were removed from the baseline CT score, there was improvement in the score for small nodules in un-resected lobes of surgical patients (mean improvement 0.66, p=0.02). Scores for other findings did not change.
- There was no correlation between change in SGRQ Total Score and change in CT score.
- There were no demographic or CT differences between patients who had improvement versus worsening of QOL..

Non-Surgical Patients

Conclusions

- Patients undergoing adjunctive lung resection for treatment of *M. abscessus* complex pneumonia experienced greater improvements in SGRQ Total Score and were more likely to have clinically important improvements in QOL.
- Surgery removed focal lung disease, including severe bronchiectasis and associated nodules, consolidation, atelectasis and mucus plugging.
- Removal of focal lung disease allowed antibiotics to address infection (nodularity) in un-resected lobes.
- Apart from surgery, no other independent predictors of QOL were detected, but sample size was relatively small.
- Additional follow-up CT and culture data will be used to evaluate whether improvement in SGRQ correlates with other measures of treatment response.
- We will evaluate the accuracy, reproducibility, and validity of CT scoring.
- Adjunctive lung resection should be considered for patients with *M. abscessus* complex pneumonia and focal lung disease.

References

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