Outcomes for Adolescent and Young Adult Patients with Uncontrolled Severe Persistent Asthma Switched from Omalizumab to Dupilumab: A Case Series

Parteet Sandhu, MD; Heather Lehman, MD

INTRODUCTION

The majority of pediatric and adolescent asthmatics are atopic asthmatics. There is only one biologic medication, omalizumab, indicated for the treatment of severe atopic asthma. Until recent years, omalizumab was the mainstay biologic therapy for treating severe adolescent asthmatics who are uncontrolled on conventional controller medications. Now, with the availability of biologics targeting IL-5 and the IL-4 receptor, the decision of which biologic to initiate is more puzzling in adolescent patients, with limited information available to guide selection of biologic treatment. While most adolescent asthmatics are atopic, omalizumab does not result in adequate disease control in all such patients, prompting the consideration of alternative biologics in these patients with predominantly atopic disease.

METHODS

Case series of six adolescent/young adult patients with severe persistent atopic asthma, uncontrolled on omalizumab who were switched to dupilumab.

CASE SERIES

#1: 16-year-old female with severe persistent asthma and allergic rhinitis:
- On omalizumab for 11 months before switching to dupilumab.
- Pulmonary function test (PFT) improved 3 months after the switch (table 2).
- FeNO decreased from 53ppb to 23ppb 5 months after being switched from omalizumab to dupilumab.
- Decreased requirement of steroid bursts and hospitalizations (table 3).

#2: 13-year-old female with severe persistent asthma and allergic rhinitis:
- On omalizumab for 5 years before switching to dupilumab.
- PFT improved 7 months after the switch (table 2).
- Decreased requirement of steroid bursts (table 3).
- She was able to stop chronic steroids 6 months after starting dupilumab.

#3: 18-year-old female with severe persistent asthma and allergic rhinitis:
- On omalizumab for 7 months then was put on mepolizumab for 13 months before starting dupilumab.
- PFT on omalizumab: FEV1/FVC – 79%, FEV1 – 2.11 (64%)
- PFT on mepolizumab: FEV1/FVC – 82%, FEV1 – 2.57 (75%)
- PFT improved 7 months after the switch to dupilumab (table 2).
- Decreased requirement of steroid bursts and hospitalizations (table 3).

#4: 20-year-old female with severe persistent asthma and allergic rhinitis:
- On omalizumab for 5 years. Switched to mepolizumab for 1 year and 7 months then switched back to omalizumab due to worsening symptoms.
- Bronchial thermoplasty was being considered
- On omalizumab for 6 months before switching to dupilumab.
- PFT on mepolizumab: FEV1/FVC – 52%, FEV1 – 0.97(34%)
- PFT omalizumab (2nd time): FEV1/FVC – 57%, FEV1 – 1.79 (55%).
- PFT improved 7 months after the switch to dupilumab (table 2).
- Drastic decrease in requirement of steroid bursts and hospitalizations (table 3).

#5: 17-year-old male with severe persistent asthma and allergic rhinitis:
- On omalizumab for 4 months; patient did not want to continue due to large local swelling.
- After 1 year and 8 months he was started on dupilumab.
- PFT prior to dupilumab: FEV1/FVC – 57%, FEV1 – 1.41(38%)
- PFT mildly improved 3 months after the switch to dupilumab (table 2).
- Decreased requirement of steroid bursts (table 3).
- FeNO decreased from 57ppb to 14ppb three months after being switched from omalizumab to dupilumab.

#6: 16-year-old female with severe persistent asthma and allergic rhinitis:
- On omalizumab for 2 years and 2 months before switching to dupilumab.
- Pulmonary function test (PFT) improved 3 months after the switch (table 2).
- Decreased requirement of steroid bursts and hospitalizations (table 3).

Case #	Baseline IgE (units/ml)	Highest Recorded eosinophils (cells/µl)	# of Perennial Sensitizations	# of Seasonal Sensitizations
1	373	2100	5	2
2	464	2847	6	1
3	627	640	3	1
4	453	800	1	1
5	2820	700	4	2
6	184	550	3	2

Table 1: Characteristics of patients in the case series.

Case #	FEV1/FVC on omalizumab (%)	FEV1 on omalizumab (L)	FEV1/FVC on dupilumab (%)	FEV1 on dupilumab (L)
1	49	1.37	77	2.77
2	74	1.64	80	2.14
3	79	2.11	83	2.76
4	57	1.79	94	2.80
5	-	-	60	2.27
6	78	2.40	88	2.93

Table 2: PFT results of patients on omalizumab and dupilumab.

Case #	Number of steroids bursts 6 months prior	Number of steroids bursts 6 months after	Number of hospitalizations 6 months prior	Number of hospitalizations 6 months after
1	4	1	2	0
2	2	0	0	0
3	3	1	1	0
4	8	1	5	0
5	1	0	0	0
6	2	0	1	0

Table 3: Comparing number of exacerbations requiring oral steroids and hospitalizations 6 months prior to starting dupilumab and 6 months after starting dupilumab.

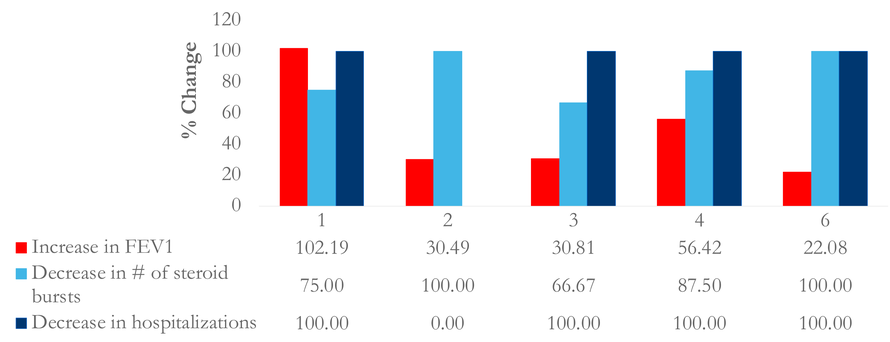

Figure 1: Bar graph showing change in FEV1 in each case after switching from omalizumab to dupilumab. It also shows change in exacerbations requiring steroids and hospitalizations from 6 months prior to 6 months after switching from omalizumab to dupilumab.

RESULTS

- All patients were atopic, with perennial sensitizations.
- Patient in case #5 was excluded from analysis as omalizumab was stopped due to side effects as opposed to efficacy.
- Patients were on omalizumab for 6 months to 5 years
- After switching to dupilumab, all patients experienced improvement in FEV1.
- When compared with omalizumab, mean improvement in FEV1 predicted was 0.82L (range 0.5L-1.40L)
  - On average FEV1 improved by 48.40%
- From 6 months prior to being on dupilumab to 6 months after being on dupilumab, average number of steroid bursts and hospitalizations for asthma exacerbation decreased by 85.83% and 80%, respectively.
- One patient successfully stopped chronic oral steroids
- Two patients failed both mepolizumab and omalizumab before achieving disease control on dupilumab.

CONCLUSION

Pediatric and adolescent asthmatics typically have atopic phenotype. While omalizumab is the only biologic specifically indicated for atopic asthma, dupilumab, an anti-IL4R antagonist, also impacts atopic diseases. Dupilumab may offer control for atopic adolescent asthmatics with uncontrolled disease on omalizumab. This case series exhibits need for better understanding of biologic treatment options for each asthma phenotype and endotype to avoid preventable morbidity.

REFERENCES

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University at Buffalo The State University of New York

University at Buffalo, Division of Allergy/Immunology & Rheumatology