Prevalence and Predictors of Follow-Up Endoscopic Biopsy in Patients With Celiac Disease in the United States

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Background

Endoscopic duodenal biopsy remains the gold standard in the diagnosis of celiac disease. However the role of follow-up duodenal biopsy after the initial diagnosis remains less clear.

The appropriateness of repeat biopsy is particularly uncertain in patients whose symptoms resolve with initiation of the gluten-free diet. There may be value in capturing persistent asymptomatic villous atrophy to predict certain adverse disease outcomes.

Study Objective

To characterize the frequency of follow-up duodenal biopsy in patients with biopsy-diagnosed celiac disease, and to evaluate factors influencing the likelihood of receiving a follow-up biopsy.

Methods

Data Source: IBM MarketScan Commercial Claims and Encounters and Medicare Supplemental and Coordination of Care databases.

Inclusion Criteria: A claim for endoscopic biopsy between 2009 and 2019, a claim for celiac disease on the same day to within one year of that biopsy, and at least six months of continuous insurance coverage after the initial diagnostic biopsy.

Primary Outcome: Occurrence of a second endoscopic biopsy.

Potential Predictive Factors Evaluated: Calendar year of first biopsy, patient age, sex, geographic region, metropolitan statistical area residence status, Elixhauser comorbidity index.

Means of Analysis: Patients were followed until they received a second biopsy or their insurance coverage ended. Potential predictors of follow-up biopsy were assessed using a Cox proportional hazards model. As an exploratory secondary analysis, presence of celiac disease related symptom codes in the 30 days prior to follow-up biopsy was assessed.

Results

Among 30,737 patients with biopsy-proven celiac disease who met our inclusion criteria, 5,976 (19.4%) received a follow-up duodenal biopsy. Median time between the initial and follow-up biopsies was 16.8 months. In patients who did not receive a follow-up biopsy, median follow-up time was 24.1 months.

Figure 1: Incidence of follow-up duodenal biopsy

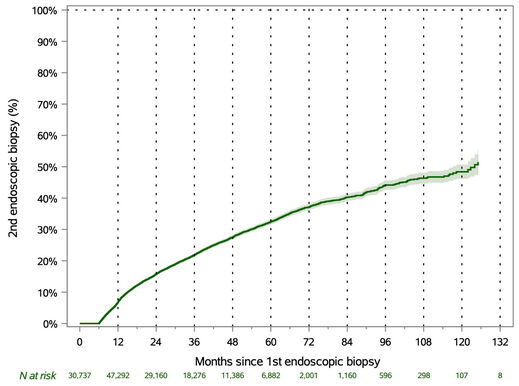

Table 1: Presence of celiac disease symptoms in the 30 days prior to follow-up duodenal biopsy

Symptom	Symptom present (%)
Any celiac disease related symptom	**57.1**
Abdominal pain	34.9
Diarrhea	17.2
Nausea / vomiting	12.0
Dysphagia	8.1
Weight loss	5.5
Abdominal distension / gas	5.4
Malaise / fatigue	4.5
Heartburn	4.1

Table 2: Predictors of follow-up duodenal biopsy

	Adjusted Hazard Ratio (*=p<0.05)
Age (years)	
≤ 19	Referent
20-29	1.45 (1.30-1.62)*
30-39	1.49 (1.35-1.64)*
40-49	1.62 (1.49-1.77)*
50-59	1.69 (1.55-1.83)*
60-69	1.76 (1.59-1.94)*
≥ 70	1.54 (1.36-1.75)*
Year, 1st duodenal biopsy	
2009	Referent
2010	0.90 (0.81-0.99)*
2011	0.87 (0.79-0.96)*
2012	0.85 (0.77-0.94)*
2013	0.85 (0.77-0.94)*
2014	0.85 (0.76-0.94)*
2015	0.83 (0.74-0.94)*
2016	0.77 (0.68-0.87)*
2017	0.82 (0.72-0.94)*
2018	0.73 (0.62-0.86)*
2019	0.77 (0.55-1.08)
Sex	
Male	Referent
Female	0.98 (0.93-1.04)
Region	
Northeast	Referent
North Central	0.92 (0.86-0.99)*
South	0.98 (0.92-1.04)
West	1.12 (0.81-1.54)
Unknown	0.80 (0.74-0.87)*
Metropolitan statistical area	
MSA	Referent
Non-MSA	0.96 (0.88-1.04)
Unknown	0.82 (0.64-1.05)
Elixhauser Comorbidity Index	
0	Referent
1	1.09 (1.01-1.17)*
2 or greater	1.28 (1.20-1.37)*

Discussion

- Among US celiac disease patients with commercial or Medicare insurance coverage, approximately one in five patients receive a follow-up duodenal biopsy.
- Follow-up duodenal biopsy is more commonly performed in adults than in children. The rate of follow-up biopsy appeared to decrease over time, but this could be due to lower average follow-up time and over-representation of younger patients in more recent years.
- Comorbidity burden was associated with a higher likelihood of receiving a follow-up biopsy, whereas sex, geographic region, and residence in a metropolitan area had no substantial impact.
- Although a slight majority of patients who received a follow-up duodenal biopsy had celiac disease related symptoms prior to the procedure, a substantial number of patients may have been asymptomatic prior to their follow-up biopsy.
- Strengths of this study include the large sample size offered by the MarketScan database and the relatively high degree of confidence in capturing procedures like endoscopic biopsy.
- Limitations include the difficulty in ascertaining the presence or absence of symptoms using insurance claims data.

Conclusions

- Follow-up duodenal biopsy is performed in a minority of patients with biopsy-proven celiac disease. However, given the size of the celiac disease patient population, the absolute number of patients receiving follow-up duodenal biopsy is still substantial.
- Age, comorbidity burden, and temporal trends had the greatest impact on the likelihood of receiving a follow-up duodenal biopsy.
- A substantial proportion of follow-up duodenal biopsies are being performed in patients who may not have significant persistent symptoms attributable to celiac disease.

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