Patient-Level Factors Associated With Revision Blepharoplasty: A Large Database Retrospective Cohort Study

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Introduction

- Blepharoplasty is among the most performed facial plastic surgery procedures worldwide, addressing functional impairment and aesthetic goals related to periocular aging.
- Revision surgery presents unique challenges compared with primary blepharoplasty, including altered anatomy, scar formation, and increased risk of complications, healthcare costs, and patient burden.

Objective: To identify demographic, periocular, procedural, medical, and psychoactive predictors of revision blepharoplasty in a large multicenter cohort to improve patient selection, preoperative counseling, and surgical planning.

Methods

- Retrospective cohort study using the TriNetX Research Network, a global database of de-identified electronic health records from over 275 million patients across 30 countries.
- Patients undergoing primary blepharoplasty (CPT/SNOMED-defined) from 2012–2025 were classified as revision or non-revision based on a second procedure occurring ≥30 days after the index surgery.
- Baseline demographics, periocular diagnoses, comorbidities, prior procedures, and medication exposures within 1 year of surgery were collected as candidate predictors.
- Univariate analysis with Benjamini-Hochberg FDR correction identified candidate variables for multivariable modeling.
- Multivariable logistic regression was used to calculate adjusted odds ratios (aORs) and 95% confidence intervals for independent predictors of revision.

Results

- The final multivariable model included 74,355 patients, of whom 2,227 (3.0%) underwent revision surgery.
- Younger age was independently associated with increased revision risk (aOR 0.981 per year, 95% CI 0.977–0.985).
- Asian race was strongly associated with revision (aOR 2.139, 95% CI 1.804–2.537), and Black or African American race was independently associated with increased risk (aOR 1.344, 95% CI 1.035–1.744).
- Revision risk increased with preexisting periocular conditions, including ptosis, blepharochalasis, dermatochalasis, blepharitis, dry eye disease, blepharospasm, and senile ectropion.
- Skin-related factors, including atrophic or laxity-related skin and scar/fibrotic disorders, independently predicted revision (aOR 1.444 and 1.234, respectively).

Results (cont.)

Characteristic	N (total = 88,294)	No Revision Blepharoplasty (n= 85,478)	Revision Blepharoplasty (n= 2,816)	P-value
Age at Surgery, years (mean ± SD)	74,391	64.3 ± 11.5 (n=72163)	61.8 ± 11.5 (n=2228)	**<0.001**
Sex	88,251			1
Male		22,904 (26.8%)	755 (26.8%)	
Female		62,532 (73.2%)	2,060 (73.2%)	
Race	88,294			**<0.001**
White		60,624 (70.9%)	1,889 (67.1%)	
American Indian or Alaska Native		204 (0.2%)	8 (0.3%)	
Asian		3,024 (3.5%)	183 (6.5%)	
Black or African American		1,964 (2.3%)	71 (2.5%)	
Native Hawaiian or Other Pacific Islander		125 (0.1%)	8 (0.3%)	
Other Race		3,409 (4%)	161 (5.7%)	
Unknown		16,128 (18.9%)	496 (17.6%)	
Ethnicity	88,294			0.13
Not Hispanic or Latino		53,273 (62.3%)	1,704 (60.5%)	
Hispanic or Latino		4,462 (5.2%)	160 (5.7%)	
Unknown		27,743 (32.5%)	952 (33.8%)	

Table 1. Baseline Demographic and Cohort Characteristics of Patients Undergoing Primary and Revision Blepharoplasty.

Variable	Odds Ratio	95% CI	P-value	FDR-adjusted P-value
Demographics				
Age at surgery	0.98	0.976-0.984	**<0.001**	**<0.001**
American Indian or Alaska Native race	1.236	0.57-2.681	0.592	0.693
Asian race	2.111	1.779-2.505	**<0.001**	**<0.001**
Black or African American race	1.349	1.039-1.751	**0.025**	0.056
Female sex	0.995	0.895-1.105	0.924	0.924
Hispanic or Latino ethnicity	1.032	0.86-1.238	0.739	0.751
Native Hawaiian or Other Pacific Islander race	1.755	0.814-3.781	0.151	0.248
Other race	1.057	0.819-1.364	0.67	0.693
Unknown ethnicity	0.732	0.639-0.838	**<0.001**	**<0.001**
Unknown race	1.559	1.344-1.81	**<0.001**	**<0.001**
Medical Comorbidities				
Coagulation defect, unspecified	1.581	1.177-2.124	**0.002**	**0.009**
Hypothyroidism, unspecified	1.054	0.941-1.18	0.365	0.489
Tobacco use	0.876	0.687-1.115	0.282	0.406
Ocular hypertension	1.115	0.803-1.547	0.516	0.621
Personal history of tobacco use	1.254	1.042-1.51	**0.017**	**0.041**
Ocular Comorbidities				
Any blepharitis diagnosis	1.302	1.124-1.507	**<0.001**	**0.002**
Any dry eye or keratoconjunctivitis sicca diagnosis	1.205	1.08-1.344	**<0.001**	**0.003**
Bell's palsy	1.244	0.969-1.598	0.087	0.156
Meibomian gland dysfunction of left eye, unspecified eyelid	1.125	0.927-1.365	0.233	0.353
Other chronic allergic conjunctivitis	1.066	0.808-1.406	0.65	0.693
Skin/Scar-Related Diagnoses				
Any atrophic or laxity-related skin diagnosis	1.398	1.248-1.566	**<0.001**	**<0.001**
Any scar or hypertrophic scar/fibrosis diagnosis	1.396	1.249-1.56	**<0.001**	**<0.001**
Medication Use within 1 Year prior to Surgery				
Any alprazolam use within 1 year before surgery	1.6	1.387-1.846	**<0.001**	**<0.001**
Any diazepam use within 1 year before surgery	1.286	1.086-1.523	**0.004**	**0.012**
Zolpidem	1.599	1.154-2.215	**0.005**	**0.015**
Venlafaxine	1.429	1.091-1.87	**0.009**	**0.026**
Mental Health/Sleep Disorders				
Anxiety disorder, unspecified	0.942	0.836-1.061	0.322	0.442
Major depressive disorder, single episode, unspecified	0.948	0.825-1.09	0.453	0.567
Surgical Indication/Procedure History				
Any blepharochalasis diagnosis	2.075	1.852-2.324	**<0.001**	**<0.001**
Any generic or unspecified eyelid ptosis diagnosis	1.941	1.765-2.135	**<0.001**	**<0.001**
Blepharoplasty, lower eyelid	1.054	0.924-1.203	0.434	0.567
Blepharoplasty, lower eyelid; with extensive herniated fat pad	1.119	0.971-1.29	0.121	0.209
Blepharoplasty, upper eyelid	1.151	1.032-1.284	**0.011**	**0.029**
Blepharospasm	1.524	1.108-2.095	**0.01**	**0.026**
Canthoplasty (reconstruction of canthus)	1.338	1.017-1.76	**0.038**	0.076
Dermatochalasis of left lower eyelid	1.9	1.67-2.161	**<0.001**	**<0.001**
Encounter for cosmetic surgery	2.599	2.329-2.9	**<0.001**	**<0.001**
Encounter for plastic/reconstructive surgery following medical procedure/healed injury	1.801	1.195-2.713	**0.005**	**0.015**
Facial rhytidoplasty	2.681	2.018-3.563	**<0.001**	**<0.001**
Senile ectropion of left lower eyelid	1.805	1.511-2.158	**<0.001**	**<0.001**
Mechanical ptosis	1.461	1.117-1.912	**0.006**	**0.017**
Reconstruction of eyelid, not otherwise specified	1.342	0.991-1.818	0.057	0.106

Table 2. Univariate Logistic Regression Analysis of Factors Associated With Revision Blepharoplasty.

Variable	Odds Ratio	95% CI	P-value	FDR-adjusted P-value
Demographics				
Age at surgery	0.981	0.977-0.985	**<0.001**	**<0.001**
American Indian or Alaska Native race	1.263	0.582-2.739	0.555	0.599
Asian race	2.139	1.804-2.537	**<0.001**	**<0.001**
Black or African American race	1.344	1.035-1.744	**0.026**	**0.045**
Female sex	0.996	0.897-1.106	0.94	0.94
Hispanic or Latino ethnicity	1.053	0.878-1.263	0.579	0.609
Native Hawaiian or Other Pacific Islander race	1.915	0.901-4.067	0.091	0.133
Other race	1.054	0.817-1.359	0.688	0.706
Unknown ethnicity	0.724	0.633-0.828	**<0.001**	**<0.001**
Unknown race	1.553	1.339-1.800	**<0.001**	**<0.001**
Medical Comorbidities				
Coagulation defect, unspecified	1.619	1.207-2.173	**0.001**	**0.003**
Hypothyroidism, unspecified	1.096	0.983-1.222	0.1	0.141
Tobacco use	1.243	0.898-1.720	0.189	0.25
Ocular hypertension				
Personal history of tobacco use				
Ocular Comorbidities	1.371	1.187-1.585	**<0.001**	**<0.001**
Any blepharitis diagnosis	1.222	1.096-1.362	**<0.001**	**<0.001**
Any dry eye or keratoconjunctivitis sicca diagnosis	1.282	0.999-1.644	0.051	0.077
Bell's palsy	1.129	0.932-1.369	0.216	0.271
Meibomian gland dysfunction of left eye, unspecified eyelid	1.122	0.855-1.472	0.407	0.487
Other chronic allergic conjunctivitis				
Skin/Scar-Related Diagnoses	1.444	1.263-1.651	**<0.001**	**<0.001**
Any atrophic or laxity-related skin diagnosis	1.234	1.077-1.413	**0.002**	**0.005**
Any scar or hypertrophic scar/fibrosis diagnosis				
Medication Use within 1 Year prior to Surgery	1.685	1.465-1.937	**<0.001**	**<0.001**
Any alprazolam use within 1 year before surgery	1.353	1.143-1.602	**<0.001**	**0.001**
Any diazepam use within 1 year before surgery	1.631	1.178-2.259	**0.003**	**0.007**
Zolpidem	1.463	1.117-1.915	**0.006**	**0.011**
Venlafaxine				
Mental Health/Sleep Disorders	0.93	0.829-1.044	0.218	0.271
Anxiety disorder, unspecified	0.948	0.833-1.078	0.415	0.487
Major depressive disorder, single episode, unspecified				
Surgical Indication/Procedure History	2.107	1.882-2.360	**<0.001**	**<0.001**
Any blepharochalasis diagnosis	2.025	1.848-2.218	**<0.001**	**<0.001**
Any generic or unspecified eyelid ptosis diagnosis	1.042	0.941-1.153	0.43	0.489
Blepharoplasty, lower eyelid	1.044	0.921-1.182	0.502	0.556
Blepharoplasty, lower eyelid; with extensive herniated fat pad	1.114	0.969-1.281	0.129	0.177
Blepharoplasty, upper eyelid	1.179	1.058-1.313	**0.003**	**0.006**
Blepharospasm	1.513	1.115-2.054	**0.008**	**0.014**
Canthoplasty (reconstruction of canthus)	1.335	1.015-1.755	0.039	0.061
Dermatochalasis of left lower eyelid	1.892	1.667-2.148	**<0.001**	**<0.001**
Encounter for cosmetic surgery	2.614	2.356-2.900	**<0.001**	**<0.001**
Encounter for plastic/reconstructive surgery following medical procedure/healed injury	1.738	1.154-2.617	**0.008**	**0.014**
Facial rhytidoplasty	2.742	2.064-3.642	**<0.001**	**<0.001**
Senile ectropion of left lower eyelid	1.441	1.235-1.682	**<0.001**	**<0.001**
Mechanical ptosis	1.399	1.034-1.893	**0.029**	**0.048**
Reconstruction of eyelid, not otherwise specified	1.754	1.468-2.095	**<0.001**	**<0.001**

Table 3. Multivariable Logistic Regression Analysis of Independent Predictors for Revision Blepharoplasty.

Results (cont.)

- Prior facial aesthetic procedures were the strongest independent predictors of revision, including facial rhytidoplasty (aOR 2.742) and an encounter for cosmetic surgery (aOR 2.614).
- Upper eyelid blepharoplasty was independently associated with a higher likelihood of revision (aOR 1.179), while lower eyelid approaches showed no significant association.
- Preoperative psychoactive medication use, including benzodiazepines (alprazolam, diazepam), a sedative-hypnotic (zolpidem), and an antidepressant (venlafaxine), showed independent risk associations.
- Medical comorbidities involving coagulation disorders increased risk (aOR 1.619), while independent psychiatric diagnoses showed no association.

Conclusion

- Revision blepharoplasty is driven by a multifactorial interplay of demographic, periocular, skin, pharmacologic, and prior surgical factors, supporting a multifactorial etiology of secondary intervention.
- These findings may inform more precise preoperative risk stratification, targeted patient counseling, and future hypothesis-driven prospective research.
- Given the reliance on administrative coding and potential referral bias inherent to claims-based data, these associations should be interpreted as hypothesis-generating rather than definitive predictors.

References

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Disclosures

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