

Laryngeal Granulomas; Characteristics and Our Clinical Approach

Laringeal Granulomalar; Karakteristik Özellikleri ve Klinik Yaklaşımımız

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Abstract

Objective: This study aims to present our clinical approach and treatment strategies for laryngeal granulomas, emphasizing etiological differentiation and individualized management.

Methods: This retrospective study included 65 patients diagnosed with laryngeal granulomas over a 3-year period. Patients were categorized into two main etiological groups: contact granulomas and intubation-induced granulomas. Clinical evaluations involved videolaryngostroboscopy, symptom assessment, and voice analysis when available. Treatment was tailored to etiology and included medical reflux management, voice therapy, surgical excision, and botulinum toxin injection in selected cases.

Results: Contact granulomas accounted for 90.8% of cases and were more prevalent in males. Laryngopharyngeal reflux emerged as the most common underlying factor in both subgroups. All patients received standardized anti-reflux therapy, which significantly reduced recurrence rates. In patients with persistent or bilateral lesions, botulinum toxin injection proved to be a valuable adjunctive treatment. Surgical excision was reserved for lesions causing airway compromise or not responding to conservative treatment, and was always combined with medical management to reduce recurrence risk. Among the 12 patients who underwent surgery, recurrence was more common in those who had excision alone than in those who also received botulinum toxin.

Conclusion: Our findings highlight the importance of identifying the underlying etiology in managing laryngeal granulomas. A multimodal, etiology-driven treatment strategy-particularly emphasizing reflux control-offers favorable outcomes. Botulinum toxin injection appears to enhance treatment success in refractory or recurrent cases and should be considered as part of individualized management protocols.

Keywords: Granuloma laryngeal, dysphonia, botulinum toxin

Öz

Amaç: Bu çalışma, laringeal granülomlara yönelik klinik yaklaşımımızı ve tedavi stratejilerimizi; etiyolojik ayrım ve bireyselleştirilmiş tedavi planlaması odağında sunmayı amaçlamaktadır.

Yöntem: Bu retrospektif çalışmada, 3 yıl içinde laringeal granülom tanısı alan 65 hasta değerlendirildi. Hastalar, kontakt granülom ve entübasyona bağlı granülom olmak üzere iki ana etiyolojik gruba ayrıldı. Klinik değerlendirmede videolaringostroboskopi, semptom sorgulaması ve mevcutsa ses analizleri kullanıldı. Tedavi planları etiyolojiye göre bireyselleştirildi; reflü tedavisi, ses terapisi, cerrahi eksizyon ve gerektiğinde botulinum toksin enjeksiyonu uygulandı.

Bulgular: Olguların %90,8'ini kontakt granülomlar oluşturdu ve erkeklerde daha sık görüldü. Her iki grupta da en yaygın etiyolojik neden laringofaringeal reflüydü. Tüm hastalara standart anti-reflü tedavisi başlandı ve bu tedavi rekürrens oranlarını anlamlı şekilde azalttı. Dirençli veya bilateral lezyonlarda



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Öz

botulinum toksin enjeksiyonu etkili bir tamamlayıcı yöntem olarak ön plana çıktı. Cerrahi eksizyon, hava yolunu daraltan veya konservatif tedaviye yanıt vermeyen hastalarda uygulandı ve her zaman medikal tedaviyle desteklendi. Sadece cerrahi uygulananlarda nüks oranı daha yüksekken, botulinum toksin ile kombine edilen olgularda başarı oranı daha yüksekti.

Sonuç: Laringeal granülomların tedavisinde altta yatan etiolojinin belirlenmesi kritik öneme sahiptir. Özellikle reflü kontrolüne odaklanan multimodal ve bireyselleştirilmiş tedavi yaklaşımları daha başarılı sonuçlar sağlamaktadır. Botulinum toksin, dirençli ya da rekürren olgularda etkili bir seçenektir.

Anahtar Kelimeler: Laringeal granülomlar, disfoni, botulinum toksin

Introduction

Laryngeal granulomas are benign inflammatory masses typically located at the vocal process of the arytenoid cartilage⁽¹⁾. They are also referred to by various names, including arytenoid granuloma and inflammatory polyp, vocal process granuloma, peptic granuloma, pyogenic granuloma, and laryngeal granuloma. Jackson⁽²⁾ initially identified them as contact ulcers, while Clausen⁽³⁾ later associated them with intubation-related trauma. Reported prevalence varies from 0.9% to 2.7% among adults with voice disorders, with a noted male predominance^(4,5). Vocal granulomas can be divided into two types: intubation granulomas and contact granulomas^(6,7). Despite similar histology, etiological distinctions exist, including associations with reflux and phonotraumatic behaviors⁽⁸⁻¹¹⁾. Granulomas may occur with more than one underlying factor^(12,13). If there is a history of intubation, this supports the diagnosis of intubation granuloma. The most important underlying cause of contact granuloma are gastroesophageal reflux and laryngopharyngeal reflux^(14,15). Treatment resistance may arise from repeated irritation or unresolved underlying causes. Treatment options for contact granulomas include laser excision, microlaryngoscopic excision with a cold knife, and botulinum toxin injection; in addition to voice therapy, corticosteroid injection, inhaled corticosteroids, and zinc supplementation. Among these modalities, botulinum toxin injection has been widely regarded as the most effective approach, particularly in refractory cases^(16,17). While excision treatment is based on removal of the granuloma (especially in granulomas narrowing the airway); other treatments alleviate inflammation or reduce friction of the vocal cords during phonation.

The present study aims to present the descriptive characteristics, clinical course and treatment modalities of our patients with laryngeal granuloma in our clinical setting.

Materials and Methods

There is an ethics committee approval numbered 04/1206 on 17.04.2025 from Ankara Yıldırım Beyazıt University Faculty of Health Sciences, this study is conducted in University of Health Sciences Türkiye, Ankara Etlik City Hospital. Informed consent was obtained from all patients included in this study.

Exclusion Criteria

Patients were excluded from the study if they had any of the following:

- Incomplete clinical documentation.
- Follow-up duration shorter than 2 months.
- Coexisting laryngeal pathologies (e.g., vocal fold polyps, cysts, neoplastic lesions).
- History of prior laryngeal surgery unrelated to granuloma treatment.
- Non-compliance with anti-reflux or voice therapy that could not be verified.
- Patients, who were lost to follow-up during the observation period, were unaccounted for in the final analysis.
- Presence of concomitant vocal cord lesions.

A systematic evaluation was conducted on 65 patients aged 24-86 years were systematically evaluated.

1. Videolaryngostroboscopy (VLS) was employed to evaluate the closure pattern of the glottal cycle, vibration amplitude, mucosal fluctuation, presence of adynamic segments, vertical closure level, phase symmetry, and medial edge irregularity, supraglottic region, and posterior glottis.
2. Voice handicap index-10 (VHI-10), GRBAS and reflux symptom index (RSI) were used to evaluate voice perception.
3. The multi-dimensional voice program (MDVP) was employed for acoustic analysis of the voice: fundamental

frequency, intensity, perturbation measurements (Jitter, Shimmer), noise-to-harmonic ratio parameters were examined.

VHI, GRBAS, and voice analysis (MDVP) are not included in the findings of this study. Descriptive patient information and treatment methods are mentioned in this study.

At initial evaluation, VLS was performed in all patients. Although assessments such as VHI-10, GRBAS, RSI, and MDVP were indeed used during the clinical evaluation of some patients, the data were not equally available across the entire cohort due to the retrospective nature of the study and differences in clinical documentation over the 3-year period.

Surgical Intervention and Botulinum Toxin Application

Surgical excision of granulomas was performed under general anesthesia using direct microlaryngoscopy. A cold knife technique was employed in all cases, and excision was carried out with care to preserve the underlying vocal fold mucosa and arytenoid cartilage.

In selected patients, botulinum toxin type A (Botox®, Allergan Inc., Irvine, CA, USA) was administered in conjunction with excision. A dose of 2.5 units was injected directly into the thyroarytenoid muscle on the side of the lesion. In one patient with recurrence, a transcervical electromyography (EMG)-guided botulinum toxin injection was performed as an adjunctive procedure.

Antireflux Therapy

All patients received standardized antireflux therapy consisting of esomeprazole 40 mg twice daily and sucralfate 1 g three times daily, accompanied by dietary and lifestyle modifications. Treatment adherence and symptom control were assessed during follow-up visits at 2-month intervals.

All patients received postoperative anti-reflux therapy and voice hygiene counseling as part of a standardized treatment protocol.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 23.0 (IBM Corp., Armonk, NY). Numerical variables were presented as mean ± standard deviation, while categorical variables were presented as frequencies and percentages.

The Shapiro-Wilk test was used to assess the normality of numerical data. Homogeneity of variances was evaluated

using Levene’s test. Between-group comparisons of normally distributed variables were performed using the independent samples t-test. The chi-square test was used for comparing categorical data. A p-value of less than 0.05 was considered statistically significant.

Results

Our cohort included 65 patients aged between 24 and 86 years, with a mean age of 54.82±14.3 years. Of the patients, 21.5% were female and 78.5% were male (Table 1). Contact granulomas accounted for 90.8% of the cases, while 9.2% were intubation-related granulomas. Of the six patients with intubation granulomas, all were male (Table 1). In terms of localization, 49.2% (n=32) were located on the right vocal fold, 41.5% (n=27) on the left vocal fold, and 9.2% (n=6) were bilateral (Table 1).

Videostroboscopic examination revealed a decreased mucosal wave in all patients, while phase symmetry was preserved in the majority. No significant alterations were observed in the glottal closure pattern, vertical level of closure, amplitude of vibration, supraglottic activity, or the presence of adynamic segments.

The RSI revealed clinically significant reflux symptoms across the entire cohort, with a mean RSI score of 33.51±5.45. All patients received standardized antireflux therapy. Due to ethical considerations, a comparison group without antireflux therapy could not be created.

Among the five patients who developed recurrence, four had contact granulomas and were additionally referred for voice therapy due to persistent phonotraumatic behavior. One patient with an intubation granuloma was managed with surgical excision and pharmacologic therapy. All patients received voice hygiene counseling before initiating treatment.

Table 1. Demographic and clinical characteristics of patients with laryngeal granulomas			
Variable	Category	n	%
Sex	Female	14	21.5%
Sex	Male	51	78.5%
Etiology	Contact	59	90.8%
Etiology	Intubation	6	9.2%
Side	Right	32	49.2%
Side	Left	27	41.5%
Side	Bilateral	6	9.2%

Surgical excision was indicated in cases where the granuloma posed a risk of airway compromise or was associated with clinically significant dyspnea, consistent with previously established criteria.

In total, 12 patients (18.46%) had a history of surgical intervention. Of these, five had previously undergone cold knife excision in an external center. Three of these patients experienced recurrence and were subsequently managed in our clinic with excision and botulinum toxin injection into the thyroarytenoid muscle (Table 2).

In our institution, seven primary patients underwent simultaneous cold knife granuloma excision and botulinum toxin injection in their initial session. Only two of these patients developed recurrence. The recurrence rate was 60% among patients treated with excision alone at external centers, compared to 28.5% in those treated with excision, plus botulinum toxin, at our clinic (Table 3).

Of the five patients requiring reintervention due to recurrence, four (80%) had contact granulomas and one (20%) had an intubation granuloma. The four recurrent contact granuloma patients included two males and one female; the recurrent intubation granuloma case was male. One patient required an additional EMG-guided transcervical botulinum toxin injection following

relapse; the others responded to combined surgical and pharmacological management with complete resolution.

Patients were stratified into four follow-up categories: <3 months, 3-6 months, 6-12 months and >12 months. Follow-up durations were distributed as follows: 26.1% <3 months, 40% from 3-6 months, 8.45% from 6-12 months, and 8.45% >12 months (Table 4). Among patients with recurrent contact granulomas, three experienced recurrence at 4 months and one at 2 months. The patient with a recurrent intubation granuloma, experienced a recurrence at 4 months.

Discussion

Laryngeal granuloma should be evaluated according to its etiologic origin and treatment should be planned accordingly. The aim of this study was to classify the patients based on the presence of intubation-induced and contact granulomas and to evaluate the treatment response. In terms of clinical features, intubation granulomas are more common in women than men in the literature⁽¹⁸⁾; all 6 patients with intubation granulomas were men in our study. Contact granulomas showed a strong male predominance, consistent with global data on voice misuse and vocal process trauma in men⁽¹⁹⁾. In many studies in the literature, proton pump inhibitors are recommended as the first anti-reflux treatment⁽²⁰⁾. All patients

Table 2. Detailed surgical patients data

Patient ID	Surgery history	Botulinum toxin during surgery	Recurrence	Granuloma type	Etiology
1	Only excision (external centre)	No	Yes	Contact	Voice misuse
2	Only excision (external centre)	No	Yes	Contact	Voice misuse
3	Only excision (external centre)	No	No	Contact	Voice misuse
4	Only excision (external centre)	No	No	Contact	Voice misuse
5	Only excision (external centre)	No	Yes	Intubation	Intubation trauma
6	Primary excision+botulinum toxin	Yes	Yes	Contact	Voice misuse
7	Primary excision+botulinum toxin	Yes	Yes	Contact	Voice misuse
8	Primary excision+botulinum toxin	Yes	No	Contact	Voice misuse
9	Primary excision+botulinum toxin	Yes	No	Contact	Voice misuse
10	Primary excision+botulinum toxin	Yes	No	Contact	Voice misuse
11	Primary excision+botulinum toxin	Yes	No	Contact	Voice misuse
12	Primary excision+botulinum toxin	Yes	No	Contact	Voice misuse

Table 3. Surgical treatments and recurrence

Patient group	Treatment	Number of patients	Recurrence (%)
Patients treated only in an external center	Cold knife granuloma excision only	5	3 (60%)
Primary patients treated in our clinic	Cold knife excision+botulinum toxin (1 st session)	7	2 (28.5%)

Table 4. Follow-up time/duration		
Follow-up time	Number of patients	Total (%)
0-3 months	17	26.1
3-6 months	26	40
6-12 months	11	16.9
>12 months	11	16.9
Total	65	100

were started on esomeprazole 40 mg twice daily and sucralfate 1 g three times daily, accompanied by lifestyle and dietary modifications for reflux management. Follow-up evaluations were conducted at 2-month intervals, and treatment was continued or adjusted based on clinical improvement. Among the 59 patients with contact granulomas, 48 (81.3%) showed significant regression following 2 months of standardized anti-reflux treatment. Contact granulomas largely regressed within approximately 3 months-however, the resolution timelines (median 9-12 months) seen in other series⁽²¹⁾ indicate variability. In the literature, steroid treatment is at the forefront intubation granulomas⁽²²⁾. In contrast to contact granulomas, surgical intervention, including surgical excision and steroid injection alongside botox injection, was undertaken in only 1 of 6 patients with intubation granulomas, while the other 5 regressed with anti-reflux treatment and inhaled steroid^(23,24). Most of the granulomas in other patients with contact granuloma regressed after 3 months of anti-reflux treatment. 18.46% of the patients underwent surgical excision. Among the five patients who experienced recurrence, three had previously undergone excision alone in external centers without adjunctive botulinum toxin injection. Five patients who developed recurrence and underwent a second surgical intervention, of whom 4 (80%) had contact granulomas and 1 (20%) had an intubation-related granuloma. We believe that the continued mechanical trauma from the vocal process of the arytenoid may have contributed to the recurrence in the absence of muscle relaxation. In contrast, two of our primary cases experienced recurrence despite receiving both excision and botulinum toxin injection. However, due to the small sample size, we are unable to determine a clear causal factor in these cases, and further studies are warranted. Botox application, which is the gold standard treatment for granulomas, was first described by Fink et al.⁽²⁵⁾. Damrose and Damrose⁽²⁶⁾ reported that transcervical Botox application is safe and effective in the treatment of granulomas. The mechanism of action of Botox treatment is to eliminate the effect of repeated trauma by preventing hard glottal closure with temporary paralysis of the thyroarytenoid muscle. It has been shown that this is the most effective treatment option

in patients who do not respond to drug treatment^(27,28). In our clinical practice, we not only perform granuloma excision; if there is a granuloma that closes the posterior glottis and causes airway obstruction, botulinum toxin injection is planned together with surgical excision. 2.5 units of Botox were injected into the thyroarytenoid muscle on the side of the lesion. Of the 5 patients with recurrence, 3 underwent granuloma excision at an external center and 2 underwent granuloma excision and botox. In the follow-up after surgery for recurrence, only 1 of these patients experienced a recurrence of complaints and transcervical botox was applied to them under EMG guidance.

One of the main strengths of our study is the inclusion of both surgical and non-surgical treatment approaches, allowing for a more comprehensive understanding of clinical outcomes in laryngeal granuloma cases. The favorable response to anti-reflux therapy in non-surgical patients highlights the importance of medical management in selected cases. In addition, surgical excision demonstrated effective results in refractory granulomas, particularly when combined with postoperative reflux control. However, our study also has certain limitations. The retrospective design may introduce selection bias, and the lack of randomization limits causal inferences. Moreover, patient adherence to medical therapy was not objectively measured, which may have influenced the outcomes. Recurrence remains a concern in both treatment arms, emphasizing the chronic and multifactorial nature of laryngeal granulomas.

Study Limitations

This study has several limitations. First, its retrospective design may have introduced selection bias and limited the consistency of available data. Second, follow-up duration was relatively short in some patients, and pathology reports could not be accessed for all surgically treated cases, which restricted a comprehensive evaluation of outcomes. Third, perceptual and acoustic voice analyses (VHI-10, GRBAS, MDVP) were not consistently documented across the entire cohort, preventing a systematic analysis of correlations between clinical outcomes and voice measures. Future prospective studies with standardized data collection and long-term follow-up are warranted to overcome these limitations.

Although the RSI questionnaire was used as part of the clinical evaluation, pre- and post-treatment scores were not consistently recorded in all patients. Therefore, changes in RSI values could not be statistically evaluated. This represents a limitation of our retrospective data set.

Conclusion

Laryngeal granulomas should be managed based on their underlying etiology, as treatment responses may differ between contact and intubation-related granulomas. While most patients respond well to conservative therapy, including antireflux management and voice therapy, surgical excision combined with botulinum toxin injection may be required in recurrent or obstructive cases. Early identification of risk factors and adherence to individualized treatment protocols can improve patient outcomes and reduce recurrence rates.

Ethics

Ethics Committee Approval: There is an ethics committee approval numbered 04/1206 on 17.04.2025 from Ankara Yıldırım Beyazıt University Faculty of Health Sciences, this study is conducted in University of Health Sciences Türkiye, Ankara Etlik City Hospital.

Informed Consent: Informed consent was obtained from all patients included in this study.

Footnotes

Authorship Contributions

Surgical and Medical Practises: E.A., Concept: E.A., D.S., E.B., Design: E.A., D.S., E.B., Data Collection or Processing: E.A., D.S., E.B., Analysis or Interpretation: E.A., D.S., E.B., Literature Search: E.A., D.S., E.B., Writing: E.A., D.S., E.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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