

An approach to the management of paroxysmal laryngospasm

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Abstract

Objective: To review the presentation, risk factors and management of paroxysmal laryngospasm.

Study design: Retrospective review of cases.

Setting: A teaching hospital otolaryngology department with a subspecialty interest in airway disorders.

Patients: All patients diagnosed with laryngospasm over a two-year period were reviewed. Information was obtained about disease presentation, risk factors, management and symptom resolution.

Results: Laryngospasm was diagnosed in nine women and six men. The average age at presentation was 56 ± 6.5 years, and there was an 80 per cent association with gastroesophageal reflux disease. Proton pump inhibitors led to complete symptom resolution in six patients and to partial symptomatic relief, requiring no further treatment, in a further four patients. Of the remaining five patients unresponsive to proton pump inhibitor therapy, two continued to experience syncopal episodes due to laryngospasm. Both these patients achieved complete remission after laryngeal botulinum toxin injection. Symptoms recurred after three to four months and were successfully treated with a repeat injection.

Conclusions: The primary risk factor for spontaneous laryngospasm is laryngopharyngeal reflux. Symptoms are distressing and may be relieved in most cases by treatment aimed at suppressing gastric acid secretion. Laryngeal botulinum toxin injection appears to be a viable treatment modality in selected patients with refractory symptoms.

Key words: Laryngospasm; Gastro-Oesophageal Reflux; Botulinum Toxin

Introduction

Laryngospasm is a forceful, sustained apposition of the glottis and supraglottis which impedes ventilation. It has long been a recognised complication of general anaesthesia and typically occurs during the recovery period.¹ On the other hand, paroxysmal laryngospasm occurs spontaneously; the patient frequently describes a sudden onset of difficulty in breathing, which becomes stridulous.² The episodes frequently have a positional component, and they may wake the patient.³ These episodes are brief and resolve within minutes but are extremely distressing to the patient, who often feels a sense of impending doom. Some patients may also lose consciousness during these episodes, which leads to relaxation of the larynx. Patients often present to the clinic seeking both relief from their distressing symptoms and reassurance that their sense of impending doom is unwarranted.

The underlying pathological abnormality is believed to be an increased sensitivity of the laryngeal mucosa, which is secondary to, or exacerbated by, laryngopharyngeal reflux of gastric contents.^{2,4–6}

This condition is often misdiagnosed as asthma, obstructive sleep apnoea or paroxysmal nocturnal dyspnoea. The diagnosis is based primarily on the characteristic history, with physical examination between episodes being usually unremarkable except for the presence of supraglottic inflammation and inter-arytenoid oedema. Some patients may also have symptoms of gastroesophageal reflux disease or other manifestations of laryngopharyngeal reflux, including hoarseness, recurrent pharyngitis and taste disturbance. In this study, we reviewed our experience with the management of paroxysmal laryngospasm.

Materials and methods

We undertook a retrospective analysis of 15 patients diagnosed with laryngospasm over a two-year period starting in 2003. Information was obtained about the patients' presentation, risk factors, management strategy and outcome (regarding symptom resolution).

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Results

Table I shows the patient data obtained. The patients comprised nine women (60 per cent) and six men. The average age at presentation plus or minus the standard deviation was 56 ± 7 years (range 29–85 years). The age-adjusted Charlson comorbidity score was used to assess the burden of associated medical comorbidity.⁷ This score represents a validated index which correlates with the risk of death over five years from the time of intervention, with a maximum theoretical score of 37. Ten patients had a score of zero, three had a score of two, and a further two patients had scores of three and four. Potential, identifiable risk factors included: obesity (20 per cent), rhinitis (20 per cent), smoking (27 per cent) and gastroesophageal reflux disease (87 per cent). Two patients described the onset of symptoms following an upper respiratory tract infection.

One patient did not require any treatment beyond avoiding inhaled irritants, and they felt that, following explanation, their symptoms were not sufficiently troublesome to require further intervention. Three patients were already taking a maximum dose of proton pump inhibitors for other gastroesophageal reflux disease symptoms. One of these patients declined further treatment in view of the infrequency of their laryngospasm (once every three months), and another was referred for consideration of a Nissen fundoplication.

Eleven patients were commenced on proton pump inhibitors. Of these, six experienced complete resolution of symptoms after a minimum follow up of 12 months, and three patients experienced less frequent and less severe symptoms for which they required no further treatment. One patient could not tolerate proton pump inhibitors, and a second derived no benefit from them. Both this patient and another already receiving maximal acid suppression were suffering from debilitating episodes of laryngospasm several times a week, frequently leading to loss of consciousness.

These two patients therefore underwent injection of 3.75 units of botulinum toxin (Dysport[®], Ipsen Limited, Slough, UK) to each vocalis muscle. This was undertaken percutaneously, in collaboration with a clinical neurophysiologist who confirmed the intramuscular position of the needle. This procedure provided complete symptom relief for three and four months, respectively. On recurrence of symptoms, both patients were successfully re-injected, again leading to complete resolution of symptoms. Prior to this treatment, these patients had undergone psychiatric assessment to exclude the possibility that this was learnt behaviour from which they were deriving secondary gain.

The patient who failed to tolerate proton pump inhibitors also suffered from rhinitis, and derived some benefit from treatment of this with topical nasal steroids.

Discussion

Laryngospasm is a frequent complication during the recovery phase of anaesthesia, resulting from acute irritation of the vocal folds.¹ On the other hand, paroxysmal spontaneous laryngospasm is a very rare complication of gastroesophageal reflux disease.⁴ It is believed that laryngopharyngeal reflux leads to chronic mucosal inflammation and hypersensitivity which, in a minority of patients, encourages the development of a maladapted reflex arc. Alternative explanations for the apparent irritability of this reflex arc have included focal epileptic activity, neural instability and aberrant reinnervation following neuropathia.^{2,4,6,8–10} Our study confirmed a very strong association between reflux disease and laryngospasm. Viral upper respiratory tract infection has been proposed as a possible aetiological factor, with suggestions that the irritability of the reflex arc may have a post-viral aetiology.¹¹ We did not find a

TABLE I
PATIENTS AND OUTCOMES

Patient	Gender	Age (years)	Charlson score	Treatment	Outcome
1	M	44	0	None (avoid precipitants)	Reassured following discussion, declined further treatment
2	M	70	0	Maximal acid suppression, no additional treatment	Reassured following discussion, declined further treatment
3	F	53	2	Maximal acid suppression, no additional treatment	Referred for possible Nissen fundoplication
4	M	61	3	PPI	Complete response
5	F	53	0	PPI	Partial response
6	M	68	4	PPI	Complete response
7	M	57	0	PPI	Partial response
8	F	29	0	PPI	Complete response
9	F	85	0	PPI	Complete response
10	F	58	0	PPI	Complete response
11	M	33	2	PPI	Complete response
12	F	48	0	PPI, amitriptyline	Complete response
13	F	60	0	PPI, Betnesol [®] drops	Not tolerated
14	F	60	2	PPI, botulinum toxin	Complete response
15	F	55	0	Botulinum toxin	Complete response

M = male; F = female; PPI = proton pump inhibitor

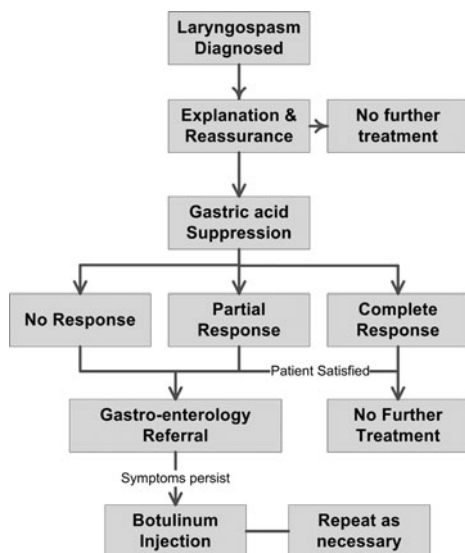


FIG. 1

A schematic representation of our approach to the management of paroxysmal laryngospasm.

strong association with viral upper respiratory tract infection in our series.

The symptoms of laryngospasm are often brief but they are extremely distressing, invoking in the patient a sensation of impending doom. Diagnosis is based almost entirely on the history, and, with few physical signs to guide the clinician to the diagnosis, it is important that a high index of suspicion for this condition be maintained. In some otherwise healthy patients with infrequent symptoms, an explanation of the mechanism and natural history of the condition may provide sufficient reassurance, and the patient may not want any further treatment. The treatment approaches described for this condition have included local anaesthetic spray, superior laryngeal nerve blockade, antiepileptic medication (such as gabapentin and carbamazepine) and proton pump inhibitors.^{2,4,6,8-10} Botulinum toxin has been described in the treatment of spasmodic dysphonia and laryngeal dysfunction following aberrant reinnervation of damaged recurrent laryngeal nerves;^{12,13} however, to our knowledge, it has not previously been used in the context of spontaneous paroxysmal laryngospasm.

Our treatment approach was based on aggressive elimination of laryngopharyngeal reflux. Our choice of proton pump inhibitor for this condition was esomeprazole. If this failed to adequately control symptoms, nocturnal ranitidine was added. This treatment was effective in the majority of patients, and those who did not respond were referred to gastro-intestinal physicians for further assessment and possible consideration of anti-reflux surgery. A minority of patients (two in our series) remained symptomatic despite maximal therapy and were effectively treated with injection of the vocalis muscle with botulinum toxin. This was achieved using standard microlaryngoscopic techniques under anaesthesia. However, it could

have been equally well undertaken under local anaesthesia using an injection electrode with a percutaneous technique, with the intramuscular position of the needle confirmed by a clinical neurophysiologist.

- **This paper presents a retrospective analysis of 15 patients diagnosed with laryngospasm over a two-year period**
- **Paroxysmal laryngospasm is an uncommon but distressing condition which can be satisfactorily treated in the majority of patients through effective elimination of the laryngopharyngeal reflux**
- **Botulinum toxin injection appears to be an effective treatment in the small number of patients who fail to respond to maximal medical therapy**

The summary of our treatment approach for paroxysmal laryngospasm is provided in Figure 1.

Conclusion

In conclusion, paroxysmal laryngospasm is an uncommon but distressing condition which can be satisfactorily treated in the majority of patients through effective elimination of the laryngopharyngeal reflux. Botulinum toxin injection appears to be an effective treatment in the small number of patients who fail to respond to maximal medical therapy.

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