

# Current aetiology of unilateral vocal fold paralysis in a teaching hospital in the West of Scotland

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## Abstract

Between May 1997 and May 2001 all patients presenting with a unilateral vocal fold palsy at Gartnavel General hospital were entered into a prospective observational study. The sex, age, side of palsy and aetiology were documented. The aim of the study was to assess the current aetiology of vocal fold palsy in a large teaching hospital in the West of Scotland, and to compare this with the established aetiology in other parts of the world. Seventy-seven patients were studied. Eighty-three per cent were found to have a left and 17 per cent a right vocal fold palsy. The male to female ratio was 2:1, with an age range of 23–85, mean 61. Forty-three per cent of all vocal fold palsies were secondary to an underlying bronchogenic carcinoma and a further nine per cent due to other malignancies. This contrasted with figures quoted in other studies, that gave lung cancer causes of vocal fold palsies ranging from four to 22 per cent. Surgical trauma accounted for 24 per cent and in 11 per cent no cause was found. In conclusion, in our hospital population there is a high rate of vocal fold palsy secondary to bronchogenic carcinoma. This is likely to be associated with the high levels of smoking found in Scotland. Lung cancer rates in Scotland are 1.6 times greater for men, and two times greater for women than the world standard. Malignancies overall cause over 50 per cent of our vocal fold palsies. Vigilance is required in any patient presenting with a vocal fold palsy to ensure a malignancy is not overlooked.

**Key words: Vocal Cord Paralysis; Aetiology**

## Introduction

Vocal fold palsy results from injury to the vagus nerve anywhere from its nucleus in the medulla to the more commonly affected recurrent laryngeal branch. The passage of the left recurrent laryngeal nerve into the chest accounts for the higher incidence of left palsies in all series to date. The cause of the palsy may be the presenting feature of a new disease process or malignancy, or it may be obviously iatrogenic following surgical intervention. In a small number of patients no cause is found despite exhaustive investigations. Earlier studies observe wide variability in the reported incidence for the various aetiologies, with extra-laryngeal malignancy rates varying from eight to 44 per cent (see Table I).<sup>1–6</sup> There have been no studies in the United Kingdom in the last 10 years to assess the current aetiology of this condition.

Our institution covers a population of 300 000; including both deprived and affluent areas, as well as an urban and rural population. The hospital itself contains all medical and surgical specialties, except neurosurgery. It was felt that with continuing change in surgical practice, and in the pattern of malignant

disease seen locally, a prospective evaluation of the current aetiology of vocal fold palsy in our population should be undertaken.

## Patients and methods

All patients presenting to Gartnavel General Hospital, Glasgow, between May 1997–May 2001 with a diagnosis of vocal fold palsy were studied prospectively. All patients underwent a thorough clinical history and physical examination, including assessment of fold function using either a rigid or flexible fibre-optic laryngoscope. Their age, sex, side of palsy, aetiology and investigations were noted. Patients with laryngeal malignancies and mechanical fixation of the fold were excluded from analysis.

All patients with no clear cause underwent chest X-ray and computed tomography (CT) scan from the base of the skull to the diaphragm. Any suspicion that the patient had an underlying bronchial neoplasm i.e. haemoptysis, resulted in the patient being referred to the respiratory clinic for assessment and bronchoscopy. If at this stage there was no abnormality, then the patient was reviewed regularly

TABLE I  
COMPARISON OF AETIOLOGY OF UNILATERAL VOCAL FOLD PALSY: RESULTS OF SIX SERIES, INCLUDING CURRENT STUDY

	Willat and Stell <sup>3</sup>	Terris <i>et al.</i> <sup>4</sup> 1992	Benninger <i>et al.</i> <sup>5</sup> 1998	Havas <i>et al.</i> <sup>6</sup> 1999	Ojawa <i>et al.</i> 1990 <sup>7</sup>	Loughran present study
Malignancy	30%	41%	25%	5%	43%	52%
Lung	19%	17%	20%	4%	22%	43%
Surgical	30%	35%	24%	40%	30%	22%
Trauma	2%	8%	19%	6%	1%	5%
Idiopathic	27%	11%	20%	33%	6%	11%
Other	11%	6%	13%	17%	20%	10%
Total no.	154	84	280	108	148	77
Study design	prospective	retrospective	retrospective	?	?	prospective
Country	UK	US	US	Australia	Japan	UK
Length of study	25 years	8 years	10 years	7 years	6 years	4 years

with a chest X-ray at six months and repeat CT scan at an interval of one year. The number of patients whose fold mobility recovered was also documented.

## Results

Between May 1997 and May 2001, 77 patients with a diagnosis of unilateral vocal fold palsy were seen. The left fold was affected in 64 (83 per cent) and the right in 13 (17 per cent). The sex distribution, as expected, showed a predominance of men to women: 51:26, with an age range of 23–85, mean 61. All 77 initially had unilateral palsies but two patients went on to develop bilateral fold palsies. Follow up ranged from one month to two years. The patients with a short follow-up represented the terminal patients with carcinomas. Patients in whom no cause was found were discharged at two years.

Fifty-two per cent of all vocal fold palsies were secondary to a malignancy (Figure 1). Forty-three per cent were as a result of malignant infiltration by bronchogenic tumours. Figure 2 shows the proportions of the various malignancies involved. Figure 3 shows the distribution of surgical causes with a preponderance of thoracic and cardiac procedures. There were four cases of traumatic palsies, associated with prolonged intubations and stay on an intensive care unit. There were nine patients for whom no cause could be found despite CT scan and

repeated examinations, with an average follow-up of 16 months. Of these patients four regained some degree of mobility in the paralysed fold, all within one year of diagnosis.

## Discussion

Vocal fold palsy is not a disease entity in itself, but a sign of an underlying disorder of the vagus nerve or its recurrent laryngeal branch. The unusual tortuous path that the nerve supply takes means that the examination and investigation of a patient with a vocal fold palsy needs to include the head, neck and chest, as disease in any of these areas could be responsible. It is important that an underlying cause be sought if not immediately obvious.

We saw an average of 20 newly diagnosed patients with a vocal fold palsy per year which compares favourably with other studies referred to in Table I, and noted that a large proportion were secondary to malignancies, especially lung. In our hospital 42 per cent of all unilateral vocal fold palsies are caused by bronchogenic carcinoma, and malignancy overall caused 52 per cent. Other series to date report an incidence of 3.7–22.4 per cent for rates of vocal fold palsies caused by bronchogenic tumours. Referral patterns will obviously influence these figures, but it is likely that there are also geographical differences. Table I shows the incidence of the various causes of

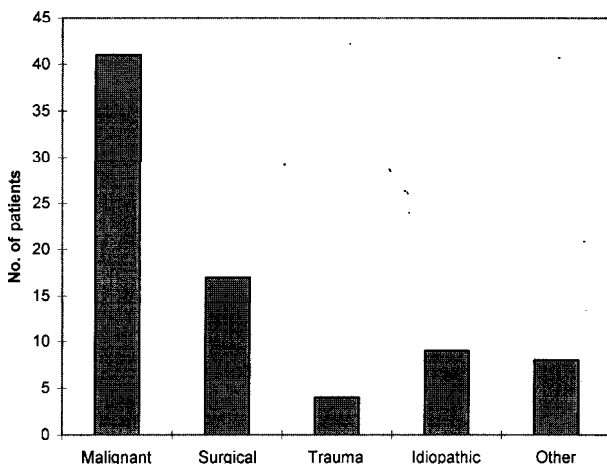


FIG. 1

Current aetiology of unilateral vocal fold palsy in a teaching hospital in the West of Scotland.

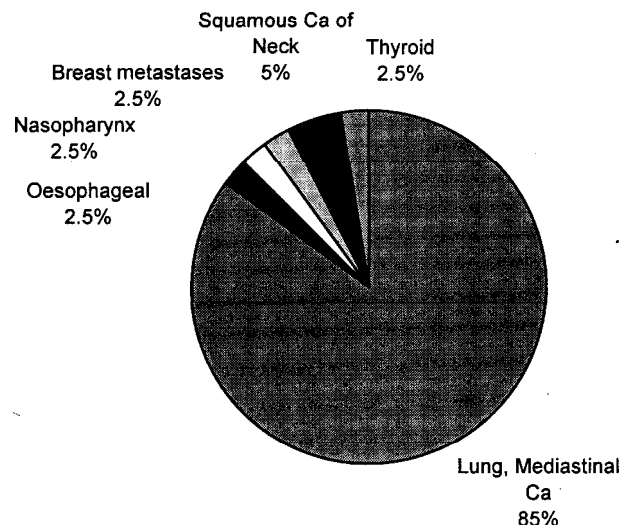


FIG. 2

Incidence of malignant causes of unilateral vocal fold palsy.

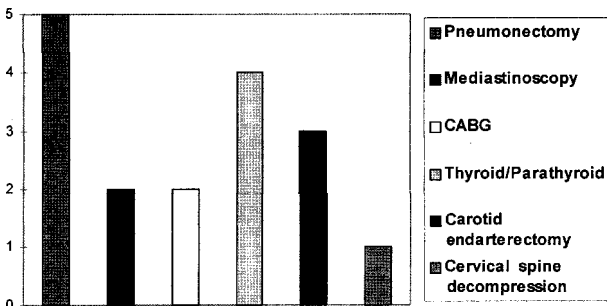


FIG. 3

Surgical causes of unilateral vocal fold palsy.

vocal fold palsies in six recent studies. Two studies are American, one from Australia, one Japanese, and two, including our study, from the United Kingdom. Apart from the article by Havas *et al.*,<sup>6</sup> and our study, the incidence for lung cancer is fairly constant at 16–22 per cent.<sup>3–5,7</sup>

Scotland has a significantly higher death rate from lung cancer than the world standard; Figure 4 illustrates this difference, and in addition shows the increase in rates of lung cancer deaths especially in women in recent years. In Scotland the death rate for men is 1.6 times, and that for women two times the world standard (source: cancer surveillance group, Scottish Cancer Intelligence Unit, ISD, Scotland). We have a close relationship with our respiratory and oncology colleagues, and this may influence the numbers of oncological referrals we receive.

Historically, surgical intervention, especially thyroid surgery, was a significant cause of vocal fold palsy. Parnell and Brandenburg<sup>1</sup> in 1970 quoted figures of 28 per cent of vocal fold palsy secondary to thyroid surgery. However, only six years later another series of 134 patients showed an extremely low rate of 3.7 per cent.<sup>2</sup> This inconsistency continues to the present day, but most studies show that thyroid surgery is not a prominent cause.

In our study four patients had vocal fold palsy secondary to thyroid surgery. However, one patient was undergoing removal of a parathyroid adenoma, and another had been hoarse since thyroid surgery in the 1940s. Taking into consideration the number of thyroidectomies performed each year in our hospital, this equates to a 2.6 per cent risk of developing a vocal fold palsy following thyroid surgery.

With the apparent decline of thyroidectomy as a major cause of vocal fold palsy, other surgical procedures are emerging. In the most recent series, a number of patients developed a vocal fold palsy secondary to carotid endarterectomy. In one such series the rate was 0.5 per cent of 411 patients undergoing endarterectomy,<sup>8</sup> in a second study from this institution, the rate following endarterectomy was three per cent.<sup>9</sup> Other causes such as anterior approaches to the cervical spine have also emerged; this appears to be secondary to retraction trauma, and has a high rate of spontaneous recovery.<sup>10</sup> In our series, the main surgical cause appeared to be secondary to thoracic and cardiac surgery, with 13.4 per cent of all vocal fold palsies secondary to these procedures. A significant proportion of these

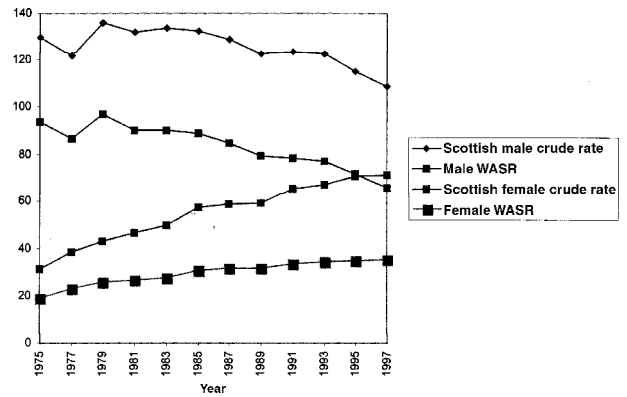


FIG. 4

Trends in lung cancer incidence in Scotland from 1975–1997: comparing Scottish male and female rate to the world average. Crude rate is calculated per 100 000 person – years at risk. WASR = age-standardized incidence per 100 000 person – years at risk (World Standard Population).

procedures were for surgical removal of malignant lung tumours, in patients without a pre-existing vocal fold palsy.

Finally, we are left with a group of patients in whom no cause is ever established, despite regular examination and imaging. In some older series<sup>3</sup> the rate of idiopathic causes of vocal fold palsy is high. We feel that this may have been due to the quality of imaging available at the time of the studies. A protocol was described by MacGregor *et al.*<sup>11</sup> depending on the side of the lesion, and has been modified for our practice (see Figure 5 and below). Magnetic resonance image (MRI) scanning is not routinely undertaken unless other neurological signs are present, if a base of skull lesion is suspected, or in children where avoidance of ionizing radiation and the relatively high incidence of intracranial causes necessitate it. CT scanning is more readily available in most UK departments and is the best imaging modality for the chest and mediastinum. In this department, we CT scan from skull base to diaphragm, unlike the protocol proposed by MacGregor *et al.*,<sup>11</sup> as so many of our patients have lung tumours. If we have been unable to obtain a good view of the larynx or hypopharynx in the clinic, or if we suspect crico-arytenoid fixation then we proceed to panendoscopy under general anaesthetic. Laryngeal electromyography is not routinely used but can

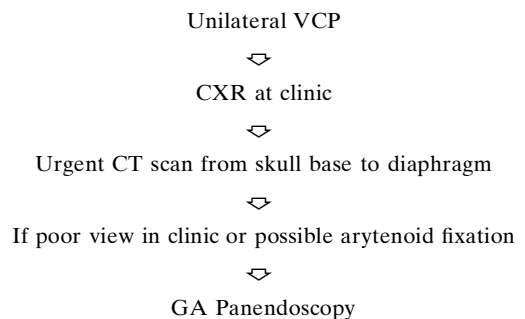


FIG. 5

Management paradigm for patient with vocal fold palsy

assist in identifying the site of the lesion and the likely prognosis.<sup>13</sup>

A proportion of patients with idiopathic vocal fold palsy, 44 per cent in our series, will recover some function. It is significant that not one patient has been diagnosed as having a malignancy having had normal imaging at presentation. No patients, whatever the cause, showed recovery of function after one year.

### Conclusions

Over 50 per cent of vocal fold palsy in our hospital are secondary to an underlying malignancy, and lung cancer is by far the commonest cause of unilateral vocal fold palsy in the West of Scotland. Surgical causes are the second commonest aetiology with cardiothoracic procedures predominating. A neoplasm must be excluded in patients presenting with a vocal fold palsy of unknown origin, with a CT of neck and chest, followed by appropriate follow-up for at least one year.

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Mr S. Loughran takes responsibility for the integrity of the content of the paper.

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