

CASE STUDY

Inspiratory vocal cord dysfunction, a new approach in treatment

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Inspiratory vocal cord dysfunction, a new approach in treatment. G.J. Archer, J.L. Hoyle, A. McCluskey, J. Macdonald. ©ERS Journals Ltd 2000.

ABSTRACT: Vocal cord dysfunction is a well recognized respiratory condition in which adduction of the vocal cords during either inspiration or expiration, or both, causes functional airways obstruction.

Diagnosis is usually made by laryngofibrescopy, however treatment of this condition has generally been unsatisfactory, requiring a multi-disciplinary approach consisting of speech therapy, psychological counselling, sedatives and anaesthetic agents.

Here we use an innovative approach which requires relatively inexpensive and simple anaesthetic equipment in order to manipulate airways resistance and thus reduce any vocal cord dysfunction as it occurs.

The patient involved found instant relief when using this simple device which is easy to use and is portable.

Eur Respir J 2000; 15: 617–618.

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Keywords: Asthma treatment
paradoxical vocal cord dysfunction

Received: March 3 1999

Accepted after revision July 30 1999

Vocal cord dysfunction

Inspiratory and expiratory wheeze has previously been described as being due to the adduction of the true and false vocal cords throughout the respiratory cycle [1]. Diagnosis of this condition is usually made after a patient presents with asthma which proves difficult to control and thus clinical suspicions are aroused [2].

Many methods have been used previously in order to make the diagnosis, with direct visualization of the cords during an episode of wheeze being one of the most clinically useful.

Demographic data often describes either children [3] or adult females aged 14–58 yrs of age, with variable histories of psychiatric or attention seeking behaviour [4].

Once diagnosed, treatment has previously consisted of sedation and the use of anaesthetic agents, together with explaining the cause of wheeze, speech therapy to learn how to reduce the wheeze once it begins, and psychological techniques aimed at treating any underlying psychiatric disorder [5].

Case report

A 22-yr-old female presented with a 4-yr history of asthma diagnosed by her General Practitioner. She was a nonsmoker, had no family history of asthma and did not have any history of atopy. On presentation the patient had increased shortness of breath and wheeze. Physical examination revealed tachycardia and increased respiratory rate associated with an inspiratory stridor continuing whilst the patient slept. Initially the patient was treated with standard antiasthma medication with no effect.

All routine tests including arterial blood sampling and chest radiographs were normal. The patient was unable to

perform full lung function tests or flow volume loops adequately due to breathlessness. Laryngofibrescopy showed that the patients vocal cords were adducting during inspiration thus confirming the diagnosis of inspiratory vocal cord dysfunction. The diagnosis was fully explained to her, and diazepam and chlorpromazine were added to the treatment with no clinical improvement. Speech therapy proved unhelpful and no previous psychiatric history or attention seeking behaviour was identified.

A previously described treatment for expiratory vocal cord dysfunction, continuous positive airways pressure [5], has been shown to decrease wheeze by slowing the expiratory flow rate. With this in mind we devised a mask using basic anaesthetic equipment designed to have an adjustable resistance to inspiratory air flow with no resistance to expiratory air flow (fig. 1).

Method of use

The patient was asked to use the device by fixing the mask to her face, when having an episode of stridor, by using the harness.

Once in place the patient adjusted the distal adjustable pressure limiting valve [4], which caused an increase in resistance, to inspiration to occur, thus effectively slowing the rate of air flow during inspiration. The patient adjusted this valve until either the inspiratory stridor could not be heard or until a level at which the least amount of stridor could be heard without causing too much discomfort to the patient, was reached. The expiratory valve [5], was fixed so that it gave a minimum amount of resistance to expiratory airflow at all times.

Initially the patient used this device for 2 h *b.i.d.* for 4 days before having her nebulized drugs (oral Prednisolone and Diazepam), gradually reduced.

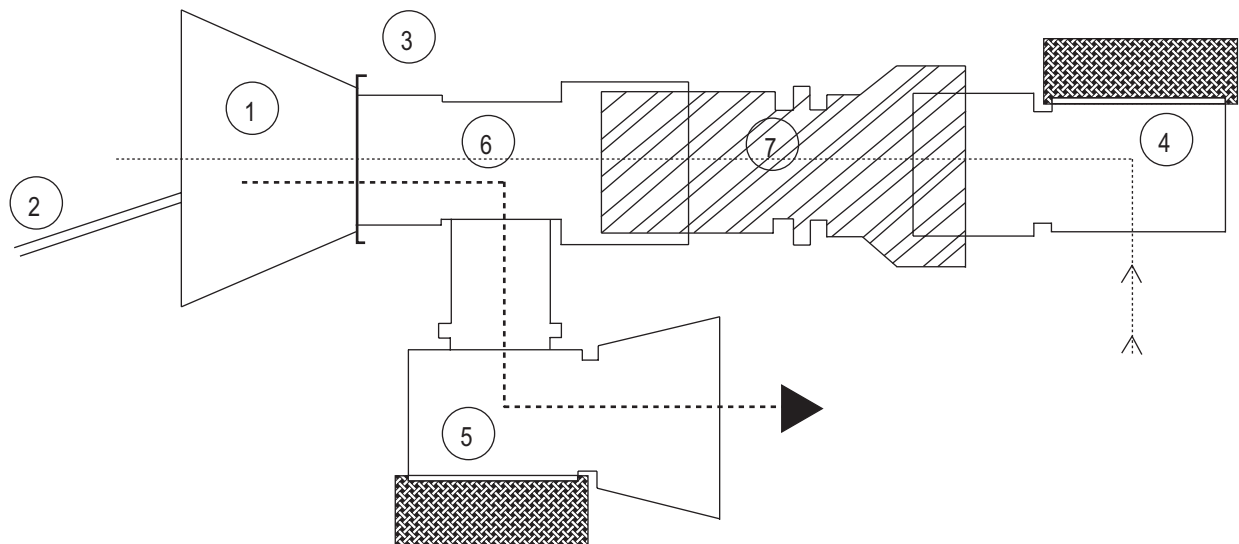


Fig. 1. – Schematic to show the operation of the breathing apparatus. The individual components are assembled *via* 22 and 30 mm push-fit connectors. 1: Laerdal size 5 face mask (Laerdal Medical Ltd, Orpington, Kent, UK); 2: Klausen harness (Med. Ind. Eq. Ltd., Exeter, Devon, UK); 3: retaining ring for harness; 4 and 5: one-way adjustable pressure limiting valves taken from single use Intersurgical Bain anaesthetic breathing circuits (Intersurgical, Wokingham, Berkshire, UK); 6: Intersurgical T connector (Intersurgical); 7: Intersurgical 22M-30 F connector (Intersurgical). Direction of air flow; - - < -: inspiration; - - - ->: expiration.

The patient had no problems with tolerating an increased resistance to inspiratory airflow at a level which decreased the inspiratory stridor to a point where we could not hear the stridor. After decreasing the asthma medications to inhaled therapy only we discharged the patient home with a reducing course of Chlorpromazine.

Over the next few weeks the patient slowly decreased the use of the mask to 1 h *b.i.d.* for 2 weeks to once daily for 2 weeks to as required use. On first using this device our patient found immediate relief from her symptoms which have gradually decreased in number and lengths of episodes since.

The patient does, without doubt, still have an element of asthma, and occasionally an episode of stridor seems to accompany an exacerbation of asthma. However, the patient herself can feel the difference between these episodes and therefore either increases the use of her inhalers or the mask as appropriate.

Discussion

Vocal cord dysfunction is a well described condition which occurs in patients both with and without asthma [5]. Treatment of this condition has previously involved a multi-disciplinary approach with variable results which can at times be unsatisfactory. This case of inspiratory vocal cord dysfunction which proved resistant to methods previously described was treated with a device which is easily available, quick to make, much cheaper to provide than the continuous positive airway pressure machines used in expiratory airflow manipulation, and easily carried by the patient during their usual activities. The use of the mask is relatively simple and no more time consuming than any other method previously described.

It is possible that the mask works for a variety of reasons. These may include: 1) by decreasing the inspiratory rate of airflow the patient is not passing as much air through the vocal cords per second and therefore is unable

to wheeze; 2) by decreasing the rate of airflow hitting the vocal cords they are not stimulated to adduct abnormally; 3) Since the patient is unable to hear themselves wheeze they do not feel as distressed and therefore the spiral of distress causing more wheeze is reversed and the patient feels more calm. Of course it is possible that the mask is effective for purely psychological reasons. This, however, would not explain why sedating the patient had no effect but on using the mask the majority of the patient's symptoms were eased, which includes any stridor heard when the patient was asleep. Whatever the reason that we may postulate for the device being effective, we feel that it has been of great benefit in this case and since it is so easy to both make and use, would be worth considering in similar cases of inspiratory vocal cord dysfunction which have failed to respond to conventional treatment.

It may be possible to construct a similar device and evaluate its usefulness in expiratory vocal cord dysfunction by manipulating resistance to expiration. This might act in a similar way to continuous positive airway pressure machines, but at a fraction of the cost.

References

1. Christopher KL, Wood RP, Eckert C, Blager FB, Rancey RA, Souhendra JF. Vocal cord dysfunction presenting as asthma. *N Engl J Med* 1983; 308: 1566–1570.
2. Kenn K, Schmitz M. Vocal cord dysfunction, an important differential diagnosis of severe and implausible bronchial asthma. *Pneumologie* 1997; 51: 14–28.
3. Caraon P, O'Toole C. Vocal cord dysfunction presenting as asthma. *Irish Med J* 1991; 84: 98–99.
4. O'Connell MA, Sklarew PR, Goodman DL. Spectrum of presentation of paradoxical vocal cord motion in ambulatory patients. *Ann Allergy Asthma Immunol* 1995; 74: 341–344.
5. Goldman J, Muers M. Vocal cord dysfunction and wheezing. *Thorax* 1991; 46: 401–404.