

Passy-Muir Mishap: Learning from Near-miss Events

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The Passy-Muir valve is an excellent device which allows patients with a tracheostomy to talk and communicate. Because this device is relatively specific to that of a critical care environment, there have recently been two critical incidents which may have resulted in moderate or severe harm. The aim of this short article is to raise awareness of the Passy-Muir valve, how they work and how patients who use one should be managed safely.

The Passy-Muir valve was invented by a patient, David Muir, in 1985.¹ David was diagnosed with muscular dystrophy; he eventually became dependent on a ventilator and subsequently became unable to speak. Following months of frustration at his inability to communicate, David used his scientific background to invent a speaking valve that could be used both on and off the ventilator.¹ The resultant effect for a patient being able to communicate with their friends, family and medical team providing their care, is a dramatic increase in the patient's mood, quality of life and rehabilitation.

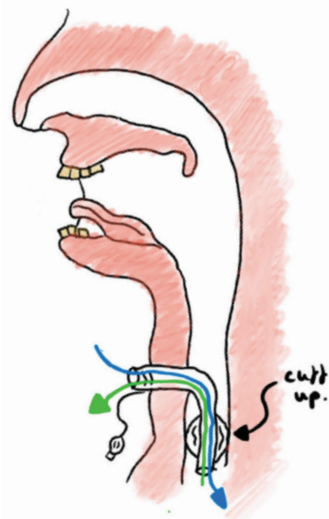
HOW DOES IT WORK?

The Passy-Muir valve works by redirecting expiration up and out through the vocal cords and mouth, allowing speech. The patient inspires through their tracheostomy and expires through their mouth. In order for this to happen, the cuff on the tracheostomy needs to be deflated. If the cuff is inflated, then the patient cannot expire; breath stacking ensues, potentially followed by respiratory arrest if the problem is not resolved. This can be visualised by the illustrations below.

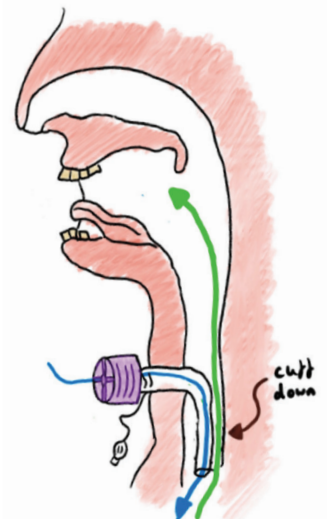
WHAT WENT WRONG?

A patient with a tracheostomy was transferred from the intensive care unit (ICU) to theatre with a Passy-Muir valve in place. During the procedure, the cuff on the tracheostomy was inflated to allow ventilation. At the end of the procedure, the Passy-Muir valve was replaced but the cuff was not deflated.

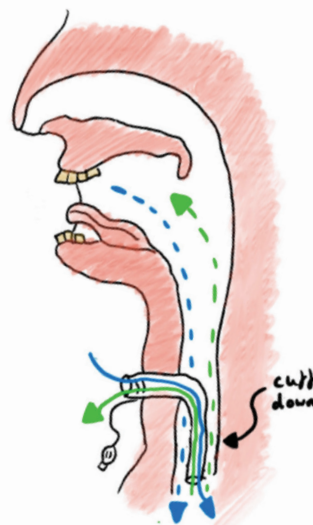
1. When the cuff is up, the patient inspires and expires through their tracheostomy. The cuff prevents air passage through the mouth and nose.



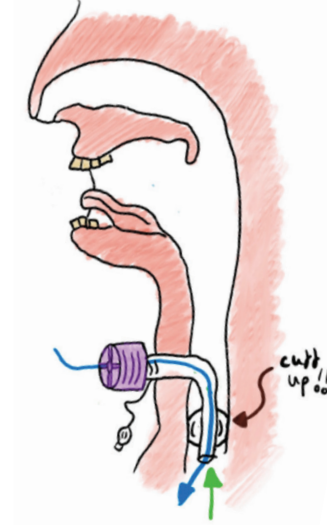
3. With a Passy-Muir valve in place, the patient can talk. This is because the Passy-Muir is a one-way valve; the patient cannot expire through their tracheostomy, so air passes up and out of the mouth.



2. If the cuff is deflated, a small amount of air can pass in and out of the nose and mouth, but most inspiration and expiration is still via the tracheostomy, so the patient is not able to talk properly.



4. If the cuff is inflated with the Passy-Muir valve in place, the patient cannot breathe out. This will quickly lead to respiratory arrest if not identified!



The patient rapidly developed respiratory distress with the patient agitated and struggling to breathe. Fortunately, one of the physiotherapists noted that the cuff was inflated; it was immediately deflated, and the patient's symptoms settled. The patient thankfully didn't come to any harm from this particular incident, but had the problem not been noticed, the patient may have gone into respiratory arrest with the worst-case scenario being death. This incident was a definite 'near-miss' in which we should learn from to ensure it does not happen again.

HOW DID THIS HAPPEN?

From this case, two potential root causes have been identified:

1. A lack of familiarity with the Passy-Muir valves and how they function amongst the theatre staff caring for the patient.
2. An inadequate handover from the ICU staff to the theatre team. The fact that the theatre staff may be unfamiliar with Passy-Muir valves makes it all the more important that patients which use one should be handed over particularly carefully.

HOW CAN WE PREVENT THIS FROM HAPPENING AGAIN?

There are three potential methods which can be used and introduced into clinical practice to minimise the chances of another 'near-miss' event, such as this one, from happening again:

1. Ensure that any ICU patients due to go to theatre have the Passy-Muir valve removed prior to being transferred to theatres (removes the ability for the error to be made). This is the most efficient and realistic method in clinical practice.

2. ICU staff could provide additional training to theatre staff around tracheostomies and Passy-Muir valves. However, even if this training takes place, it is very rare that the theatre staff manage a patient with a Passy-Muir valve in situ and therefore competency may be difficult to maintain due to lack of exposure.
3. Ensure that the ICU team are particularly careful when handing over patients going to theatre. This isn't always done as thoroughly as required, especially in an emergency.

KEY-LEARNING POINTS

- Tracheostomised patients speaking with a Passy-Muir valve should ALWAYS have their tracheostomy cuff DOWN!
- If a patient develops respiratory distress or hypoxia with a Passy-Muir valve in situ, check that the cuff is not inflated!

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REFERENCES:

1. Passy-Muir: Our history. Available from: <https://www.passy-muir.com/history>. (Accessed on 14 October 2021).

2023: THE BICENTENARY OF THE LANCASTER AND MORECAMBE MEDICAL BOOK CLUB

Established on 11th November 1823, at a meeting of clinicians in the Royal Oak public house, the Lancaster Medical Book Club (recently renamed the Lancaster and Morecambe Medical Book Club or LMMBC) is one of the oldest surviving provincial medical societies in England. Thanks to current President Dr Andy Gallagher, I have recently had the privilege of reading the original minute book of the Book Club. Purchased for the cost of 5 shillings, this book was one of the first 5 books purchased by the Book club on November 17th 1823, the others being: Chevalier's Lectures (cost 12 shillings); Cooke's Treatise on Nervous Diseases (cost £1 and 4 shillings); Haden's Formulary (cost 4 shillings and 6 pence) and Good's Nosology (cost £1 and 1 shilling).

Very few medical organisations have survived for 200 years so the Book Club committee are organising a number of special events to mark this achievement. This will include a 'Book Club Bicentenary' edition of the Morecambe Bay Medical Journal in spring 2023. As guest editor of the edition, I welcome any suitable articles that readers may wish to submit for inclusion in this edition. Ideally the article should relate to the Book Club or its members or, at least, be relevant to our local medical heritage.

I am hoping to include a feature celebrating the first female President of the Book Club, namely Dr Elizabeth B Dowell, who was President in 1952 and who, alongside her husband, was also an outstanding GP in Bentham. I am currently searching for a photograph of Elizabeth to accompany the article so please contact me on bryan.rhodes@mbht.nhs.uk if you can help with this request.

The Book Club continues to welcome new members and, although the society no longer purchases medical books on behalf of members, it continues to organise a varied and educational programme of events for a miniscule annual fee. For membership enquiries please contact Andy Gallagher on argallagher@btinternet.com