

## SPUMS ANNUAL SCIENTIFIC MEETING 2000

### LIVING ON COMPRESSED AIR. A CASE STUDY

Michael Logan

#### Key Words

Air, case report, general interest, medical conditions and problems, ventilators.

#### Introduction

We have been discussing fitness to dive. This patient, though in no way fit to dive, lives because of compressed air. I would like to tell you the story of a boy, born in 1972. I will call him AB. He has been on a ventilator for seventeen years and I have been involved with his care since his admission to hospital in 1984 when he was 12 years old.

#### Case report

AB developed Congenital Myasthenia Gravis as a baby and recovered fully. Unfortunately he developed a polyneuritis at the age of ten. This progressively destroyed his spinal cord to C2 and virtually destroyed his optic nerves. He can only move his head side to side on the pillow. His intelligence is unimpaired.

AB was admitted to the Base Hospital in February 1984, virtually blind and with sensory and motor loss below C2. He has lived in the hospital for 17 years on constant ventilator support, a wonderful tribute to constant 24 hour nursing care.

Every day he has needed to be ventilated, given food and drink, his bladder and bowels emptied, his skin and his hygiene cared for and his medical care carried out. Of course there are problems from time to time.

#### VENTILATION

We started with 6 mm uncuffed tracheostomy tube and, by trial and error, found the right settings for the ventilator. We have used many ventilators both pneumatic and electric. These are run off wall outlets. When he is in a wheel chair we originally used a Campbell pneumatic ventilator with the gas cylinder mounted under the chair. Now he has an electric ventilator operated by battery or 240 volt AC.

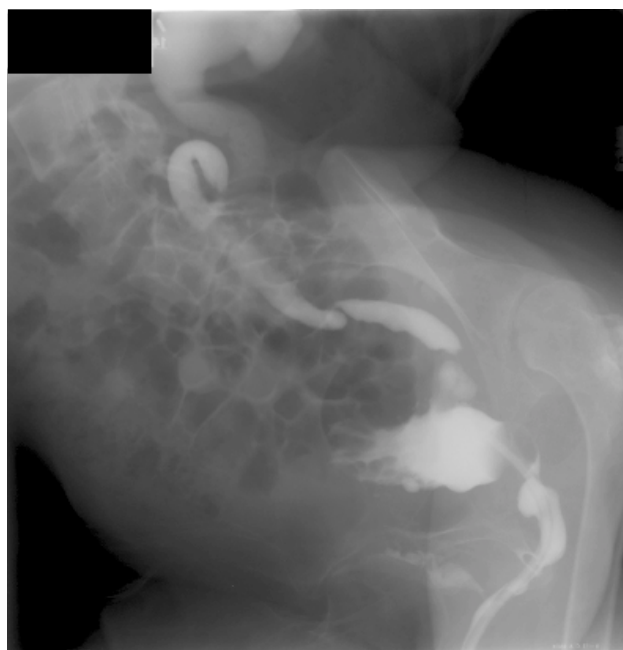
#### FOOD AND DRINK

Initially AB was tube fed, then a gastrostomy feeding tube was used. This was removed when he was able to

swallow without difficulty. His diet varies with his appetite and desires so it is unpredictable

#### BLADDER AND BOWELS

At first we used Penrose tubing but this led to retention and hydronephrosis (Figure 1). An indwelling catheter caused a stricture. His bowels move with regular suppositories.



**Figure 1.** Pyelogram showing hydronephrosis at top, dilated ureter and gas in intestine.

#### SKIN CARE

For 17 years he has had daily bathing and rubbing of pressure spots when being turned every two hours. In spite of these precautions he has had one bad pressure sore which required a musculo-cutaneous rotation flap.

His stoma and catheter have been recurrently infected. Treatment has been mostly topical and granulations have been treated with copper sulphate.

#### MEDICAL CARE

Infections have been treated as necessary. His ventilation supported adequately.

He has learnt to time his speech to fit the expiratory stage of the ventilator. We have provided psychological support and made sure that he obtained an education.

## COMPLICATIONS

AB has had occasional complications with ventilation, infections and pressure areas as mentioned above.

Because he has lost the power to move, his bones have become osteoporotic and very fragile. Fractures cause him no pain. Figures 2 and 3 show fractures in femur and humerus which occurred while lifting him into and out of his bath.

Some fibres of his right phrenic nerve have been spared so that he can make a small inspiratory effort and is able to breathe spontaneously for about ten minutes with great difficulty but then he is exhausted. This spontaneous inspiratory effort has caused his right lung to increase in size at the expense of his left lung and has caused his spine to develop severe scoliosis as is demonstrated by serial X-rays (Figures 4-6).

## AUTONOMIC RESPONSES

These have been unpredictable. Six or seven episodes of bradycardia and hypotension occurred approximately ten years after admission and on one occasion, during an anaesthetic for removal of tracheal stoma polyps, he had a cardiac arrest. He has recovered from these episodes without harm and has had none for the last five years.

## MENTAL STRESSES

He has been in his present condition since he was nine years old. He has had to pass through puberty and adolescence, with its problems, blind and helpless. For some years in his teens he was a most difficult patient with vicious spiteful remarks to his carers that was his only outlet for his anger and frustration. This caused a fairly rapid turnover of carers but a solid core have stuck by him through it all.

He has now passed that phase and has "grown up" and is now a most cheerful and interesting young man.

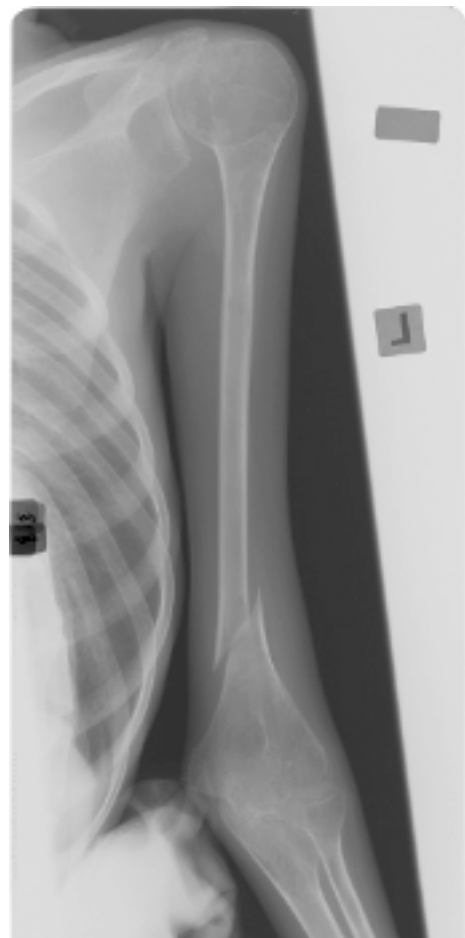
When I asked him recently how he managed day by day he surprised me with his reply that "He had lost the sense of time" so that he never felt that the day, week or month was going slowly and that "he enjoyed his own company" and that "he always had a lot of thing to rehash and sort out" and "he was never bored". (I am impressed that this psyche defence mechanism has made his life so apparently enjoyable when it appears from outside that it would seem to be so easy to be depressed and morbid.)

## GROWING UP IN HOSPITAL

His teenage years were difficult. He insisted on total immersion baptism when he found religion. Having a



**Figure 2.** Fracture of lower end of femur showing muscular wasting and osteoporotic bone.



**Figure 3.** Fracture of lower end of left humerus showing osteoporotic bones.



**Figure 4.** An early X-ray of AB's chest. The endotracheal tube can be detected running down the neck across the mediastinum and into the right lung field.



**Figure 6.** Later X-ray showing tracheostomy tube and extreme scoliosis.



**Figure 5.** Later X-ray showing shortening of the ribcage and the presence of a tracheostomy tube.

computer opened a new world, even though someone else has to work the keyboard and read the screen to him.

#### ACTIVITIES

His days are filled with using his computer, "reading" (listening to) books, visits from and conversations with friends and making plans for the future.

#### THE FUTURE

His desire is to escape from the hospital and have a "home" with some independence. In February 2001 AB moved from the Base Hospital into a house with two other severely handicapped people. He is now (June 2001) much happier. All is well at his new home. Last week he had to have a suprapubic drain put into his bladder because of continuing catheter problems but everything else is going well.

#### Conclusions

AB's survival is a tribute to the excellent care and devotion lavished on him by the nurses who have cared for him. They have been with him 24 hours a day for 17 years. I salute them all for their dedication above and beyond the call of duty.

When scuba diving we submit ourselves to depending on compressed gas. In return we enter a marvellous world of colour and movement.

In the 18 years that I have been a member of the South Pacific Underwater Medicine Society the thrust of the Society has been safety in sports diving.

I encourage the members to continue to try to make exposure to compressed air as safe as possible. Individually

we should be careful to prevent injury to ourselves and others.

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## SPUMS ANNUAL SCIENTIFIC MEETING 2001

### THE HISTORY AND DEVELOPMENT OF THE SOUTH PACIFIC UNDERWATER MEDICINE SOCIETY JOURNAL

John Knight

#### Key Words

General, history, underwater medicine.

#### Introduction

This paper presents the history of the South Pacific Underwater Medicine Society Journal from 1971 to 2001, covering not so much the content of the publication as the processes by which the Journals have been produced and the behind-the-scenes work of those involved in the production of the 31 volumes published so far. A great deal of work is involved in transforming papers written by doctors from their original form to a final format, understandable by non-medical associate members. This is then printed in the Journal and posted to members around the world. The major reason for presenting this paper is to find someone to replace me as Editor at the 2002 Annual General Meeting (AGM) when I will not be available for appointment.

For the past six years SPUMS has paid the Editor a honorarium and in return has required the Editor's attendance at the Annual Scientific Meeting (ASM). The Editor negotiates annually with Committee the amount of the honorarium.

#### The early years

The South Pacific Underwater Medicine Society (SPUMS) was founded on Monday, March 3rd 1971, in the Wardroom at HMAS PENGUIN. The foundation members were Carl Edmonds, the first President of SPUMS, Bob Thomas, who succeeded Carl as Editor of the Newsletter in

1973, Douglas Walker who was Editor from 1974 to 1990, Ian Unsworth and Cedric Deal. The first issue of the "South Pacific Underwater Medicine Society Newsletter" appeared in May 1971, so within three months of the foundation of the Society educational material was on its way to the members. This emphasis on membership education through the Journal has continued without a break. The first Newsletter was produced using a Roneo machine, probably the one at the Royal Australian Navy Diving School at HMAS PENGUIN. The cartoon on the cover started a tradition which carried on for seventeen years until untimely death of the Resident Cartoonist, Peter Harrigan. Each cartoon dealt with some aspect of underwater medicine, physiology or safety.

SOUTH PACIFIC UNDERWATER MEDICINE SOCIETY  
NEWSLETTER

