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### Acknowledgment

I wish to thank Dr Martin Forer, ENT consultant, for his help with information about endoscopic sinus surgery.

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## FACIAL PARALYSIS AFTER SCUBA DIVING A CASE HISTORY

Noel Roydhouse

### Introduction.

The occurrence of facial paralysis after scuba diving has been reported by Molvær<sup>1</sup> and Becker.<sup>2</sup> Their cases suffered transient ipsilateral facial paralysis associated with middle ear overpressure during ascent. When it occurs it produces a marked and unmistakable deformity which prompts the seeking of medical advice even if it is transient. Bell's palsy is the commonest clinical variety to be seen. Other causes are acute otitis media, chronic otitis media with or without cholesteatoma or mastoiditis, skull fracture, tumours, and iatrogenic. Viral peripheral neuritis and vascular spasm of perineural vessels are also rare possibilities. In the course of all middle ear and mastoid operations the facial nerve is at risk from trauma. It emerges from the lower border of the pons passing laterally down the internal auditory meatus, then between the cochlea and the vestibule until it reaches the medial wall of the middle ear. It bends sharply backwards to travel in the horizontal part of the facial canal which is a rounded eminence above the fossa ovalis. At the posterior margin of the fossa ovalis the nerve arches downward behind the middle ear between it and the mastoid region.

In about 40% of cases the bony facial canal during passage through the middle ear has dehiscences. This lack of bone covering the facial nerve varies from complete to small 2-3 mm gaps. At the time of operations such as total stapedectomy, a procedure rarely carried out now, an instrument may press against such an exposed nerve. However rarely is there any problem but facial paralysis for up to 6 months has been known to occur. It takes 6 months for re-growth of the fibrils from the middle ear to the muscle motor end plates. However without a break in the neural tubes the paralysis may last 5 minutes to a day or two.

### Case History.

This 16 year old male patient was doing his first diving session in a PADI scuba diving course. He was diving in a swimming pool with a depth of 3 m and had carried out about 6 descents and ascents over a period of 45 minutes. After descent he would swim around the bottom of the pool before ascending. He stated that he was able to equalise his middle ear pressure with the ambient pressure without difficulty. His method was to hold his nose and blow hard through his nose and his ears would pop. On descent he inflated his ears in response to the feeling of pressure in his ears. There was some soreness on descent but he developed more soreness in his ears on ascent. Both ears were affected equally.

He first noticed his facial symptoms when he had finished underwater and had come out of the water. His left lower lip felt numb and 5 minutes after this he noticed the numbness had spread to the side of his face and that his left lower lip was hanging down and he could not whistle. By this time he had removed his scuba gear and was surface swimming. He found that he could not close his left eye fully and that water was getting into it and it was sore. This failure to close the eye was noticed by other people. This was about five minutes after the initial numbness that he felt in his left lower lip. This condition lasted for 15 minutes when there was a fairly sudden return to normality of his face.

About one and a half hours after getting out of the water he noticed some deafness in his left ear as he used the telephone. This ear felt as though there was water in it and felt blocked. The deafness was definite. The morning after the incident of the facial asymmetry he reported to his General Practitioner who syringed out a lump of wax from the left ear with the relief of the left deafness.

In the past he had had ventilating tubes inserted into his eardrums along with the removal of his tonsils and adenoids at the age of five years. His mother never saw the ventilating tubes come out. This is not unusual. He stated that his ears as a rule did not get itchy nor did they block but he did rub them at times. He did not use cotton buds in his ears. He denied grinding his teeth but admitted that he

did clench his teeth at times and used to get headaches at the back of his head about twice a year. Two days before his diving incident he developed a minor sniffle in his nose and the day after his incident he had as bad a cold as he had ever had. He had no dizziness nor loss of balance nor complained of a deafness in his right ear.

He was seen by a second doctor two days after his facial paralysis who stated that he had "grade two barotrauma of both eardrums". Audiometry was performed. There is no indication as to whether this was clinical or screening audiometry but it showed a hearing loss in both ears slightly worse on the left. The loss was mostly in the low tones and presumed typical of screening audiometry under non-sound proofing circumstances. Tympanometry at that stage showed a low A curve on the right and a normal A curve on the left with a negative pressure of 50 mm of water.

### Examination.

Both eardrums were thin and the incus was visible through the eardrum. The region of the facial nerve could be seen on both sides. In the sitting position he could hold his nose and blow and the eardrum was seen to move. The nose was congested still and the patient stated that it had been like this ever since two days before the incident. He had a slight deviation of his nasal septum to the right. His throat appeared normal. He has not erupted his molar teeth and there was no wear on his front teeth. An audiogram showed the hearing in the left ear to be normal apart from a minor low tone loss and that the hearing in the right ear was abnormal. Bone conduction testing on the right side showed a minor high-tone loss but the air conduction showed a lowtone loss indicating a minor conductive hearing loss in the right ear.

### Diagnosis.

The diagnosis was a left facial paralysis, grade two barotrauma from scuba diving and minor conductive deafness in the right ear due to permanent damage as a result of otitis media with effusion prior to and around the age of five years.

### Discussion.

The cause of the facial paralysis is obscure but it could have been due to a virus infection co-incidental with his diving as he had a bit of a sniffle 2 days before the incident.

Another possible cause might have been a vascular spasm of the blood vessels along the perineurium but this has never been described.

It might be very remotely due to barotrauma with positive or negative pressure in the middle ear. It is hypothesised that there is direct pressure on a facial nerve which has not got its bony canal intact as it passes across the medial wall of the middle ear. He was only in 3 m of water. This causation has no evidence to support it as he went back to finish his diving course six months later when he suffered marked middle ear barotrauma. Towards the end of this course after a dive in 4 m he surfaced and felt slightly deaf and this began to clear so he dived again. He was having difficulty in clearing his ears, feeling pressure in his ears and having a minor pain on descent. His technique was to hold his nose and blow but not as hard as he could. The Toynbee test of Eustachian tube function was positive. He admitted to biting his mouthpiece very hard. He was seen two days after his last dive complaining of minor deafness and blocked ears. Examination showed that the eardrums were mobile but dark in colour due to middle ear fluid. This was confirmed with tympanometry and audiometry. His hearing loss was from 50 to 35 db, a moderately severe loss.

He was given Otrivine and Rhinocort nasal sprays to reduce the amount of nasal congestion which was present and he was able to inflate his ears easily so he was told to do this ten times a day. Despite this third degree of barotrauma there was no sign of any facial palsy. He returned in two weeks stating that his problem had fully resolved in three days and this was confirmed by audiometry although he still had a minor low tone deafness probably due to the scarring as a result of childhood ear infections.

In conclusion, in view of the few reports of facial palsy due to barotrauma, it could be that the actual cause is due to co-incidental happenings. If the lack of the bony covering over the facial nerve is a factor then the problem would be more common as alternobaric vertigo is common. Considering the millions of aural barotrauma cases and the lack of facial palsies, some other theory of causation, apart from pressure, is required.

### References

- 1 Molvær OL. Alternobaric facial palsy. *Med Aeronaut Spat Med Subaquat, Hyperbor* (Fr) 1979; 18: 249-250 (quoted in 2)
- 2 Becker GD. Recurrent alternobaric facial paralysis resulting from scuba diving. *Laryngoscope* 1983; 93: 596-598

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## SPUMS NOTICES

### MINUTES OF THE EXECUTIVE COMMITTEE MEETING (TELECONFERENCE)

held on 28.11.93 at 0900 Eastern Standard Time

#### Present

Drs D Gorman (President), C Meehan, S Paton (Treasurer), J Knight (Editor), D Davies (Education Officer), A Slark (Past President), C Acott, G Williamson and J Williamson.

#### Apologies

Nil.

#### 1 Minutes of the previous meeting

These were accepted as a true record.

#### 2 Business arising from the minutes

##### 2.1 1995 ASM

It was decided that the 1995 Scientific Conference would be in the format of, Theme, Fitness to dive and Workshop, Asthma with possibly a smaller workshop on ENT problems.

To decide on the convener at the next meeting. Possibles are Drs Davies, Paton and Williams.

##### 2.2 Rabaul ASM

Comment from Dr Slark that the manner in which the depth limit of 39 m was presented was unnecessarily "police-like".

There will be a mixture of topics at the ASM including information on PNG, the history of Rabaul, tropical medicine and perhaps a day off for tours etc.

2.2.1 Peter Bennett's letter of inability to attend the Rabaul ASM was discussed and it was decided to supply speakers from within the SPUMS membership.

2.2.2 Allways to be congratulated for their increased accountability. Letter to be written to Allways to hold the money set aside for the guest speaker on behalf of SPUMS until it is decided how best to deal with it. Include in the letter a request to reimburse the Treasurer for the cost of printing the conference booklet by SPUMS and notification of how much of \$2,000 budgeted for printing had been set aside for printing the booklet. Also clarification of how the figure of \$3,000 for Telecom was arrived at and the allocation of the FOCs to be requested. Dr Acott to organise the purchase of safety sausages and DCIEM tables for distribution to delegates.

#### 3 Treasurer's report

There is approximately \$43,500 in the account. Acknowledgment and appreciation of the hard work of Dr

Paton in helping to turn the finances of the society around was expressed. Dr Knight requested that a quarterly income and expenditure report be made available when the finances are computerised.

#### 4 Correspondence

4.1 Expansion of the hyperbaric section of SPUMS was considered a good idea.

4.2 The committee ratified the accreditation of the course run by Dr Geoff Gordon in Townsville.

4.3 Correspondence with the AMA about training for doctors performing diving medicals. Dr Slark considered the tone in general was rather aggressive and that a more diplomatic approach may have achieved better results.

##### 4.4 Queensland Workplace Health and Safety

The committee decided that SPUMS would fully support the International Diving Health and Safety Symposium to be held in Cairns in October 1994. Dr Knight to send address labels of the membership to the organisers for mailing out information. The letter from the Council to be printed in the next Journal.

#### 5 Other business

5.1 After a discussion about providing committee members with telecards to charge calls made on SPUMS business to a central number it was decided that committee members could obtain telecards so that they could charge SPUMS business calls to their home number. The relevant calls can be highlighted on a photocopy of their telephone bills and sent to the Treasurer for reimbursement.

5.2 The emergency ascent training papers will appear in the December Journal.

5.3 DES will become DAN Australia. The number is now 1 800 088 200.

5.4 Summary of questionnaires about conferences. Some of the suggestions have already been adopted by Dr Acott for the Rabaul ASM. The questionnaire is to be an annual item at each conference. Any suggestions to go to Dr Paton.

#### 6 Future meetings

6.1 Venues and speakers for future ASMs.

6.2 Two committee meetings will be required before the ASM to discuss and analyse the tenders for the 1995 ASM in the Solomons.

6.3 Next committee meeting will be on 13/2/94.

**SOUTH PACIFIC UNDERWATER MEDICINE  
SOCIETY  
DIPLOMA OF DIVING  
AND HYPERBARIC MEDICINE.**

**Requirements for candidates**

In order for the Diploma of Diving and Hyperbaric Medicine to be awarded by the Society, the candidate must comply with the following conditions:

- 1 The candidate must be a financial member of the Society.
- 2 The candidate must supply documentary evidence of satisfactory completion of examined courses in both Basic and Advanced Hyperbaric and Diving Medicine at an institution approved by the Board of Censors of the Society.
- 3 The candidate must have completed at least six months full time, or equivalent part time, training in an approved Hyperbaric Medicine Unit.
- 4 All candidates will be required to advise the Board of Censors of their intended candidacy and to discuss the proposed subject matter of their thesis.
- 5 Having received prior approval of the subject matter by the Board of Censors, the candidate must submit a thesis, treatise or paper, in a form suitable for publication, for consideration by the Board of Censors.

Candidates are advised that preference will be given to papers reporting original basic or clinical research work. All clinical research material must be accompanied by documentary evidence of approval by an appropriate Ethics Committee.

Case reports may be acceptable provided they are thoroughly documented, the subject is extensively researched and is then discussed in depth. Reports of a single case will be deemed insufficient.

Review articles may be acceptable only if the review is of the world literature, it is thoroughly analysed and discussed and the subject matter has not received a similar review in recent times.

- 6 All successful thesis material becomes the property of the Society to be published as it deems fit.
- 7 The Board of Censors reserves the right to modify any of these requirements from time to time.

**CHANGE OF ADDRESS**

The Australian and New Zealand College of Anaesthetists (ANZCA) has moved into new premises. As a result all correspondence, **addressed to the office holder concerned**, should now be sent to

SPUMS, C/o  
Australian and New Zealand College of Anaesthetists,  
**630 ST KILDA ROAD, MELBOURNE  
VICTORIA 3004, AUSTRALIA.**

**SPUMS SCIENTIFIC MEETING AND  
DIVE COMPUTER WORKSHOP  
MAY 14th to 22nd at Rabaul**

If anybody who wishes to contribute to this workshop is unable to attend please send their views, in writing before April 21st to me at **1 Landscape Crescent, Highbury, South Australia 5089 Fax (61) 08 232 3283.**

If anyone wishes to present a paper please notify me immediately and send me a copy of the paper as soon as possible. The deadline is April 21st. This workshop is open to everyone. You do not have to be medically qualified to present a paper but have to be willing to argue your point of view. The workshop will be used to formulate SPUMS policy on the use of computers by recreational divers. This policy will be published along with the content of the workshop.

If anyone wants their views published or aired please either send me a paper on the topic or, if you are attending the SPUMS Scientific Meeting, agree to present a paper.

If you do not contribute then it is pointless complaining about the policy after it has been published, particularly if the consensus differs from your views, as has happened with the policy statement on Emergency Ascent Training. If you do not contribute, then do not complain.

**For those attending the conference**

Remember that Papua New Guinea is a malarial area so anti-malarials need to be taken. Appropriate dress for protection at night i.e. long sleeves and long trousers with mosquito repellent on exposed areas. Full details of protection measures will be sent by Allways Travel to those attending the conference. Tetanus immunisation is important, so please check this before going. Hepatitis A and B immunisation is also recommended

Chris Acott  
Convener

**SPUMS ANNUAL SCIENTIFIC CONFERENCE  
1994**

Hamamas Hotel, Rabaul, Papua New Guinea  
Saturday May 14th to Sunday May 22nd 1994

**CONFERENCE THEME**

**THE CAUSES AND MANAGEMENT OF DIVING  
ACCIDENTS**

**PROVISIONAL PROGRAM**

**Saturday 14 May**

**Day 1**

Registration

**Official opening and welcome**

Conference arrangements

Introduction to dive guides C Acott and Allways  
Demonstration of oxygen equipment C Acott

**Welcome cocktail party**

**Sunday 13 May**

**Day 2**

**Hazards of wreck diving**

Introduction: DIMS data C Acott  
The hazards of wreck diving T Cummins  
Wreck diving: another perspective P Lunn

**Open papers**

Diving retinopathy M Cross  
Medical hazards of the tropics C Acott  
A personal view. The history of SPUMS  
G Leslie and G Thomson

**Monday 16 May**

**Day 3**

**Diving Accidents Part I**

Overview of decompression illness D Gorman  
Discovery Bay Lab. Some interesting cases of decompression illness  
M Cross

**Diving Accidents Part 2**

Reflections of diving safety in the USA. D Richardson  
Factors in diving accidents. Failure to check C Acott

**Tuesday 17 May**

**Day 4**

**Diving Accidents Part 3**

Overview of diving accident management D Gorman  
Diver retrieval and medical outcome in NSW M Bennett

**Management of diving accidents Part 1**

Teaching of rescue and retrieval T Brown  
The unconscious diver in the water. Can CPR/EAR be effectively performed? C Pask and C Acott

**Wednesday 18 May**

**Day 5**

**Management of diving accidents Part 2**

Heliox trial: an update from RNZN D Gorman  
Management of diving accidents in the UK M Cross  
Diving fatality causes: post mortem considerations in diving accidents P Lewis  
Some interesting case histories C Acott

**Workshop. Dive computers, friend or foe ? Part 1**

Introduction to the 1994 SPUMS Workshop C Acott  
Why I use a computer G Williams  
What I like (and don't) about computers J Knight

**Thursday 19 May**

**Day 6**

**Workshop. Dive computers, friend or foe ? Part 2**

Summary of part 1  
Computer assisted diving D Richardson  
Diving behaviour. A DIMS update C Acott  
Inert gas kinetics D Gorman

**Friday 20 May**

**Day 7**

**Workshop. Dive computers, friend or foe ? Part 3**

Formulation of SPUMS policy on Dive Computers

**South Pacific Underwater Medicine Society Annual  
General Meeting**

**Saturday 21 May**

**Day 8**

**Tropical Medicine.**

Visit to the local hospital

**Gala Dinner**