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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 Molvær¹ and Becker.² 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

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