THE DIFFERENTIAL DIAGNOSIS OF A CASE OF UNDERWATER EAR PAIN

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This is a description in chronological order of the way an underwater diver may present to the diving specialist doctor (DSDr). It demonstrates the unwitting failure to disclose vital information, that is not uncommon in a lay person not medically educated and not uncommon in a diving professional (DP).

Day 1: 7.30 pm

Situation. DSDr in spa pool in backyard. DP in Singapore. Abbreviated conversation on telephone when DSDr summonsed by the blinking red light overlooking the pool.

DP: "The ENT surgeon wants to do a bilateral Caldwell-Luc (a radical antrostomy) on my sinuses because I am having difficulty in clearing my ears when diving. Do you agree?"

DSDr: "Describe your problem." Note that the description at this stage differs from what DP describes later.

DP: "My nose runs and it blocks and I have had increasing difficulty in clearing my ears so that I get a lot of pain."

DSDr: "What did the X-rays show?"

DP: *"I do not know really but it showed a lot of white."* This could be opaque antra on sinus X-ray and indicative of sinusitis. Note the confusion that exists between most lay people between "sinus" trouble which is actually a 1920 folk-medicine misnomer for nasal catarrh ie. nasal blockage and nasal discharge, and the condition of true purulent sinusitis. There is an enormous difference.

DSDr: "Well in New Zealand I do not advise a Caldwell-Luc operation, (a radical type of operation) at the first consultation."

DP: "What should I do?"

DSDr: "Use a nasal spray and Sudafed tablets and see how you get on."

DP: "OK. I will fly back if I am no better."

Day 5: 9.30 am

Situation: DSDr doing some minor surgery. DP at the Auckland International Airport asking for and appointment and given one for 2 pm.

Day 5: 2 pm

Situation: Both in surgery. Interrogation resumes.

DSDr: "What actually happens when you dive?"

DP: "When I clear my ears I can feel the air go into my ears but the pain persists in my right ear. I used to be able to clear my ears easily but it has become more difficult over the past few months. I do not get colds but my nose blocks up at times especially on the right side and it runs a lot."

DSDr: "What sort of stuff comes out of your nose? Thick or thin, clear or cloudy?"

DP: 'Thin clear fluid."

DSDr: (To himself) Aha, thin clear copious fluid you do not get with sinusitis, you should have some at least cloudy and there is not usually much discharge. Blockage is usually on the side of the sinusitis. DSDr then carries out an examination. The ear drums are both indrawn and more so on the right side. (This is a probable indication of spasm of the right tensor tympani muscle whose nerve supply is the same as the temporalis muscle and the medial pterygoid muscle, both elevators of the mandible against the maxilla). The medial pterygoid muscle is palpated, (a finger pressing medial to the ramus behind the last molar tooth) and the right one is very tender compared to the left side. There is a minor wear of the lower incisor teeth indicative of a tendency to grind the teeth.

DSDr: "Do you grind your teeth?"

DP: "Yes I do."

DSDr: A grunt, and then examines the nose which is very clear, ie. there is a good airway on both sides with a slight deviation of the nearly straight nasal septum to the left with compensatory hypertrophy of the right inferior turbinate, ie. the right inferior turbinate was larger than the left and this explained the complaint of greater nasal blockage on the right. The middle meati into which the maxillary sinuses open, are clean and clear, which state is not expected with sinusitis. There is no pus or purulent exudate in the middle meati, on the inferior turbinates or on the floor of the nose. Provisional diagnosis to this stage is vaso-motor rhinitis with a preponderance of the parasympathetic effect, ie. copious thin nasal discharge and the mandibular dysfunction syndrome (MDS), ie. referred subclinical pain to the right ear brought to subjective levels by exposure to cold water. Note that in Brunei at 30 metres the water is quite cold. Other symptoms elicited to back up the MDS were the blocked feeling in the right ear, popping noises in this ear and sometimes the feeling that there was water in his ear ie. that there was a feeling of water in his ear when he knew there was no water there. The proviso at this stage was that it was necessary to have his sinuses X-rayed especially as this examination was what had prompted the advice that he needed a radical antrostomy operation ie. a Caldwell-Luc operation in which a large opening is made between his maxillary sinuses and the lower part of the nose.

PLAN OF ACTION

1. Cauterize the right inferior turbinate, which was done. He said at this stage that in Hamilton an ENT surgeon had done this five years ago and that he usually fainted when he saw a needle.

2. Arrange for a sinus X-ray. This was carried out at 3 pm.

3. Arrange for a dentist to examine and treat any interferences. Lower left molar interferences were treated at 3.30 pm. Interferences are where natural teeth cusps are too upstanding and interfere with easy side to side movements of the teeth and promote grinding of the teeth which in turn brings on spasm of the mandibular muscles which in this case was the medial pterygoid.

Day 5: 4 pm

X-ray of sinuses (inexplicably at this stage) showed that the maxillary sinuses were opaque, this being the usual indication of a purulent sinusitis, so an antral lavage was set up to wash out the maxillary sinuses to determine whether there was pus or not in the sinuses.

DP: "So I have infected sinuses after all?"

DSDr: "Not until I see pus. Seeing is believing." (with a slightly lessened sureness of the provisional diagnosis). To do a wash out of the sinuses, in addition to the topical anaesthetic, a reinforcing injection of local anaesthetic is given into the mucosa of the inferior meatus under cover of the inferior turbinate, using a 5cm gauge 26 Schimmell needle on a dental syringe. At this stage some difficulty occurred in finding the bone of the naso-antral wall.

DSDr: "What sort of operation did the Hamilton ENT surgeon do to you?" (The undisclosed information).

DP: "I do not really know, but my nose bled for days afterwards."

DSDr: (To himself.) Aha, and so ho. What is going on here? Did the surgeon do it or did he not? So a probe was passed into the inferior meatus and sure enough on both sides were found the antrostomies or the holes made by the ENT surgeon from the nose into the maxillary antra for the operation of intranasal antrostomies. Even before the penny could drop the X-ray result was explained. After any antrostomy operation, be in intranasal or a Caldwell-Luc, the sinus mucosa becomes thickened and shows up in X-rays as an opacity. Every ten years I get caught out, but only temporarily. A re-examination of all the X-rays substantiates the thought and the findings of a previous sinus operation.

DIAGNOSIS

1. Vaso-motor rhinitis.

2. Mandibular dysfunction syndrome.

3. Previous intranasal antrostomy.

PLAN OF ACTION

1. Cautery, already done on the right.

2. Interferences treated, already done.

3. Jaw muscle stretching exercises.

4. Librium.

5. Atrovent (Ipratropium Bromide) nasal spray.

6. Cautery of the left inferior turbinate.

7. Weekend with his parents down country.

REASONS FOR PLAN OF ACTION

1. Cautery of the inferior turbinates stops them from swelling up so much and improves the functional airway, ie. prevents nasal blockage. In four out of five divers it makes it easier to clear the ears.

2. Interferences promote tooth grinding and clenching causing spasm and incoordinate movements of the mandibular muscles. Referred sensations from the mandibular muscles are felt in the ears.

3. Jaw muscle stretching exercises promote normal movements and normal coordination of the jaw musculature. In this case he could not open his mouth without the lateral pterygoid coming into action and pulling his mandible forwards with a jerk, an unnatural movement. So he was trained to open his mouth without the forward protrusion of his mandible.

4. Librium has a specific effect on the chewing centre and reduces or stops nocturnal grinding and clenching of the teeth. It is given for a short (5 day or night) course to break the habit.

5. Atrovent (Ipratropium Bromide) is a parasympathetic paralyser as is its relative, atropine. Locally it has a strong effect on reducing nasal discharge. The other procedure to stop a rhinorrhoea is to do a Vidian nerve resection in the pterygo-palatine fossa behind the posterior wall of the maxillary antrum. The nerve carries the parasympathetic nerve fibres to the nasal mucosa.

6. Cautery of the left inferior turbinate to improve the nasal airway and cautery sometimes reduces the nasal discharge. With a non-congested nose, the patency of the normally cleaned Eustachian tube is improved. He had carried out the Toynbee test previously and this showed, at that time, normal Eustachian tube function.

7. Down country is a good place to relax and would give him time to carry out his exercises.

Day 8:

He returned from the country stating that his jaws were ever so much better though he had not complained before that his jaws were tight. The inferior turbinates were healing and his nose was clear of mucus. An audiogram showed that his hearing was normal. He flew back to Singapore the next day after a trial in a pressure chamber to check that he could clear his ears easily. He has reported no problems since then.