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Eardrum perforation handling with Doc's Proplugs in Professional Divers.

Introduction:

In our activity as ENT diving specialists in this island, Sardinia, that offers up to 5 marine national reserves with hundreds of diving centers of every size which concentrate their activities in the summer, we have often come to diagnose ear drum perforation in the professional divers who are running these diving activities.

Our suggestions to temporarily stop their diving activity in order to protect the ear from possible phlogistic entanglement and infections in order to leave it to heal spontaneously, or worse to send the patient to the surgeon for a miringotomy, always made them fall into despondency. For us doctors this generated a feel of helplessness which motivated us to search for alternative solutions to improve this painful prognosis.

The goal of this research is to determine the diving safety of earplugs that offer the possibility to dive safely without infective complications of the middle ear, in those divers who cannot interrupt their diving job to unedergo miringotomy surgery.

Patients and Methods:

In January 2005 we found a type of earplugs (Doc's Proplugs-Stomp Distribution Milano), produced in a kind of soft sylicon invented by a surfing doctor from California.

The plugs are shaped to perfectly fit the ear (pic.1) and are sold in 8 different sizes (pic.2) to adapt to all types of ear canals. They can be closed (NonVented) for those swimmers who don't dive and ventilated (Vented) with a valve to allow for equalization.

For our research we have involved two professional divers, owners of diving centers who in the summer made constantly 3 dives per day. The first patient monitored with a "follow up" of approximately 17 months, in the winter referred a slower activity with a dive every two-three weeks. The second patient was involved in May 2006. In both cases the anamnesis indicated a pathological weakness of the eardrum (MT) which was periodically perforated due to slight barotraumas or infective agents. This phase was followed by a period of anti-phlogistic and antibiotic therapy with refrainment from diving for a variable time from 15 to 45 days which led to eardrum reconstruction. In both cases we have applied a Doc's Proplug size L on one perforated eardrum, allowing to dive, once the purulent phlogosis had healed, where it was present. We programmed a monthly "follow up" in the summer months and a trimestral in the

winter to look for phlogosis of the middle ear which complicate eardrum perforations especially in an aquatic environment, since perforation represents an open door for infections.

Discussion:

The opportunity of having ventilated earplugs allows for diving even with a ruptured eardrum. The depth reached by our two pro-divers was of –40meters and –47meters, respectively.

The first one reported an easy equalization and that small amount of water manage to pass through the valve into the ear canal. In our opinion this moderate quantity cannot reach the middle ear and doesn't cause any bacterial phlogosis, thanks to the minimal amount of water.

The second diver instead, denies that even small quantities of water passed through his valve and refers a difficulty in equalizing the healthy ear since part of the air necessary is loss through the ruptured ear drum. This demands for more frequent equalization to adapt to the reduced quantity of air available for it.

This evidence was predictable since the air loss through the ruptured ear drum, causes a reduction in the air needed to equalize the healthy ear.

In both cases was suggested the use of Doc's Proplugs also for the healthy ear. Probably due to the frequent equalization maneuvers the water cannot pass in significant quantities inside the ear canal.

Results:

During an observation period of 17 months for the first diver and 3 months for the second one, for a total of approx. 1,000 dives, we did not have any problem of phlogosis of the middle ear, and did not have any inconvenient with the earplugs' performances.

Conclusions:

Our survey, at the moment, even if of small numbers seems very hopeful since it allowed the two professional divers not to interrupt their working season and to continue their diving activity in total safety.

In the mean time the first diver in his check up in the month of May 2006 had spontaneously healed his perforated ear drum. This eventuality is not supposable during periods of intense diving activity since the continuous passages of air through the perforation during equalization precludes reconstruction of the ear drum membrane. Instead, a spontaneous healing of the membrane is probable during the winter time when the diving activity is very much reduced. In any case, the use of the earplugs must be necessarily aimed at the repair which can be induced in times of scarce diving engagement.

Membrane restoration, spontaneous or after miringotomy must always be suggested and seeked y the dive doctor since continuous activity without ear drum represents an open door t infections of the middle ear which can evolve in a series ofv severe complications.

Thanks:

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(this was said because it could have looked as a promotional AD! Doctors and divers were all supported with Proplugs by Stomp.)