



AN INTERIM REPORT ON EUROSIA TUNNEL PROJECT

Toklu A¹, Mirasoglu B¹, Arslan A², Aktas S¹

¹Department of Underwater and Hyperbaric Medicine, Istanbul Medical Faculty, Istanbul University, Istanbul, Turkey

²Department of Underwater and Hyperbaric Medicine, Mevlana Faculty of Medicine, Necmettin Erbakan University, Konya, Turkey

BACKGROUND

Compressed-air work has been used for more than 150 years, to provide dry working environment where people work under pressure during a tunnel construction. In 1980s a new technique, tunnel boring machine (TBM) was introduced, which enables to construct a tunnel by using manpower under pressure less than before. However there are some pressurized compartments of TBM wherein people occasionally should perform repairs or maintenance.



EURASIA TUNNEL

The Eurasia Tunnel Project (Istanbul Strait Road Tube Crossing Project) will connect the Asia and Europa for the first time via a highway tunnel going underneath the seabed. A TBM designed exclusively for this project is being used in the strait crossing tunnel. The operating pressure of TBM is 11 bars and the excavation diameter is 13,7 m. The tunnel construction started on the Anatolian side and will be completed on the European side after approximately 25 meters have been dug under the seabed. The daily advance speed of the TBM is around 8-10 m. average.



HYPERBARIC INTERVENTIONS



The components for hyperbaric interventions such as hyperbaric systems (saturation and transfer chambers etc), hyperbaric staff, diving gears, mixed gases, hyperbaric medical supports were ready on job site.

DIVES and SATURATIONS

Eight interventions into the pressurized heading of the TBM through a man-lock were needed for inspection, maintenance and servicing the cutter head, since the TBM started to advance. The first intervention was performed by bounce diving on air to the pressure of 4,2-4,6 bar without using a diving helmet. Saturation dives were needed for the other seven interventions and in six interventions three divers, in one intervention four divers saturated, on trimix that contains 2 % Oxygen, and 6 % Nitrogen to 10 bar. Interventions were done on bottom mixes that contains 4 % Oxygen / 12 % Nitrogen and 6 % Oxygen / 17 % Nitrogen balanced by Helium, by using surface supplied equipment. The longest saturation lasted 16 days including 97 hours decompression time. The minimum and maximum oxygen fractions were changed from 4,5 % to 23 % during the decompression from 10 bar to 0 bar. The tunnel part of Eurasia Tunnel Project was planned to be completed by the end of 2015



DIVING MEDICINE

Medical support were given by four diving physicians and always a doctor was kept at job site, and another one on call. There was no significant health issue encountered during the saturation except some minor problems such as otitis external and upper respiratory problems. Insomnia was another problem when the divers kept at saturation depth as standby. The divers were examined before and after saturation. Two divers were not allowed to go under saturation since one had upper respiratory infection and the other one had unexplained hemoglobinuria. Bubble checks were done by Doppler device on subclavian vein and pulmonary artery and no bubbles were detected within 20 minutes after the decompression.

