

## Hyperbaric oxygen therapy for pediatric patients with carbon monoxide poisoning

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To the Editor,

We read with great interest the article by Yazar et al. entitled "Analysis of the features of acute carbon monoxide poisoning and hyperbaric oxygen therapy in children"<sup>1</sup>. Carbon monoxide (CO) poisoning, with its high morbidity and mortality, remains an important public health problem. The data about CO poisoning in pediatric patients are limited and the contributions of Yazar et al. are of value in this respect. In addition, analysis of data obtained from the studies like that of Yazar et al. gives an insight into better understanding the role of hyperbaric oxygen (HBO) therapy in the treatment of CO poisoning.

As outlined by Yazar et al., HBO therapy is suggested in patients who manifest signs of serious CO poisoning including unconsciousness, neuropsychiatric symptoms, and cardiac or hemodynamic instability. They stated that early initiation of HBO therapy is important to benefit from the treatment. However, in many cases, delay to HBO therapy is inevitable because of the scarcity of HBO centers in Turkey. At the moment, HBO centers are present in only nine cities (İstanbul, Ankara, İzmir, Eskişehir, Kocaeli, Bursa, Antalya, Samsun, Muğla-Bodrum), and transportation of a severely poisoned patient to these cities delays the initiation of the first HBO therapy. Furthermore, even in a city with an HBO center, transportation of the patients between hospitals may be a common contributing factor in the delay. If the patients initially admit to a small state hospital, they are seldom referred directly to an HBO center. They are initially transported to a hospital with a pediatric intensive care unit and subsequently referred to an HBO center.

There is no consensus among HBO practitioners on administration of HBO therapy after the initial 24 hours. Weaver et al.<sup>2</sup> demonstrated that HBO therapy started in the first day significantly reduced the risk of cognitive sequelae. To our best knowledge, there is no study investigating the effectiveness of HBO therapy in the delayed period of CO poisoning. However, it is reported that some HBO practitioners treat as long as 4-8 weeks after poisoning<sup>3</sup>. Additionally, HBO has been used in the treatment of delayed neurological sequelae of CO poisoning<sup>4,5</sup>.

In their article, Yazar et al. reported the patients who received HBO therapy in the initial 24 hours<sup>1</sup>. As mentioned above, there is a need for information about the role of HBO therapy in the delayed period. Therefore, we retrospectively searched our medical records and identified 42 pediatric patients who were treated with HBO therapy for CO poisoning between January 2003 and December 2008. Of those patients, 5 (12%) received HBO therapy after the initial 24 hours. The characteristics of these patients are presented in Table I. The delay to HBO therapy was between 3 to 18 days. Two patients died despite intensive care and HBO therapy. The other patients recovered with neurocognitive sequelae to varying degree.

Although they were in critical condition, most of the patients (5/6) required long distance transport. Transportation can have serious implications for these patients, especially for those with cardiovascular instability. A 14-year-old boy in deep coma was transported to our department for HBO therapy from Bursa two days after CO poisoning. The patient died just after transportation to our department. Therefore, transportation-associated complications should be carefully weighed in these patients.

Another issue to deal with in severe CO poisoning is the emotionally charged state of the patients' relatives and physicians. Although scientific evidence is lacking to support the use of HBO in delayed cases, patients' relatives and physicians insist on HBO therapy.

As a result, it is hard to draw a definite conclusion about the role and effectiveness of HBO therapy in the delayed period because of the low number of cases. We suggest to Yazar et al. and others to report their patients who received HBO therapy for CO poisoning in the delayed period in an effort to better understand the role of HBO therapy in the delayed period.

**Table I.** Characteristics of Patients Treated with Hyperbaric Oxygen (HBO) Therapy for Carbon Monoxide Poisoning after the Initial 24 Hours

No.	Sex/Age	Delay to HBO therapy (day)	HBO sessions (n)	Glasgow Coma Scale	Origin	Outcome
1	F/16	5	5	3	İstanbul	Exitus
2	F/12	18	22	4	Trabzon	Neurocognitive sequelae
3	M/15	14	18	4	Trabzon	Neurocognitive sequelae
4	F/17	10	31	3	Zonguldak	Neurocognitive sequelae
5	F/12	3	3	3	Tekirdağ	Exitus

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