

Review Article

Observation on clinical efficacy of hyperbaric oxygen combined with neurosurgery in treating craniocerebral trauma

Sung-Won Kim

Medicine, Peking University, No. 5 Yiheyuan Road, Haidian District, Beijing, 100871, China

Abstract: The probability of craniocerebral trauma is higher and higher, along with the increasing number of traffic and construction accidents in our lives which cause physical injuries. Main symptoms of such injuries are headache, dizziness, and impairment in language function and limb activity to varying degrees. For patients with severe craniocerebral trauma whose nerve tissue are greatly damaged, there are difficulties in effectively recovering, which may lead to some obstacles in consciousness, intelligence and even action. The current treatment research has found that inappropriate treatment method will increase patients' mortality or disability rate. At present, the effect of hyperbaric oxygen treatment for craniocerebral trauma has been recognized in many clinical trails, seen from increased cure rate.

Keywords: Clinical efficacy; hyperbaric oxygen; neurosurgery; craniocerebral trauma

Received: December 13, 2019 **Accepted:** January 15, 2020 **Published:** January 21, 2020

1. Status of clinical treatment in patients with craniocerebral trauma

At present, craniocerebral trauma has become a common clinical surgical disease. Past experience showed that the protection of patients during surgery and the prevention of post-surgery intracranial infection didn't gain enough attention, which often led to coma, vomiting, and even cerebral edema and hydrocephalus. These consequences affect each other and damage patients' body function to different degrees, reduce the body resistance and aggravate the disease. Moreover, because of the blood-brain barrier, delivery of antibiotics is inefficient and shows poor efficacy. The post-surgery recovery is far from ideal.

2. Hyperbaric oxygen combined with neurosurgery in treating craniocerebral trauma

From a medical point of view, craniocerebral trauma is common but life-threatening. The high disability rate is not only caused by the disease itself, but also the operation and the post-surgery recovery methods. Patients with severe craniocerebral trauma will suffer from impairment in consciousness and breathing. With the progress of modernization, the acceleration of urbanization and mechanization of human interaction have led to an increasing morbidity of craniocerebral trauma. Effective and timely treatment methods should be adopted to avoid further serious damage in brain tissue, thus relieving the illness as soon as possible, alleviating the suffering of patients and reducing the burden on the family. For example, according to previous observation and work experience, compared with conventional therapy, hyperbaric oxygen therapy has shorter coma time and better consciousness recovery of patients. With single

Copyright © 2019 Sung-Won Kim

doi: 10.18282/g.s.v3i1.783

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

implementation means, conventional therapy has limited recovery effect which mainly depends on the patients' self-recovery. Hyperbaric oxygen therapy can strengthen the medical means and maximize the external effect of doctors. Judging from the standard of curative effect, both the grades of improved and effective have obvious changes, while the ineffective grade is even, which shows that hyperbaric oxygen is quite worthy of attempt. Therefore, timely treatment should be carried out to avoid further damage to the brain tissue. It is often unknown where the patient's disease occurs in the brain. Even if the brain is scanned by X-ray, there are many irresistible factors and changes during the operation. Craniotomy is a very common and critical treatment method. Doctors need to analyze and locate the craniocerebral trauma or edema through various aspects, and remove necrotic tissue through craniotomy. As mentioned above, although the conventional treatment method has certain effects, it is limited in thoroughly eliminating cerebral anoxia and edema. In other words, patients may suffer from poor recovery.

Under the above situation, hyperbaric oxygen treatment is favored by people, in which the patient is in a very professional high-pressure environment. Pure oxygen to be inhaled is released by devices with negative ion, which has no toxin, invasiveness or side effects. This treatment is natural and ecological. Under hyperbaric oxygen, the oxygen pressure in brain tissue is greatly increased, which not only provides sufficient oxygen but also contracts blood vessels, reduces the permeability of blood vessels and cerebral edema, and effectively ensures sufficient oxygen supply for patients. It can reduce the occurrence of vertigo and palpitation, put the central system of the brain into a relatively excited working state, and improve the recovery of human body function. Hyperbaric oxygen also helps a lot once the patient has coma of different degrees. Many medical studies have found that the effect of hyperbaric oxygen is better than that of awakening agents in waking up coma patients. In addition, hyperbaric oxygen can also effectively reduce the volume of patients' blood vessels. Studies on many patients have shown that it can obviously promote the recovery of ruptured intracranial vessels, which cannot be achieved by the conventional treatment. Fast recovery of intracranial vessels accelerates that of damaged brain tissue function. Under hyperbaric oxygen, the symptoms mentioned above, such as cerebral anoxia and edema of the patients, can be further treated, and then the brain tissue function can be recovered. Moreover, damaged neurons can be fully stimulated, thus preventing cells from necrosis, and relieving some symptoms of craniocerebral trauma. Objectively speaking, hyperbaric oxygen is not the final treatment for craniocerebral trauma as it cannot revive dead cells.

3. Conclusion

In the specific clinical practice, in order to ensure the recovery of patients with craniocerebral trauma, it is necessary to apply targeted treatment along with conventional treatment methods. According to the above content and through some analysis, it can be concluded that hyperbaric oxygen treatment can speedily increase the cerebral blood oxygen content of patients with craniocerebral trauma and promote brain tissue regeneration. Although inflammation cannot be avoided, it is possible to reduce stress response caused by that and relieve patients' clinical symptoms. By consulting some comparative studies, hyperbaric oxygen treatment should be carried out immediately when patients' vital signs are relatively stable. In some clinical treatment examples, poor recovery effect and sequelae are caused by missing treatment opportunity. Timely hyperbaric oxygen treatment can obviously reduce the occurrence of "vegetative" state and disability sequelae, and enable quick recovery of patients' body functions, thus improving the quality of life, living ability and ideology of patients to a great extent, and improving their clinical effects. This method has great clinical application value and is worthy of being vigorously promoted and widely used in specific clinical practice. The last but not the least, hyperbaric oxygen treatment for patients with craniocerebral trauma needs to be combined with conventional treatment methods to achieve the desired efficacy.

References

1. Du JG, Ren MY, Wang DX. Effect of pre-hospital emergency treatment on neurological impairment in patients with severe craniocerebral trauma. *Jilin Medical Journal* 2020; 41(1): 165-166.
2. Liu HT, Wang XQ, Li GC. Study on the curative effect of early tracheotomy in patients with craniocerebral trauma

and cerebral hemorrhage. *China Practical Medicine* 2019; 14(36): 24-25.

3. Huang XQ, Peng SW, Zhu JY. Effects of early hyperbaric oxygen treatment on coagulation function and cerebral blood flow in patients with craniocerebral trauma. *Heilongjiang Medicine Journal* 2019; 32(6): 1397-1399.
4. Ren LX and Zhao DM. Observation on clinical efficacy of hyperbaric oxygen combined with neurosurgery in treating patients with craniocerebral trauma. *World Latest Medicine Information* 2019; 19(81): 61+64.
5. Xing DH. Observation on clinical efficacy of hyperbaric oxygen combined with neurosurgery in treating patients with severe craniocerebral trauma. *Guide of China Medicine* 2016; 14(4): 52-53.
6. Zheng ZL. Comparative observation on therapeutic effects of hyperbaric oxygen and conventional methods on neurosurgery diseases. *Chinese Journal of Modern Drug Application* 2015; 9(13): 101-102.
7. Chen SL. Application of hyperbaric oxygen in treating neurosurgery diseases. *Guide of China Medicine* 2015; 13(11): 189.
8. Zhang G, Xu YG, Huang L, Peng W. Clinical analysis of early hyperbaric oxygen combined with ganglioside in treating senile severe craniocerebral trauma. *Chinese Journal of Practical Nervous Diseases* 2015; 18(1): 105-106.
9. Chen HL. Study on the therapeutic effects of neurosurgery combined with hyperbaric oxygen in treating severe craniocerebral trauma. *Contemporary Medicine Forum* 2015; 13(1): 187-188.
10. Kuang YX, Li BS, Xie ZQ. Effect analysis of hyperbaric oxygen as an additional treatment for 30 patients with severe craniocerebral trauma. *China Medical Engineering* 2014; 22(10): 93+96.
11. Jiang J. Comparison of clinical efficacy between hyperbaric oxygen combined with neurosurgery and neurosurgery alone in treating patients with severe craniocerebral trauma. *Guide of China Medicine* 2014; 12(24): 156-157.
12. Liang LL. Common psychological problems and nursing care of neurosurgery patients during hyperbaric oxygen therapy. *Today Nurse (Mid-month Edition)* 2014; (5): 120-121.
13. Dai J. Clinical treatment of hyperbaric oxygen combined with neurosurgery for 44 patients with severe craniocerebral trauma. *Modern Diagnosis & Treatment* 2014; 25(2): 427-428.
14. Li D, Cui JJ, Li DF, Cui YK. Clinical study of hyperbaric oxygen combined with neurosurgery and neurosurgery alone in treating patients with craniocerebral trauma. *Guide of China Medicine* 2013; 11(24): 463-464.
15. Sun XP, Gao BS, Qu K, Guo XD, Wang YH. Effect analysis of hyperbaric oxygen combined with neurosurgery and neurosurgery alone in treating patients with severe craniocerebral trauma. *Medical Innovation of China* 2013; 10(12): 41-42.
16. Luo YL, Liu XS, Chen YG. Application of hyperbaric oxygen in treating neurosurgery diseases. *Jilin Medical Journal* 2013; 34(9): 1629.
17. Chen YG. Comparison of therapeutic effects of hyperbaric oxygen combined with neurosurgery and neurosurgery alone for patients with severe craniocerebral trauma. *Chinese Journal of Modern Drug Application* 2013; 7(6): 39-40.
18. Huang XM. Effect analysis of hyperbaric oxygen with neurosurgical treatment and only neurosurgical treatment to patients with severe craniocerebral injury. *China Foreign Medical Treatment* 2012; 31(27): 18-19.
19. Guo YP, Zuo HC, Tang JT. Hyperbaric oxygen in treatment of neurosurgery related diseases. *Science & Technology Review* 2009; 27(17): 111-115.
20. Tang XP, Qi J, Wang YC, Luo RG, Yu DY, *et al.* Hyperbaric oxygen therapy in neurosurgical diseases. *Practical Journal of Clinical Medicine* 2009; 6(4): 36-38.
21. Wang HP, Shu K, Xu HL, Lei T. Hyperbaric oxygen therapy for postoperative infection in neurosurgery. *China Rehabilitation* 2005; (01): 21-22.