

Research Progress of Anesthesia Consciousness Index in Clinical Anesthesia Depth Monitoring

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Abstract: General anesthesia is one of the commonly used anesthesia methods in surgical treatment, and the depth monitoring of clinical anesthesia is the top priority of clinical anesthesia because effective depth monitoring of clinical anesthesia can have a positive effect on the amount of anesthesia during operation, adverse reactions during operation, postoperative recovery, extubation time and complications. There are many methods of depth monitoring of anesthesia in clinic. Among them, as a new monitoring method, the clinical application effect of anesthesia consciousness index is controversial. Therefore, this paper summarizes the application effect of anesthesia consciousness index in clinical anesthesia depth monitoring, in order to provide reference for the application of anesthesia consciousness index in clinical anesthesia depth monitoring.

1. Introduction

As one of the commonly used anesthesia methods in clinic, general anesthesia mainly refers to injecting anesthetic drugs into patients through respiratory inhalation, intravenous injection, intramuscular injection and other methods, so as to produce reversible inhibition on the patient's central nervous system, resulting in loss of consciousness, disappearance of general pain, amnesia, reflex inhibition, skeletal muscle relaxation, etc, make the patient in the anesthesia state during the whole operation. But during the anesthesia period, it can also lead to serious complications, delayed awakening after anesthesia, and even be life-threatening. Most of the above situations are related to the depth of anesthesia, so it can reflect the importance of clinical anesthesia depth monitoring, and selecting appropriate methods for monitoring is also one of the primary clinical problems. With the continuous development of medical technology, the anesthesia awareness index independently developed in China is widely used in clinic. This paper mainly discusses its application effect in early clinical anesthesia depth monitoring, so as to provide reference for clinic.

2. Significance of Clinical Anesthesia Depth Monitoring

2.1 More Accurate Anesthetic Dosage

The anesthetic dosage can have a serious impact on the anesthetic effect of patients. Insufficient dosage can lead to incomplete anesthesia implementation, and excessive dosage can affect the postoperative recovery and consciousness of patients. Therefore, how to accurately grasp the anesthetic dosage, use the minimum dose to achieve the best anesthetic effect is an urgent problem to be solved in clinic. Ge Ziqiang, Ge Hongwei, Zhao Li, etc. did a study^[1] on the application effect of clinical anesthesia depth monitoring in general anesthesia surgery. 78 patients undergoing general anesthesia surgery were divided into control group (traditional anesthesia) and study group (BIS monitoring). The results showed that the dosage of Propofol, Remifentanyl and other anesthetics in the study group was (371.9 ± 25.4) mg, (763.8 ± 25.6) μ g, significantly lower than that of the control group (633.5 ± 35.4) mg, (1209.7 ± 34.3) μ g. The awake rate during operation is low, and

the anesthetic effect is ideal. Therefore, clinical anesthesia depth monitoring can make the anesthetic effect and dosage more accurate and the anesthetic effect more ideal.

2.2 Significantly Shorten the Recovery Time

In the application of anesthesia depth monitoring in general anesthesia surgery, Zheng Pengjie, Xiao Lin, Lu Hui, et al. [2] divided the patients into control and observation groups, and were monitored by traditional anesthesia and BIS respectively. The results showed that there was no significant difference in anesthesia time between the two groups, that is, the observation group: (118.6 ± 10.9) min and the control group: (120.1 ± 9.6) min. However, the recovery time of anesthesia in the observation group was significantly shorter than that in the control group, that is, the observation group: (12.2 ± 1.3) min and the control group: (27.9 ± 3.5) min. Therefore, monitoring the depth of anesthesia can effectively control the depth of anesthesia and anesthetic effect of patients, which can be conducive to the recovery of patients' consciousness and shorten the recovery time.

2.3 Reduce the Risk of Intraoperative Adverse Reactions and Postoperative Complications

Intraoperative adverse reactions and postoperative complications can have adverse effects on the surgical efficacy and postoperative recovery of patients. Therefore, during anesthesia, appropriate methods should be adopted to improve the safety of anesthesia, so as to improve the surgical efficacy and improve the prognosis of patients. In relevant research, Tang Haijuan [3] applied anesthesia depth monitoring to general anesthesia surgery, and the results showed the intraoperative awake rate, intraoperative pain rate and postoperative memory reduction rate of patients with deep anesthesia monitoring were 0.00%, 2.38% and 2.38% respectively, which were significantly lower than those with conventional anesthesia monitoring. Therefore, anesthesia depth monitoring can effectively reduce intraoperative adverse reactions, postoperative complications and improve the safety of clinical anesthesia.

3. Concept of Anesthesia Awareness Index

As a new monitoring index of anesthesia depth, anesthesia consciousness index mainly analyzes the complexity of EEG information sample entropy, edge frequency in frequency domain and burst replication ratio in time domain, and then obtains a dimensionless value of 0-99 through certain calculation methods, and the optimal anesthesia depth in clinical is 40-60. In addition, this monitor can also display EEG, EEG signal, EMG index, BSR, etc., so as to more accurately monitor the depth and effect of anesthesia.

4. Application and Advantages of Anesthesia Awareness Index in Clinical Anesthesia Depth Monitoring

4.1 High Accuracy of Anesthesia Depth Monitoring

Nowadays, BIS monitoring, which is widely used in clinic, has been proved by a large number of studies that this monitoring method can effectively monitor the changes of patients' cerebral cortex, and has certain sensitivity. It has certain advantages in reducing the amount of anesthetic drugs, shortening the awakening time and improving the safety of anesthesia. In the comparative study of anesthesia consciousness index and BIS monitoring in general anesthesia, Shi Shuxian^[4] compared the indexes such as basic blood pressure, intraoperative operation time, anesthetic drug dosage, circulation fluctuation times, vasoactive drug dosage, awakening score, awakening time and extubation time. The results showed that there was no significant difference between anesthesia consciousness index and BIS monitoring. It has good consistency and correlation. Tao Shoujun^[5] compared and analyzed the application effect of anesthesia consciousness index and EEG bispectral index monitoring in Propofol total intravenous compound anesthesia. The results showed that the relevant values of the above two groups of monitoring methods were in the same anesthesia depth range at T0-T5, there was no significant difference, and there was a low positive correlation in

blood pressure and heart rate. Anesthesia awareness index and BIS have good consistency, which can effectively reflect the depth of anesthesia of patients. Therefore, anesthesia awareness index has high accuracy in monitoring the depth of anesthesia. It has the same advantages as BIS in reducing the risk of clinical anesthesia.

4.2 More Stable Hemodynamics

Because anesthesia can affect the hemodynamics of patients, and then lead to stress reactions, which can have an adverse impact on the surgical treatment and postoperative recovery of patients, maintaining hemodynamic stability during anesthesia can effectively reduce the risk of anesthesia and surgery, and is conducive to the postoperative recovery of patients. Yan Qi^[6]. analyzed the correlation between anesthesia consciousness index and hemodynamic changes in total intravenous anesthesia and the clinical application effect. The results showed that compared with T1, they increased in T0, T2, T3, T4 and T5; compared with T3, they increased in T0, T4 and T5, and the heart rate increased in T0 and T2. Therefore, in terms of correlation, anesthesia consciousness index was positively correlated with hemodynamics, and the mean arterial pressure can also better reflect the depth of anesthesia. In terms of clinical application effect, the extubation time and awakening time of the anesthesia consciousness index monitoring group are shorter than those of the hemodynamics monitoring group, and the use times of vasoactive drugs and the dosage of Propofol and other anesthetic drugs are less than those of the hemodynamics monitoring group. Therefore, the clinical application effect of anesthesia consciousness is more ideal, which can stabilize the hemodynamics of patients and effectively inhibit the stress response of patients, so as to effectively improve the safety of clinical anesthesia and have high clinical application value.

4.3 Reduce the Complications of Elderly Anesthesia Patients

Due to the factors of low immunity and low physical quality, elderly patients have low tolerance to surgery and anesthesia, and the risk of anesthesia and surgery is higher than that of young patients. Therefore, clinically, elderly patients have higher requirements for anesthesia. However, some studies have pointed out that^[7], the application effect of anesthesia consciousness index in elderly total intravenous anesthesia is ideal, which can effectively reduce the dosage of anesthesia drugs such as Propofol and Remifentanyl. It is also more stable in maintaining intraoperative hemodynamics, and has no significant impact on the patient's perioperative neurocognitive function. Before and after the operation, the patient's mental state is good. Therefore, in elderly anesthetized patients, the monitoring of anesthesia consciousness index has more advantages and can provide safety guarantee for patients.

5. Conclusion

In clinical surgery, general anesthesia is widely used. It mainly injects anesthetic drugs into the patient's body, so that the patient is in an anesthetic state, which can be conducive to the operation. After the operation, after the anesthetic drugs are metabolized or discharged from the body, the patient's consciousness and limb reflex can be gradually restored. During this period, there are still some risks. Due to the improper use of narcotic drugs, delayed awakening, hemodynamic instability, intraoperative adverse reactions and other factors, the safety of anesthesia is not high, and can have an adverse impact on surgical treatment. With the continuous development of medical technology, anesthesia depth monitoring is widely used in clinic, which can comprehensively reflect the sedation level of patients, analgesia level, muscle relaxation level, stress response, etc. As a new monitoring method, anesthesia consciousness index can better monitor the anesthesia depth of surgical patients, and has excellent effect in reflecting the consciousness level. Compared with BIS monitoring, there is no significant difference, and the monitoring is more accurate and more sensitive. It can also make the hemodynamics of patients more stable, and for elderly patients, it can effectively improve the safety of anesthesia. However, due to surgery, anesthesia and other factors, it is still affected by individual differences of patients. Therefore, the application effect of this monitoring method in improving intraoperative awareness and other aspects is not clear, and a large

number of clinical studies are still needed to deeply explore and analyze many problems in the clinical application of anesthesia awareness index.

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