COMPARISON OF THE EFFICIENCY OF THE CLOSURE OF DEFECTS OF DURA MATER WITH HIGH-FREQUENCY ELECTRIC WELDING TO TRADITIONAL SEWING CONNECTION

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Summary. A comparison of the effectiveness of closure of dura mater defects in the surgical removal of tumors of the frontal sinuses with intracranial invading by methods of high-frequency electric welding of tissues and traditional sutures. A comprehensive assessment of methods by a group of indicators for both direct surgery and rehabilitation period was used. Significant advantages of high-frequency bipolar electric welding in comparison with traditional seam connection are shown.

Usage of biological welding contributes to a significant reduction of intra- and postoperative complications, shortening the operation time, reduced duration of postoperative treatment compared to traditional methods.

Keywords: defects of dura mater, electrosurgical welding, frontal sinus tumors, intracranial invading

The state of the art. The main complications in the removal of tumors of the frontal sinuses with intracranial invading (TFSwII) are associated with a violation of the closed physiological circuit of cerebrospinal fluid circulation. This is due to insufficient sealing of the dura mater (DM) with radical removal of these tumors, and the formation of cerebellar scar [1]. The reason for the latter is the use of foreign materials to close the defects of DM. Influence of suture material, glue, sealants and other artificial materials causes constant irritation of the adjacent areas of the
cerebral cortex, which creates a focus of epileptic activity [2]. The use of bipolar high-frequency electric welding of fabrics prevents this. Protein-associated electrothermal adhesion allows you to securely and seamlessly connect DM tissues. The structure and functions of the tissue are not disturbed, and the formed postoperative scar is elastic and non-deforming [3].

**The aim of the study.** To evaluate the effectiveness of high-frequency bipolar electric welding for the closure of DM defects compared to traditional methods for surgical removal of tumors of the frontal sinuses with intracranial spread.

**Materials and methods.**

During 2018-2022, the connection of the DM defect and postoperative observation of 52 patients with TFSwII, who were treated at the State Institution "O.S. Kolomiychenko Institute of Otolaryngology NAMS of Ukraine "and the State Institution "A.P. Romodanov Institute of Neurosurgery NAMS of Ukraine". The age of patients ranged from 18 to 76 years, by gender 56% were men (29 persons), 44% were women (23 ones). Patients were divided into two groups by randomization "coin method". The main group consisted of 26 patients who underwent resection of the tumor with affected DM and subsequent plastic surgery and sealing of DM defects with the formation of a "linear weld" by high-frequency bipolar electric welding. Bipolar tools and power supply EC 300 M1 Patonmed were used [4].

Specially developed 3 automatic modes of the hardware welding complex EC 300 M1 were used for welding of fabrics:
1) DM with DM;
2) DM with a fascia lata; 
3) fascia lata with fascia lata.

Patients in the control group (26 people) resected the tumor with affected DM plastic and sealing DM defects was performed by the method of "linear mechanical suture". Monofilament polypropylene atraumatic suture material with a thread diameter of 4.0 and 5.0 according to Donadi was used, which is recognized as a kind of "gold standard" in neurosurgery for nowadays [5].

The following criteria were chosen to compare the effectiveness of the applied methods:
- tightness of the suture by hemostasis, aerostasis and cerebrospinal fluid;
- time of complete healing of DM;
- dynamics of postoperative epidural DM exudation;
- presence / absence of complications of tightness of DM;
- term of removal of epidural drainages;
- total duration of postoperative treatment.

Statistical processing of the results was performed using a software package for statistical processing of biometric data WinPEPI. Student's t-test was used to assess the difference between groups. Differences between groups were considered reliable at p < 0.05.

**Results.** The properties of the DM suture and aponeurosis were evaluated directly during surgery. Adequate suture did not require additional action to achieve complete hemostasis and tightness. This suture was formed by high-frequency bipolar welding in all operated patients of the main group. Instead, with traditional mechanical suturing in 11 patients of the control group, the tightness of the tissue connection was insufficient. This forced in 8 cases to resort to additional suturing with knotted sutures, in 1 case - to use surgical glue BioGlue and in 2 cases - to use the sealant "Tachocomb". This extended the duration of the operation and caused...
the risk of insufficient suture efficiency in the postoperative period. This, in turn, could lead to the development of complications.

The dynamics of subaponeurotic accumulation of cerebrospinal fluid was chosen as an integral indicator of the assessment of the early postoperative period. In the main group of cerebrospinal fluid complications were not detected, in the control group in 3 patients (5.7%) pseudomeningocele was detected. Epidural drainage in the main group was removed after 12 ± 2.3 days compared to 15 ± 2.9 days in the control group (p <0.05). Among the neurological complications in both groups, hydrostatic edema of the brain was predominant, manifested by symptoms from the site of surgical trauma, transient neurological deficit and intracranial hypertension. The latter usually occurred when it was impossible to completely remove the tumor and / or a high degree of tumor anaplasia. In the main group, the hydrostatic edema of the brain disappeared by 10-12 days compared to 14-15 days of the control group. Depending on the primary neurological status of the patient, there were residual signs of neurological deficit.

Meningeal hematomas were found in 2 patients (3.8%) of the main group compared to 4 patients (7.6%) of the control group (p <0.05), when removing large tumors, atrophy and excessive dehydration of brain. Of these, 1 patient (1.9%) of the control group developed a contralateral meningeal hematoma.

The total duration of postoperative treatment was determined taking into account the treatment of complications. In the main group, this figure was 20.3 ± 4.3 days compared to 16.7 ± 1.2 control group (p <0.01). When using biological welding, not only accelerated rapid course of the postoperative period was observed, but also statistically less postoperative complications.

Among the assessment of the general condition of a cancer patient according to the Karnowski scale in these groups and the ECOG-WHO postoperative quality of life assessment scale, the number of patients in the main group with 3-4 points was 40.3% (21 people) compared to 28.8% (15 patients) of control group (p <0.05).

Conclusions. Presented data indicate significant advantages of using high-frequency bipolar electric welding DM and fascia lata to restore the closed physiological circuit of cerebrospinal fluid circulation in the removal of TFSwII compared to traditional suture methods. This approach reduces huge amount of intra- and postoperative complications, time of surgery, and the length of the postoperative period.

References: