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ALGORITHM FOR TREATING PATIENTS WITH TRAUMATIC SUBDURAL HEMATOMAS.

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Abstract: The study aimed to evaluate the effectiveness of the algorithm we developed when choosing the surgical treatment tactics of acute subdural hematoma of the brain. A retrospective analysis of 82 patients hospitalized from 2018 to 2019 was carried out in the neurosurgery department of the Samarkand branch of the Republican Scientific Center for Emergency Medicine with acute subdural hematomas. Group 1 included 53 observations, where osteoplastic and resection craniotomy were performed for removal of subdural hematomas. Group 2 included 29 observations, where subdural hematomas were removed using a new minimally invasive method. Based on the data obtained, the algorithm developed and implemented by us allowed us to provide emergency medical care most effectively and get positive results. This algorithm can be used with all age groups of patients, regardless of the severity of the injury. The algorithm for choosing the treatment tactics for acute subdural brain hematoma is available on all stationary computers in all medical institutions and is easy to use. In combination with the clinical and neurological picture, the results of radiation diagnostics studies, the algorithm we developed is an innovative method of providing qualified emergency medical care and surgical intervention that meets modern requirements.

Keywords: traumatic subdural hematoma, minimally invasive removal method, algorithm, innovative.

Relevance: Due to the increasing number of cases of craniocerebral trauma accompanied by acute subdural hematoma and the lack of data on the individual choice of surgical treatment tactics for this disease, there was a need to develop an algorithm for the selection of surgical treatment tactics for acute subdural hematoma with the least traumatization of the patient and a more effective approach to surgical treatment of patients with acute traumatic subdural hematoma.

Conservative and surgical methods can carry out the treatment of subdural hematomas of the brain. It depends on its size and degree of increase in the patient's dynamics, age, and anesthesiological risk [6,8]. Some small subdural hematomas may undergo independent resorption under careful dynamic observation. In the case of large or manifested hematomas, craniotomy, an autopsy of the dura mater, removal of the blood clot, identification and control of bleeding places are performed [1,2,3,7].

Absolute indications for surgical treatment of subdural hematomas are acute subdural hematoma, causing constriction and displacement of the brain; the earlier the subdural hematoma is removed, the more favorable is the prognosis for recovery [3,4,5].

However, in a detailed study of the literature, there is no data available on the development of standards of diagnostic actions and individual choice of tactics to treat acute subdural brain hematoma.

Considering the general condition and symptoms of brain dislocation, the general strategy, and the process of differentiated estimation of consciousness condition, for selecting more concrete tactics of subdural hematoma treatment, it is necessary to develop an algorithm of choice of an individual approach to patients. The absence of a modern method that meets the requirements of an individual approach to diagnosis and treatment leads to an increase in late formidable complications that lead to a significant decrease in the patient’s quality of life up to death. However, using modern radiation diagnostics methods and the clinical and neurological picture and individual approach to each patient individually, taking into account the age, severity, and nature of trauma, cases of postoperative complications, including fatal outcomes, are minimized.

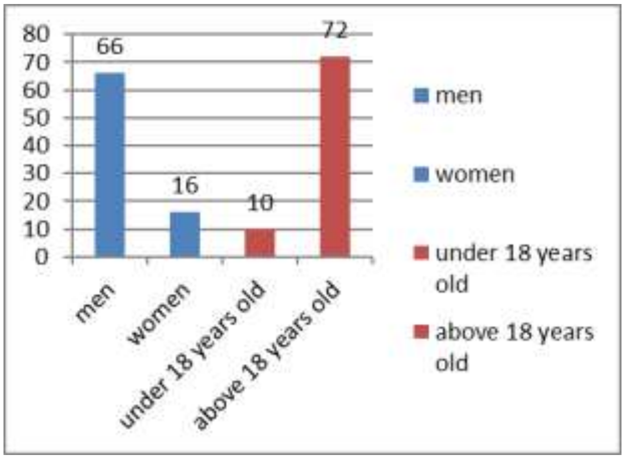
In addition to the above, some other circumstances may be the basis for surgery only at the discretion of the attending physician, taking into account the combination of clinical and radiological data, as well as the need for a particular surgical intervention.

Thus, by analyzing the scientific literature described above, it can be established that this problem is still very relevant. Therefore, the development of an algorithm in the choice of tactics for treating acute subdural brain hematoma using radiation diagnostics methods and a differentiated approach to surgical treatment contributes to early rehabilitation of patients, reducing disability and improving their quality of life.

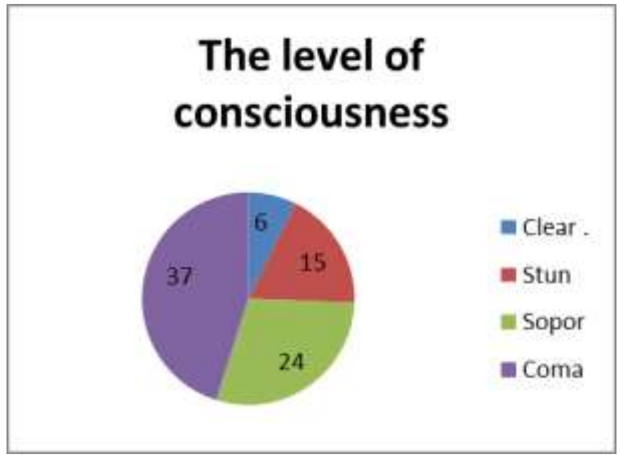
The objective is to develop an algorithm for surgical treatment tactics for acute subdural brain hematoma.

Research material and methods: The analysis of the surgical treatment of 82 patients with traumatic subdural hematomas was performed. Patients were treated in the Samarkand branch of the Republican Research Centre of Emergency Medicine from 2018 to 2019.

There were 66 men and 16 women at the age of up to 18 years - 10 patients, over 18 years - 72. (Pic. 1).



Pic. 1. Distribution of patients by gender and age



Pic. 2. The level of consciousness of the examined patients.

Patients admitted within the first 24 hours of receiving the MBT were 73 people, within 2-3 days - 9.

Patients were treated in the form of surgical intervention, carried out in the first 24 hours after admission to the hospital.

The SCG assessed the level of consciousness and severity of patients. In 6 patients at admission, the state of consciousness was evaluated as clear, in 15 patients - stun, in 24 - sopor, in 37 - coma. (Pic. 2).

Brain MICT was conducted on admission and in dynamics for all patients.

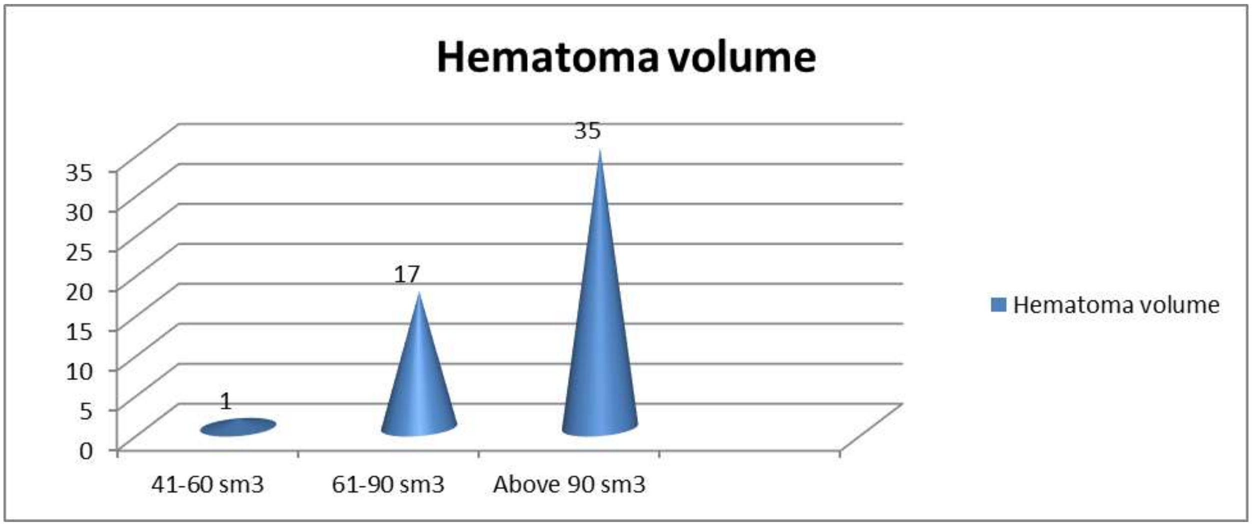
Depending on the type of surgical intervention, patients were divided into two groups.

Patients of the first group, 53 patients, had open removal of hematomas using osteoplastic and resection trepanations. In 27 cases, the operations were decompressive in nature.

There was 1 patient in clear consciousness, 6 patients in stun, 15 patients in comparison, 31 patients in coma.

With the volume of hematoma 41-60 cm^3 there was 1 patient, with the volume 61-90 cm^3 - 17, over 90 cm^3 - 35. (Pic. 3).

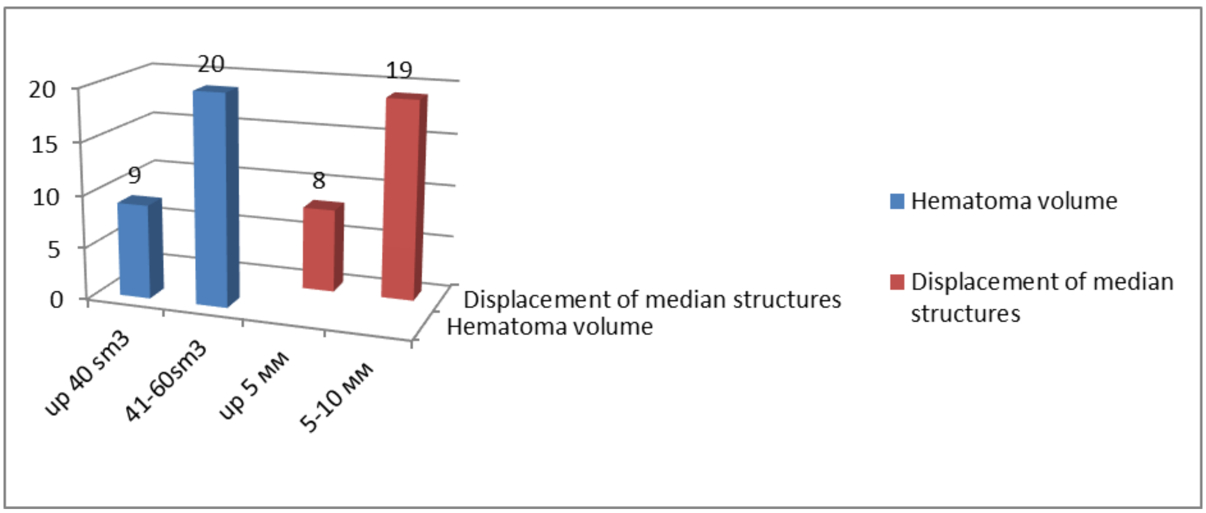
Displacement of median brain structures up to 5 mm was observed in 5 patients, 5-10 mm - in 19, over 10 mm - in 29 patients.



Pic. 3. Hematoma volume.

The second group included 29 observations. There were 5 patients in clear consciousness, 10 in stun, 14 in comparison.

With the volume of hematoma up to 40 cm³, there were 9 patients, with a volume of 41-60 cm³ - 20. Displacement of median brain structures up to 5 mm was observed in 8 patients, 5-10 mm - 19. There were 2 patients without signs of lateral dislocation. (Pic. 4).



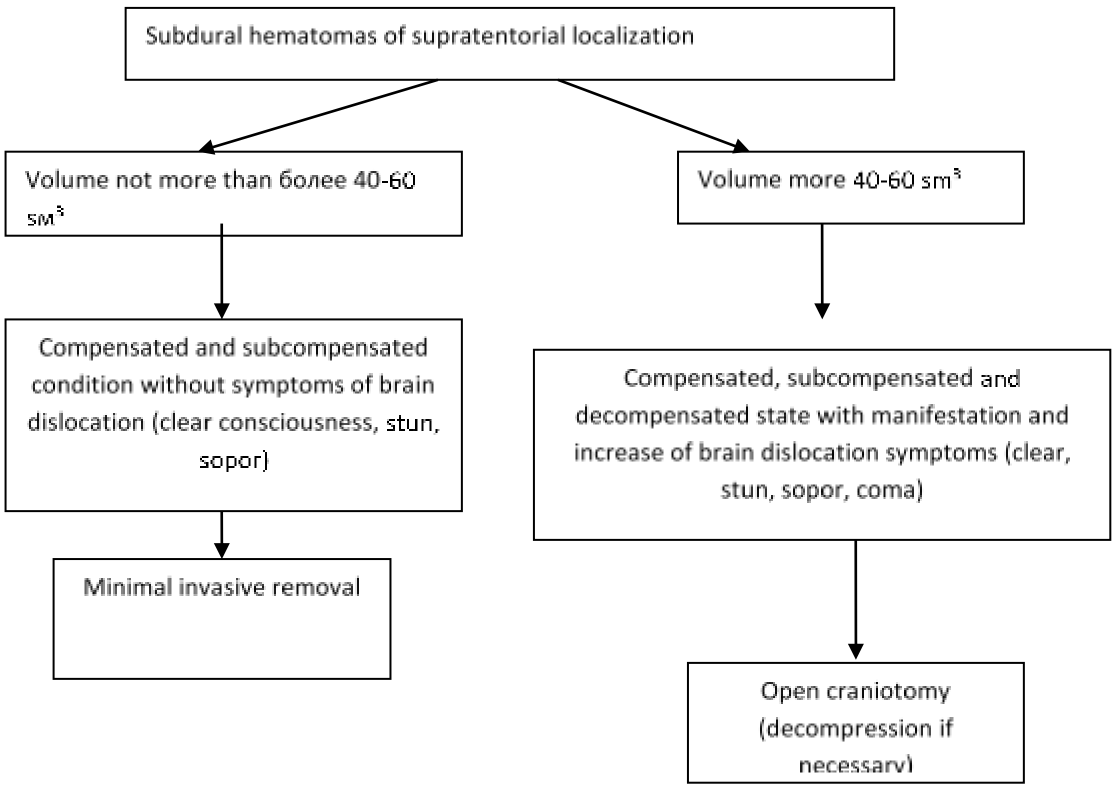
Pic. 4. The volume of hematoma and displacement of medial structures.

Clinical examination of patients with OSH included examining the patient's complaints and anamnesis of the disease with preserved consciousness and absence of speech disorders or anamnesis from the words of relatives or attendants during hospitalization. The neurological status assessment was carried out according to the standard scheme of examination of the patient. The complex of examinations included hemodynamic indices, multispiral computer tomography of the brain, electrocardiography, chest X-ray, results of ultrasound examination (ultrasound) of abdominal and small pelvis organs.

Due to the annual increase in the number of patients with PMT, accompanied by acute subdural hematomas, and the urgent need to choose the most optimal approach to surgical treatment of acute subdural hematomas, we have developed an algorithm. The proposed algorithm is a timely, convenient and easy-to-use tool that fully meets modern medicine requirements, providing the possibility of a quick choice of treatment tactics.

The algorithm work scheme for the choice of surgical treatment tactics for acute subdural hematoma of the brain.

Indications for minimally invasive removal of subdural hematomas



Score assessment and indications for minimally invasive removal of subdural hematomas

State of consciousness:

Clear - 4 points;

Stun - 3 points;

Aspor - 2 points;

Coma - 1 point.

The presence of lateral dislocation of the brain:

No displacement of the median brain structures - 3 points;

Displacement of up to 5 mm - 2 points;

Displacement over 5 mm - 1 point.

Hematoma volume:

Less than 40 cm^3 - 3 points;

40-60 cm^3 - 2 points;

Over 60 cm^3 - 1 point.

From 7 to 10 points, it is possible to use a minimally invasive method of subdural hematoma removal.

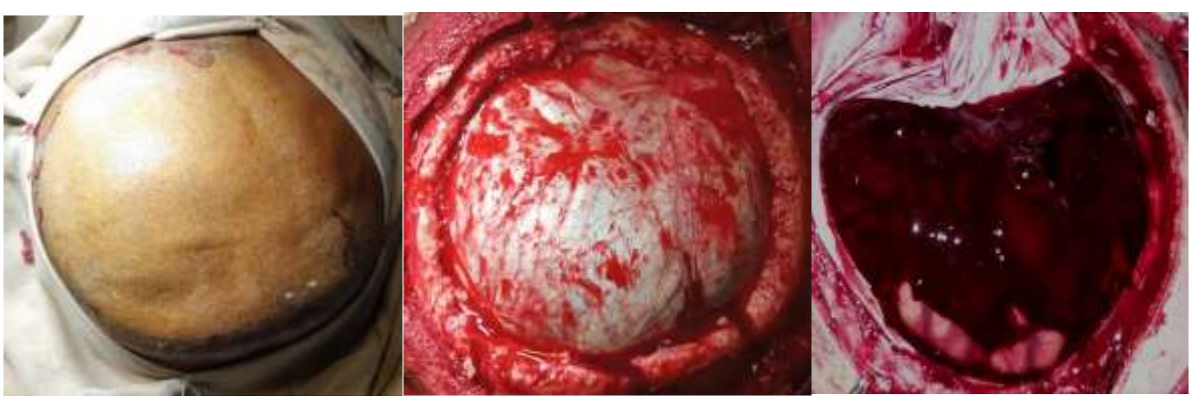
If the sum is from 3 to 7 points, open surgical interventions are used.

At the sum of 7 points, the surgical intervention method's question is solved individually depending on additional data, such as time from receiving the trauma, speed of growth of dislocation signs, vital indices, etc.

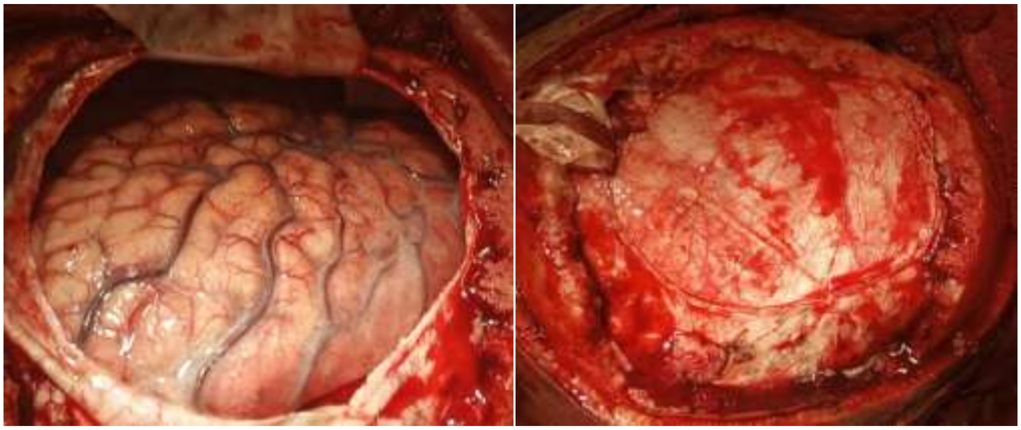
The main results:

Patients of the first group, 53 patients, were exposed to hematomas through bone and plastic fluttering and resection trepanations. In 27 cases, the operations were decompressed.

Criteria of this surgical intervention were: decompensated patient's state regardless of age; hematoma volume from 60 cm3 and more taking into account concomitant contusion foci and perifocal edema zone; patient's severity - compensated, subcompensated and decompensated state; consciousness level according to Glasgow Kombs scale - from 13 points and lower, as well as displacement of medial structures from 5 mm and higher. (Fig. 5).



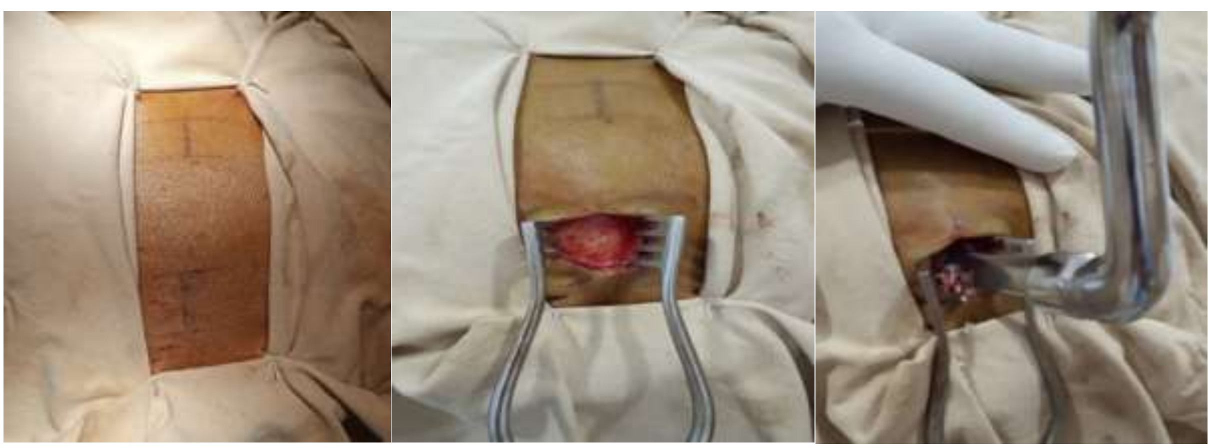
I. II. III.



Pic. 5. Subdural hematoma removal stages: I. Labeling of the incision site. II. Skull resection. III. Opening of the dura mater. IV. Condition after subdural hematoma removal. V. Suturing of the dura mater.

Patients of the second group, 29 patients, were carried out minimally invasive removal of the hematoma by the following method: in the projection of the hematoma, depending on its size and prevalence, 2-3 milling holes are applied. The overlay of bone holes is preliminary determined on the CT slices and is transferred to the head surface, taking into account the real scale factor. The hard cerebral envelope is opened in a crosswise manner, long enough to carry out a brain spatula. The subdural hematoma is then evacuated through the dura mater's openings with a spatula and an electrical suction device. In this case, the spatula's movements are carried out in different directions, both towards the superimposed holes and in the opposite direction. With such tactics, it is possible to achieve the complete removal of blood clots. The subdural space is drained. The wound is sutured. (Fig.6).

The treatment results were estimated by the indicator of hospital mortality and types of functional outcomes, for which the Glasgow scale of outcomes was used.



I. II. III.

IV. V. VI.

VII. VIII. IX.

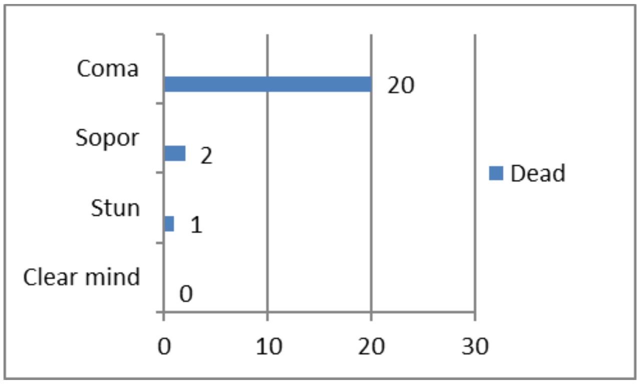
X. XI. XII.

Pic. 6. Subdural hematoma removal stages by the minimally invasive method: I. Markings of incision sites. II. Skin incision. II. SKIN INCISION. III. Overlay of the cutter hole. IV. Hard cerebral membrane incision. V. Removal of subdural hematoma. VI. Condition after hematoma removal. VII. Skin incision for second milling hole application. VIII. Overlay of the second cutter hole. IX. Hard cerebral membrane incision. X. Removal of subdural hematoma. XI.

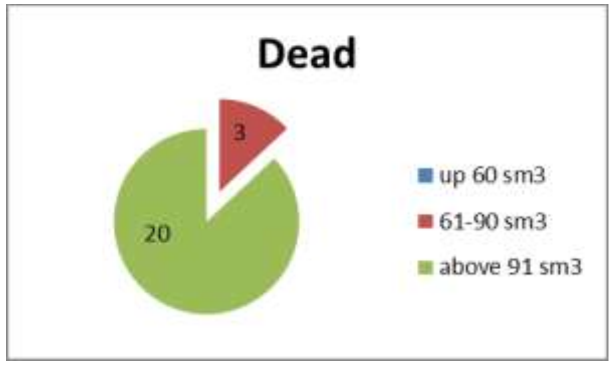
Condition after removal of the hematoma. XII. General view after suturing and drainage of wounds.

We analyzed the disease's outcome depending on the severity of the condition, the level of consciousness disturbance, the amount of hemorrhage, and the displacement of the brain's medial structures.

The level of consciousness impairment and the severity of the condition was decisive in assessing severity and significantly impacted the outcome. So out of the total number of patients among 6 patients admitted in clear consciousness, there were no deaths. Out of 15 patients admitted in stun, 1 died, out of 24 compared to 2, out of 37 in a coma - 20 (Fig. 7).



Pic.7. Deceased patients depending on the consciousness



Pic. 8 . Deceased patients at the level of consciousness.

Due to the increase in the volume of hemorrhage, increased mortality. Among patients with hemorrhage up to 60 cm ^{3}, there were no lethal outcomes, with a volume of 61-90 cm ^{3} died 3 patients, more than 91 cm ^{3} - 20. (Fig. 8).

The lethality rate also increased with the increase of dislocation signs. There were no lethal outcomes in patients without displacement of median brain structures and with displacement up to 5 mm. At the displacement of 5-10 mm, 3 patients died, more than 10 mm - 20 patients.

The following results were obtained: in the first group of patients, there was a good recovery in 12 cases, moderate neurological disorders - in 14, rough neurological disorders - in 4, the lethal outcome was in 23 cases. There was a good recovery in 21 cases in the second group, moderate neurological disorders - in 8 cases.

Results of surgical treatment in groups depended on signs that characterized the severity of patients' condition - degree of consciousness disturbance, the volume of hematoma, degree of displacement of medial brain structures.

Application of open craniotomy was necessary when the victims' level of consciousness was lower than the comparison and the volume of hematoma was higher than 60 cm^3. In cases of dislocation syndrome escalation, emergency decompression was performed as an element of resuscitation aid.

The data obtained showed that a minimally invasive TSH removal method was possible under several conditions. At the level of consciousness impairment of patients not lower than deep stun, the volume of hematoma not exceeding 40-60 cm^3 and minimal severity of lateral dislocation symptoms, when the displacement of median brain structures did not exceed 5 mm, encouraging clinical results were obtained. From 29 cases, in 4 of them, the removed hematoma volume was insufficient and due to this, the patients required repeated surgical interventions. In these cases, bone and plastic cranial fluttering was performed. At the same time, the lines of bone sawing fell on the previously superimposed milling holes.

Conclusions:

According to the study results, reliable clinical and neurological criteria for monitoring are the patient's general state and consciousness level. Simultaneously, the neuroimaging method, which includes a multispiral computed tomography of the brain and transcranial Doppler, allows eliminating the need to use the latter in the preoperative period. Radiation diagnostics data alone are not enough to determine the choice of the most effective approach to treatment. Therefore, there is a need to create an additional algorithm in selecting a strategy for providing medical care to patients with acute traumatic subdural hematomas.

Using the algorithm, developed and implemented by us, to select the treatment tactics for acute subdural hematoma of the brain allows us to provide emergency medical care most effectively and obtain positive results. This algorithm can be used concerning all age groups of patients, regardless of the severity of trauma. The algorithm for choosing the treatment tactics of acute subdural brain hematoma is available on all stationary computers in all medical institutions and is easy to use. Combined with the clinical and neurological picture and the results of radiation diagnostics research, the algorithm we have developed is an innovative method of providing qualified emergency medical care and surgical intervention that meets modern requirements.

As we choose to compensate for brain dislocation's general state and symptoms, we develop a common strategy. As we make a differentiated assessment of the state of consciousness, the level of displacement of the medial brain structures, and the volume of hematoma in cm3, we present a more specific subdural hematoma treatment tactic. The program's history is recorded using electronic archiving of all original and effective information in the root file.

At present, the algorithm developed by us is fully implemented in the practice of the neurosurgery department of the Samarkand branch of the Republican Scientific Center for Emergency Medical Care. It has proved to be a reasonable, acceptable, and convenient means for choosing the tactics and strategy for treating patients with acute traumatic subdural hematomas.

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