

Abstract

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LOCALIZATION AND HISTOLOGICAL STRUCTURE OF SPINAL CORD TUMORS IN PATIENTS IN SUMY REGION

Spinal cord tumors include tumors developing from its parenchyma, vessels, roots and membranes.

The main theory of the formation of spinal cord tumors is the poly-etiological dysontogenetic theory. According to this theory, hereditary factors, dysembriogenesis, trauma, carcinogenic effects, viral infection, intoxication, radiation, etc. play an important role in the development of tumors.

Although scientists keep finding out more about genetic and environmental factors influencing the development of many types of tumors, spinal tumors are still a relatively unknown subject. Spinal tumors partially contain pathological genes, but in many cases, researchers don't know what causes these genetic changes.

Tumors of the central nervous system (CNS) make up 12% of all tumors, tumors of the spinal cord – 3% of nervous system disorders, in the structure of malignant lesions of the CNS – 1,4-5%, occur mainly at the age of 20-60 years. In children, as well as in elderly and senile persons, these tumors are rare. Most often, they develop not from the brain matter, but from the surrounding tissue, and when they increase in size, they compress the spinal cord.

Spinal tumors are usually divided into primary and secondary. The group of primary tumors include tumors, originating from the brain matter (intramedullar tumors), and those that grow from the membranes of the brain, roots, vessels (extramedullar tumors). Extramedullar tumors are much more common (in 80% of all spinal tumors) than intramedullar tumors.

Extramedullar tumors can be both subdural and epidural. The majority of extramedullar tumors are subdural. Occasionally there are tumors, some of which are located inside the dural sac, and some – outside the dura mater, they are subdural-epidural tumors, as well as epidural-extrovertebral tumors.

Among extramedullar tumors the most commonly diagnosed are meningiomas and neurinomas, among intramedullar the most common are ependymomas, less common are astrocytomas and oligodendroglioma. Glioblastomas of the spinal cord is extremely rare; the most common metastases from the posterior fossa are medulloblastomas.

Intracerebral tumors of the spinal cord are characterized by greater biological benignity, than similar brain tumors. Extracerebral spinal cord

tumors have no such differences in their biological properties.

In general, spinal cord tumors are more common in elderly patients. Neurinomas and meningiomas predominate in adults, and ependymomas and dysgenetic tumors (teratoma, epidermoid cysts) – in children.

Peculiarities of etiopathogenetic aspects, clinical course, influence on socio-economic factors encourage further improvement of diagnosis and more detailed study of this type of tumors.

Materials and methods. The analysis of medical records of patients with spinal cord tumors, who were hospitalized in neurological departments of the Sumy Regional and 4th City Clinical Hospitals in 2015-2018 was carried out. 69 clinical cases were processed in order to investigate the prevalence of spinal cord tumors in the Sumy region, the characteristics of the disease in this group of patients, the leading symptoms, methods of diagnosis and treatment.

The analysis of statistical data, obtained after processing of the research materials, was carried out using the licensed version of the IBM SPSS Statistics 17 software.

Our study significantly established that, according to the histological structure, in 46 patients (28 women and 18 men) meningiomas were predominant and that in 31 patients they were located at the level of Th6-Th12. Mainly in 42 patients (33 women and 9 men, $p < 0.05$) spinal cord neoplasms were localized at the level of Th6-Th12, with extramedullary-intradural tumor location – 57 patients (38 women and 19 men).

According to our study, pain syndrome significantly prevailed in 42 patients (35 with extramedullary-intradural tumor localization).

The study of the histological structure of tumors depending on their localization is an integral part of both diagnosis and treatment, and an important component of predicting the quality of life of the patient.

Key words: spinal tumors, clinical syndromes, magnetic resonance tomography.

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Резюме

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ЛОКАЛІЗАЦІЯ ТА ГІСТОЛОГІЧНА СТРУКТУРА ПУХЛИН СПИННОГО МОЗКУ У ХВОРИХ В СУМСЬКІЙ ОБЛАСТІ

Актуальність. У наш час пухлини спинного мозку, спинномозкових оболонки і кінського хвоста діагностуються не часто, але їх курабельність напряму залежить від глибини знань лікаря щодо особливостей початкових проявів захворювання, їх виявлення із формуванням індивідуального підходу до тактики ведення пацієнта, розробкою планів лікування, враховуючи можливі ускладнення та прогноз перебігу. За даними національної програми реєстру пухлин (NPCR) та програми спостереження, епідеміології та вихідних показників пухлин (SEER) в Америці за 2004-2007 рр. (охоплено 99,2 % популяції) було зареєстровано 2576 злоякісних і 9136 доброякісних первинних пухлин спинного мозку. Загальна захворюваність складає 1,08 на 100 000, з частотою 0,99 на 100 000 у жінок і 1,15 у чоловіків.

Мета та завдання: Порівняти взаємозв'язок між гістологічною структурою, рівнем ураження, провідним клінічним синдромом та локалізацією пухлин спинного мозку у хворих.

Матеріали та методи. Було проведено аналіз медичних карт хворих із пухлинами спинного мозку, які знаходилися на стаціона-

рному лікуванні у неврологічних відділеннях Сумської обласної та 4-ї міської клінічних лікарень у 2015–2018 роках. Було опрацьовано 69 клінічних випадків із метою дослідження поширеності пухлин спинного мозку в Сумській області, особливостей перебігу захворювання у даної групи пацієнтів, провідними симптомами, методів діагностики та лікування.

Обробка статистичних даних, отриманих після опрацювання матеріалів дослідження, проводилася за допомогою ліцензійної версії програма IBM SPSS Statistics 17.

Нашим дослідженням вірогідно встановлено, що за гістологічною структурою у 46 хворих (28 жінок і 18 чоловіків) переважали менингіоми, що у 31 пацієнта розташовувалися на рівні Th6-Th12. Переважно у 42 хворих (33 жінки та 9 чоловіків, $p < 0,05$) новоутворення спинного мозку локалізувалися на рівні Th6-Th12, із екстрамедулярно-інтрадуральним розташуванням пухлини – 57 пацієнтів (38 жінок і 19 чоловіків). У 42 пацієнтів (35 – із екстрамедулярно-інтрадуральним розміщенням пухлини), за даними нашого дослідження, вірогідно переважав больовий синдром.

Вивчення гістологічної структури новоутворень залежно від їх локалізації є невід'ємною частиною як діагностики та лікування, так і важливим компонентом прогнозування якості життя хворого.

Ключові слова: спінальні пухлини, клінічні синдроми, магнітно-резонансна томографія.

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Introduction

Spinal cord tumors include tumors developing from its parenchyma, vessels, roots and membranes [1].

The main theory of the formation of spinal cord tumors is the polyetiological dysontogenetic theory. According to this theory, hereditary factors, dysembriogenesis, trauma, carcinogenic effects, viral infection, intoxication, radiation, etc. play an important role in the development of tumors [2].

Although scientists keep finding out more about genetic and environmental factors influencing the development of many types of tumors, spinal tumors are still a relatively unknown subject. Spinal tumors partially contain pathological genes, but in many cases, researchers don't know what causes these genetic changes [3, 4].

Tumors of the central nervous system (CNS) make up 12% of all tumors, tumors of the spinal cord – 3% of nervous system disorders, in the structure of malignant lesions of the CNS – 1,4-5%, occur mainly at the age of 20-60 years. In children, as well as in elderly and senile persons, these tumors are rare. Most often, they develop not

from the brain matter, but from the surrounding tissue, and when they increase in size, they compress the spinal cord [5, 6].

Spinal tumors are usually divided into primary and secondary. The group of primary tumors include tumors, originating from the brain matter (intramedullar tumors), and those that grow from the membranes of the brain, roots, vessels (extramedullar tumors). Extramedullar tumors are much more common (in 80% of all spinal tumors) than intramedullar tumors [7].

Extramedullar tumors can be both subdural and epidural. The majority of extramedullar tumors are subdural. Occasionally there are tumors, some of which are located inside the dural sac, and some – outside the dura mater, they are subdural-epidural tumors, as well as epidural-extravertebral tumors [7].

Among extramedullar tumors the most commonly diagnosed are meningiomas and neurinomas, among intramedullar the most common are ependymomas, less common are astrocytomas and oligodendroglioma. Glioblastomas of the spinal cord is extremely rare; the most common metastases from the posterior fossa are medulloblastomas [8].

Intracerebral tumors of the spinal cord are characterized by greater biological benignity, than

similar brain tumors. Extracerebral spinal cord tumors have no such differences in their biological properties [8].

In general, spinal cord tumors are more common in elderly patients. In addition, there are age distribution features within different groups of tumors: neurinomas and meningiomas predominate in adults, and ependymomas and dysgenetic tumors (teratoma, epidermoid cysts) – in children [9].

Peculiarities of etiopathogenetic aspects, clinical course, influence on socio-economic factors encourage further improvement of diagnosis and more detailed study of this type of tumors.

Materials and methods. The analysis of medical records of patients with spinal cord tumors, who were hospitalized in neurological departments of the Sumy Regional and 4th City Clinical Hospitals in 2015-2018 was carried out. 69 clinical cases were processed in order to investigate the prevalence of spinal cord tumors in the Sumy region, the characteristics of the disease in this group of patients, the leading symptoms, methods of diagnosis and treatment.

The analysis of statistical data, obtained after processing of the research materials, was carried out using the licensed version of the IBM SPSS Statistics 17 software.

Study results. A total of 69 patients' medical histories were analyzed, whose age ranged from 35 to 60 years, 34 women and 35 men. The average age of the patients was 50.5 ± 15.5 years. Significantly ($p < 0.05$) according to the results of histological examination, meningioma was diagnosed in 46 (66.6%) patients (28 (60.8%) women and 18 (39.1%) men), ependymoma in 8 (11.59%) patients (4 women and 4 men), schwannoma in 4 men (5.7%) and chondroma in 4 (5.7%) women. In 7 (10.1%) patients, the histological structure of the tumor was not verified. In order to determine the localization and level of the lesion magnetic resonance imaging (MRI) with intravenous contrast enhancement was used, that was performed using devices with magnetic field induction at least 1.5 T in dynamics. It was significantly ($p < 0.05$) found that in 42 (60.8%) patients the lesion was located in the thoracic region at the level of Th6-Th12 vertebrae (33 (78.5%) women and 9 (21.4%) men), in 15 (21.7%) patients in the thoracic region at the level of Th1-Th6 vertebrae (9 (60%) women and 6 (40%) men), in 12 (17.3%) patients in the lumbar region at the level L1-L3 vertebrae (8 (66.6%) women and 4

(33.3%) men). Depending on the level of lesion and the results of histological examination, meningioma of the thoracic region was significantly ($p < 0.05$) most often diagnosed at the level of Th6-Th12 vertebrae (in 31 (44.9%) patients), also schwannoma was confirmed in 4 (5.79%) patients at this level. In 7 (10.1%) patients, the histological structure of the tumor was not verified. At the level Th1-Th6 meningioma was confirmed in 15 (21.7%) patients. At the level of L1-L3 ependymoma was verified in 8 (11.5%) patients and chondroma in 4 (5.79%) patients. Depending on the localization of the tumor it was located – intramedularly-intradurally (8 (11.59%) patients), extramedularly-intradurally (57 (82.6%) patients) and extradurally (4 (5.79%) patients). In 4 (5.79%) women, the tumor localization was extradural, in 38 (55.07%) women and 19 (27.5%) men – extramedular-intradural, in 4 (5.79%) women and 4 (5.79%) men – intramedular-intradural. The distribution was significant ($p < 0.05$).

The studied patients were distributed (distribution was significant, $p < 0.05$) according to identification of the main clinical syndrome: pain, radicular and sensitivity disorders. Pain syndrome was observed in 42 (60.8%) patients, radicular – in 4 (5.79%), sensitivity disorders were recorded in 23 (33.3%) patients. Among patients with extramedular-intradural location of the tumor, pain syndrome was observed in 35 (50.7%) patients, radicular – in 4 (5.79%), sensitivity disorders were recorded in 15 (21.7%), in patients with intramedular-intradural location, pain syndrome was observed in 4 (5.79%) patients, sensitivity disorders – in 4 (5.79%), in patients with extradural location, pain syndrome was observed in 4 (5.79%) patients.

Discussion. The results of our study are consistent with the data, contained in literature, which we analyzed when planning the work. That is, the space-occupying lesion tumors of the spinal cord are probably more often localized at the level of Th6-Th12 with extramedular-intradural location of the tumor, with a likely predominance of pain syndrome, as also evidenced by the data of Pronin I. M., Kornienko V. M. described in Diagnostic Neuroradiology, as well as the data of Livshits A.V. described in the textbook "Spinal Cord Surgery". The histo-topographical peculiarities of our study also corresponded with the statistical data, presented in the edition of the cancer registry.

Conclusions

Our study significantly established that, according to the histological structure, in 46 patients (28 women and 18 men) meningiomas were predominant and that in 31 patients they were located at the level of Th6-Th12.

Mainly in 42 patients (33 women and 9 men, $p < 0.05$) spinal cord neoplasms were localized at the level of Th6-Th12, with extramedullary-intradural

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The study of the histological structure of tumors depending on their localization is an integral part of both diagnosis and treatment, and an important component of predicting the quality of life of the patient.

Conflict of interest

The authors declare no conflict of interest.

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(received 29.11.2019, published online 29.12.2019)

(одержано 29.11.2019, опубліковано 29.12.2019)