

doi: 10.13241/j.cnki.pmb.2019.17.041

神经导航下经胼胝体-穹窿间入路切除丘脑胶质瘤的临床应用价值分析*

康国创¹ 韦 祎² 翟德忠³ 尚宏杰⁴ 谭党会⁴ 宋少军¹

(1 海南省肿瘤医院神经外科 海南 海口 570300; 2 海南医学院中医学院 海南 海口 570100;

3 定西市人民医院神经外科 甘肃 定西 743000; 4 武功县人民医院神经外科 陕西 咸阳 712200)

摘要 目的: 探讨神经导航系统辅助下经胼胝体-穹窿间入路手术切除丘脑胶质瘤的临床应用价值。**方法:** 选择2016年2月至2018年9月我院收治的丘脑胶质瘤患者60例为研究对象,以其中采用神经导航系统辅助下的经胼胝体-穹窿间入路显微切除丘脑胶质瘤的30例患者作为实验组,另外30例采用常规手术切除的患者作为对照组。分析和比较两组手术情况、治疗效果及并发症的发生情况。**结果:** 治疗后,实验组手术时间、住院时间均比对照组明显缩短,术中出血量及术中引流量显著少于对照组(均 $P<0.05$);实验组肿瘤全切除率高于对照组,次全切除率及部分切除率均低于对照组($P<0.05$);实验组并发症发生率(20.0%)显著低于对照组(53.3%)($P<0.05$)。**结论:** 与常规手术相比,神经导航系统辅助下经胼胝体-穹窿间入路切除丘脑胶质瘤能显著缩短手术时间,减少术中出血量及术后引流量,显著提高丘脑肿瘤全切除率,并降低术后并发症的发生率。

关键词: 胼胝体;神经导航;丘脑胶质瘤;丘脑

中图分类号: R739.4 **文献标识码:** A **文章编号:** 1673-6273(2019)17-3393-04

Analysis of the Clinical Value of Neuronavigation-Guided Corpus Callosum-foraminal Approach for the Resection of Thalamus Glioma*

KANG Guo-chuang¹, WEI Yi², ZHAI De-zhong³, SHANG Hong-jie⁴, TAN Dang-hui⁴, SONG Shao-jun¹

(1 Neurosurgery department, Hainan Cancer Hospital, Haikou, Hainan, 570300, China;

2 College of traditional Chinese Medicine, Hainan Medical University, Haikou, Hainan, 570100, China;

3 Neurosurgery department, Dingxi people's Hospital, Dingxi, Gansu, 743000, China;

4 Neurosurgery department, Wugong County People's Hospital, Xianyang, Shaanxi, 712200, China)

ABSTRACT Objective: To investigate the clinical value of neuronavigation-guided corpus callosum-foraminal approach for the resection of thalamus glioma. **Methods:** 60 cases of thalamus glioma admitted to our hospital from February 2016 to September 2018 were selected. Among them, 30 patients who underwent microsurgical resection of thalamus glioma via the transcallosal-dome approach assisted by neural navigation system were selected as the experimental group, and the other 30 patients who underwent conventional surgical resection were selected as the control group. The operation condition, treatment effect and incidence of complications were analyzed and compared between two groups. **Results:** After treatment, the operation time and hospitalization time of experimental group were significantly shorter than those of the control group, and the intraoperative blood loss and intraoperative drainage flow were significantly lower than those of the control group (all $P<0.05$). The total tumor resection rate of experimental group was higher than that of the control group, and the subtotal resection rate and partial resection rate were lower than those of the control group ($P<0.05$). The incidence of complications in the experimental group (20.0%) was significantly lower than that in the control group (53.3%)($P<0.05$). **Conclusion:** Compared with the regular surgery, the neuronavigation system can significantly shorten the operation time, reduce the bleeding volume and postoperative drainage, increase the total resection rate of thalamus tumor, and reduce the incidence of postoperative complications.

Key words: Corpus callosum; Neural navigation; Thalamus glioma; Thalamus

Chinese Library Classification(CLC): R739.4 **Document code:** A

Article ID: 1673-6273(2019)17-3393-04

前言

丘脑内含有重要的人体神经核团和传输纤维,功能极为重要,且毗邻第三脑室、下丘脑、内囊等重要解剖结构,解剖关系比较复杂,发生肿瘤后手术的难度较大,术后并发症也较多,尤

其是内侧型丘脑胶质瘤,传统手术方法疗效差,致残率较高^[1-4]。据相关文献报道,丘脑胶质瘤的发病率约占颅内肿瘤的1%~5%^[5],由于其位置较深,且毗邻颅内重要结构,手术难度较大,术后并发症发生率较高,采用传统的经额部皮质造瘘-室间孔入路,疗效差,致残率高。因此,丘脑胶质瘤的治疗一直以来都是神经

* 基金项目:海南省社会发展专项资助项目(2015SF40)

作者简介:康国创(1976-),男,本科,主治医师,研究方向:颅底与脊髓肿瘤,电话:18591701317, E-mail: kangguochuang@163.com

(收稿日期:2018-12-23 接受日期:2019-01-18)

外科领域的技术难题^[9]。

随着当前医疗技术的突飞猛进,显微神经外科技术和神经导航技术的发展,越来越多的专家主张全切除或次全切除丘脑胶质瘤。胼胝体-穹隆是脑组织在胚胎发育过程中形成的潜在腔隙,经此入路到达第三脑室的路径较短,能较大限度的减少手术损伤^[7,8],本研究旨在通过比较神经导航(Neuronavigator)辅助下显微外科手术与常规手术治疗丘脑胶质瘤的疗效,探讨神经导航在丘脑胶质瘤显微外科手术治疗中的临床应用价值。

1 资料与方法

表 1 两组基线资料的对比(n=30)

Table 1 Comparison of the baseline data between the two groups(n=30)

Groups	Male /female	Average Age (year)	Average Course (month)	Average Diameter (mm)	Pathological type (n)			
					Glioblastoma multiforme	Astrocytoma	Oligodendro-glioma	Rest
Observation group	17/13	36.7± 2.4	0.8± 0.2	4.6± 1.1	9	8	7	6
Control group	16/14	36.8± 2.1	0.8± 0.1	4.3± 1.5	7	10	6	7

1.2 治疗方法

1.2.1 对照组治疗方法 给予常规显微手术治疗,经胼胝体-穹隆间入路切除。

1.2.2 实验组治疗方法 术前准备:实验组患者术前均行MRI,导航MRI。患者术前1d剃头,在患者头皮贴5~8个导航定位标记(Marks),标记围绕病灶分散在不易移动的部位,如顶结节。然后行全头颅无间隙MRI水平连续增强扫描,层厚1mm;根据肿瘤的位置及与周围纤维束的毗邻关系,选择经胼胝体-穹隆间入路手术。

手术过程:将待手术患者的MRI数据导入导航系统工作站,扫描并建立三维立体图像,根据肿瘤的位置、形状、大小、毗邻关系建立三维模型,选择最优手术入路。术前患者全身麻醉,取仰卧位或侧卧位,根据术前规划最佳手术路线,以导航探针为指引,标记出肿瘤头皮投影位置,在肿瘤与正常组织的交界处标记病灶界限,行马蹄形手术切口,尽量缩小切口面积,开颅

1.1 研究对象

选择2016年2月至2018年9月在我院接受治疗的丘脑胶质瘤患者60例作为研究对象,术前均采用CT扫描或MRI进行检查,且术后病理检查证实患者均未丘脑胶质瘤。将所有患者平均分为两组,实验组30例在神经导航辅助下的经胼胝体-穹隆间入路显微切除丘脑胶质瘤,对照组30例采用常规手术切除丘脑胶质瘤。两组的基线资料对比差异无统计学意义($P>0.05$),见表1,具有可比性。

后,按手术计划逐层向肿瘤切入并寻找肿瘤,注意避开功能区,观察肿瘤及周围组织结构的血流分布与解剖关系,尽可能做到全切除肿瘤。

1.3 观察指标

对比两组手术时间与住院的时间;术中出血量与术后引流量;肿瘤切除率及手术后的并发症的发生情况。

1.4 统计学分析

采用SPSS21.0软件进行数据处理,组间计量资料比较采用t检验,计数资料采用 χ^2 检验,以 $P<0.05$ 为差异具有统计学意义。

2 结果

2.1 两组手术时间、术中出血量、术后引流量和住院时间的对比

实验组的手术和住院的时间都显著短于对照组,术中出血量和术后引流量也都明显少于对照组(均 $P<0.001$),见表2。

表 2 两组患者手术时间、术中储蓄量、术后引流量及住院时间的比较

Table 2 Comparison of the operation time, intraoperative bleeding volume, postoperative draining volume and hospitalization time between the two groups

Groups	N	Operation time/min	Intraoperative bleeding volume/mL	Postoperative draining volume/mL	Hospitalization time/d
Control group	30	64.4± 9.7	173.7± 10.6	2241± 114.6	11.7± 1.7
Observation group	30	29.7± 9.9	102.6± 10.3	1277± 121.4	6.9± 2.1
t		13.71	26.35	31.63	9.73
P		<0.001	<0.001	<0.001	<0.001

2.2 两组肿瘤切除率的对比

实验组肿瘤全切除率高于对照组($P<0.05$),次全切除率及部分切除率均低于对照组($P<0.05$),见表3。

2.3 两组术后并发症发生情况的对比

治疗期间,实验组并发症发生率显著低于对照组($P<0.05$),见表4。

3 讨论

神经导航系统是由德国 Schlondorff 和日本 Watanabe 发明并命名的^[9],是将患者术前的影像资料和术中患者肿瘤的实际位置通过计算机系统联系起来,从而在术中准确显示中枢系统的三维解剖结构及肿瘤的毗邻关系,指导术者精确定位并摘除

肿瘤^[10-12]。神经导航系统的优点包括:(1)可以在术前设计最佳的术野结构,回避重要结构,引导手术的前进方向^[15];(3)手术过程中根据实际需要实时调整手术方案^[16]。

表 3 两组患者肿瘤切除率的比较

Table 3 Comparison of the tumor resection rates between the two groups

Groups	N	Total tumor resection	Subtotal removal resection	Partial removal resection
Control group	30	8(26.7%)	14(46.7%)	8(26.7%)
Observation group	30	22(73.3%)	6(20.0%)	2(6.7%)
χ^2		13.07	4.8	4.32
P		<0.001	0.028	0.038

胼胝体 - 穹隆是脑组织在胚胎发育过程中形成的潜在腔隙^[17],经胼胝体 - 穹隆间入路的优势包括:(1)利用自然间隙进行手术操作能最大限度减少手术的创伤;(2)通过该入路到达第三脑室的路径较短^[18-20],通过调整显微镜的角度及患者头部固定方位可以充分显示术野,术中充分暴露丘脑的各解剖结构,有利于把黏连肿瘤的大脑大静脉分离;(3)该入路能在直视下探查并打通室间孔,并根据情况造瘘以减少脑积水,改善脑脊液循环^[21];(4)该入路的手术过程无须切断穹隆柱、结扎静脉,从而减少了术后偏瘫、昏迷等并发症的发病率^[22]。

丘脑周围毗邻重要的解剖结构,关系复杂,加之丘脑胶质瘤位置深,治疗难度大^[23-26]。以往的手术只能借助 CT 或 MRI 等检测肿瘤,且如果需要术中寻找位置较深、体积较小的肿瘤和那些边界不清的恶性肿瘤,医师只能靠自己的经验^[27]。神经导航系统能够对颅内的任何位置做出精确的定位,并能动态跟踪,从而能够实现术中精确定位肿瘤;同时,使手术医师能最大限度地规避手术误差;最终能够实时监测手术过程并尽可能地切除肿瘤^[28-30]。

本研究选择手术时间、术中出血量、术后引流量、住院时间、肿瘤切除率及术后并发症作为观察指标,能比较客观地反映手术疗效及安全性。本结果表明神经导航系统辅助能提高丘脑胶质瘤手术的效率与安全性。在本次研究过程中,我们也注意到神经导航系统定位的精确度在手术过程中会受到多重因素的影响,应当予以高度重视,否则可能会给手术带来极大的不确定性,主要包括以下几个方面:(1)导航标志物应固定在头皮上不易移动的部位,且需适当增加标记物的数量,术中谨防导航标志松动和脱落,可以选择眉弓、鼻尖、岩骨乳突等作为标记点,标记物应围绕靶点散在分布,避免直线排列;(2)准确固定患者的头部、参考架等,如标志物注册完成后头部出现移动需重新注册,否则将误导手术,同时应尽可能降低导航过程中的影像漂移,根据丘脑胶质瘤的部位选择最佳手术方案;(3)术中应对颅内标志性结构进行定位复检,以防止出现较大误差;(4)要特别警惕术前严重脑积水患者,可先行脑室穿刺外引流术或脑室 - 腹腔分流术以进一步降低手术风险;(5)当术中医师无法通过肿瘤质地、颜色等辨别肿瘤与正常丘脑组织时,可借助导航来确认手术准确位置,但术中也存在不可避免的影响如脑脊液流失和肿瘤部分切除。因此,在术中应不断地更新导航系统的数据,以避免对手术操作产生误导。

神经导航技术可以准确的在术前对肿瘤进行追踪,及时的

制定手术方案及术中对手术操作的实时引导,有助于神经外科医师准确发现并切除颅内深部肿瘤,避免损伤重要功能区组织,降低医源性损伤发生率。同时,借助导航系统,医师在操作丘脑胶质瘤手术时,选择最安全的入路,提高切除的准确率,减少不必要的损伤,降低并发症的发生率,在显微神经外科手术中具有更广泛的应用前景。

综上所述,神经导航系统辅助下经胼胝体 - 穹隆间入路切除丘脑胶质瘤能显著缩短手术时间,减少术中出血量及术后引流量,显著提高丘脑肿瘤全切除率,并降低术后并发症的发生率,临床应用价值较高。

参考文献(References)

- [1] Feng HE, Yan X, Neurosurgery DO, et al. Effect analysis of minimally invasive surgery on small and medium sized basal ganglia intracerebral hemorrhage [J]. Anhui Medical & Pharmaceutical Journal, 2017, 21(9): 520-524
- [2] Brokinkel B, Yavuz M, Warneke N, et al. Endoscopic management of a low-grade thalamic glioma: a safe alternative to open microsurgery? [J]. Acta Neurochirurgica, 2017, 159(7): 1-4
- [3] Mire E, Hocine M, Bazellières E, et al. Developmental Upregulation of Ephrin-B1 Silences Sema3C/Neuropilin-1 Signaling during Post-crossing Navigation of Corpus Callosum Axons[J]. Current Biology, 2018, 28(11): 1768-1782
- [4] Steinweg J, Arichi T. Bridging the gap between early corpus callosal growth and neurodevelopmental outcome in infants born very preterm [J]. Dev Med Child Neurol, 2017, 59(4): 351-352
- [5] Noh TS, Rah YC, Kyong JS, et al. Comparison of treatment outcomes between 10 and 20 EEG electrode location system-guided and neuronavigation-guided repetitive transcranial magnetic stimulation in chronic tinnitus patients and target localization in the Asian brain[J]. Acta Otolaryngol, 2017, 137(9): 945-951
- [6] Li Y, Xu J, Wang Y, et al. Clinical efficacy analysis of neuronavigation-guided endonasal microsurgery for sellar region tumors via transsphenoidal approach [J]. Chinese Journal of Minimally Invasive Neurosurgery, 2017, 22(10): 448-450
- [7] Wu SY, Aurup C, Sanchez CS, et al. Efficient Blood-Brain Barrier Opening in Primates with Neuronavigation-Guided Ultra sound and Real-Time Acoustic Mapping [J]. Scientific Reports, 2018, 8(1-2): 47-54
- [8] Shimokawa N, Takami T. Surgical safety of cervical pedicle screw placement with computer navigation system [J]. Neurosurgical Re-

- view, 2017, 40(2): 251-258
- [9] Hussain A, Wan M, Deangelis D. Progressive optic nerve glioma: orbital biopsy technique using a surgical navigation system [J]. Can J Ophthalmol, 2018, 53(1): e18-e22
- [10] Waqas M, Enam SA, Hashmi FA, et al. Video Microscope Robotic Arm-Assisted, Neuronavigation-guided Glioma Resection and Regional Sampling[J]. Cureus, 2017, 9(10): e1738-e1742
- [11] Koning IV, Roelants JA, Ial G, et al. New Ultrasound Measurements to Bridge the Gap between Prenatal and Neonatal Brain Growth Assessment[J]. AJNR Am J Neuroradiol, 2017, 38(9): 1807-1813
- [12] Dogan I, Ucer M, Başkaya MK. Gross Total Resection of Chordoid Glioma of the Third Ventricle via Anterior Interhemispheric Transcallosal Transforaminal Approach at Two Stages[J]. J Neurol Surg B Skull Base, 2018, 79(S 03): S281-S282
- [13] Taschner CA, Süß P, Hohenhaus M, et al. Freiburg Neuropathology Case Conference: Tumor Located in the Anterior Portion of the Third Ventricle[J]. Clinical Neuroradiology, 2018, 28(1): 139-143
- [14] Goulay R, Flament J, Gauberti M, et al. Subarachnoid Hemorrhage Severely Impairs Brain Parenchymal Cerebrospinal Fluid Circulation in Nonhuman Primate[J]. Stroke, 2017, 48(8): 2301-2305
- [15] Fournier AP, Gauberti M, Quenault A, et al. Reduced spinal cord parenchymal cerebrospinal fluid circulation in experimental autoimmune encephalomyelitis[J]. J Cereb Blood Flow Metab, 2018, 27(16): 1-8
- [16] Brokinkel B, Yavuz M, Warneke N, et al. Endoscopic management of a low-grade thalamic glioma: a safe alternative to open microsurgery? [J]. Acta Neurochirurgica, 2017, 159(7): 1-4
- [17] Saito R, Kumabe T, Kanamori M, et al. Distant recurrences limit the survival of patients with thalamic high-grade gliomas after successful resection[J]. Neurosurgical Review, 2017, 40(3): 1-9
- [18] Krishnan V, Lim TC, Ho FC, et al. Clinics in diagnostic imaging (175). Corpus callosum glioblastoma multiforme (GBM): butterfly glioma[J]. Singapore Med J, 2017, 58(3):121-125
- [19] Lampinen B, Szczepankiewicz F, Mårtensson J, et al. Neurite density imaging versus imaging of microscopic anisotropy in diffusion MRI: A model comparison using spherical tensor encoding[J]. Neuroimage, 2017, 147(15): 517-531
- [20] Longardner K, Malicki D, Crawford J. A Neurological Disorder of the Thalamus Mimicking Low-Grade Glioma[J]. Pediatric Neurology, 2018, 84(4): 55-55
- [21] Fukami S, Nakajima N, Okada H, et al. Pathological findings and clinical course of midline paraventricular gliomas diagnosed using a neuroendoscope[J]. World Neurosurgery, 2018, 114(2): e366-e377
- [22] Upadhyaya SA, Ghazwani Y, Wu S, et al. Mortality in children with low-grade glioma or glioneuronal tumors: A single-institution study [J]. Pediatric Blood & Cancer, 2017, 65(1): e26717-e26727
- [23] Han R, Zhang F, Gao X. A fast fiducial marker tracking model for fully automatic alignment in electron tomography[J]. Bioinformatics, 2017, 34(5): 853-863
- [24] Hutchinson L, Schwartz JB, Morton AM, et al. Operator bias errors are reduced using standing marker alignment device for repeated visit studies [J]. Journal of Biomechanical Engineering, 2017, 140 (4): 1115-1117
- [25] Abouelkaram S, Ratel J, Kondjoyan N, et al. Marker discovery in volatolomics based on systematic alignment of GC-MS signals: Application to food authentication [J]. Analytica Chimica Acta, 2017, 991(23): 58-67
- [26] Robba C, Bacigaluppi S, Cardim D, et al. Intraoperative non invasive intracranial pressure monitoring during pneumoperitoneum [J]. Journal of Clinical Monitoring & Computing, 2017, 30(5): 1-12
- [27] Lampinen B, Szczepankiewicz F, Mårtensson J, et al. Neurite density imaging versus imaging of microscopic anisotropy in diffusion MRI: A model comparison using spherical tensor encoding[J]. Neuroimage, 2017, 147(15): 517-531
- [28] Waiblinger C, Whitmire CJ, Sederberg A, et al. Primary tactile thalamus spiking reflects cognitive signals [J]. J Neurosci, 2018, 38(21): 4870-4885
- [29] Allan M, Ourselin S, Hawkes DJ, et al. 3-D Pose Estimation of Articulated Instruments in Robotic Minimally Invasive Surgery [J]. IEEE Transactions on Medical Imaging, 2018, 37(5): 1204-1213
- [30] Zhang KC, Chen L. Emphasis on standardization of minimally invasive surgery for gastric cancer[J]. Zhonghua Wai Ke Za Zhi, 2018, 56 (4): 262-264

(上接第 3383 页)

- [26] Zhu T, Si Y, Fang Y, et al. Early outcomes of the conformable stent graft for acute complicated and uncomplicated type B aortic dissection[J]. Journal of Vascular Surgery, 2017, 66(6): 1644
- [27] Robleda G, Roche-Campo F, Sendra MÀ, et al. Fentanyl as pre-emptive treatment of pain associated with turning mechanically ventilated patients: a randomized controlled feasibility study [J]. Intensive Care Medicine, 2016, 42(2): 183-191
- [28] Chakravarthy M. Modifying Risks to Improve Outcome in Cardiac Surgery: An Anesthesiologist's Perspective [J]. Annals of Cardiac Anaesthesia, 2017, 20(2): 226-233
- [29] Zhu C, Huang B, Zhao J, et al. Influence of distal entry tears in acute type B aortic dissection after thoracic endovascular aortic repair[J]. Journal of Vascular Surgery, 2017, 66(2): 375
- [30] Yang B, Fung A, Pac-Soo C, et al. Vascular surgery-related organ injury and protective strategies: update and future prospects [J]. British Journal of Anaesthesia, 2016, 117(2): ii32