

脑膜瘤切除术围手术期输血的危险因素分析

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[摘要] **目的** 分析脑膜瘤切除术围手术期输血的危险因素。**方法** 回顾性分析2016年2月至2020年4月在凉山彝族自治州第一人民医院行脑膜瘤切除术的262例患者,收集脑膜瘤切除术围手术期输血的可能危险因素。根据有无输血将患者分为两组,比较两组患者各因素的差异,并以多因素logistic回归分析各因素对脑膜瘤切除术中输血的影响。**结果** 本研究纳入的262例患者中161例(61.45%)患者接受输血,输血量为1~10 U,平均 4.08 ± 1.21 U。单因素分析基础上多因素分析,脑膜瘤切除术患者年龄>60岁[比值比(odds ratio, OR) 1.526, 95%可信区间(confidence interval, CI) 1.214~1.928]、肿瘤位于颅底(OR 1.759, 95%CI 1.311~2.428)、肿瘤直径>3 cm(OR 1.642, 95%CI 1.371~2.162)、累及重要血管(OR 1.553, 95%CI 1.131~1.920)、手术耗时>4 h(OR 1.794, 95%CI 1.238~2.562)、术前血红蛋白低于正常值(OR 1.930, 95%CI 1.527~2.793)及术前未行肿瘤栓塞术(OR 1.841, 95%CI 1.494~2.605)为输血的危险因素($P < 0.05$)。**结论** 脑膜瘤切除术围手术期输血率较高,主要受患者年龄、肿瘤位置、肿瘤直径、累及重要血管情况、手术时间、术前血红蛋白水平及术前肿瘤栓塞术情况等影响。

[关键词] 脑膜瘤切除术; 异体输血; 危险因素; 回顾性分析

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Analysis of Risk Factors of Blood Transfusion During Meningioma Resection

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Abstract: Objective To analyze the risk factors of allogeneic blood transfusion during meningioma resection. **Methods** 262 patients with meningiomas in the First People's Hospital of Liangshan Yi Autonomous Prefecture between February 2016 and April 2020 were retrospectively analyzed. The possible risk factors of perioperative blood transfusion were collected. The patients were divided into two groups according to the presence or absence of blood transfusion. The differences of various factors between the two groups were compared, and the influence of each factor on blood transfusion during meningioma resection was analyzed by multivariate logistic regression. **Results** Among the 262 patients included in this study, 161 (61.45%) received blood transfusion with a blood transfusion volume ranging from 1 to 10 U, (average 4.08 ± 1.21 U). Based on univariate analysis, multivariate analysis showed that patients with meningiomas were older than 60 years old [odds ratio (OR) 1.526, 95% confidence interval (CI) 1.214~1.928], tumors located in skull base (OR 1.759, 95%CI 1.311~2.428), tumor diameter >3 cm (OR 1.642, 95%CI 1.371~2.162), involvement of important vessels (OR 1.553, 95%CI 1.131~1.920), operation time >4 h (OR 1.794, 95%CI 1.238~2.562), preoperative hemoglobin lower than normal (OR 1.930, 95%CI 1.527~2.793) and no preoperative tumor embolization (OR 1.841, 95%CI 1.494~2.605) were risk factors for blood transfusion ($P < 0.05$). **Conclusions** The blood transfusion rate during meningioma resection was relatively high, which was mainly affected by the patient's age, tumor location, tumor diameter, important blood vessel involvement, operation time, preoperative hemoglobin level, and preoperative tumor embolization.

Key words: meningioma resection; allogeneic blood transfusion; risk factors; retrospective analysis

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脑膜瘤为临床常见的颅内良性肿瘤,起源于脑膜及脑膜间隙的衍生物,调查数据显示脑膜瘤发病率约占颅内肿瘤的19.2%,仅次于胶质瘤^[1-2]。该病的治疗仍以手术切除为首选方案,但有研究显示脑膜瘤血供丰富且肿瘤组织周边有众多重要的神经血管,脑膜瘤切除术中出血量可高达400~1 800 mL,大量失血可致患者出现急性贫血,若得不到及时有效的治疗可能引起脑部微循环障碍而影响脑组织的氧供,导致继发性脑损伤而加重病情,虽然近年来血液保护技术应用使脑膜瘤切除术患者输血率有所下降,但实践中发现仍有不少患者需进行输血治疗,因而降低脑膜瘤切除术中输血率的相关工作仍有较大的改进空间^[3-4]。输血可引起发热、过敏、溶血、移植物抗宿主等多种副作用^[5],因此本研究旨在通过分析脑膜瘤切除术中输血的危险因素以指导临床改进血液保护措施,降低此类患者术中输血率以减少各类输血并发症发生的风险。

1 资料与方法

1.1 一般资料

回顾性分析2016年2月至2020年4月在凉山彝族自治州第一人民医院行脑膜瘤切除术的262例患者。其中男性93例,女性169例;年龄19~78岁,平均 53.18 ± 12.06 岁;体质量指数(body mass index, BMI)指数17.82~32.05 kg/m²,平均 26.03 ± 7.28 kg/m²;美国麻醉医师协会(American Society of Anesthesiologists, ASA)分级I~Ⅲ级;术前高血压72例,糖尿病53例;病理分型:WHO I级214例,Ⅱ级35例,Ⅲ级13例;肿瘤直径2.13~9.45 cm,平均 4.15 ± 1.33 cm;161例(61.45%)患者接受输血治疗,术中输血104例,术后输血57例,输血量1~10 U,平均 4.08 ± 1.21 U。

1.2 纳入与排除标准

纳入标准:(1)行脑膜瘤切除术并经术后病理学检查确诊;(2)影像学资料及临床病历资料完整;(3)术前无凝血功能异常。

排除标准:(1)免疫系统疾病患者;(2)感染性疾病患者;(3)有输血史的患者;(4)心、肝、肾等重要脏器功能障碍者;(5)术前已行输血治疗者;(6)慢性贫血的患者。

1.3 方法

1.3.1 资料收集 收集患者性别、年龄、BMI指数、ASA分级、术前并发症、肿瘤位置、肿瘤数量、

病理分型、肿瘤直径、肿瘤边界情况、累及重要血管、侵袭性、肿瘤边缘组织水肿情况、手术耗时、颅内手术史、术前血红蛋白水平、术前血小板计数、凝血酶原时间、国际标准化比值、活化部分凝血活酶时间、术中失血量、术前行肿瘤栓塞术情况等可能对围术期输血率造成影响的因素。其中肿瘤累及重要血管指累及颈内动脉或椎基底动脉系统。

1.3.2 手术方法 患者均由同一组具10年以上临床经验的神经外科医师进行手术,入手术室后常规开放静脉通路,监测血氧饱和度、心率、中心静脉压等指标。在静脉麻醉诱导后行气管插管并连接呼吸机,以静脉-吸入复合麻醉维持,术中均行限制性输血策略,参照中华人民共和国卫生行业标准WS/T 623-2018《全血和成分血使用》^[6]决定是否进行输血:血红蛋白水平 ≥ 80 g/L者不输血;血红蛋白水平70~80 g/L者无症状不输血,出现贫血表现排除体位性低血压、过度疼痛、焦虑等因素外可输血;血红蛋白水平 < 70 g/L输血治疗。根据有无输血将患者分为两组,并比较两组患者上述各指标。

1.4 统计学方法

采用SPSS 22.0统计学软件进行数据分析,单因素分析中计数资料行 χ^2 检验,计量资料行t检验,将单因素分析中具显著性差异的因素以似然比法筛选变量后行多因素分析采用二元logistic回归分析,均以 $P < 0.05$ 认为差异具有统计学意义。

2 结果

2.1 脑膜瘤切除术中输血的单因素分析

单因素分析结果显示脑膜瘤切除术输血组与未输血组在性别、年龄、术前并发高血压、糖尿病、肿瘤位置、肿瘤直径、累及重要血管、肿瘤边缘组织水肿情况、手术耗时、术前血红蛋白及术前行肿瘤栓塞术等情况差异均具有统计学意义($P < 0.05$),见表1。

2.2 脑膜瘤切除术中输血的多因素分析

将单因素分析中具显著性差异的因素以似然比前进行法筛选变量,行多因素非条件logistic回归分析,结果显示:脑膜瘤切除术患者年龄 > 60 岁、肿瘤位于颅底、肿瘤直径 > 3 cm、累及重要血管、手术耗时 > 4 h、术前血红蛋白低于正常值(男性120 g/L,女性110 g/L为界值)及术前未行肿瘤栓塞术为输血的危险因素($P < 0.05$),见表2。

表1 脑膜瘤切除术中输血的单因素分析

Tab.1 Single factor analysis of blood transfusion during meningioma resection

Factors	Blood transfusion group (n=161)	Non transfusion group (n=101)	t/χ^2	<i>P</i>
Gender				
Male(n=93)	67	26	6.829	0.009
Female(n=169)	94	75		
Age	58.19±7.02	52.11±6.83	6.894	0.000
BMI(kg/m ²)	25.19±7.04	26.11±7.35	-1.012	0.312
ASA grade				
Grade I (n=109)	69	40	0.271	0.873
Grade II (n=98)	59	39		
Grade III (n=55)	33	22		
Preoperative complications				
Hypertension(n=72)	55	17	9.353	0.002
Diabetes(n=53)	39	14	4.130	0.042
Tumor location				
Convex(n=70)	42	28	19.944	0.000
Skull base(n=82)	61	11		
Sickle-tenure-sinus type(n=110)	58	52		
Number of tumor				
Single(n=203)	133	80	1.250	0.263
Multiple(n=59)	28	11		
Pathological type				
WHO grade I (n=214)	133	81	0.318	0.853
Grade II (n=35)	20	15		
Grade III (n=13)	8	5		
Tumor diameter(cm)	5.09±1.38	4.10±0.87	6.448	0.000
Tumor border				
Clear(n=182)	105	77	3.554	0.059
Unclear(n=80)	56	24		
Involve important blood vessels				
No(n=115)	82	33	8.402	0.004
Yes(n=147)	79	68		
Edema of tumor marginal tissue				
No(n=138)	79	59	5.834	0.016
Yes(n=124)	82	32		
Tumor aggressiveness				
No(n=192)	113	79	2.045	0.153
Yes(n=70)	48	22		
Operation time(h)	4.83±1.02	4.31±0.94	4.138	0.000
History of intracranial surgery				
No(n=220)	140	80	2.768	0.096
Yes(n=42)	21	21		
Preoperative platelet count(×10 ⁹ /L)	233.18±71.74	235.27±70.65	-0.231	0.818
Preoperative prothrombin time(s)	13.29±2.81	12.89±2.74	1.132	0.259
Preoperative international normalized ratio	1.02±0.24	1.04±0.26	-0.636	0.526
Preoperative activated partial thromboplastin time(s)	26.27±5.11	27.10±4.85	-1.305	0.193
Preoperative hemoglobin(g/L)	112.85±26.14	126.09±29.13	-3.817	0.000
Tumor embolization before surgery				
No(n=120)	93	27	24.076	0.000
Yes(n=142)	68	74		

表2 脑膜瘤切除术中输血的多因素分析
Tab.2 Multivariate analysis of blood transfusion during meningioma resection

Factors	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>P</i>	OR	95%CI
Female (take male as reference)	-1.258	0.040	1.051	0.620	0.819	0.706~1.037
Age> 60 years old (take ≤ 60 years old as reference)	1.537	0.169	3.908	0.018	1.526	1.214~1.928
Preoperative hypertension (take no hypertension as reference)	1.128	0.112	1.791	0.381	1.107	0.895~1.273
Diabetes (take no diabetes as reference)	1.162	0.129	1.811	0.356	1.128	0.782~1.305
The tumor was located at the base of the skull (take convex surface as reference)	1.706	0.197	10.682	0.000	1.759	1.311~2.428
The tumor was located in the sickle-tentorial-sinus type (take convex surface as reference)	1.143	0.123	1.964	0.233	1.131	0.579~1.377
Tumor diameter >3 cm (take ≤3 cm as reference)	1.683	0.184	8.911	0.000	1.642	1.371~2.162
Involve important blood vessels (take no involved in important blood vessels as reference)	1.558	0.171	5.739	0.001	1.553	1.131~1.920
Edema of tumor marginal tissues (take no edema as reference)	1.208	0.132	2.911	0.071	1.189	0.816~1.355
Operation time >4 h (take ≤4 h as reference)	1.767	0.202	4.376	0.010	1.794	1.238~2.562
Preoperative hemoglobin is lower than normal (take higher than normal as reference)	1.833	0.261	6.793	0.000	1.930	1.527~2.793
No tumor embolization was performed before surgery (take embolization as a reference)	1.802	0.242	7.409	0.000	1.841	1.494~2.605

3 讨论

3.1 脑膜瘤切除术输血危险因素分析的意义

脑膜瘤为临床常见的颅内肿瘤,可发生于颅内任何部位,手术治疗为首选方案^[7]。本研究结果脑膜瘤患者异体输血率较高且主要以术中输血为主,虽然近年来血液保护技术的应用使异体输血率有所下降,但因脑膜瘤血供丰富,术中出血量大可造成血容量下降而影响各脏器血供,术中输血可迅速补充血容量维持血供,但当前血液资源紧缺,避免盲目性的输血具有重要的意义^[8-9]。本研究旨在分析脑膜瘤切除术中输血的危险因素而为临床上此类患者的血液保护措施的制订提供参考。

3.2 年龄对脑膜瘤切除术输血的影响

年龄>60岁为脑膜瘤切除术中输血的危险因素,可能与随着年龄的增加患者的身体机能逐渐下降,机体的代谢能力、骨髓造血功能及体内储存红细胞能力均相应下降相关,大量失血需通过外源性补充红细胞而维持身体机能^[10];另外年龄较大的患者心血管系统的代偿能力下降,术中失血后对周围毛细血管张力调节能力不足,导致组织间隙的体液无法进入血管以及及时补充循环血量而增加隐性失血量进一步升高输血率;再者年龄较

大者对术后贫血的耐受力更差,容易出现各种与出血相关的并发症,异体输血可有效降低此类并发症的发生率,因而临床上老年患者多考虑进行异体输血治疗^[11]。

3.3 肿瘤部位、大小对脑膜瘤切除术输血的影响

肿瘤位于颅底者输异体血率更高,可能与颅底肿瘤手术部位较深,肿瘤容易累及鼻窦及血管,因而术中出血量较大。再者颅底脑膜瘤可诱导激活组织型纤溶酶原激活物而引起纤维溶解而加重出血^[12]。有研究证实脑膜瘤直径与术中出血量呈正相关关系,本研究结果显示:肿瘤直径>3 cm为脑膜瘤切除术的危险因素,与上述观点一致^[13]。可能随着脑膜瘤直径的增加,其血供也更为丰富,瘤体周围可能存在部分动静脉短路而增加手术出血的风险。另外随着肿瘤直径增加,切除时创面面积也相应增大,导致术中渗血增加而增加输血风险。因脑膜瘤的血供主要由脑膜动脉所提供,大部分的脑膜瘤均需临近的软脑膜及血管进行供血,因而在瘤体周围容易出现血管神经环绕。对于累及重要血管的患者在术中需对瘤体周围血管进行保护而实施静脉窦皮层静脉引流术进行治疗,引流使脑膜瘤腔与外界相通而降低了腔内的压力,但持续的引流还可使显性失血增加,同时也不利于软组织创面的愈合。

3.4 手术时间及术前治疗对脑膜瘤切除术输血的影响

手术时间延长,意味着手术的难度增加,术中需对脑膜瘤周围组织的解离也更多,更容易出现大出血而需要进行输血治疗。术前行肿瘤栓塞术可减少脑膜瘤术中输血率已被研究所证实^[14],术前行肿瘤栓塞术患者输血率更低可能与血管栓塞术可有效减少脑膜瘤血供而减少术中出血,另外有研究者指出术前栓塞去血管化达到90%以上时减少脑膜瘤术中出血的效果更明显^[15]。

3.5 血红蛋白水平对脑膜瘤切除术输血的影响

血红蛋白水平可一定程度反映机体的携氧能力,如血红蛋白水平严重下降或循环功能不良时可致机体出现缺氧而增加细胞的无氧酵解,对机体造成损伤。本研究结果显示术前血红蛋白低于正常值为患者输血的危险因素,因此笔者建议对于术前血红蛋白水平较低者可通过术前给予重组促红细胞生成素、维生素B12、叶酸等药物以提高体内血红蛋白水平而降低患者输异体血率。

综上所述,脑膜瘤切除术围术期输血率较高,主要受患者年龄、肿瘤位置、肿瘤直径、累及重要血管情况、手术时间、术前血红蛋白水平及术前肿瘤栓塞术情况的影响。因本研究为单中心研究,样本量较少,加上患者多观察至术后第5天即出院,对于出院后输血情况未进行随访,可能导致本研究结果出现一定的偏倚,下一步将进行多中心增加样本量的前瞻性研究以进一步证实本研究结果。

利益冲突:所有作者均声明不存在利益冲突。

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