·听神经瘤·

听神经瘤个体化评估及乙状窦后入路手术内听道处理策略

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【摘要】 **目的** 探讨听神经瘤乙状窦后入路手术前个体化评估以及术中内听道处理策略。**方法** 纳入2018年1月至2022年1月在重庆医科大学附属第一医院行乙状窦后入路手术的149例听神经瘤患者，术中常规磨开内听道后壁处理内听道内肿瘤95例（磨开内听道组）和掏刮法处理内听道内肿瘤54例（掏刮组），记录肿瘤切除率和术后并发症发生率，术后6个月采用House-Brackmann（H-B）分级评价面神经功能。**结果** 磨开内听道组肿瘤全切除37例（38.95%）、近全切除30例（31.58%）、次全切除和大部切除28例（29.47%），术后6个月H-B分级Ⅰ～Ⅱ级47例（49.47%）、Ⅲ级22例（23.16%）、Ⅳ～Ⅴ级23例（24.21%），并发症发生率占比脑脊液漏5例（5.26%）、颅内感染9例（9.47%）、肺部感染13例（13.68%）、下肢肌间静脉血栓6例（6.32%）；掏刮组肿瘤全切除12例（22.22%）、近全切除22例（40.74% ）、次全切除和大部切除20例（37.04%），术后6个月H-B分级Ⅰ～Ⅱ级者21例（38.89%）、Ⅲ级16例（29.63%）、Ⅳ～Ⅵ级17例（31.48%），无一例发生脑脊液漏、颅内感染4例（7.41%）、肺部感染7例（12.96%）、下肢肌间静脉血栓3例（5.56%）；两组肿瘤切除率（$\chi^2=0.902$，$P=0.342$）、术后6个月面神经功能（$\chi^2=0.282$，$P=0.594$），以及颅内感染（$\chi^2=0.185$，$P=0.667$）、肺部感染（$\chi^2=0.015$，$P=0.901$）和下肢肌间静脉血栓（$\chi^2=0.035$，$P=0.851$）等并发症发生率差异均无统计学意义。**结论** 常规磨开内听道后壁是处理内听道内肿瘤的首选方式，掏刮法可以作为经过严格术前评估后的补充选择。

【关键词】 神经瘤，听； 小脑脑桥角； 内耳； 显微外科手术

Individualized evaluation of vestibular schwannoma and strategy of interal auditory canal management via retrosigmoid approach

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【**Abstract**】 **Objective** To investigate the strategy of internal auditory canal (IAC) management in retrosigmoid approach for vestibular schwannoma after accurate implementation of preoperative individualized assessment. **Methods** The clinical data of 149 patients with vestibular schwannoma who underwent resection via retrosigmoid approach at The First Affiliated Hospital of Chongqing Medical University were retrospectively analyzed from January 2018 to January 2022. The tumors in IAC were conventionally treated by drilling open the posterior wall of the IAC in 95 patients (the drilling open IAC group), and treated by scraping method in 54 patients (the scraping group). Tumor resection rate and postoperative complication rate were recorded, and facial nerve function was evaluated by House-Brackmann (H-B) grade at 6 months after surgery. **Results** In the patients who were treated with drilling open the posterior wall of the IAC, gross total resection (GTR) was performed in 37 cases (38.95%), near total resection (NTR) in 30 cases (31.58%), subtotal resection (STR) and majority resection in 28 cases (29.47%). Forty-seven cases (49.47%) of H-B grade Ⅰ－Ⅱ, 22 cases (23.16%) of Ⅲ and 23 cases (24.21%) of Ⅳ－Ⅵ were classified at 6 months after surgery. Incidence of complications: cerebrospinal fluid (CBF) leakage in 5 cases (5.26%), intracranial infection in 9 cases (9.47%), pulmonary infection in 13 cases (13.68%), and intermuscular venous thrombosis in 6 cases (6.32%). In patients who were treated with scraping method,

doi：10.3969/j.issn.1672-6731.2022.12.006
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GTR was performed in 12 cases (22.22%), NTR in 22 cases (40.74%), while STR and majority resection in 20 cases (37.04%). Twenty-one cases (38.89%) of H-B grade Ⅰ-Ⅱ, 16 cases (29.63%) of Ⅲ and 17 cases (31.48%) of Ⅳ-Ⅵ were classified at 6 months after the surgery. Incidence of complications: CSF leakage in 0 cases, intracranial infection in 4 cases (7.41%), pulmonary infection in 7 cases (12.96%), and intermuscular venous thrombosis in 3 cases (5.56%). Tumor resection rate (χ^2 = 0.902, P = 0.342), facial nerve function at 6 months after surgery (χ^2 = 0.282, P = 0.594), intracranial infection (χ^2 = 0.185, P = 0.667), pulmonary infection (χ^2 = 0.015, P = 0.901) and lower limb intermuscular venous thrombosis (χ^2 = 0.035, P = 0.851) were not statistically significant in 2 groups. **Conclusions** Conventionally drilling open the posterior wall of the IAC is the preferred method to deal with the IAC, and scraping can be used as a selective supplement after strict preoperative evaluation.

【Key words】 Neuroma, acoustic; Cerebellopontine angle; Ear, inner; Microsurgery

Conflicts of interest: none declared

听神经瘤亦称前庭神经鞘瘤，约占脑桥小脑角（CPA）肿瘤的80%、颅内肿瘤的6%～9%[1]。对于肿瘤体积较大（最大径＞3 cm）、生长迅速、侵犯脑桥小脑角、患侧无实用听力、年轻、有手术意愿的患者，通常采取显微手术切除[2-4]。手术入路主要包括乙状窦后入路、迷路入路和中颅窝入路，其中，迷路入路可直视内听道全程，故可以早期切开内听道硬膜，行内听道内减压，便于切除内听道内肿瘤，但该入路需磨除迷路，无法保留听力[5]；中颅窝入路仅适用于局限于内听道的小型听神经瘤[3]；乙状窦后入路是显微手术切除听神经瘤的首选，在充分显露肿瘤与脑干粘连面的同时可有效保留听力，但存在直视内听道困难的弊端[6]。研究显示，仅约2.7%的听神经瘤不侵入内听道[7]，故磨开内听道后壁充分显露内听道内肿瘤并全切除是听神经瘤乙状窦后入路手术处理内听道的首选方法[8-9]。然而，对于肿瘤侵入内听道长度＜0.50 cm、内听道呈“喇叭口”样扩大、年龄＞65岁、术前有严重基础疾病无法耐受长时间手术的患者，掏刮法处理内听道内肿瘤是常规磨开内听道后壁的有效补充[10-11]。重庆医科大学附属第一医院近4年分别采用磨开内听道后壁或掏刮法处理内听道内肿瘤，对比分析两种处理方式对肿瘤切除率、术后并发症发生率和术后6个月面神经功能的差异，初步探讨掏刮法作为磨开内听道后壁法补充选择的可能性。

对象与方法

一、研究对象

1. 纳入与排除标准 （1）脑桥小脑角区占位性病变。（2）单侧病变。（3）均行乙状窦后入路手术。（4）术后参照2021年世界卫生组织（WHO）中枢神经系统肿瘤分类（第五版）神经鞘瘤诊断标准[12]，经病理证实为神经鞘瘤。（5）年龄16～80岁。（6）凡存在以下情况者不作为本研究观察范畴：肿瘤最大径＜2 cm，肿瘤未侵入内听道，肿瘤多发，行迷路入路或中颅窝入路手术，以及肿瘤复发患者。（7）患者及其家属均对手术方案知情并签署知情同意书。

2. 一般资料 选择2018年1月至2022年1月在我院神经外科行乙状窦后入路手术的听神经瘤患者共149例，分别予以常规磨开内听道后壁切除听道内肿瘤（磨开内听道组）或掏刮法处理内听道内肿瘤（掏刮组）。（1）磨开内听道组：共95例患者，男性55例，女性40例；年龄22～69岁，平均（49.51±9.72）岁。肿瘤最大径2.50～5.50 cm，平均（3.24±1.05）cm；肿瘤侵入内听道长度0.50～1.10 cm，平均（0.76±0.22）cm；无一例发生瘤卒中、合并高位颈静脉球或岩骨过度气化。术前面神经功能House-Brackmann（H-B）分级均为Ⅰ级。既往有高血压3级（极高危）者3例（3.16%）、血糖控制欠佳1例（1.05%）。（2）掏刮组：共54例患者，男性26例，女性28例；年龄16～72岁，平均（50.37±12.98）岁。肿瘤最大径2.10～4.10 cm，平均（2.94±1.03）cm；肿瘤侵入内听道长度0.10～0.70 cm，平均（0.41±0.24）cm；4例（4.21%）发生瘤卒中、8例（8.42%）合并高位颈静脉球、5例（5.26%）合并岩骨过度气化。术前H-B分级均为Ⅰ级。既往有高血压3级（极高危）者13例（13.68%）、血糖控制欠佳3例（3.16%）。对两组患者一般资料比较，掏刮组肿瘤侵入内听道长度大于磨开内听道组（P = 0.000），发生瘤卒中（P = 0.007）、合并高位颈静脉球（P = 0.000）和岩骨过度气化（P = 0.003）比例高于磨开内听道组，其余各项指标组间差异无统计学意义（均P＞0.05，表1）。

表1 磨开内听道组与掏刮组患者一般资料的比较
Table 1. Comparison of general data between the drilling open IAC group and the scraping group

观察指标	磨开内听道组（n=95）	掏刮组（n=54）	χ^2或t值	P值
性别[例(%)]			1.318	0.251
男性	55(57.59)	26(48.15)		
女性	40(42.11)	28(51.85)		
年龄($\bar{x}\pm s$,岁)	49.51±9.72	50.37±12.98	0.424	0.672
肿瘤最大径($\bar{x}\pm s$,cm)	3.24±1.05	2.94± 1.03	1.697	0.090
肿瘤侵入内听道长度($\bar{x}\pm s$,cm)	0.73±0.22	0.41± 0.21	8.787	0.000
瘤卒中[例(%)]	0(0.00)	4(7.41)	7.231	0.007
合并高位颈静脉球[例(%)]	0(0.00)	8(14.81)	14.873	0.000
合并岩骨过度气化[例(%)]	0(0.00)	5(9.26)	9.102	0.003
高血压3级[例(%)]	7(7.37)	9(16.67)	0.437	0.508
血糖控制欠佳[例(%)]	1(1.05)	3(5.56)	0.225	0.635

Two-independent-sample t test for comparison of age, maximum tumor diameter and length of tumor in IAC, and χ^2 test for comparison of others,年龄、肿瘤最大径和肿瘤侵入内听道长度的比较行两独立样本的t检验,其余指标的比较行χ^2检验

二、研究方法

1.术前影像学评估 所有患者术前均行岩骨薄层CT扫描,观察肿瘤对内听道侵袭程度、内听道口形状、骨迷路与内听道后壁距离,以及有无岩骨过度气化等;并行头颈部CTV检查,观察肿瘤血供及其与周围血管毗邻关系,以及有无高位颈静脉球等。除急诊手术患者,其余患者亦行内听道薄层MRI增强扫描,观察内听道内肿瘤大小、形态,以及有无瘤卒中。

2.乙状窦后入路手术 对于颅内压显著增高、特别是合并瘤卒中的患者,术前先行脑室外引流术。所有患者均行乙状窦后入路手术,患侧侧俯卧位,气管插管全身麻醉,Myfied头架(美国Integra LifeSciences公司)固定头部,安置电生理监测电极。于耳后作"S"形或"钩"形切口,铣下成形骨瓣,骨窗上界显露横窦下缘、外侧界显露乙状窦后缘、外上界显露横窦-乙状窦夹角(TSSJ);术中常规监测脑干听觉诱发电位(BAEP)和体感诱发电位(SEP),并在此基础上重点监测面神经自由肌电图(free-EMG)和触发肌电图(tigger-EMG),据面神经解剖位置和术中显微镜下所见结合双极神经刺激器刺激肿瘤包膜,综合判断面神经走行,先予0.30 mA的刺激强度,发现面神经后改为0.10 mA的刺激强度继续探查;排除肿瘤背侧面神经走行后,横切开肿瘤包膜,以超声吸引手术刀(CUSA)充分瘤内减压。处理内听道内肿瘤时,常规以高速微型磨钻磨开内听道后壁,充分显露肿瘤,先瘤内减压再分离切除内听道内肿瘤(磨开内听道组);对于肿瘤侵入内听道长度<0.50 cm、内听道呈"喇叭口"样扩大、发生瘤卒中、合并高位颈静脉球和岩骨过度气化,以及年龄>65岁、伴严重基础疾病无法耐受长时间手术的患者(掏刮组),则采用钝性锐性结合方式分离肿瘤与周围血管和面神经,切除脑桥小脑角池内肿瘤,顺面神经和前庭蜗神经走行方向、朝向内听道后壁,以刮匙掏刮内听道内肿瘤(图1~5),为尽可能全切除肿瘤,可同时辅以神经内镜技术。自内听道方向的切除与自脑干方向的切除会合后,对于粘连不十分紧密的肿瘤可完成全切除;对于脑干面或内听道口粘连紧密的肿瘤,为保留面神经和前庭蜗神经解剖结构和功能,需残留少许肿瘤包膜。

3.预后评价 (1)肿瘤切除率:根据术中显微镜下所见以及术后内听道薄层MRI增强扫描判断肿瘤切除程度,全切除指显微镜和(或)神经内镜下无肿瘤残留;近全切除指显微镜和(或)神经内镜下肿瘤残留体积<5%、影像学无肿瘤残留;次全切除和大部切除指显微镜和(或)神经内镜下肿瘤残留体积≥5%[2,8,13]。(2)面神经功能评价:术前和术后6个月采用H-B分级评价面神经功能,Ⅰ级为功能正常;Ⅱ级呈现轻度面瘫但可完全闭眼,轻微口角歪斜;Ⅲ级呈中度面瘫,用力可闭眼;Ⅳ级呈中重度面瘫,无法闭眼;Ⅴ级为重度面瘫和面部肌肉不对称,嘴角可见肌肉活动;Ⅵ级为完全性面瘫,无肌肉活动。Ⅰ~Ⅱ级为面神经功能良好,Ⅲ级为中度面瘫,Ⅳ~Ⅵ级为中重度至重度面瘫。(3)手术安全性评价:术后至出院期间记录术后并发症,包括脑脊液漏[鼻漏和(或)咽部液体][14]、颅内感染、肺部感染、下肢肌间静脉血栓等。

三、统计分析方法

采用SPSS 26.0统计软件进行数据处理与分析。计数资料以相对数构成比(%)或率(%)表示,行χ^2检验;呈正态分布的计量资料以均数±标准差($\bar{x}\pm s$)表示,采用两独立样本的t检验。以$P\leq0.05$为差异具有统计学意义。

结 果

本组共计144例(磨开内听道组92例、掏刮组

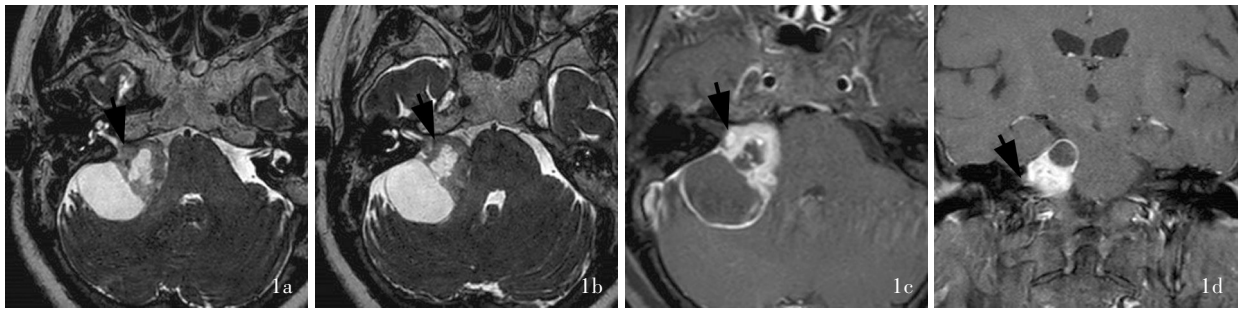

图1 女性患者，52岁。因头晕2年、右耳听力下降3个月入院。术前影像学检查提示右侧脑桥小脑角区占位性病变，考虑听神经瘤。术前面神经功能正常（H-B分级Ⅰ级），患侧无实用听力。2021年12月11日行右侧乙状窦后入路听神经瘤切除术，术中见病变位于右侧脑桥小脑角区，呈囊实性，血供丰富，瘤内减压分块切除，肿瘤与小脑、脑干、后组脑神经、面神经和三叉神经粘连，谨慎分离，以塑形显微刮匙掏刮内听道内肿瘤，手术全切除肿瘤。术后病理证实为神经鞘瘤。术后未发生脑脊液漏、颅内感染等并发症。术后6个月面神经功能正常（H-B分级Ⅰ级），复查内听道薄层MRI增强扫描无肿瘤复发。术前内听道MRI检查所见 1a，1b 术前横断面T_2WI显示右侧脑桥小脑角区占位性病变，肿瘤侵入内听道长度＜3 mm，内听道内充满脑脊液（箭头所示） 1c 术前横断面增强T_1WI显示右侧脑桥小脑角区病变呈囊实性强化（箭头所示），肿瘤侵入内听道长度＜3 mm 1d 术前冠状位增强T_1WI显示右侧脑桥小脑角区病变呈囊实性强化（箭头所示），肿瘤侵入内听道长度＜3 mm

Figure 1 A 52-year-old female patient was admitted to hospital due to dizziness for 2 years and hearing loss in right ear for 3 months. Preoperative imaging examination showed a space occupying lesion in the right CPA, which may be considered as vestibular schwannoma. The preoperative facial nerve function was classified as H-B grade Ⅰ, and the affected side had no effective hearing. So she underwent resection of right vestibular schwannoma on December 11, 2021. During the surgery, it was seen that the lesion was located in the right CPA, which was cystic and solid, with rich blood supply. The tumor was resected by decompression in blocks. The tumor adhered to the cerebellum, brain stem, posterior group of cranial nerves, facial nerves and trigeminal nerves, which was carefully separated. The tumor in the IAC was scraped with a plastic microcurette, and the tumor was completely removed. Postoperative pathology confirmed that the tumor was vestibular schwannoma. No CSF leakage, intracranial infection and other complications occurred. Six months after surgery, the facial nerve function was classified as H-B grade Ⅰ, and there was no tumor recurrence in thin enhanced MRI of the IAC. Preoperative axial T_2WI showed the right CPA space occupying lesion, and the length of the tumor invading the IAC was less than 3 mm. While the IAC was filled with CSF (arrows indicate; Panel 1a, 1b). Preoperative axial (Panel 1c) and coronal (Panel 1d) enhanced T_1WI showed cystic and solid enhancement of the lesion in the right CPA (arrows indicate), and the length of the tumor invading the IAC was less than 3 mm.

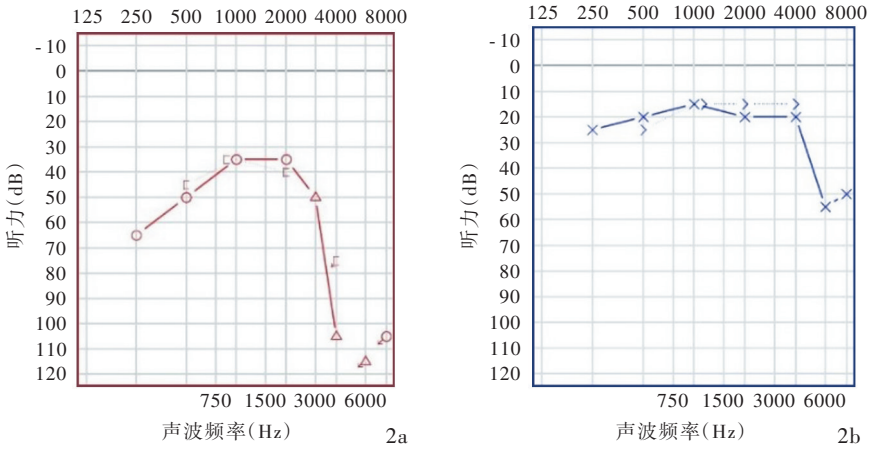

图2 术前纯音测听及言语识别率测定右侧言语识别率为零，提示无实用听力 2a 右侧 2b 左侧

Figure 2 Preoperative pure tone measurement and SDS showed the SDS of the right side was 0, indicating there was no effective hearing on the right side. Right side (Panel 2a). Left side (Panel 2b).

52例）患者术前T_2WI未见脑干和小脑水肿，术中亦未见肿瘤与脑干粘连紧密情况，均于显微镜下行包膜下分离，且分离肿瘤与脑干面过程中脑干听觉诱发电位和体感诱发电位均无明显波动，分别完成内听道内肿瘤切除以及脑干面粘连分离后，从两端向内听道口会合，以保护面神经；有5例（磨开内听道组3例、掏刮组2例）术中肿瘤与脑干粘连紧密，需残留少量肿瘤包膜。处理内听道内肿瘤时，两组共计84例因内听道口粘连紧密需残留少量肿瘤包膜，磨开内听道组48例、掏刮组36例。掏刮组有20例术中同时辅以神经内镜以尽可能全切除肿瘤。

肿瘤切除率比较，磨开内听道组患者肿瘤全切除37例（38.95%）、近全切除30例（31.58%）、次全切除和大部切除28例（29.47%），掏刮组分别为12例（22.22%）、22例（40.74%）和20例（37.04%），组间差异无统计学意义（$P=0.342$，表2），表明掏刮法处理内听道内肿瘤与常规磨开内听道后壁对肿瘤切除率无明显影响。

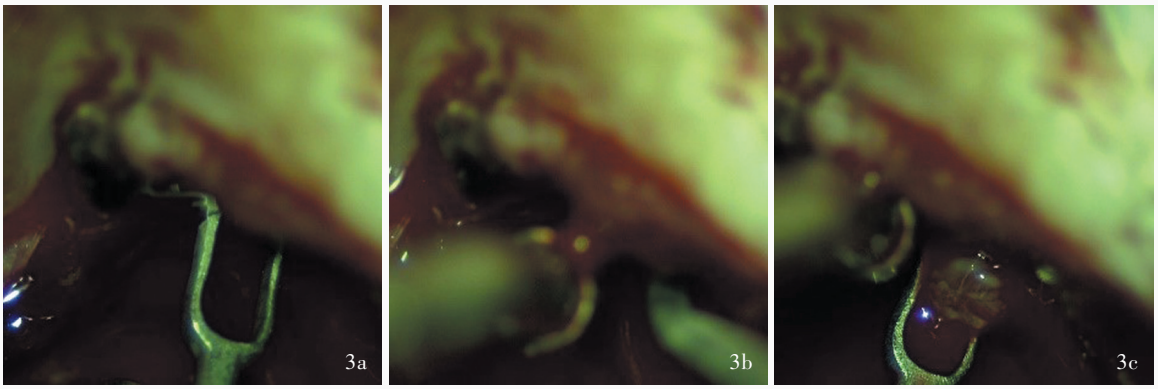

图3　术中所见　3a　于直视下切除脑桥小脑角肿瘤，再将椭圆形刮匙伸进内听道　3b　以椭圆形刮匙伸进内听道，向后方掏刮内听道内残留肿瘤　3c　掏刮并吸除内听道内残留肿瘤

Figure 3　Intraoperative findings　Resecting the tumor of CPA under direct vision and putting oval curettage into internal auditory canal (Panel 3a). Putting the oval curettage into the IAC to scrape the residual tumor (Panel 3b). Scraping and aspirate residual tumor in the IAC (Panel 3c).

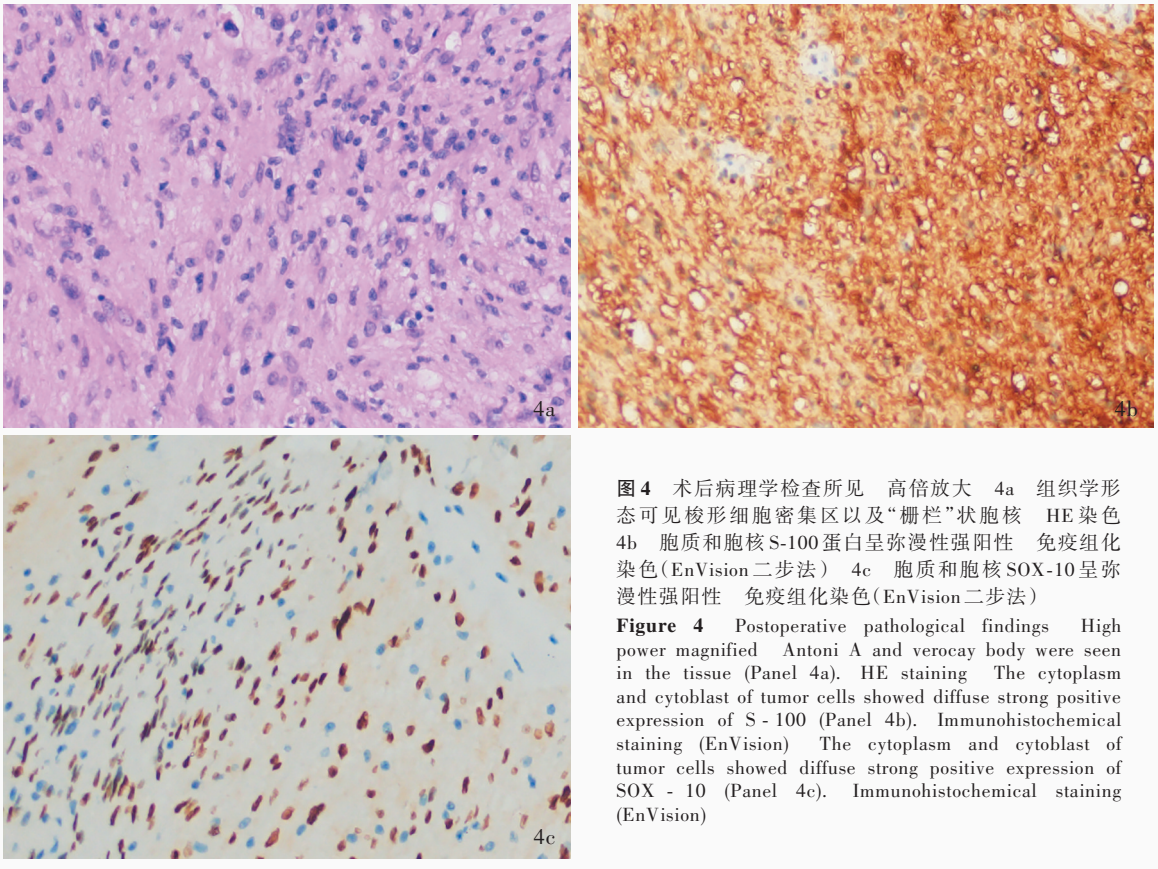

图4　术后病理学检查所见　高倍放大　4a　组织学形态可见梭形细胞密集区以及“栅栏”状胞核　HE染色　4b　胞质和胞核S-100蛋白呈弥漫性强阳性　免疫组化染色（EnVision二步法）　4c　胞质和胞核SOX-10呈弥漫性强阳性　免疫组化染色（EnVision二步法）

Figure 4　Postoperative pathological findings　High power magnified　Antoni A and verocay body were seen in the tissue (Panel 4a). HE staining　The cytoplasm and cytoblast of tumor cells showed diffuse strong positive expression of S-100 (Panel 4b). Immunohistochemical staining (EnVision)　The cytoplasm and cytoblast of tumor cells showed diffuse strong positive expression of SOX-10 (Panel 4c). Immunohistochemical staining (EnVision)

术后6个月面神经功能比较，磨开内听道组患者H-B分级Ⅰ～Ⅱ级47例（49.47%）、Ⅲ级22例（23.16%）、Ⅳ～Ⅵ级23例（24.21%），掏刮组H-B分级Ⅰ～Ⅱ级者21例（38.89%）、Ⅲ级16例（29.63%）、Ⅳ～Ⅵ级17例（31.48%），组间差异无统计学意义（$P=0.594$，表3），表明掏刮法处理内听道内肿瘤与常规磨开内听道后壁对术后面神经功能的影响无显著差异。

术后并发症包括脑脊液漏[磨开内听道组5例（5.26%）]、颅内感染[磨开内听道组9例（9.47%）、掏刮组4例（7.41%）]、肺感染[磨开内听道组13例（13.68%）、掏刮组7例（12.96%）]和下肢肌间静脉血栓[磨开内听道组6例（6.32%）、掏刮组3例（5.56%）]；两组颅内感染（$\chi^2=0.185$，$P=0.667$）、肺

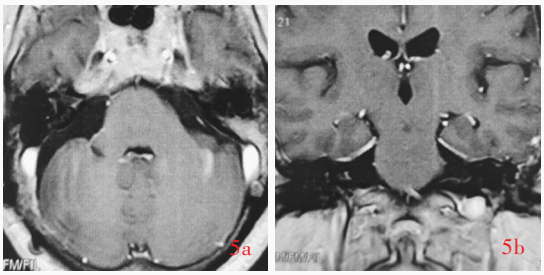

图5 术后6个月复查MRI未见肿瘤复发 5a 横断面增强T_1WI 5b 冠状位增强T_1WI

Figure 5 Six months after surgery axial (Panel 5a) and coronal (Panel 5b) enhanced T_1WI showed no tumor recurrence in IAC.

部感染($\chi^2 = 0.015$, $P = 0.901$)、下肢肌间静脉血栓($\chi^2 = 0.035$, $P = 0.851$)等并发症发生率差异均无统计学意义。掏刮组无一例发生脑脊液漏,磨开内听道组脑脊液漏患者虽经患侧卧位、抬高头位并腰大池引流术治愈,但住院时间有所延长,受限于样本量,未对两组脑脊液漏发生率进行统计学分析,但提示脑脊液漏可能与磨开内听道后壁有关。

讨 论

目前关于听神经瘤乙状窦后入路手术处理内听道内肿瘤的策略,尚存一定争议。钟东教授团队主张并一直践行绝大部分听神经瘤均应磨开内听道后壁以切除内听道内肿瘤,尽可能实现肿瘤全切除[8-9,15];但也有学者认为,听神经瘤近全切除后辅助伽马刀治疗,可有效控制肿瘤生长,并认为肿瘤近全切除即达到治疗目的[16]。由于考虑到磨开内听道后壁可能引起相关并发症,本研究在进行严格的术前个体化评估后选择肿瘤侵入内听道长度<0.50 cm的患者采用掏刮法处理内听道内肿瘤,必要时于神经内镜下辅助切除肿瘤。

一、术前个体化评估

本研究从患者身体状况和术前影像学检查两方面进行个体化评估。对于身体状况较差的患者,如发生瘤卒中需急诊手术、合并高血压3级(极高危)、血糖控制欠佳、高龄(>65岁)、呼吸和循环功能较差等,采用掏刮法处理内听道内肿瘤,较磨开内听道后壁的处理方式可减少手术操作及其损伤,在一定程度上减少严重并发症的风险。因此认为,对于此类患者应优先考虑掏刮内听道而非磨开内听道后壁,避免术中和术后出现严重并发症。参照Samii提出的高位颈静脉球分级标准[17]:Ⅰ级,颈静脉球位于内听道下缘上方<1.50 mm;Ⅱ级,颈静脉球位于内听道下缘上方1.50~3.00 mm;Ⅲ级,颈静脉球位于内听道下缘上方>3 mm。对于术前岩骨薄层CT和头颈部CTV提示高位颈静脉球或岩骨过度气化的患者,尤其是合并Ⅲ级高位颈静脉球者[岩骨连续薄层(1.50 mm)CT平扫显示≥3个层面同时存在颈静脉球和内听道],考虑掏刮法处理内听道内肿瘤,避免术中造成颈静脉球破裂出血以及术后发生脑脊液漏[鼻漏和(或)咽部液体]。对于肿瘤侵入内听道较少(<0.50 cm)或内听道呈明显"喇叭口"样扩大的患者,无需磨除内听道后壁,仅行内听道口周围掏刮即可实现肿瘤全切除。

二、掏刮法处理内听道内肿瘤的依据

乙状窦后入路是听神经瘤手术最常应用的入路,其优势在于有利于显露肿瘤与脑干的粘连,其劣势在于术中无法直视内听道。研究显示,绝大多数听神经瘤均侵入内听道,给肿瘤全切肿瘤带来困难[7],且术后残留肿瘤体积与肿瘤再生长速度呈正相关[18],因此,术中磨开内听道后壁从而最大程度切除肿瘤对减少听神经瘤复发至关重要[18]。既往认为,听神经瘤起源于前庭神经神经胶质髓鞘与施万细胞髓鞘之移行处,通常位于内听道口或内听道内[19-20];近年研究发现听神经瘤还可起源于前庭神经轴突髓鞘移行处至半规管的任意节段[20]。部分听神经瘤可见仅少量肿瘤侵入内听道(<0.50 cm),或者因肿瘤严重侵犯或压迫内听道口使内听道呈明显"喇叭口"样扩大,此时无需磨除内听道后壁,于神经内镜下观察内听道内肿瘤,采取掏刮法即可近全切除肿瘤[21]。本研究对肿瘤侵入内听道长度<0.50 cm、合并瘤卒中、内听道呈明显"喇叭口"样扩大、年龄>65岁、术前伴严重基础疾病无法耐受长时间手术的患者,采取掏刮法处理内听道内肿瘤,较磨开内听道后壁可以减少磨钻带来的手术相关严重并发症,特别是合并高位颈静脉球或岩骨过度气化者,减少磨开内听道后壁可能导致的颈静脉球破裂出血和脑脊液漏风险。有文献报道,高达9%的听神经瘤患者术前岩骨薄层CT可见高位颈静脉球,而坐位手术、合并高位颈静脉球可使术中空气栓塞发生率增加9.5%[17],因此,术中处理内听道内肿瘤磨开内听道后壁时,应谨慎操作,尤其是合并Ⅲ级高位颈静脉球者,每次磨除骨质不得超过0.10 mm,以免发生颈静脉球破裂出血或空气栓塞。我们的临床经验是,对于合并高位颈静脉球的患

表2 磨开内听道组与掏刮组患者肿瘤切除率的比较[例(%)]*

Table 2. Comparison of tumor resection rate between the drilling open IAC group and the scraping group [case (%)]*

组别	例数	全切除	近全切除	次全切除和大部切除
磨开内听道组	95	37(38.95)	30(31.58)	28(29.47)
掏刮组	54	12(22.22)	22(40.74)	20(37.04)

*$\chi^2=0.902$, $P=0.342$

表3 磨开内听道组与掏刮组患者面神经功能的比较[例(%)]*

Table 3. Comparison of facial nerve function between the drilling open IAC group and the scraping group [case (%)]*

组别	例数	H-B分级		
		Ⅰ~Ⅱ级	Ⅲ级	Ⅳ~Ⅵ级
磨开内听道组	95	47(49.47)	22(23.16)	26(24.21)
掏刮组	54	21(38.89)	16(29.63)	17(31.48)

*$\chi^2=0.282$, $P=0.594$。H-B, House-Brackmann, House-Brackmann分级

者,术中处理内听道内肿瘤时应采取掏刮法,有助于减少手术损伤,减少术中和术后严重并发症。研究显示,存在岩骨过度气化的听神经瘤患者术后易发生脑脊液漏[鼻漏和(或)咽部液体],此类患者术中磨开内听道后壁时须以骨蜡严格密封[22];术前岩骨薄层CT或术中发现内听道骨质破坏明显的患者,应以掏刮法处理内听道内肿瘤,以减少术后脑脊液漏发生率。本研究结果显示,磨开内听道组有5例(5.26%)发生脑脊液漏,而掏刮组无一例发生脑脊液漏,虽未行统计学分析,但提示脑脊液漏可能与磨开内听道后壁有关。亦有国外研究显示,听神经瘤乙状窦后入路手术后出现脑脊液漏主要与气化的内听道后壁被磨开有关[22]。由此可见,乙状窦后入路手术切除听神经瘤前进行个体化评估对降低脑脊液漏[鼻漏和(或)咽部液体]、高位颈静脉球破裂出血、空气栓塞、心肺功能衰竭等严重并发症的风险有积极作用。

三、内听道内肿瘤的掏刮策略

掏刮法处理内听道内肿瘤的关键之处在于,根据内听道口扩大程度和形状,术中对刮匙进行实时塑形,小心掏刮内听道周围残留肿瘤,对于不侵犯内听道或侵入内听道较少(<0.50 cm)的肿瘤即可实现近全切除;而对于因高龄等原因需行掏刮法的患者,术后应密切随访影像学检查结果。常规显微镜下切除脑桥小脑角肿瘤和部分内听道内肿瘤后,可辅助神经内镜观察内听道深处残留肿瘤的位置及其与面神经、前庭蜗神经和内听道内血管的毗邻关系,有助于术中保护面神经和前庭蜗神经,同时检查有无肿瘤破坏的乳突气房,及时予以骨蜡密封,术中清晰判断肿瘤切除程度,避免脑脊液漏[鼻漏和(或)咽部液体]的同时最大程度切除肿瘤[23]。然而,术中采用神经内镜辅助切除肿瘤可延长手术时间,因此建议,非必要不予神经内镜辅助,然而采用掏刮法处理内听道内肿瘤需直视下准确全切除肿瘤时,可考虑神经内镜辅助手术。本研究掏刮组有20例术中采用神经内镜辅助切除肿瘤,其中1例发生瘤卒中、3例合并高位颈静脉球、2例合并岩骨过度气化。

受限于内听道口开放角度,现有的手术器械角度和曲度不能完全配适内听道形状,无法进行肿瘤锐性分离,从而增加肿瘤切除难度,延长手术时间,且造成面神经和前庭蜗神经牵拉损伤。这是本研究术后6个月掏刮组与磨开内耳道组面神经功能保留率相当的原因之一。因此寻找或制作合适的内听道掏刮器械是目前内听道掏刮策略亟待解决的问题。

本研究为单中心回顾性研究,样本量较小,且受限于随访时间较短,未能评估术后肿瘤复发率以及术后长期面神经功能;此外,由于本组病例肿瘤体积较大,且术前部分患者无实用听力,未配备术中蜗神经电生理监测,故能评估术后听力保留率,尚待进一步扩大样本量、延长随访时间、增加听力评价指标进行多中心研究。

综上所述,听神经瘤乙状窦后入路手术应坚定主张并践行绝大多数患者磨开内听道后壁是处理内听道内肿瘤的首选方式,掏刮法可以作为经过严格术前评估后的补充选择,目前亟待解决的问题是对现有的掏刮器械进行合理改良。

利益冲突 无

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(收稿日期:2022-12-21)
(本文编辑:彭一帆)