Proceedings of Anticancer Research

Research Article

The Clinical Effect of Two Approaches of Microsurgery in the Treatment for Pituitary Tumor

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Abstract: ***Objective:*** To analyze the effect of two approaches of microsurgery in the treatment of pituitary tumor. ***Methods:*** The main body of this study was 69 patients with pituitary tumor who came to the hospital between December 2016 and December 2019. Taking the coin method as the standard, group A underwent nasal-sphenoid sinus approach with 36 cases; group B underwent transcranial approach with 33 cases. The treatment effects were compared. ***Results:*** The total effective rate of group A was 94.44%, and that of group B was 72.73%; the therapeutic index of group A was better than that of group B; the complication rate of group A was 8.33%, and that of group B was 30.30% ($P<0.05$). After treatment, the tumor volume of both groups decreased, and group A was smaller than group B ($P<0.05$). ***Conclusion:*** Nasal-sphenoid sinus approach for patients with pituitary tumors can improve the treatment index, enhance the curative effect, reduce the size of the tumor, and have better safety.

Keywords: Two approaches of microsurgery; Pituitary tumors; Complications; Treatment indicators

Publication date: July, 2020
Publication online: 31 July, 2020
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Pituitary tumor is one of the intracranial tumors with a high incidence, accounting for 10-16%. It is benign tumor, but if the course of disease is prolonged, the tumor volume will increase, leading to various complications[1-2]. Surgical operations, radiotherapy and conservative treatment of drug are often used to treat the disease clinically, among which surgical treatment is the most efficient one and commonly used. However, the traditional surgical method is more traumatic, which is not conducive to postoperative recovery[3]. With the vigorous development of medical technology, microsurgery has become its optimal choice. The key to successful microsurgery is correct approach, while the routine approach is transcranial one that has many adverse events and poor long-term efficacy. To this end, this study selected 69 patients with pituitary tumors to analyze the application value of the two approaches of microsurgery.

1 Materials and methods

1.1 Baseline data

The main body of the study was 69 patients with pituitary tumors who were admitted to the hospital between December 2016 and December 2019. Inclusion criteria: adenomas extending toward the sella; imaging examination shows that the tumor was soft; there was no invasion around sella; the pituitary tumor grew toward the sphenoid sinus; the tumor volume was 13-41 mm^2; accompanied by cerebrospinal rhinorrhea. Exclusion criteria: combined heart, liver and kidney disease; accompanied by coagulation dysfunction; difficult to tolerate surgery; missing clinical data. After grouping according to the coin method, there were 36 patients in group A, with 24 males and 12 females; the age is ranged from 4 months to 7 years, with an average of (1.26±0.42) years. There were 33 patients in group B, including 23 male patients and 10 female patients; the age ranged from 5 months to 6 years, with an average of (1.35±0.37) years. There is no difference after hypothesis test (P>0.05).

1.2 Method

Transcranial approach in group B: Patients underwent general anesthesia. MRI scan or CT of brain was used before surgery. After incision of the dura mater, the lateral cleft cistern-carotid artery-chiasmatic cistern was opened and cerebrospinal fluid wad released to expand the surgical field of vision. The chiasmatic cistern was separated from the carotid cistern to expose the tumor in the sella area. And electrocautery treatment was performed on the diaphragm. The tumor and the invaded diaphragma sellae were removed. The intraoperative pituitary gland was protected to prevent structural damage such as the optic chiasm and hypothalamus. Postoperative blood glucose and blood pressure should be monitored and changes in urine volume should be recorded.

Group A underwent nasal-sphenoid sinus approach: after general anesthesia, whether a single nostril approach or nasal-sphenoid sinus approach was performed based on preoperative MRI images. The patient was kept in a supine position, and the oral cavity and face were disinfected with iodophor. An exfoliator was used through the transnasal nasal cavity to identify the anterior sphenoid sinus wall and the anterior midline outer sphenoid sinus opening. Following this direction, it is in the ventral wall of the sphenoid sinus to avoid the retractor which was ensured that the anterior edge of the retractor is located around the sphenoid sinus ostium. The front end of the retractor used to break the root of the nasal septum and turn it to the corresponding side of the pear bone. The middle turbinate on the same side was broken outward, and the retractor is expanded to magnify the surgical field. A small amount of bite was removed from the nasal septal osseous structure, and the sphenoid sinus mucosa was cut. And the direction of the retractor was moderately adjusted so that the sphenoid sinus window was effectively expanded, and the posterior inferior pear bone was moderately retained to determine the position of the midline. The relationship between the sella turtica and the sphenoid sinus segmentation was clarified, and the fenestrate size and location at the bottom of the sella were determined. A long needle was used to puncture the dura mater and further to exclude the type of disease as an aneurysm in the sella. The dura mater was cut at the bottom of the sella in an X shape, and a curette was used to remove the tumor. The residual cavity was filled with gelatin sponge to stop bleeding. The retractor was withdrawn to clear the nasal secretions. The nasal septal cartilage was reset, and properly the gauze was filled in both nasal cavities. The oil gauze was removed 2-3 days after the anti-infective treatment.

1.3 Observation index

The hospitalization days, operation time and intraoperative blood loss were recorded; Complications like high fever, electrolyte disturbance, decreased pituitary function and diabetes insipidus were closely observed; the tumor volume was recorded before and after treatment.

1.4 Evaluation criteria of efficacy

Significant efficacy: blood biochemical examination shows no abnormality, and tumor volume reduces by more than 90% after CT follow-up examination; Mild efficacy: blood biochemical examination shows slight abnormality, and tumor volume reduction by postoperative CT follow-up examination is 50-90%; Poor efficacy: The blood biochemical examination shows severe abnormality, and the volume of the tumor was reduced by less than 50% after postoperative CT follow-up examination[4].

1.5 Statistical analysis

The data processing is done by SPSS21.0 software, and the measurement data expression is [$\bar{x} \pm s$]. After comparison and inspection of t value, the count data expression is [%]. After comparison and inspection of χ^2 value, the assuming standard for whether the verification is significant is that P value is less than 0.05.

2 Results

2.1 Comparison of total effective rate

The total effective rate of group A was 94.44%, and that of group B was 72.73% (P<0.05).

Table 1. Comparison of total effective rate

Group	Number of cases	Significant efficacy	Mild efficacy	Poor efficacy	Total effective rate
Group A	36	21(58.33)	13(36.11)	2(5.56)	94.44(34/36)
Group B	33	15(45.45)	9(27.27)	9(27.27)	72.73(24/33)
χ^2	-	-	-	-	6.060
P	-	-	-	-	0.014

2.2 Comparison of treatment index

The treatment index of group A was better than that of group B ($P<0.05$).

Table 2. Comparison of treatment index ($\bar{x} \pm s$)

Group	Number of cases	Hospitalization days(d)	Operation time(min)	Intraoperative blood loss(ml)
Group A	36	10.25±2.16	65.22±18.34	58.75±12.34
Group B	33	14.95±2.31	85.49±18.46	68.44±12.45
t	-	8.734	4.572	3.245
P	-	0.000	0.000	0.002

2.3 Comparison of complication rate

The complication rate of group A was 8.33%, while that of group B was 30.30% ($P<0.05$).

Table 3. Comparison of complication rate [*n*/%]

Group	Number of cases	High fever	Electrolyte disturbance	Decreased pituitary function	Profuse urination	Incidence
Group A	36	1(2.78)	1(2.78)	1(2.78)	0	8.33(3/36)
Group B	33	2(6.06)	4(12.12)	2(6.06)	2(6.06)	30.30(10/33)
χ^2	-	-	-	-	-	5.435
P	-	-	-	-	-	0.020

2.4 Comparison of tumor volume

The postoperative tumor volume of two groups are both decreased, and the tumor volume of group A was smaller than that of group B ($P<0.05$).

Table 4. Comparison of tumor volume ($\bar{x} \pm s$/mm^2)

Group	Number of cases	Preoperation	Postoperation	*t*	*P*
Group A	36	34.85±0.24	10.21±0.11	539.842	0.000
Group B	33	34.80±0.21	15.59±0.14	450.535	0.000
t	-	0.917	176.386	-	-
P	-	0.362	0.000	-	-

3 Discussion

Pituitary tumor is benign type of intracranial tumors. The site of the disease is the anterior pituitary gland inside the sella turcica. If the tumor volume is too small, it will cause endocrine disorders; if the tumor volume is too large, it will cause serious endocrine disorders, with further damage to the brain and optic nerve function[5-6]. Surgery is its ideal therapy, which can recover pituitary function through tumor resection so as to prevent tumors from compressing nerves and regulate endocrine[7]. However, the location of the disease is mostly in the sella area which is special, and the surrounding structure is complicated, accompanied by cranial nerves and large blood vessels. Furthermore, the pituitary function is relatively complicated, which will increase postoperative complications[8-10]. Craniotomy is often used to treat the disease clinically, but the amount of bleeding is large, which is not conducive to prognosis. The transcranial approach can damage the hypothalamus or brain nerves, which has a higher risk[11]. The nasal-sphenoid sinus microsurgery has minimally invasive features, and its advantages are: (1) It is more feasible than single-approach surgery, and the nasal septum is broken during the operation without damaging the nasal mucosa, which is beneficial for postoperative recovery[12-13]. (2) The field of vision is clear, and the direct visualization operation can be completed under the microscope, which shortens the operation time and does not damage the nerve and blood vessel. (3) The tumor can be completely removed, which is not easy to cause some of the tumor to remain. (4) It can adjust endocrine disorders and eliminate clinical symptoms as soon as possible; (5) It has small trauma, which is not easy to produce serious complications[14]. Relative research shows that the approach is more operable and the surgical procedure has clear standards. The technical requirements for the operator are general, which can obviously exclude the influence of human factors on the surgical effect. In addition, its short treatment cycle can reduce the burden of treatment, and it is favored by patients[15].

In the results, the total effective rate of group A (94.44%) was higher than that of group B (72.73%); the treatment index of group A was better than that of group B; the complication rate (8.33%) of group A was lower than that of group B (30.30%); and the tumor volume of group A was less than that of group B (P<0.05). It shows that the nasal-sphenoid sinus approach of microsurgery can improve clinical symptoms, reduce the size of the tumor and complications, and ensure the safety of treatment.

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