CLINICAL RESEARCH

Surgical Treatment of Sellar Region Neoplasms

Sella Bölgesi Neoplazmlarının Cerrahi Tedavisi

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Abstract: The result of surgical therapy of sellar region neoplasms in 107 patients treated between 1986-1995 is reviewed. In this series there were 89 pituitary adenomas, 8 meningiomas, 9 craniopharyngiomas, and one mucocele. Transcranial, transphenoidal, and combined transcranial-transsphenoidal approaches were used for surgical therapy. Three patients died postoperatively. Ten patients had complications related to surgery; CSF leak in three patients, diabetes insipidus in four, meningitis in two, and abscess in one. Radiation therapy was administered to four patients postoperatively.

Key Words: Craniopharyngioma, meningioma, pituitary adenoma, sellar region

Özet : Bu çalışmada 1986-1995 yılları arasında, sella bölgesi neoplazmı nedeni ile cerrahi tedavi uygulanan 107 olgu incelendi. Olguların 89'u hipofiz adenomu, 8'i meningioma, dokuzu kraniofaringioma ve biri mukosel idi. Tümör çıkarılması için transkranial, transsfenoidal ve transsfenoidal-transkranial bileşik yaklaşımlar kullanıldı. Üç hasta ameliyat sonrası dönemde öldü. On hastada cerrahiye bağlı komplikasyon gelişti; üç hastada rinore, dört hastada diabetes insipitus, iki hastada menenjit, bir hastada abse. Ameliyat sonrasında dört hastaya radyoterapi uygulandı.

Anahtar Sözcükler: Hipofiz adenomu, kraniofaringioma, meningioma, sella bölgesi

INTRODUCTION

The close relationship of neural, endocrine, vascular, meningeal, and skeletal tissues in the sellar and parasellar regions poses special surgical problems in a small anatomical area (21). Most of the pathological entities encountered in this area are pituitary adenomas, meningiomas, and craniopharyngiomas. Clinical manifestations of these tumors may be similar (18,20). Introduction of microsurgical techniques to the surgical treatment of sellar tumors increased successful outcome. In this study, we reviewed the result of surgical treatment in 107 sellar region neoplasms.

PATIENTS AND METHODS

Between 1986 and 1995, 107 patients with sellar region neoplasm were treated surgically. Fifty-five patients were female and 52 were male, ranging in age from 8 to 67 years. Initial medical records of the patients were reviewed in detail and the clinical, laboratory, and radiographic data were collected.

Pituitary adenomas were classified according to radiological findings as proposed by Hardy and Vesina (7).

In 89 patients with pituitary adenomas 79

patients had hormonally functioning adenomas, with high blood levels of prolactin (PRL) in 48 cases, growth hormone (GH) in 20, both GH and PRL in 7, and adrenocorticotropic hormone (ACTH) in 4. In 10 patients pituitary adenomas were hormone inactive.

All 9 craniopharyngiomas were cystic and five of them had calcification.

Of 8 meningiomas 4 were clinoidal, 2 were tuberculum sellae meningioma, and two were cavernous.

Presenting symptoms are given in Table I.

Table I. Clinical findings in 107 patients.

Finding	Number of patients
Headache	63
Amenorrhea	33
Loss of vision	24
Acromegaly	19
Galactorrhea	11
Cranial nerve palsy(3,4,5,6)	8
Polydipsy	7
Polyuria	7
Impotence	4
Obesity	4
Exophthalmos	3
Seizure	3

The patient with mucocele, and 68 pituitary adenomas (including 47 PRL-secreting adenomas, 14 GH-secreting adenomas, 3 PRL-GH secreting adenomas, 1 ACTH-secreting adenoma, and 3 non-secreting adenomas) underwent transsphenoidal surgery.

30 patients with 13 pituitary adenomas (including 1 PRL-secreting adenoma, 2 GH-secreting adenomas, 3 PRL-GH-secreting adenomas, 2 ACTH-secreting adenomas, and 5 non-secreting adenomas), 9 craniopharyngiomas, and 8 meningiomas underwent transcranial surgery. Eight pituitary adenomas (including 4 GH-secreting adenomas, 1 PRL-GH-secreting adenoma, 1 ACTH-secreting adenoma and 2 non-secreting adenomas) were treated by transcranial-transsphenoidal approach (multiple procedures).

RESULTS

In eight transsphenoidal approaches, the tumors were subtotally excised not to damage the optic nerve and vascular structures. Because of this problem, in cases with lateral extension and dumbbell shape tumors, we preferred transcranial approach in second surgery in the following 6-12 months.

Forty-seven of 48 patients with PRL-secreting pituitary tumors underwent transsphenoidal surgery. In 45 patients, PRL values were in normal range (<20ng/ml) by the 8th week of surgery. Thirteen patients who were in remission reported return of normal menstrual cycle and 8 patients no longer had galactorrhea. In three cases with subtotal removal the adenomas had significant extrasellar extension.

Fourteen of 20 patients with GH-secreting adenomas underwent transsphenoidal surgery. Twelve of 14 patients had remission in this group and GH values were in normal range (<10ng/ml).

Thirteen of 89 pituitary tumors (1 PRL, 2 GH, 3PRL-GH, 2 ACTH secreting, 5 non-secreting adenomas) were removed by transcranial surgery. In two patients with subtotal removal radiation therapy was administered postoperatively. These patients are in remission.

Five of 9 patients with craniopharyngioma who underwent transcranial surgery had solid-calcified portions and cysts, and 4 of them showed extension to the third ventricle. In 7 cases total removal was performed. Postoperative radiotherapy was administered to a patient after subtotal removal. One patient underwent secondary surgery due to recurrence .

Of 8 transcranially operated meningiomas all were excised totally except one cavernous meningioma.

Although three patients developed cerebrospinal fluid leak after surgery, all resolved with conservative therapy. Four patients developed permanent diabetes insipidus. Three patients developed infection, meningitis in two, abscess in one. Three patients died after surgery; one from meningitis and the others from cerebral infarction.

The histopathological findings, postoperative treatment, complication and mortality are

Table II. Results of surgical treatment of sellar region neoplasms.

	Transcranial (n=30)	Trans-sphenoidal (n=8)	Multiple Procedures (n=69)
Histopathologic Features			
Pituitary Adenoma	13	68	8
Prolactinoma	1	47	
GH Secreting Adenoma	2	14	4
PRL+GH Secreting Adenoma	3	3	1
ACTH Secreting Adenoma	2	1	1
Non-Secreting Adenoma	5	3	2
Craniopharyngioma	9		
Meningioma	8		
Mucocele		1	
Postoperative Radiotheraphy	2	2	
Complications			
CSF Leakage		1	2
DI	2	1	1
Meningitis	1		1
Abscess		1	
Mortality	2	1	

GH: growth hormone, PRL: prolactin, ACTH: adenocorticotropic hormone, CSF: cerebrospinal fluid, DI: diabetes insipidus

summarized in Table II.

DISCUSSION

Kramer (10) pointed out that the management of intracranial tumors had undergone dramatic changes in the last 40 years. As remission has now become a reality in an increasing proportion of patients, we have learned that the success of therapy should now be measured by more than mere survival.

The operative approaches to pituitary adenomas have been described in many reports (1,12,14). The tumor's configuration determines the choice between the transcranial and transsphenoidal approaches (21). The transsphenoidal approach is the technique of choice for tumors occupying the sella, whether or not there is sphenoid extension, and for tumors with suprasellar expansion without lateral extension. Transsphenoidal approach is contraindicated for tumors with significant lateral parasellar extension or massive suprasellar expansion (12). We do not recommend transsphenoidal approaches to the tumors with lateral and suprasellar extension because of inadequate exposure and decompression. Besides, patients with extrasellar tumor extension have a poor response to surgery (12). In Wilson's series (22), only 1 % of the pituitary tumors was treated by transcranial surgery. In our study, this ratio was 14 %.

There are occasional cases in which the consistency of tumor that is encountered via the transsphenoidal approach is such as to defy an adequate decompression (14,21). In our 8 patients, we had to use multiple procedures (transcranial-transsphenoidal) because of the inadequate decompression and dumbbell-shaped tumor. In two of these patients (2 GH-secreting pituitary adenomas), tumors were excised subtotally and radiotherapy was administered afterwards. Pituitary adenomas have been treated successfully in many cases by subtotal tumor resection and radiation therapy (18,21).

There is continuous controversy regarding the optimum approach for the treatment of craniopharyngiomas (6,8,13). The best results concerning tumor remission in a large series of patients with craniopharyngiomas have been reported by Baskin and Wilson (3). Baskin and Wilson treated 50 of 74 patients with craniopharyngiomas via transcranial approach. In the present study, craniotomy was performed in all patients with large extension into the frontal fossa and the third ventricle. Total removal of these tumors may be difficult in many cases (15,19). In two patients, subtotal removal was performed. Some authors have advocated radiotherapy as an adjunct to surgical resection (9,15). Kramer (10) reported excellent results with subtotal removal and supervoltage irradiation. It is clear that radiotherapy plays a significant role in the treatment of all subtotally removed tumors (15). One case with subtotal removal in this study underwent radiotherapy.

Tuberculum sellae and clinoidal meningiomas present difficult technical challenges to the neurosurgeon because of their close proximity to the anterior visual pathways, arteries of the anterior circulation and the hypothalamus (17). These structures may be involved by the tumor and their preservation certainly remains one of the main technical difficulties for the surgeon attempting excision of the tumor (16).

Cavernous meningiomas were technically the most difficult tumors to excise (2). The difficulties were related to internal carotid artery encasement and narrowing, and the involvement of the adjacent structures (4). In our patient with cavernous meningioma, tumor was removed subtotally. The presence of a mass in the cavernous sinus does not itself constitute an indication for operation. One recent report have demonstrated that stereotactic radiosurgery presented a viable alternative in patients with small cavernous meningiomas (5).

Complications in the surgery of sellar region includes cerebral edema, damage to important blood vessels, injury to cranial nerves, and injury to the hypothalamus (11). Minimizing these complications requires attention to detail and a few simple principles.

The goals of surgical treatment of this region include elimination of tumor mass effect and restoration of normal hormone physiology. Our experience indicates that sellar region neoplasms can be removed safely with careful preoperative evaluation and microsurgical technique.

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REFERENCES

1. Adams CBT : The management of pituitary tumors and post-operative visual deterioration. Acta Neurochir (Wien) 94 : 103-107, 1988
2. Al-Mefty O: The supraorbital-pterional approach to skull base lesions. Neurosurgery 21 : 474-477, 1987
3. Baskin DS, Wilson CB: Surgical management of craniopharyngiomas. J Neurosurg 65 : 22-27, 1986
4. Bonnal J, Thibaut A, Brotchi J, Born J: Invading meningiomas of the sphenoid ridge. J Neurosurg 53 : 587-599, 1980
5. Duma CM, Lunsford LD, Kondziolka D: Stereotactic radiosurgery of cavernous sinus meningiomas as an addition or alternative to microsurgery. Neurosurgery 32: 699-705, 1993
6. Fischer EG, Welch K, Belli JA: Treatment of craniopharyngiomas in children: 1972-1981. J Neurosurg 62 : 496-501, 1985
7. Hardy J, Vezina JL: Transsphenoidal neurosurgery of intracranial neoplasm, in Thompson RA, Green Jr (ed), Neoplasia in the Central Nervous System. Advances in Neurology, volume 15, New York: Raven Press, 1976: 261-274
8. Hoff JT,Patterson RH Jr: Craniopharyngiomas in children and adults. J Neurosurg 36 : 299-302, 1972
9. Hoffman HJ, Hendrick EB, Humphreys RP: Management of craniopharyngiomas in children. J Neurosurg 47 : 218-227, 1977
10. Kramer S : Craniopharyngioma : The best treatment is conservative surgery and postoperative radiation therapy, in Marley TP(ed), Current Controversies in Neurosurgery,. Philadelphia :WB Saunders, 1976: 336-343
11. Laws ER Jr, Kern EB: Complications of transsphenoidal surgery. Clin Neurosurg 23 : 401-416, 1976
12. Mac Kay A, Hosobuchi Y: Treatment of intracavernous extensions of pituitary adenomas. Surg Neurol 10 : 377-383, 1978
13. Matson DD, Crigler JF Jr: Management of craniopharyngioma in childhood. J Neurosurg 30 : 377-390, 1969
14. Nakane T, Kuwayama A, Watanabe M, Kageyama N: Transsphenoidal approach to pituitary adenomas with suprasellar extension. Surg Neurol 16 : 225-229, 1981
15. Richmond IL, Wara WM, Wilson CB: Role of radiation therapy in the management of craniopharyngiomas in children. Neurosurgery 6 : 513-517, 1980
16. Sekhor L, Sen C, Jho H, Janecka I: Surgical treatment of intracavernous neoplasms: a four-year experience. Neurosurgery 24 : 18-30, 1989
17. Stern WE: Meningiomas in the cranio-orbital junction. J Neurosurg 38 : 428-432, 1973
18. Stern WE, Batzdorf U: Intracranial removal of pituitary adenomas: An evaluation of varying degrees of excision from partial to total. J Neurosurg 33: 564-573, 1970
19. Sweet WH: Radical surgical treatment of craniopharyngioma. Clin Neurosurg 23 : 52-79, 1976
20. Taylor SL, Barakos JA, Harsh GR, Wilson CB: Magnetic resonance imaging of tuberculum sellae meningioma. Neurosurgery 31 : 621-627 , 1992
21. Tindall GT, Barrow DL: Tumors of the sellar and parasellar area in adults, in Youmans JR (ed) , Neurological Surgery, volume 5, Philadelphia: WB Saunders, 1990, pp 3447-3498
22. Wilson CB, Dempsey LC: Transsphenoidal microsurgical removal of 250 pituitary adenomas. J. Neurosurg 48 : 13-22, 1978