

Stereotaxis In The Management Of Mass Lesions Of The Third Ventricular Region

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Abstract : The impact of stereotactic techniques on the management of mass lesions of the third ventricular region is reviewed in a consecutive series of 82 patients treated over three years, using primarily stereotactic techniques. The lesions were in the ventricular cavity in 8 cases, thalamic in 26 cases, sellar or suprasellar in 31 cases, pineal in 12 cases and mesencephalic in 5 cases. A CT compatible Leksell stereotactic system was used. The patients underwent a total of 144 procedures. Objectives were biopsy alone in 47 procedures, biopsy and cyst aspiration in 33 procedures, catheterization in 5 procedures, aspiration alone in 28 procedures, interstitial radiosurgery in 27 procedures, third ventriculostomy in 1 procedure, and microstereotactic resection in 3 procedures. These objectives were realized in all cases. There were no perma-

nent complications and no morbidity. A positive pathological diagnosis could be made in all patients. On the basis of the information obtained at biopsy, only 15 patients (18%) had to undergo conventional craniotomy and resection, while 29 patients received external radiotherapy only, 19 patients had interstitial radiosurgery, 3 patients underwent microstereotactic removal of their tumors, and 8 patients received non-surgical therapy. This experience shows that the use of diagnostic and therapeutic stereotactic techniques has had a drastic effect on management of third ventricular mass lesions, obviating major intracranial operations in many patients.

Key words: brachytherapy, brain tumor, radiosurgery, stereotaxy, third ventricle tumor

INTRODUCTION

Despite tremendous improvements in neuroradiology and microsurgery over the last 20 years, conventional and microsurgical approaches to lesions of the third ventricular region are still fraught with serious neurological, endocrine, and psychiatric complications. Image guided stereotaxis provides precise pathological diagnosis at a low risk, obviating the need for craniotomy for diagnostic purposes, and offers a rational guide for further therapeutical modes. With detection of intracranial masses of increasingly smaller sizes, it has become possible to use stereotactic techniques for therapeutic purposes as well (1- 3, 5, 6, 8-16). To assess the impact made by stereotactic techniques on the management of lesions of the third ventricular region, we present a retrospective review 82 consecutive cases encountered over three years.

CLINICAL MATERIAL AND METHODS

Between March 1, 1991 and March 1, 1994, 243 patients with intracranial mass lesions underwent stereotactic procedures at the Department of Neurosurgery of İstanbul Faculty of Medicine. Of these, 82 were situated at the third ventricular region. The series comprised 44 male and 38 female patients, ranging from 2 to 82 years of age. The lesions were in the ventricular cavity in 8 cases, thalamic in 26 cases, sellar or suprasellar in 31 cases, pineal in 12 cases and mesencephalic in 5 cases (Table 1). Tumors believed to originate from the basal ganglia or corpus callosum were not included. All patients had contrast enhanced computed tomography (CT) and/or magnetic resonance imaging (MRI).

A CT compatible Leksell stereotactic system (Elekta AB, Stockholm) was used. All procedures, except those in children were performed under local

Table 1: Localizations of mass lesions of the third ventricle

Localization	No of cases
Ventricular cavity	8
Thalamus	26
Sellar or suprasellar	31
Pineal	12
Mesencephalon	5
Total	82

anesthesia. All lesions were approached through burr holes at the coronal suture. The patients underwent a total of 144 procedures. Objectives were biopsy alone in 47 procedures, biopsy and cyst aspiration in 33, aspiration alone in 28, catheterization in 5 procedures, stereotactic interstitial radiosurgery (SIR) in 27, third ventriculostomy in 1 and, microstereotactic resection in 3 (Table 2). Appropriate therapeutic procedures such as SIR, aspiration, etc were done in the same session in 24 cases.

One patient with a pineoblastoma underwent endoscopic third ventriculostomy at the same session. A sheathed rigid endoscopy instrument (Karl Storz Endoscopy America Inc, USA) was introduced to the third ventricle through the foramen of Monro, the membrane between the interpeduncular cistern and the third ventricle was perforated with a blunt instrument, and the hole was widened by a 5F-Fogarty balloon catheter.

SIR was performed in 23 cases. Cystic tumors were treated by the injection of beta-emitting Yttrium 90 (Y 90) in a colloidal solution (Amersham, UK) to deliver 220-300 Gy to the cyst wall. For solid tumors, Iodine-125 (I 125) seeds (Amersham, UK) were inserted temporarily to deliver 60 to 80 Gy to tumor margins.

Three lesions were resected microstereotactically through a cylindrical retractor (7). One of these was a colloid cyst; the others were thalamic astrocytomas.

RESULTS

The procedural objectives were realized in all cases without mortality or any permanent morbidity.

Table 2: Procedural Objectives

	biopsy	biopsy and aspiration	aspiration	SIR	reservoir catheter	micro-stereotactic resection	third ventriculostomy	total
Diagnosis	47	33	2	—	—	—	—	82
Treatment	—	—	26	27	5	3	1	62
Total	47	33	28	27	5	3	1	144

The biopsies were obtained with the spiral needle of Backlund (4) or aspiration needles. This required a total of 197 point placements. The specimens were at most 1 mm wide and 1 cm long. Imprint-smears of each piece of obtained tissue were stained with hematoxyline-eosine and examined immediately in the operating room. More tissue was taken only if needed. Immunohistochemical stains were used where necessary.

In 5 cases with cystic tumors, a silastic catheter, with an Ommaya reservoir (PS Medical, USA) was inserted stereotactically into the cyst for the purpose of drainage.

Pathological diagnoses are shown in table 3. 68 lesions were proven to be neoplastic, 5 were infectious, 5 were of developmental origin, 1 was gliosis, and 1 was an inherited metabolic disease.

On the basis of the information obtained at biopsy, only 15 patients (18%) underwent conventional craniotomy and resection, while 29 patients received external radiotherapy only, 19 had SIR, 3 underwent microstereotactic removal of their tumors, and 8 received non-surgical therapy (Table 4).

Tumor control by SIR was achieved in 6 of 7 patients with solid tumors that received a mean of

Table 3: Biopsy results

Diagnosis	no of cases
Glioblastoma	2
Anaplastic astrocytoma	5
Astrocytoma	16
Pilocytic astrocytoma	6
Ependymoma	1
PNET	7
Pineocytoma	2
Craniopharyngioma	20
Pituitary adenoma	6
Primary lymphoma	1
Metastatic carcinoma	1
Germinoma	1
Colloid cyst	4
Benign cyst	1
Abscess	5
Sarcoidosis	1
Behçet's disease	1
Fahr' disease	1
Gliososis	1
Total	82

Table 4: Treatment protocols based on biopsy results.

Treatment protocols	No of cases
Medical treatment	8
Stereotactic aspiration	8
External radiotherapy (rt)	28
3rd ventriculostomy and rt	1
Microstereotactic resection	1
Microstereotactic resection and rt	2
Stereotactic interstitial radiosurgery (SIR)	16
SIR and rt	3
SIR, craniotomy and rt	3
SIR and craniotomy	1
Craniotomy	5
Craniotomy and rt	6
Total	82

60-80 Gy to the tumor periphery via I 125 seeds, and in 8 of 9 patients with purely cystic craniopharyngiomas that received 220-300 Gy via colloidal Y 90. Y 90 was not effective in cystic tumors with solid portions.

Fourteen cases required insertion of ventriculoperitoneal shunts before or after stereotactic procedures.

DISCUSSION

Optimal treatment of intracranial mass lesions depends on accurate pathological diagnosis. Image guided stereotactic biopsy has become a safe and accurate alternative for obtaining tissue for diagnosis. Careful operative planning makes sampling of all regions of the tumor possible at low risk (1-3,6,8,11,12,14,16). In this series stereotactic biopsy provided diagnosis in all patients without morbidity. In addition to accurate diagnosis, therapeutic interventions such as aspiration, SIR and microstereotactic resection were possible in many cases. Only 15 patients had to undergo subsequent craniotomies.

The goal of surgery is to achieve selective tumor removal. Despite advances in microsurgical techniques, radical total removal of tumors of the third ventricular region without any morbidity is only rarely possible. Alternative open operative approaches to the third ventricular region represent major surgical undertakings and seem to be potentially harmful treatment modes (1-3). With the application of microsurgical techniques to stereotaxis, mass lesions deep within the brain can be resected safely with acceptable morbidity. In this series two thalamic astrocytomas and a colloid cyst were excised completely by microstereotactic resection. An alternative means of tumor destruction is provided by radiosurgery. SIR aims to control brain tumor by means of necrotizing doses of ionizing radiation delivered via interstitially placed radioisotopes. It has enabled us to achieve radiosurgical tumor destruction without causing damage to surrounding tissue (5, 9, 10, 13).

Stereotactic implantation of an intracystic catheter with an Ommaya reservoir placed in the subgaleal space can be used to instill radioactive colloidal solutions and to perform frequent aspirations where necessary. With the advance of endoscopic visualiza-

tion and specialized instrumentation, endoscopic ventriculostomy has become a safe and effective treatment of associated hydrocephalus particularly in cases with lesions of the posterior third ventricle. Both of these methods have proved effective in controlling increased intracranial pressure in selected cases.

In conclusion, this experience with 82 cases has shown that the use of diagnostic and therapeutic stereotactic techniques has had a drastic effect on the management of third ventricular mass lesions, providing a safe and reliable alternative and obviating major intracranial operations in many patients.

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