Granular-Cell "Myoblastoma" of the Neurohypophysis

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A mass lesion in the region of the sella turcica, with or without suprasellar extension, is generally assumed to be a tumor of the adenohypophysis. However, a tumor in this region may occasionally arise in the general area of the neurohypophysis and the hypophyseal stalk. Such a case, diagnosed histologically as a granular-cell "myoblastoma," is recorded in this article.

So far only 4 cases of granular-cell "myoblastoma," which have shown the symptomatology associated with an intrasellar mass lesion have been described in the literature. The present case is, we believe, the fifth of this kind.

Case Report

A 47-year-old female was referred to the Neurosurgical Department of the Rothschild Hadassah University Hospital, Jerusalem, with the tentative diagnosis of pituitary tumor.

The patient had suffered from severe headaches in the frontal and occipital regions for 6 years; these, however, disappeared abruptly about 6 months before admission. Four years previously she noticed disturbances of vision in her left eye, and she stumbled against people and objects on her left side. Ophthalmologic examination at that time, in another hospital, revealed the presence of scotoma in the left upper temporal visual field. The visual field in her right eye was normal. Roentgenograms of the skull showed enlargement of the sella turcica. During the following years the patient was under constant observation, and no progressive deficiency of either vision or visual fields was noted. Two weeks prior to the present admission she was examined in another clinic, at which time bilateral pallor of both optic discs and bitemporal hemianopia were found.

Examination. On admission the essential clinical findings were confined to the optic nerves. Bilateral primary optic-nerve atrophy was noted; the visual acuity was 6/7.5 in the right eye, and 6/30 in the left eye. The pupils were equal in size and reacted to light. Studies of the visual fields revealed loss of approximately three quadrants in the left eye, only little more than the upper nasal quadrant being preserved, and temporal hemianopia in the right eye (Fig. 1a).

Routine laboratory data were noncontributory. The patient weighed 69.2 kg. Blood pressure was 90/60 mm. Hg; pulse was full and regular. Repeated urinalyses were unremarkable. Hemoglobin was 14.6 gm. per cent, and the peripheral blood count was within normal limits. Fasting blood sugar was 89 mg. per 100 ml. Blood urea nitrogen was 30 mg. per 100 ml. and blood electrolytes were normal. In the urine the 17-ketosteroids were 10.2 mg. per 24 hours. Serological tests were negative. The menstrual cycle was regular until a few months ago.

The electroencephalographic tracing was normal. Roentgenograms of the skull revealed enlargement of the sella turcica in its anteroposterior and vertical diameters, with destruction of the floor (Fig. 2). A left carotid angiogram showed marked elevation of the ipsilateral anterior cerebral artery in the anteroposterior view. Deep staining by the contrast material gave evidence, on lateral view, of the presence of a large, richly vascular, tumor in the pituitary region. The stain extended backwards and upwards, and impinged upon the floor of the 3rd ventricle (Fig. 3).

A tentative diagnosis of pituitary adenoma was made, though its staining by the contrast material was considered to be quite an unusual feature associated with this type of tumor.

Operation. On Oct. 21, 1963, a right transfrontal craniotomy was performed. The right optic nerve was found pale, flattened and raised by a reddish tumor which protruded from both its sides and displaced the optic nerve and chiasm upwards and backwards. The tumor, as far as it could be seen, was covered by a richly vascularized thin capsule. After coagulation of the capsule an incision was made in it and the tumor was removed piecemeal. Because of the highly vascularized neoplastic tissue which produced severe bleeding, the procedure was terminated as soon as decompression of both optic nerves and chiasm was achieved.

Postoperative course was uneventful and the patient was discharged 10 days after operation. Examination of

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Fig. 1. Visual-field studies with a white test object —4 mm.² for the left eye, and 0.25 mm.² for the right one. (a) On admission. (b) Three months after operation.
that only some of the numerous granules seen in the sections stained with hematoxylin and cosin showed a positive stain with the periodic-acid Schiff procedure. With Laidlaw's stain for reticulin many of the granules stained black. Treatment of the sections with potassium bichromate did not reveal the presence of chromaffin granules in the tumor. No astrocytic processes were demonstrated with Mallory's phosphotungstic acid hematoxylin in sections treated with Zenker's fixative.

The nuclei of the neoplastic cells were situated mostly at the periphery of the cells and showed a considerable degree of pleomorphism and hyperchromatism. Many of the nuclei had an eosinophilic nucleolus; others, however, contained a round, eosinophilic Feulgen-negative mass surrounded by a clear halo, or a very large homogeneous, deeply amphiphilic, Feulgen-positive central core, also surrounded by a thin clear halo bordering on margined chromatin. Both structures resembled intranuclear type "A" inclusions at different stages of their life-cycle.29

The tumor cells were arranged in small compact groups closely surrounded by fine capillaries which formed a rich and intricate network. Whorls of plump fusiform cells intimately intermingled with numerous capillaries were seen in a few foci (Fig. 4). The whorls brought to mind the cellular psammomata in "mixed" meningiomas. Except for their shape and peculiar arrangement, these cells bore the morphological and staining characteristics described above in the polygonal and oval-shaped neoplastic cells.

The tumor was very poor in stroma which consisted of the aforementioned capillary network and of thin-walled arteries and veins of small calibre. A moderate amount of separate fibrils of reticulin adjacent to the periphery of the neoplastic cells was also seen. No mitotic figures were noted.

The final anatomical diagnosis of the surgical specimen was granular-cell "myoblastoma," probably arising in the general area of the neurohypophysis and hypothalamic stalk.

Discussion

In his original description of granular-cell myoblastoma in the tongue Abrikossoff31 consid-
erred the tumor to be actually a nodule composed of degenerated muscle cells. However, he later advanced the concept that the tumor was derived from embryonic striated-muscle cells, the loose dispersion of cytoplasmic granules in the neoplastic cells presumably representing embryonic myofibrils. This hypothesis has been open to question ever since and the histogenesis of the granular-cell “myoblastoma” has been the subject of extensive investigations. Most of these have led to the conclusion that the “myoblastomatous” cells are closely related to nerve tissue and are probably altered Schwann cells or endoneural and perineural cells. A smaller group of authors, however, believe in the histiocytic derivation of “myoblastoma.” Some of them do not consider it to be a neoplastic lesion, but rather a granuloma or a manifestation of lipid storage.

The original description by Boyce and Beadles, in 1893, of foci of large granular cells in the neurohypophysis, later followed by that of many other authors, drew attention to the presence of “myoblastomatous” cells in this unusual location. However, since neither nerves, myelinated nerve fibres, nor striated muscles are indigenous to the neurohypophysis, the concept was advanced that “myoblastomatous” cells in the neurohypophysis and the hypophyseal stalk originate in pituicytes which presumably are altered astrocytes.

The presence of viral inclusion bodies within

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**Fig. 4.** Granular-cell “myoblastoma.” At right are whorls of fusiform “myoblastomatous” cells. Hematoxylin and eosin, X125.

**Fig. 5.** Positive intracytoplasmic granules in “myoblastomatous” cells. Periodic-acid Schiff method, X500.
nuclei of “myoblastomatous” cells noted by us in the histologic sections, has been described by Fisher and Wechsler who found viral particles in all examples of granular-cell “schwannoma” which they studied with the electron microscope. Their etiologic significance, although of understandable theoretical and practical interest, remains at present only a speculation.

The histogenesis of the “myoblastomatous” cells is a matter of controversy and subject for debate. The natural history of the tumor is obscure. There have been numerous descriptions of microscopic “islets” or “Tumoretten” of “myoblastomatous” cells in the neurohypophysis. Priesel described them in 20 cases; Shanklin found 17 of these islets in 100 pituitaries, whereas Luse and Kernohan found that their incidence in serial sections of 1364 pituitary glands was 6.45 per cent. In our material consisting of 300 unselected pituitary glands obtained post mortem, we found “myoblastomatous” islets (Fig. 6) in 5.7 per cent of the cases. As in Luse and Kernohan’s series, no such islands were found in patients below 20 years of age. All these islets of “myoblastomatous” cells were incidental findings or were observed in serial sections carried out with the purpose of ascertaining their incidence. Since the first description 70 years ago, only in 5 cases, including the present one, has evidence been presented of progression of “myoblastomatous” islands in the neurohypophysis to a large, clinically symptomatic, mass. In all these cases the tumor was large enough to produce symptoms by impinging upon the optic chiasm and floor of the 3rd ventricle, causing optic atrophy and blindness. In 2 cases the tumor was responsible for the patient’s death. In all 5 patients the history was of several years’ duration.

Lüthy and Klingler in 1951 were the first to report a case of granular-cell “myoblastoma” of the neurohypophysis in which the growth had caused bitemporal hemianopia. The lesion was partially excised and the patient received radiation therapy. No more details could be obtained as to the patient’s fate after he was discharged 6 months after operation. In 1953, Harland reported another case of a patient who had been blind for 2 years because of bilateral optic atrophy. The patient died and on postmortem examination a tumor, 5.6 cm in diameter, in the region of the hypophysial stalk was found. The tumor elevated the floor of the 3rd ventricle, causing obstruction with resultant internal hydrocephalus and increased intracranial pressure. This undoubtedly was the cause of the patient’s death. Histologically the tumor was diagnosed as granular-cell “myoblastoma.” The 3rd case of this kind was reported by Glazer et al. in 1956. In this case, too, the tumor had produced bilateral optic atrophy resulting in blindness. The patient died a few months after partial excision of the tumor while undergoing radiation therapy. Burston et al. published in 1962 a report of 8 cases of granular-cell “myoblastoma” of the neurohypophysis, of which only 1 had necessitated surgical intervention for relief of failure of vision of 18 months’ duration. The tumor was partly removed and the patient did not receive radiation therapy. Nineteen months later the visual fields remained unchanged, and the patient was well, doing a full day’s work. In our case the presence of a slowly expanding tumor of appreciable size in the pituitary region accounts for the clinical and laboratory findings. Following the operation, the patient received radiation therapy (4000 r) and at the time of preparing this report there is marked improvement of visual signs. The biologic behavior of granular-cell “myoblastoma” of the neurohypophysis remains uncertain. The number of patients alive is too small and the follow-up records are too short to enable one to draw any conclusions. Judging from the history of the cases reported in the literature and from the history of our patient in whom the first symptoms appeared 6 years prior to operation, the tumor seems to be of a slowly growing type. In the absence of any experience with this type of tumor, in this region, the treatment instituted in our case followed the general lines practiced in this clinic in dealing with pituitary adenoma, i.e. surgical decompression of visual pathways followed by deep radiation therapy.

The unusual pathological stain of the tumor in the arteriogram of our case led us to review in retrospect 23 other angiograms of proven pituitary adenomas. A similar stain of the tumor was noted in only 2 other cases, both of which proved to be malignant chromophobe adenomas on histologic examination. In the other 21 benign adenomas no stain was noted. This peculiar feature
might in future call attention to the differential diagnosis of lesions other than the ordinary type of pituitary adenoma.

Summary

A granular-cell “myoblastoma” arising in the general area of the neurohypophysis and hypophyseal stalk is reported in detail. The histologic picture of the tumor is described.

The literature concerning the histogenesis of granular “myoblastomatous” cells is discussed, and the incidence of islands of such cells in the neurohypophysis as found by various authors is mentioned. In 300 unselected pituitary glands examined histologically by us, we found an incidence of 5.7 per cent of these islands. The only 4 reported cases, not including the present one, of granular-cell “myoblastoma” of the neurohypophysis producing neurological signs, are reviewed.

References