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Profile of Pituitary Adenomas in Senegal: Epidemiological, Clinical and Therapeutic Aspects about 241 Collected Cases

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Abstract

Introduction: in adults, adenomas are the most frequent causes of pituitary tumours. The objective was to characterize its epidemiological and clinical aspects, as well as its therapeutic modalities in Senegal. **Methodology:** this was a multicenter, retrospective, descriptive and analytical study carried out from the Senegalese register of pituitary adenomas (2008-2022). **Results:** 242 patients were collected with an average age of 42.4 ± 13 years and a sex ratio (M/F) of 0.91. The mean consultation time was 19.7 ± 23 months. The circumstances of discovery were pituitary apoplexy (11 cases, 4.54%), tumor syndrome (176 cases, 72.72%), gonadal manifestations (103 cases, 42.56%), dysmorphic syndrome (21 cases, 8.68%), hypercorticism (15 cases, 6.19%). Morphologically, it was a macroadenoma (197 cases, 81.40%), an extensive adenoma (22 cases, 9.10%). The hormonal profile was lactotropic hypersecretion (80 cases, 33.05%), somatotropic (13 cases, 5.39%), corticotropic (14 cases, 5.78%), mixed (9 cases, 3.71%). The factors significantly associated with prolactinoma were young age ($p = 0.000$), female sex ($p = 0.000$), long consultation delay ($p = 0.000$) and microadenoma ($p = 0.001$). Only arterial hypertension was associated with acromegaly ($p = 0.000$). We found a significant correlation between Cushing's disease and microadenomas ($p = 0.000$). Non-secreting adenomas were significantly associated with advanced age ($p = 0.000$), long delay in consultation ($p = 0.000$), male gender ($p = 0.000$), tumor syndrome ($p = 0.001$) and macroadenomas ($p = 0.000$). Pituitary surgery was effective in 173 patients (71.49%) including 166 cases (68.59%) by transphenoidal approach. Postoperative incidents were transient diabetes insipidus in

82 cases (47.39%), cerebrospinal fluid leak (20 cases, 11.56%). Death was observed in 18 patients in the entire series (7.44%). The latter had a tumor syndrome (88.88%), a macroadenoma (83.33%) and had undergone pituitary surgery (72.22%). **Conclusion:** pituitary pathology has become a reality with clinical and secretory polymorphism. The diagnostic delay explains the predominance of macroadenomas which are sources of pre and post-operative complications.

Keywords

Pituitary Adenoma, Prognosis, Management, Senegal

1. Introduction

Pituitary adenomas are benign tumors developed from cells of the anterior pituitary. They represent 10% to 15% of intracranial tumors [1] [2] with a female predominance and a variable average age according to the secretory form. Functionally, these are mainly prolactinomas (40% - 56.2%), non-secreting adenomas (31.2% - 50%) [3] [4]. The clinical manifestations are based on the tumor syndrome and hypersecretion specific to each histological form. The diagnosis is facilitated by hormonal explorations, pituitary morphology and immunohistochemistry. The management of pituitary pathology remains very specific, multidisciplinary and highly dependent on the functional character of the adenoma [5] [6] [7] [8]. Since the advent of the operating microscope, the transphenoidal approach has become the reference technique for pituitary surgery [9] [10]. In Senegal, the management of pituitary adenomas, hitherto limited to neurosurgery or endocrinology units, did not facilitate the obtaining of data from all those involved in the management of this pathology. This motivated this complementary, multicenter work, with the aim of studying pituitary adenomas in their epidemiological, clinical and therapeutic aspects in Senegal.

2. Patients and Methods

This was a multicenter, retrospective, descriptive, analytical study conducted from January 1, 2008 to December 31, 2022 (*i.e.* 14 years). Our study was carried out in the neurosurgery departments of the Fann hospital and the Principal hospital in Dakar and the endocrinology department of the Abass Ndao hospital center. It focused on patients with a pituitary adenoma confirmed on morphological data and followed up in the various competent departments. Clinically and/or paraclinically incomplete records were not retained. The data was collected using a data sheet filled in from a complete clinical examination and supplemented as appropriate by the use of patient files in the archives of the neurosurgery and endocrinology department. The information needed for our study was as follows:

- Socio-demographic data: age, gender, land;
- Study of the pituitary pathology: time to consultation, complete examination of all the apparatus and systems, emphasizing the search for the tumor syndrome (headaches, dizziness and visual disturbances), clinical endocrine signs of hypersecretion or hyposecretion, neurological and ophthalmological examination (visual acuity, fundus, visual field).

The paraclinical examinations made it possible to confirm the adenoma, to evaluate its size or its volume, to specify the type of pituitary secretion. On the biological level, these were hormonal explorations: adrenocorticotropic hormone (ACTH), cortisolemia, prolactinemia, Thyroid Stimulating Hormone (TSHus), free T4, Growth Hormone (GH), Insulin-Like Growth Factor-1 (IGF1), Follicular Stimulating Hormone (FSH), Luteizing Hormone (LH). The main morphological explorations were pituitary computed tomography and magnetic resonance imaging (MRI). The other exploitations were carried out according to the profile. The histology of the surgical specimen was also studied.

- Medical and/or surgical management: this involved medical treatment and its methods (restraining or substitution therapy), pituitary surgery (technique used, quality of excision, intraoperative complication).
- Evolution: the evaluation focused on the clinical, biological and morphological data and the postoperative treatment. We systematically searched for postoperative complications such as diabetes insipidus, cerebrospinal fluid leakage, infections, and changes in neurological, ophthalmological and endocrine parameters.

Data analysis was performed with Epi Info™ software version 7.2.5.0. During the descriptive analysis, the qualitative variables were described by frequency tables. The quantitative variables were described by their position (mean) and dispersion (standard deviation, extremes) parameters. During the bivariate analysis, the Chi-square or Fisher test was used for proportion comparisons. A link was observed if the p value < 0.05.

3. Results

3.1. Socio-Demographic Data

A total of 242 patients were included with a mean age of 42.4 ± 13 years (range 17 to 76 years). Our study included 127 (52.48%) female patients, *i.e.* a sex ratio of 0.91. We found 9 (3.71%) diabetics including 04 cases of acromegaly, 02 cases of non-secreting adenomas, 02 cases of mixed adenomas and Cushing's disease. Arterial hypertension was found in 14 patients (5.78%) including 07 cases of acromegaly, 05 cases of prolactinoma, a non-secreting adenoma and Cushing's disease.

3.2. Clinical Data

The mean consultation time was 19.7 ± 23 months. This delay was ≥ 12 months in 41.91%.

The clinical symptomatology was dominated by the tumor syndrome (176 cases, 72.72%) represented by 111 cases of headaches (45.86%), 11 cases of pituitary apoplexy (4.54%).

Gonadotropic syndrome was found in 103 patients (42.56%). These were mainly disorders of the menstrual cycle and fertility. Galactorrhea was found in 89 patients (36.77%). Twenty-one (21) patients presented with a dysmorphic syndrome (8.68%) and 15 patients with Cushing's syndrome (6.19%).

On the ophthalmological level, the main abnormalities were the decrease in visual acuity (121 cases, (50%), blindness (30 cases, 12.39%), bitemporalhemianopsia (45 cases, 16.53%). Table 1 shows the distribution of patients according to epidemiological and clinical data.

3.3. Paraclinical Data

Biologically, hormonal explorations found normal anterior pituitary function in 126 patients (52.06%). The abnormalities found were isolated hyperprolactinemia (80 cases, 33.05%), isolated central hypercorticism (14 cases, 5.78%), isolated hypersecretion of GH (13 cases, 5.37%), mixed hypersecretion(09 cases, 3.71%). Partial anterior pituitary insufficiency was found in 3 cases, 1.24%.

All patients underwent pituitary imaging. Among them, 123 (50.82%) brain CT scans and 171 (70.66%) magnetic resonance imaging. The morphological anomalies were a macroadenoma in 81.40% (197 patients), a microadenoma in 18.59% (45 cases). Chiasmatic or cavernous extension was found in 22 patients (9.01%). Macroadenomas involved 99.21% (125/126 cases) of non-secreting adenomas, 62.50% (50/80 cases) of prolactin adenomas, 92.31% (12/13 cases) of acromegaly cases and 7.14% (1/14 cases) of Cushing's disease cases and 100%

Table 1. Distribution of patients according to epidemiological and clinical data.

Data	Values
Effective	242
Middle age	42.4 ± 13 ans
Sex ratio (M/F)	0.91
Consultation time	19.7 ± 23 months
Diabetic sugar	9 (3.72%)
High blood pressure	14 (5.78%)
Pituitary tumor syndrome	176 (72.72%)
Visual acuity abnormalities	152 (62.81%)
Visual field defects	56 (23.14%)
Pituitary apoplexy	11 (4.54%)
Gonadotropic syndrome	103 (42.56%)
Amenorrhea-galactorrhea syndrome	89 (36.77%)
Dysmorphic syndrome	21 (9.54%)
Cushing's syndrome	15 (6.19%)

(9/9 cases) of mixed secretion adenomas.

3.4. Final Diagnosis

Pathologically, it was mainly a non-secreting pituitary adenoma in 126 patients (52.06%), a pure prolactinoma in 80 patients (33.05%). Thirteen patients (5.37%) had acromegaly, 14 patients (5.78%) Cushing's disease. The pituitary adenoma was of mixed secretion in 9 patients (3.71%). These were hypersecretion of prolactin associated with hypersecretion of GH in 8 cases and central hypercorticism in 01 cases.

Among the cases of acromegaly, non-secreting adenoma and mixed adenoma, the predominance was male in respectively 53.85%, 55.56% and 65.6%. While in the cases of prolactinoma and Cushing's disease, the female sex represented respectively 78.57% and 78.57 of the cases. Table 2 shows Distribution of the patient profile according to the etiology of pituitary adenomas.

Table 2. Distribution of the patient profile according to the etiology of pituitary adenomas.

Final diagnosis	**Résultats**	
Mixed adenomas	**9 patients**	**3.71%**
sex ratio	1.25	
Middle age	41.77 ans	
Macroadenomas	9 (100%)	
Extensive	1 (11.11%%)	
Acromegaly	**13 patients**	**5.37%**
Sex ratio	1,16	
Middle age	45.73 ans	
Macroadenomas	12 (92.31%)	
Extensive	3 (23.08%)	
Cushing'sdisease	**14 patients**	**5.79%**
Sex ratio	0.27	
Middle age	34.64 ans	
Microadénomes	13 (92.85%)	
Extensive	0 (0%)	
Prolactinoma	**80 patients**	**33.05%**
Sex ratio	0.29	
Middle age	35 ans	
Macroadenomas	50 (62.25%)	
Extensive	10 (12.50%)	
Non-secretingadenomas	**126 patients**	**52.06%**
Sex ratio	1.90	
Middle age	48.1 ans	
Macroadenomas	125 (99.21%)	
Extensifs	8 (6.34%)	

Factors significantly associated with prolactinoma were young age (p = 0.000), female sex (p = 0.000), long consultation delay (p = 0.000) and microadenoma (p = 0.001). Only arterial hypertension was associated with acromegaly (p = 0.000). We found a significant correlation between Cushing's disease and microadenomas (p = 0.000). Non-secreting adenomas were significantly associated with advanced age, long delay in consultation, male sex, tumor syndrome and macroadenomas. Table 3 shows Representation of factors associated with the etiological forms of adenomas Supported.

Patients received medical and surgical treatment, others had both treatments

Table 3. Representation of factors associated with the etiological forms of adenomas.

		Pathologies		p-value
Variables associatedwithprolactinoma		**No n = 162 (%)**	**Yes n = 80 (%)**	
Age	<45 yearsold	73 (53.28%)	64 (46.71%)	0.000**
	≥45 yearsold	89 (84.76%)	16 (15.24%)	
Consultation deadline	<24 months	112 (79.43%)	29 (20.57%)	0.000**
	≥24 months	50 (49.50%)	51 (50.50%)	
Sex	Feminine	65 (51.18%)	62 (48.82%)	0.000**
	Male	97 (84.35%)	18 (15.65%)	
Microadenoma	Yes	17 (37.78%)	28 (62.22%)	0.000**
	No	145 (73.60%)	52 (26.40%)	
Variables associatedwithacromegaly		**No n = 221 (%)**	**Yes n = 21 (%)**	
High blood pressure	No	219 (96.90%)	7 (03.10%)	0.000**
	Yes	7 (50.00%)	7 (50.00%)	
Variables associated with Cushing's disease		**No (n = 227 (%)**	**Yes n = 15 (%)**	
Microadenoma	No	195 (98.98%)	2 (01.02%)	0.000**
	Yes	32 (71.11%)	13 (28.89%)	
Variables associated with non-secreting adenoma		**No n = 116 (%)**	**Yes n = 126 (%)**	
Age	<45 yearsold	87 (63.50%)	50 (36.50%)	0.000**
	≥45 yearsold	29 (27.62%)	76 (72.38%)	
Consultation deadline	≥24 months	46 (32.62%)	95 (67.38%)	0.000**
	<24 months	70 (69.31%)	31 (30.69%)	
Sex	Feminine	83 (65.35%)	44 (34.65%)	0.000**
	Male	33 (28.70%)	82 (71.30%)	
Tumor syndrome	No	48 (72.73%)	18 (27.27%)	0.001**
	Yes	68 (38.64%)	108 (61.36%)	
Macroadenoma	No	42 (93.33%)	03 (6.67%)	0.001**
	Yes	74 (37.56%)	123 (62.44%)	

(medical and surgical). Only 95 patients (39.25%) had received medical treatment. These were mainly prolactin adenomas and those with mixed secretion. In cases of adenoma with associated prolactin secretion, the first-line medical treatment was based on Cabergoline (Dostinex®) in 85 cases (89.5%), Bromocriptine (Parlodel®) in 8 cases (8, 4%), Quinagoline (Norprolac®) in a single case.

Among our patients, 173 (71.48%) had undergone pituitary surgery. The transphenoidal approach was the most used (166 cases, 95.95%). Four (4) patients had undergone a ventriculoperitoneal bypass (2.31%) and 03 an upper route surgery (1.73%). Only one patient had benefited from external radiotherapy. This surgery involved 65.87% of non-secreting adenomas (83 cases), 85% of prolactinomas (68 cases), 85.71% of Cushing's disease cases (12 cases), and 71.42% of acromegaly cases (15 cases).

3.5. Evolution

Postoperative complications were transient diabetes insipidus in 82 cases (47.39%), leakage of cerebrospinal fluid (20 cases, 11.56%). We had observed 18 cases of death (7.43%). They had an average age of 42 years, a sex ratio of 0.8, an average consultation time of 22.44 months, a tumor syndrome in 16 cases (88.88%), a macroadenoma in 15 cases (83.33 %). These were 03 cases of acromegaly, 08 cases of non-secreting adenomas, 01 cases of Cushing's disease and 06 prolactinomas. Only 13 patients had undergone pituitary surgery including 02 cases by high way.

One hundred and sixty-four (67.76%) patients had benefited from medium-term hormonal control. Exploration was normal in 130 patients (79.3%). Among the 173 patients operated on, 156 had performed a control MRI (90.17%). The resection was complete in 61.5% of cases. An improvement in ophthalmological explorations was observed in 80.5% of cases.

4. Discussion

4.1. Epidemiological Data

We report 242 cases of pituitary adenoma from a 14-year multicenter study. This pathology seems to be increasing with a prevalence between 3.9 and 7.4 cases per 100,000 per year [11]. In the United States, Cheng Chen *et al.* [12] reported 47,030 cases of pituitary adenoma over 12 years. In Morocco, 60 cases of pituitary adenoma were found over a period of 5 years [8]. Beyond a few disparities, the average age of 42.4 years found in our cohort was similar to the data in the literature [13]. The gender profile varies from one study to another and according to the specialty of the authors [8] [12] [13] [14]. The female predominance can be explained by the preponderance of prolactin adenomas more expressive in women by amenorrhea-galactorrhea syndrome.

4.2. Clinical Data

In our study, the tumor syndrome was composed mainly of visual disturbances

and headaches [3] [8]. Of the 242 patients, the endocrine syndrome was dominated by gonadotropic disorders, mainly amenorrhea-galactorrhea syndrome. This corroborates data from the African literature [14]. Its impact on the fertility of the couple directs the patients initially in urology or gynecology according to the sex. The epidemiological part of the other secretory syndromes remains variable from one series to another and according to the specialties [15] [16].

Worldwide, there is a disparity in the frequency of the two main etiologies of pituitary adenomas, namely prolactinomas and non-functional adenomas [3] [4] [8] [11] [14]. We report a predominance of non-functional adenomas (51.8%), followed by prolactinomas (32.78%). The predominance of secretory forms in series from medical specialties is strongly guided by specific organ disturbances [14] [15] [16]. This would initially push patients into endocrinology, gynecology, and rheumatology.

The role of tumor syndrome in non-functional adenomas explains the predominance of this entity in neurosurgical series [17]. Macroadenomas seem to be more common in male subjects [18]. These macroadenomas partly reflect a delay in consultation of an average of 18 months [3] [15] [19]. Fernandez *et al*. [15] reported that the delay in diagnosis was more pronounced in male subjects due to the long insidious nature of the symptomatology.

4.3. Supported

In Senegal, we have real difficulties in accessing somatostatin analogues. The medical treatment of functional pituitary adenomas therefore remains limited to the treatment of prolactinomas and bi-secreting adenomas with dopaminergic agonists [5] [6] [7] [20] [21]. In our series, only 95 patients (39.25%) had received medical treatment with dopaminergic agonists. Under this treatment, Irfan *et al*. [5] had found a normalization of the prolactin level in 73.2% and a reduction of more than 50% of the tumor volume in 45.8% after two years. In the study by Kars *et al*. [6] in the Netherlands, it was a normalization of prolactin in 85% and a reduction in tumor volume in 35% of patients. In a series evaluating the impact of medical treatment on prolactin macroadenomas, there was 80% normalization of prolactin, 87% significant reduction in tumor volume and 68% improvement in visual field abnormalities [22]. This reduction in tumor volume was close to 80% [23], or even 100% in 12% and 45% [24].

In our study, the management was surgical in 71.7% and the transsphenoidal approach was the most used. In the Netherlands, Kars *et al*. [6] reported that 35% of cases of prolactinomas required additional surgical treatment. Transsphenoidal pituitary surgery remains the gold standard [8] [25] [26]. However, this approach can be fraught with postoperative complications [27] [28]. Postoperative complications were dominated by transient diabetes insipidus, *i.e*. 67.9%, then cerebrospinal fluid leak, *i.e*. 12.5%. Therefore, management requires a personalized, multidisciplinary approach, taking into account each patient's individual health status and response to previous treatment.

4.4. Limitations of the Study

The limitations of the study encountered were incomplete clinical records, non-exhaustive postoperative exploration, financial difficulties and a large number of patients lost to follow-up.

5. Conclusion

Pituitary pathology is starting to gain momentum in Africa due to the availability of certain specialties. The presence of clinical manifestations already testifies to an evolved character due to the insidious nature of the pathologies. The diagnostic delay explains the predominance of macro-adenomas which are sources of pre- and post-operative mechanical complications. Management has evolved well with the advent of pituitary endoscopy and the multiplication of qualified human resources. However, a better organization, a good definition of the patient circuit and the creation of the register of pituitary pathologies at the national level, will allow to have a better overview of these pathologies, and a better objectivity in our research.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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