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Original article

Evaluation of clinical profiles in patients with benign pituitary tumors

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Summary

Introduction. Benign pituitary tumors are a heterogeneous group of neoplasms with varying clinical presentations depending on their hormonal activity, size, and mass effects. These tumors can cause significant morbidity due to endocrine dysfunction and compression of adjacent structures. Understanding their clinical characteristics is essential for improving diagnostic accuracy, optimizing treatment strategies, and predicting complications. This study aimed to evaluate the clinical profiles of patients with benign pituitary tumors, focusing on demographic characteristics, hormonal activity, and tumor size.

Methods. This retrospective five-year study (2019–2023) conducted at the University Clinical Center of Republic of Srpska, Banja Luka included patients diagnosed with benign pituitary tumors who underwent clinical, biochemical, and radiological evaluations. Demographic data, hormonal profiles, and tumor dimensions assessed via MRI were analyzed. Tumors were classified as functioning or non-functioning based on hormonal secretion. Statistical analysis explored associations between clinical parameters and tumor characteristics.

Results. This study analyzed data from patients diagnosed with benign pituitary gland neoplasms. The mean patient age was 48.61 years (SD = 17.60), ranging from 20 to 85 years. Among 53 patients with available tumor functionality data, 79.2% had functional adenomas, with prolactinomas being the most common (64.1%). Macroadenomas were present in 58.0% of cases, and 22.4% of tumors were invasive. Surgery was performed in 21 patients, with 76.2% undergoing transsphenoidal surgery. Remission was achieved in 5.9%, and complete resection in 17.7%.

Conclusions. A comprehensive assessment of clinical features in benign pituitary tumors is essential for tailoring individualized treatment and improving patient outcomes.

Key words: pituitary tumors, benign neoplasms, hormonal activity, clinical characteristics, endocrine dysfunction, tumor classification

Introduction

Pituitary adenomas are benign tumors of the pituitary gland, with varying clinical presentations depending on their size, hormonal secretion, and invasiveness. These tumors can be classified as functional or non-functional based on their hormonal activity, influencing both their clinical symptoms and treatment strategies. Pituitary adenomas are usually benign and indolent. While some lead to hormone hypersecretion, hypopituitarism, and neurologic dysfunction, many do not cause symptoms and remain undetected. Autopsy and radiographic data indicate that these tumors are relatively common, with overall prevalence rates varying from 10 to 22% [1, 2].

The epidemiology of pituitary adenomas is well-documented, with a diverse range of presentations and clinical outcomes highlighting the complexity of these tumors. Epidemiological studies indicate a global incidence that varies based on geographical location, sex, and age [3]. The demographic distribution of pituitary adenomas typically shows a higher prevalence in women for microadenomas, while men tend to develop macroadenomas more frequently. These trends are consistent with previous studies noting age- and sex-related differences in tumor occurrence.

Hemminki, Försti, and Ji [4] found an interaction between sex and age in pituitary adenoma incidence. Female incidence rates were higher than male rates up to about 30 years of age when the pattern was reversed. This has been attributed to earlier and more noticeable symptoms of associated hyperprolactinemia in females [5] (e.g., amenorrhea and galactorrhea). The most prominent symptom of hyperprolactinemia in males is decreased libido, which is not as easily diagnosed [6].

Previous studies have demonstrated a significant sex- and age-related distribution in pituitary adenomas, with a higher incidence observed in specific age groups and differences in tumor types across sexes. Sex and age are significant factors influencing the occurrence of pituitary adenomas, with men more frequently presenting with larger adenomas, while women are more commonly diagnosed with smaller tumors [7].

Functioning pituitary adenomas, which secrete hormones such as prolactin, growth hormone, and ACTH, have distinct clinical and epidemiological characteristics compared to non-functioning adenomas. As highlighted by Doknic et al. (2024), the impact of hormonal imbalances can have significant clinical consequences, which is why personalized treatment strategies, including hormone replacement therapy, are often required [8]. As highlighted by Chin SO (2020) [9], these tumors are more likely to present with endocrine-related symptoms and are commonly diagnosed in younger patients compared to their non-functioning counterparts. Prolactinomas are more commonly diagnosed in women of reproductive age, while acromegaly (growth hormone-secreting adenomas) occurs more frequently in middle-aged individuals.

Tumor size increases with age at diagnosis, with a larger sex difference in early life. Surgical resection remains the gold standard in the treatment of pituitary adenomas, with transsphenoidal surgery being the most commonly employed approach. However, as shown by Doknic et al. (2024), hormone replacement therapies, such as growth hormone supplementation, can be crucial in improving clinical outcomes in patients with pituitary dysfunction, especially in those with childhood-onset hormone deficiencies [8]. Postoperative monitoring of hormone levels, such as prolactin and IGF-1, is crucial for assessing the success of surgery and determining the need for adjunctive treatments [10].

Clinical and epidemiological studies from different geographic regions, including Saudi Arabia, underscore the importance of regional differences in pituitary tumor prevalence and treatment protocols. The characteristics of pituitary adenomas, such as tu-

mor size and hormonal activity, vary across different regions, providing valuable epidemiological insights [11].

The aim of this study was to evaluate the clinical characteristics, hormonal levels, and treatment outcomes of patients diagnosed with benign pituitary tumors at the University Clinical Center of Republic of Srpska, Banja Luka.

Methods

Study Design

This study is a retrospective, observational cohort study conducted over a five-year period, from 2019 to 2023. It aimed to analyze data from patients treated at the University Clinical Center of Republic of Srpska, Banja Luka, with a diagnosis of benign pituitary tumors (Neoplasma benignum glandula epituitariae). The study included both preoperative and postoperative clinical and biochemical data for all patients.

The study population consisted of patients diagnosed with benign pituitary tumors who underwent treatment at the University Clinical Center of Republic of Srpska, Banja Luka during the study period. The inclusion criteria were: adults (18 years and older); confirmed diagnosis of benign pituitary tumors (adenomas); available preoperative and postoperative clinical and biochemical data. Exclusion criteria: patients with incomplete medical records or those who underwent treatment for malignant pituitary tumors were excluded.

Data were collected retrospectively from the medical records of patients. The following parameters were evaluated:

- Demographic data: Age, sex, and other relevant characteristics.
- Tumor characteristics: Tumor size (macroadenoma vs. microadenoma), tumor functionality (functional vs. non-functional adenomas), and tumor invasion (invasive vs. non-invasive).
- Biochemical parameters: Preoperative and postoperative serum levels of Insulin-like Growth Factor 1 (IGF-1) and prolactin.
- Surgical and radiotherapy data: Type of surgical approach (e.g., transseptal transsphenoidal, gamma knife, radiosurgery), resection status (complete or incomplete resection), and radiotherapy treatment (number of sessions and radiation dose).
- Clinical outcomes: Remission status following the treatment (complete remission or no remission).

Tumors were classified as functional if they were associated with the secretion of specific hormones (e.g., prolactin, growth hormone, ACTH, TSH), and non-functional if no such hormone secretion was detected. The functional tumors were further categorized based on the hormone secreted:Prolactin-secreting adenomas (prolactinomas), ACTH-secreting adenomas, Growth hormone-secreting adenomas, TSH-secreting adenomas, Hypersecretory adenomas, Incidentalomas.

Statistical Analysis

Descriptive statistics were used to summarize demographic and clinical characteristics, including means, medians, standard deviations (SD), interquartile ranges (IQR), and ranges. For continuous variables, the mean ± SD and median (IQR) were reported, depending on the distribution of the data.To assess the differences in biochemical parameters and clinical outcomes before and after treatment, paired t-tests were used for normally distributed data, and Wilcoxon signed-rank tests were employed for non-normally distributed data. For the analysis of sex differences in tumor type and size, odds ratios (OR) were calculated with 95% confidence intervals (CI). The statistical significance of associations between sex and adenoma type was determined

using Chi-square tests or Fisher's exact test when applicable. A p-value of less than 0.05 was considered statistically significant. Sampling weights, except sample description, were used during statistical analysis of data. The results were presented in tables and figures. All statistical analyses were performed using SPSS version 23 (IBM, USA).

Ethical Considerations

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Ethics Committee of the University Clinical Center of Republic of Srpska prior to the initiation of the study. Given the retrospective nature of the study, informed consent was not required. However, all patient data were anonymized to ensure confidentiality.

Results

A retrospective five-year study conducted between 2019 and 2023 analyzed data from patients treated at the University Clinical Center of Republic of Srpska, Banja Luka, with a diagnosis of Neoplasma benignum glandulae pituitariae.

Tables 1 and 2 present overviews of the basic clinical and therapeutic parameters in patients.The mean age of the patients was 48.61 years (SD = 17.60), with a median age of 46.00 years. The youngest patient was 20 years old, while the oldest was 85 years old. The 95% confidence interval for the mean age ranged from 44.85 to 52.37 years.

Preoperatively, the mean IGF-1 level was 273.60 (SD = 304.54), with a median of 160.50. The values ranged from 45.00 to 985.94, and the 95% confidence interval for the mean IGF-1 level was 71.50 to 475.70. Postoperatively, the mean IGF-1 level slightly increased to 299.67 (SD = 257.83), with a median of 151.00. The range varied from 66.00 to 868.00, while the 95% confidence interval was [151.86; 447.48]. Regarding prolactin levels, the preoperative mean was significantly higher at 5,980.83 (SD = 20,065.12), with a median of 333.50. Individual values ranged from 14.00 to 127,425.00, and the 95% confidence interval was [244.30; 11,717.36]. Postoperatively, the mean prolactin level decreased significantly to 237.34 (SD = 249.08), with a median of 181.00. The lowest recorded value was 1.10, and the highest was 979.00, with the 95% confidence interval of [105.33; 369.35]. Only three patients underwent radiotherapy, with a mean number of

Table 1. Overview of basic clinical and therapeutic parameters in patients

	N	Mean value (μ)	SD	Mediana (M)	Min; Max	95% Confidence Interval
Patient age	85	48.61	17.60	46.00	20.00; 85.00	[44.85; 52.37]
IGF-1 preoperative	12	273.60	304.54	160.50	45.00; 985.94	[71.50; 475.70]
IGF-1 postoperative	15	299.67	257.83	151.00	66.00; 868.00	[151.86; 447.48]
prolactin preoperative	48	5,980.83	20,065.12	333.50	14.00; 127,425.00	[244.30; 11,717.36]
prolactin postoperative	17	237.34	249.08	181.00	1.10; 979.00	[105.33; 369.35]
Number of RTtreatmens	3	29.33	0.94	30.00	28.00; 30.00	[26.47; 32.19]
Radiation dose RT	2	23.25	21.75	23.25	1.50; 45.00	[-253.11; 299.61]

*IGF-1 - Insulin-like Growth Factor 1; RT - radiotherapy; SD - standard deviation

treatment sessions of 29.33 (SD = 0.94) and a median of 30. The number of sessions ranged from 28 to 30, with the 95% confidence interval of [26.47; 32.19]. Concerning radiation dose, the preoperative mean dose was 23.25 (SD = 21.75), with an identical median value. The recorded values ranged from 1.50 to 45.00, but the wide confidence interval [-253.11; 299.61] indicated considerable variability, which was expected given the small number of patients in that subgroup. Among the 53 patients with available data on tumor functionality, 42 (79.2%) had functional pituitary tumors, while 11 (20.8%) had non-functional tumors. Data were analyzed for 69 patients, of whom 40 (58.0%) had macroadenomas, while 29 (42.0%) had microadenomas. Among 39 patients diagnosed with an adenoma, the majority (25 patients, 64.1%) had a prolactinoma, whereas a smaller proportion

Table 2. Overview of basic clinical and therapeutic parameters in patients

	N (%)
Functionality	
functional	42 (79.2%)
non-functional	11 (20.8%)
	N = 53
Tumor type based on size	
Macroadenoma	40 (58.0%)
Microadenoma	29 (42.0%)
	N = 69
Type of adenoma	
ACTH-secreting	3 (77%)
GH-secreting	8 (20.5%)
TSH-secreting	1 (2.6%)
Hypersecreting adenoma	1 (2.6%)
Incidentaloma	1 (2.6%)
Prolactinoma	25 (64.1%)
	N = 39
Invasion	
invasive	19 (22.4%)
non-invasive	66 (77.6%)
	N = 85
Radiotherapy	
yes	3 (3.53%)
no	82 (96.47%)
	N = 85
Type of surgery	
gamma knife	1 (4.8%)
radiosurgery	1 (4.8%)
transsphenoidaltransseptal	16 (76.2%)
transsphenoidaltransseptal and transcranial	2 (9.5%)
transnasal and transcranial	1 (4.8%)
	N = 21
Resection status	
complete	3 (17.7%)
incomplete	14 (82.3%)
	N = 17
Remission	
yes	5 (5.9%)
no	80 (94.1%)
	N = 85

*ACTH - Adrenocorticotropic Hormone; GH - Growth Hormone; TSH - Thyroid Stimulating Hormone

Table 3. Overview of basic clinical and therapeutic parameters by patient gender

	Female N = 58	male N = 27	p-Value
Age	46 (IQR 31.5)	50 (IQR 24)	0.367
Functionality of adenoma			>0.999
functional	30 (78.95%)	12 (80.0%)	
non-functional	8 (21.05%)	3 (20.0%)	
	N = 38	N = 15	
Type of adenoma based on size			**0.004**
macroadenoma	15 (30.61%)	14 (70.0%)	
microadenoma	34 (69.39%)	6 (30.0%)	
	N = 49	N = 20	
Type of adenoma			0.861
ACTH-secreting	3 (10.71%)	0 (0.0%)	
GH-secreting	6 (21.43%)	2 (18.18%)	
TSH-secreting ći	1 (3.57%)	0 (0.0%)	
hypersecreting adenoma	1 (3.57%)	0 (0.0%)	
incidentaloma	1 (3.57%)	0 (0.0%)	
prolactinoma	16 (57.14%)	9 (81.82%)	
	N = 28	N = 11	
IGF-1 preoperative	182.5 (IQR 460.25) N = 8	53.0 (IQR 45.08) N = 4	0.202
prolactin preoperative	330.0 (IQR 677.0) N = 29	372.0 (IQR 12899.5) N = 19	0.704
Type of surgery			0.691
gamma knife	1 (6.67%)	0 (0.0%)	
radiosurgery	1 (6.67%)	0 (0.0%)	
transsphenoidaltranssepta00l	10 (66.67%)	5 (83.33%)	
transsphenoidaltransseptal and transcranial	2 (13.33%)	0 (0.0%)	
transnasal and transcranial	0 (0.0%)	1 (16.67%)	
	N = 15	N = 6	
IGF-1 post op	318.22 (± 261.61) Range: (66.0; 716.0) N = 9	271.83 (± 297.29) Range: (86.0; 868.0) N = 6	>0.999
prolactin post op	211.44 (± 179.95) 95% CI: [107.53; 315.34] Range: (1.1; 631.0) N = 14	358.23 (± 538.75) 95% CI: [-980.09; 1696.56] Range: (12.7; 979.0) N = 3	0.386
Remission			>0.999
yes	3 (100.0%) N = 3	2 (100.0%) N = 2	

*ACTH - Adrenocorticotropic Hormone; GH - Growth Hormone; TSH - Thyroid Stimulating Hormone; IGF -1 - Insulin-like Growth Factor 1

had ACTH-secreting (7.7%), GH-secreting (20.5%), TSH-secreting (2.6%), hypersecretory adenomas (2.6%), or incidentalomas (2.6%). Out of 85 patients with available data on tumor invasion, 19 (22.4%) had invasive adenomas, whereas 66 (77.6%) had non-invasive adenomas.Only three patients (3.53%) out of 85 underwent radiotherapy, while 82 patients (96.47%) did not receive radiation therapy. Among the 21 patients who underwent surgical treatment, 16 (76.2%) underwent a transseptal transsphenoidal procedure, while a smaller number of patients underwent gamma knife surgery (4.8%), radiosurgery (4.8%), combined transseptal transsphenoidal and transcranial approach (9.5%), or transnasal and transcranial approach (4.8%). Data on resection status showed that, among 17 patients, three (17.7%) achieved complete resection, whereas 14 (82.3%) had incomplete resection or residual tumor presence. Only five patients (5.9%) achieved remission, whereas 80 patients (94.1%) did not achieve remission.

We compared all examined parameters based on sex (Table 3). In the analysis of sex and adenoma type concerning tumor size, the results showed that in the macroadenoma group, 70.0% were men, while 30.61% were women. Conversely, in the microadenoma group, 30.0% were men, while 69.39% were women. The calculated odds ratio (OR = 5.29) indicated that the probability of men being in the macroadenoma group was 5.29 times higher than that of women. When converting the OR to a percentage, the likelihood that men were more frequently present in the macroadenoma group was approximately 84.0%. The 95% confidence interval (CI 95% = 1.70–16.42) confirmed the statistical significance of this association, indicating a moderate correlation between sex and adenoma size. The obtained p-value (p = 0.004) further supported this significant difference, suggesting that sex was a relevant factor in predicting adenoma type. Men are more prone to developing macroadenomas, whereas women are more frequently found in the microadenoma group. Other analyzed parameters did not show statistically significant differences between sexes.

Table 4 presents a comparison of preoperative and postoperative prolactin values. The mean preoperative prolactin level in patients was 5,980.83 μg/L (SD = 20,277.46), with a wide range of values from 14 to 127,425 μg/L. The median preoperative prolactin level was 333.5 μg/L (IQR: 204.5–1085.5), indicating a pronounced asymmetry in the data distribution.

After surgery, the mean prolactin level significantly decreased to 237.34 μg/L (SD = 256.75), with values ranging from 1.1 to 979 μg/L. The postoperative median prolactin level was 181 μg/L (IQR: 83–263). These results suggest a significant reduction in prolactin levels following surgical treatment, although in some patients, postoperative values did not reach the reference range, which may indicate a need for additional therapy. The median serum prolactin level before surgery in patients was 236.0 μg/L (IQR = 745.0), while the postoperative value was 177.0 μg/L (IQR = 454.0). The median difference before and after surgery was 103.95 μg/L (IQR = 355.48; 95% CI

Table 4. Comparison of preoperative and postoperative prolactin values

	N	Mean (SD) Count (%)	95% CI	Min Max	Q1 Q3	Median
prolactin preoperative	48	5980.83 (20277.46)	92.87 11868.79	14 127425	204.5 1085.5	333.5
prolactin postoperative	17	237.34 (256.75)	105.33 369.35	1.1 979	83 263	181

*SD - standard deviation; CI - confidence interval

= [-12.0; 14,720.0]), but this difference did not reach statistical significance (p = 0.156). These findings suggest a tendency for a decrease in prolactin levels after surgery, but with pronounced variability among patients and no statistically significant difference.

Individual changes in prolactin levels before and after surgery are shown in the figure 1. In most patients, a decrease in serum prolactin was observed following surgical treatment, although the variability of the response was significant. One patient had markedly elevated preoperative values (> 28,000 μg/L), which significantly decreased postoperatively. In some patients, prolactin reduction was greater than 50%, while in others, the decrease was less pronounced. No increase in prolactin was observed in any patient postoperatively. These findings suggest that, although surgical treatment generally leads to reduction in prolactin levels, in some patients, normalization of the hormone was not achieved, which may indicate incomplete tumor resection or the need for additional pharmacological therapy.

Discussion

Our findings on pituitary adenoma demographics align with prior studies. Hemminki, Försti, and Ji [4] reported a higher incidence in females up to 30 years of age, after which males had higher rates. This sex difference likely results from the more overt symptoms of hyperprolactinemia in women, such as amenorrhea and galactorrhea, compared to subtler symptoms in men like reduced libido [5]. While our study showed no significant main effect for sex (p = 0.154), the interaction between age and sex was highly significant (p < 0.0001), with women presenting at a younger mean age (46.00 years) and men at an older age (50.00 years). Daly and Beckers (2020) [3] noted the high prevalence of pituitary adenomas, with autopsy studies indicating a 16.7% occurrence in the general population. Mean age of 48.61 years in our study aligns with McDowell et al. (2011) [10] and Mindermann and Wilson (1994) [7], who reported peak incidence between 35 and 60 years. Regarding

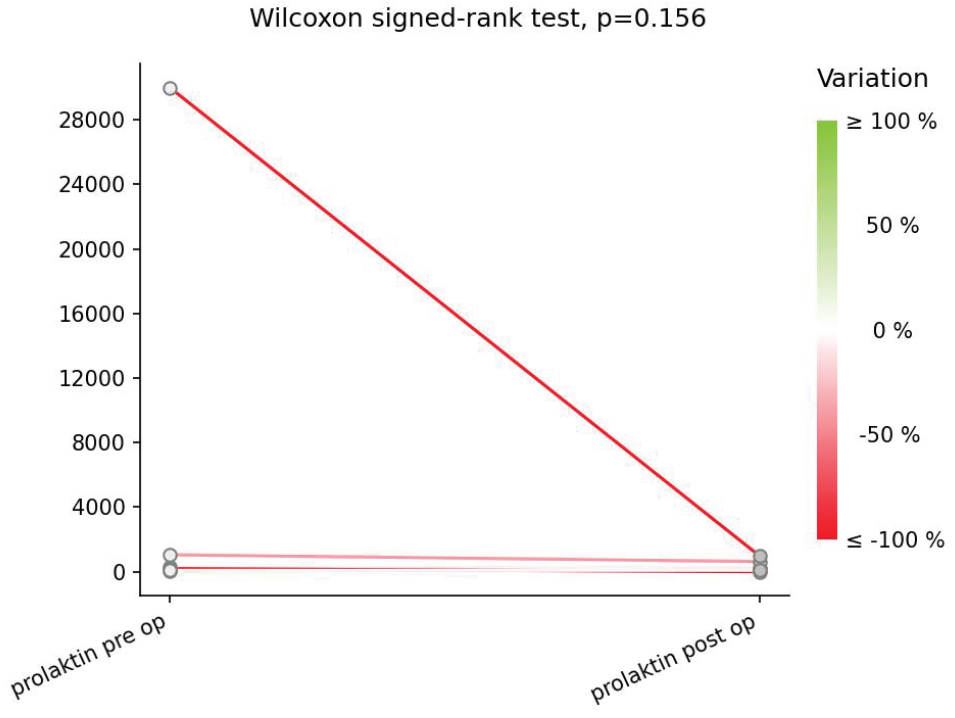

Figure 1. Individual changes in prolactin levels before and after surgery

tumor size distribution, our results indicate a significant difference between sexes. Specifically, 70% of macroadenoma patients were males, whereas 69.39% of microadenoma patients were females. The odds ratio of 5.29 suggests that males are significantly more likely to present with macroadenomas than females, supporting findings by McDowell et al. [10]. However, other clinical parameters, including tumor functionality, IGF-1 and prolactin levels, and surgical approach, show no significant sex-based differences, suggesting that sex influences adenoma size but not necessarily hormonal activity.

Our findings align with Daly and Beckers (2020) [3], who observed that men tended to have more macroadenomas, while prolactinomas were more common in women. Conversely, Hussein et al. [11] reported a higher prevalence of pituitary tumors in females, differing from our results, where males predominated in the macroadenoma group. Such discrepancies may reflect regional variations in pituitary tumor epidemiology, warranting further research.

McDowell et al. (2011) [10] noted that prolactinomas were more prevalent in women, while men were more likely to develop non-functional adenomas or those secreting other hormones. Our results align with this observation, reinforcing the role of sex in determining adenoma type and size.

Our study also assessed changes in prolactin levels pre- and post-surgery. Significant reductions were observed, with mean prolactin levels decreasing from 5,980.83 μg/L to 237.34 μg/L. However, inter-individual variability suggests that incomplete tumor resection or the need for adjunctive therapy may contribute to these outcomes. Only 5.9% of patients achieved full remission [4], consistent with findings by Chin SO (2020) [9], who emphasized the necessity of dopamine agonists for complete hormonal normalization in prolactinomas.

Surgical treatment was primarily performed via transsphenoidal surgery, aligning with Daly and Beckers (2020) [3], who described this approach as the standard for pituitary adenomas. However, a significant proportion of patients in our cohort had residual tumors, with only 17.7% achieving complete resection. This supports prior observations that larger tumors, particularly macroadenomas, are less likely to achieve full remission post-surgery.

Radiotherapy was administered to 3.53% of patients, reflecting its limited role in pituitary adenoma treatment. Hussein et al. [11] and Zada et al. [12] also noted that radiotherapy was typically reserved for recurrent or residual tumors. Our findings suggest that radiotherapy was mainly used in cases of incomplete surgical resection, consistent with current clinical guidelines. Surgical intervention remains the primary treatment modality for pituitary adenomas [11], particularly for larger tumors. However, the low remission rate (5.9%) in our cohort highlights the challenges of achieving full hormonal control through surgery alone. Chin SO (2020) [9] noted that functional adenomas often required multimodal treatment, emphasizing the importance of combining surgery with pharmacotherapy when necessary.

Our findings on sex differences in pituitary adenoma characteristics are in line with previous studies. Functional adenomas, particularly prolactinomas, were more common in women, whereas non-functional macroadenomas predominated in men. This observation is supported by McDowell et al. [10] and Mindermann and Wilson (1994) [7], who reported similar sex-based distributions.Overall, our study underscores the complexity of pituitary adenoma diagnosis and management. The predominance of functional adenomas (79.2%), with prolactinomas being the most common, aligns with epidemiological trends reported by Chin SO (2020) [9]. Additionally, our finding that 70% of macroadenomas occurred in males, whereas women were more frequently diagnosed with microadenomas, is consistent with previously documented sex-based patterns [9].Hussein et al. (2018) [11] examined pituitary tumor

epidemiology in Saudi Arabia and reported a high prevalence of non-functional adenomas. While their findings contrast with our study, which observed a predominance of functional adenomas, this difference may reflect regional variations in pituitary tumor presentations. Future research should investigate these epidemiological differences in greater detail.

Our study highlights the importance of individualized treatment strategies based on tumor size, hormonal activity, and patient demographics. The observed variability in postoperative outcomes suggests that a multidisciplinary approach, incorporating surgical, pharmacological, and occasionally radiotherapeutic interventions, is essential for optimizing patient outcomes. Further studies with larger cohorts and extended follow-up periods are necessary to refine treatment protocols and improve long-term prognoses for patients with pituitary adenomas.

The findings of this study demonstrate a statistically significant association between sex and adenoma size, with male patients exhibiting a higher predisposition for developing macroadenomas.

Nevertheless, several methodological limitations should be acknowledged. The retrospective design inherently increases susceptibility to selection bias and incomplete data acquisition. Furthermore, the limited sample size, particularly within specific subgroups, reduces the statistical power and external validity of the findings. The absence of a control group precludes direct comparative analyses, while heterogeneity in patient follow-up intervals hinders the accurate assessment of long-term clinical outcomes.

Despite these constraints, the present study contributes meaningful insights into the clinical profiles of benign pituitary tumors and emphasizes the importance of conducting future investigations utilizing larger, well-defined cohorts, prospective study designs, and standardized long-term follow-up protocols to validate and expand upon these findings. In particular, multicenter, randomized controlled trials and longitudinal cohort studies are warranted to more comprehensively assess clinical outcomes, optimize treatment strategies, and establish evidence-based guidelines for the management of benign pituitary tumors.

Conclusion

This study highlights the complexity of diagnosing and treating benign pituitary tumors. A majority of patients had functional adenomas, with prolactinomas being the most prevalent. Male patients were significantly more likely to develop macroadenomas, emphasizing the role of sex in tumor characteristics. Postoperative prolactin reductions varied, suggesting that incomplete resection or the need for additional therapy may influence outcomes. Despite surgical intervention, residual tumors remained in 82.3% of patients, underscoring the limitations of resection alone. The use of radiotherapy, though limited, further reflects the need for individualized treatment approaches. These findings emphasize the necessity for comprehensive treatment strategies tailored to each patient, incorporating multimodal therapies where needed. Future research with larger cohorts and extended follow-up is essential to refine management strategies and improve long-term outcomes in patients with benign pituitary tumors.

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Ethical approval. The Ethics Committee of the University Clinical Center of Republic of Srpska, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, approved the study and informed consent was obtained from all individual respondents. The research was conducted according to the Declaration of Helsinki.

Conflicts of interest. The authors declare no conflict of interest.

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Procena kliničkih profila pacijenata sa benignim tumorima hipofize

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Uvod. Benigni tumori hipofize predstavljaju heterogenu grupu neoplazmi sa različitim kliničkim manifestacijama u zavisnosti od njihove hormonalne aktivnosti, veličine i mas efekata. Ovi tumori mogu izazvati značajan morbiditet usled endokrine disfunkcije i kompresije okolnih struktura. Razumevanje njihovih kliničkih karakteristika ključno je za poboljšanje dijagnostičke preciznosti, optimizaciju terapijskih strategija i predikciju komplikacija. Cilj ove studije bio je da proceni kliničke profile pacijenata sa benignim tumorima hipofize, sa fokusom na demografske karakteristike, hormonalnu aktivnost i veličinu tumora.

Metode. Ova retrospektivna petogodišnja studija (2019–2023) sprovedena u Univerzitetskom kliničkom centru Republike Srpske, Banja Luka, obuhvatila je pacijente sa dijagnozom benignih tumora hipofize koji su prošli kliničku, biohemijsku i radiološku evaluaciju. Analizirani su demografski podaci, hormonalni profili i dimenzije tumora određeni putem MRI snimanja. Tumori su klasifikovani kao funkcionalni ili nefunkcionalni na osnovu sekrecije hormona. Statističkom analizom ispitane su asocijacije između kliničkih parametara i karakteristika tumora.

Rezultati. Studija je analizirala podatke pacijenata sa benignim neoplazmama hipofize. Prosečna starost pacijenata iznosila je 48,61 godinu (SD = 17,60), sa rasponom od 20 do 85 godina. Od 53 pacijenta sa dostupnim podacima o funkcionalnosti tumora, 79,2% je imalo funkcionalne adenome, pri čemu su prolaktinomi bili najčešći (64,1%). Makroadenomi su dijagnostikovani u 58,0% slučajeva, dok je 22,4% tumora bilo invazivno. Hirurški tretman je sproveden kod 21 pacijenta, pri čemu je 76,2% podvrgnuto transsfenoidalnoj hirurgiji. Remisija je postignuta kod 5,9%, dok je kompletna resekcija zabeležena kod 17,7% pacijenata.

Zaključak. Sveobuhvatna procena kliničkih karakteristika benignih tumora hipofize ključna je za prilagođavanje individualizovane terapije i poboljšanje ishoda lečenja.

Ključne reči: tumori hipofize, benigne neoplazme, hormonalna aktivnost, kliničke karakteristike, endokrina disfunkcija, klasifikacija tumora