



Original Article

Outcomes of Management of Pituitary Adenoma by Use of Octreotide Injections Preoperatively

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ABSTRACT

Objective: This study explored the effects of octreotide injections in patients with pituitary adenoma preoperatively.

Material and Methods: A quasi-observational study was conducted on 12 patients in the Neurosurgery department of the Punjab Institute of Neurosciences (PINS) with a diagnosis of pituitary adenoma. To determine the size of the tumor, we did an MRI brain with pituitary protocol and after octreotide medication. The mode of diagnosis was clinical status, MRI brain, and biopsy of the tumor. We gave 14 short-acting octreotide injections to all patients before surgery and monitored their clinical and serum IGF levels. After the completion of 14 injections of octreotide, we planned surgery for the complete excision of the tumor. We performed IGF level 2 weeks after surgery. Then, we gave long-acting octreotide injections to all patients after every 28 days.

Results: The mean age was 43 years. 67% of patients were male and 33% of patients were female. 92% of patients presented with decreased vision. 17% of patients presented to us with complete loss of vision. In 17% of patients, the vision of the patients improved. Serum IGF levels significantly decreased after short-acting octreotide, surgical excision, and long-acting octreotide therapy.

Conclusion: With the use of octreotide therapy clinical status and outcomes of management of pituitary adenoma improve.

Keywords: Serum IGF, Octreotide, Pituitary adenoma.

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INTRODUCTION

This study explored the effects of octreotide injections in patients with pituitary adenoma preoperatively. The prevalence of pituitary adenomas is 17% and approximately 35% are invasive and just 0.1% to 0.2% are carcinomas. Pituitary tumors

constitute about 10% to 25% of all intracranial tumors. Benign tumors do not secrete hormones and they do not invade.¹ If the size of pituitary tumors is greater than 1 cm they are called macroadenomas and if the size is less than 1 cm they are called microadenomas.^{2,3,4} The pituitary gland secretes cortisol, prolactin, growth hormone, luteinizing hormone follicle stimulating hormone, antidiuretic hormone, thyroid stimulating hormone, and oxytocin hormone⁵. If pituitary adenoma compresses the optic nerve at the optic chiasma then bitemporal hemianopsia occurs. And if compress the abducens nerve, cause lateral rectus palsy.⁶

If pituitary adenoma compresses the ventricles then hydrocephalus can occur.⁷ A disorder caused by excessive growth hormone (GH) after the closure of growth plates is called acromegaly. Deepening of the voice, headaches, enlargement of the hands and feet forehead, jaw, and nose. joint pain, thicker skin, and problems with vision are symptoms of acromegaly. Due to the pulsatile nature of the secretion of GH, serum growth hormone level is not a reliable test to diagnose acromegaly. Serum IGF1 level provides the most reliable test for the diagnosis of pituitary adenoma.^{8,9,10} An MRI of the brain is also used for diagnosis purposes.

Treatment options include surgery, medications (somatostatin analogs), and radiation therapy. Somatostatin analogs can be used to reduce the size of large tumors. If somatostatin analogs are contraindicated dopamine agonists, bromocriptine or cabergoline are the treatment of choice. The growth hormone receptor antagonist pegvisomant is a medical treatment for acromegaly. Surgical excision of the pituitary tumor lowers growth hormone levels. Two surgical approaches are used for the excision of the tumor.¹¹ Radiation therapy is given for 2 to 5 years and lowers GH levels by about 50 percent.¹¹

MATERIAL AND METHODS

Study Design

A quasi-observational study was conducted on twelve patients for seven months from the first of April 2022 to the thirty-first of October 2022. We performed an MRI brain with pituitary protocol and after giving octreotide therapy to see the size of the tumor.

Inclusion Criteria

Patients having acromegaly, GCS above 15/15, age range 20 – 50 years, and patients with co-morbidities were included in the study.

Exclusion Criteria

Patients of gigantism, age range 20-50 years, and GCS below 15/15 were excluded from our study.

Data Collection

Patients' data were collected on proforma and processed in SPSS version 26. We gave 14 short-acting octreotide¹⁴ injections to all patients before surgery and monitored their clinical and serum IGF levels. After the completion of 14 injections of octreotide, we planned surgery for the complete excision of the tumor. We performed IGF level 2 weeks after surgery. Then, we gave long-acting octreotide injections to all patients after every 28 days. After completion of 3 doses of long-acting octreotide injections, we again performed serum IGF levels of all patients. Serum IGF levels were improved significantly. In those patients in whom serum IGF levels were still high, we gave 3 more injections of octreotide and then will perform serum IGF levels. If after that serum IGF level may remain still high then additional few doses of octreotide injection will be given to normalize the level. If on MRI brain with contrast there will be residual tumor with enhancing nodule then we will refer patients for GAMA knife surgery.

RESULTS

Age & Gender Incidence

The mean age was 43 years. Patients between the age range of 20 – 40 years were 10 while between the age range of 40 - 50 years were only 2 (Table 1). In our study, we included 8 (67%) male patients and 4 (33 %) female patients.

Serum IGF Levels

Normal range of serum IGF is 90 – 232 ng/ml. We checked serum IGF level on admission, after

giving 14 injections of short-acting octreotide therapy. We again checked serum IGF level after 2 weeks post-operatively. Then, we gave long-acting octreotide therapy and monitored serum IGF level.

Table 1: Age Distribution.

Age	No	Percentage	Frequency
20 – 30 years	4	33.3%	33.3%
31 – 40 years	6	50%	83.3%
41 – 50 years	2	16.7%	100%

Table 2: Serum IGF Level After Octreotide Therapy.

On Admission (ng)/ml	Age (years)	Gender	After Two Weeks of Short-Acting Octreotide Therapy (ng)/ml (Pre-Operatively)	Two Weeks After the Excision (ng)/ml (Post-Operatively)	After Monthly Long-Acting Octreotide Therapy (ng)/ml
1500	39	Male	1320	500	350 after 3 injections
600	45	Male	540	450	300 after 4 injections
700	33	Male	630	350	230 after 6 injections
870	27	Male	700	560	210 after 6 injections
900	41	Female	755	525	270 after 5 injections
750	23	Male	600	330	360 after 4 injections
1200	25	Female	933	620	420 after 4 injections
1125	35	Male	890	770	400 after 5 injections
920	22	Male	450	380	339 after 5 injections
4000	40	Female	2200	1500	455 after 4 injection s
840	36	Male	710	520	370 after 4 injections
730	34	Female	560	410	330 after 5 injections

DISCUSSION

If we give serum octreotide injection along with surgery for the management of pituitary adenoma then serum IGF level significantly decreases and the outcome improves. We observed that the use of short-acting octreotide therapy preoperatively will help to normalize the serum IGF-1 level. The use of long-acting octreotide therapy post-operatively will help to normalize the serum IGF-1 level. All patients had acromegaly regardless of etiology.

Injection octreotide was given to all patients. 14 injections were given on daily basis and then

we performed surgery and then we gave long-acting octreotide therapy to all patients after surgery every 28 days and monitored their serum IGF level.

Co-morbidities like diabetes mellitus, hypertension, and dilated cardiomyopathy were included in our study. Our patients presented with a history of decreased vision, blurred vision, blindness, vomiting, fits, and headaches. For all patients, we operated after giving 14 injections of octreotide. The 7 (58%) patients were operated on through the transnasal approach while 5 (42%) patients were operated on through the

transcranial approach. Complete excision was done in all patients. Post-operatively, clinical status, urine output, and serum electrolytes were monitored to see diabetes insipidus. Our 4 (33%) patients developed diabetes insipidus which was managed medically. After completion 2 weeks after surgery we again performed serum IGF level. After short-acting octreotide therapy, vision improved in 2 (17%) patients. Perimetry was performed in all patients on admission, after short-acting octreotide therapy, after surgery, and also after long-term octreotide therapy to see improvement in vision. On echocardiography, there was cardiomegaly in one (8%) patient only. None of our patients had visceromegaly other than that. Our 2 (17%) patients presented to us with signs of hydrocephalus in these patients VP shunts were placed. After following standard guidelines for the management of pituitary adenoma it was seen that after 3 injections of long-acting octreotide therapy serum IGF level returned to normal range in nearly all patients and outcomes of management improves.

In our study, 2 patients had co-morbidities and they died. Our follow-up period was 7 months through OPD. Patients were given symptomatic medical management along with octreotide therapy. Patients whose serum IGF level was not decreased were advised to go for radiotherapy.

P Lundin et al. showed that after long-acting octreotide therapy tumor size decreases and serum IGF level is significantly decreased. Although it is a good study, they gave only long-term octreotide therapy.¹³ Fukuhara et al, published results and reported that there is shrinkage of tumor size and a decrease in the level of serum IGF level after short-acting octreotide injections. In this study, they gave only short-term octreotide therapy.¹⁴ Solari et al. reported that most pituitary adenomas are managed by a transnasal approach. In this article surgical strategy was elaborated.¹⁵ Ferolla et al, reported that the shortened schedule of LAR

administration was able to re-institute control of clinical symptoms, decrease the level of circulating neuroendocrine markers, and increase time to progression. They gave only long-acting octreotide therapy.¹⁶

CONCLUSION AND RECOMMENDATIONS

The clinical state and results of pituitary adenoma care improve with the use of octreotide medication. If we give serum octreotide injection along with surgery for the management of pituitary adenoma then serum IGF level significantly decreases and the outcome improves. So, it is recommended that we should give short-acting octreotide therapy for 2 weeks before surgery then excision should be performed and after excision, long-acting octreotide therapy should be given to all patients until serum IGF- 1 level becomes normal.

ADVANTAGES AND LIMITATIONS

Good outcomes and less or hospital stays are observed. However, octreotide injections are costly so all patients cannot afford to buy them.

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Additional Information

Disclosures: Authors report no conflict of interest.

Ethical Review Board Approval: The study conformed to the ethical review board requirements.

Human Subjects: Consent was obtained by all patients/participants in this study.

Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

AUTHOR CONTRIBUTIONS

Sr. No.	Author's Full Name	Intellectual Contribution to Paper in Terms of
1.	Rana Zubair Mahmood	Study Design, Methodology, and Paper Writing.
2.	Mukhtiar Ahmed Lakho	Data Calculation and Data Analysis.
3.	Talha Abbas	Interpretation of Results.
4.	Shahzeb Ahmad	Statistical Analysis.
5.	Umer Farooq, Muhammad Afraz	Literature Review.