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Preoperative Factors Associated with Postoperative Diabetes Insipidus after Transsphenoidal Pituitary Adenectomy

Transsphenoidal pituitary adenectomy is the gold standard method of treatment of pituitary adenomas. Post-operative diabetes insipidus is one of the common complication of this procedure. In this study we have analyzed pre-operative factors that may be associated with onset of diabetes insipidus following this procedure.

A retrospective study of five years was conducted in a tertiary neurosurgical center. Histologically proven cases of pituitary adenomas who underwent transsphenoidal pituitary adenectomy were included in the study. Age and sex of the patients along with size and functional type of tumor were analyzed to see if they predicted the occurrence of diabetes insipidus post-operatively.

Out of 49 cases who underwent transsphenoidal pituitary surgery, 46 cases were proven to be pituitary adenomas histologically. There was male preponderance with male to female ratio of 2:1. Age ranged from 15 to 72 with median age of 37 years. Nonfunctional, prolactinomas and growth hormone secreting tumors, were 25, 16 and 4 in number. Median size of the tumor was 2.35 in largest diameter. Out of these patients 13 (28%) patients developed diabetes insipidus. Age, sex of the patient, size of the tumor and functional type of the tumor did not predict the incidence.

Age, sex of the patient, size of the tumor and functional type of the tumor do not predict the incidence of diabetes insipidus post-operatively in patients undergoing transsphenoidal pituitary adenectomy.

Key words: Diabetes insipidus, Transsphenoidal pituitary adenectomy

Transsphenoidal pituitary adenectomy, either microscopic or endoscopic, is the gold standard method of treatment of pituitary adenomas¹. Diabetes insipidus (DI) is a common complication following surgeries of suprasellar region². It is defined as excessive urine output despite raising serum osmolality due to inadequate secretion or non-responsiveness of anti-diuretic hormone (ADH)³. This may be transient or permanent^{3,4}.

Post-operative diabetes insipidus is one of the common complications following transsphenoidal pituitary adenectomy reported between 10 to 30%^{2,5}. In this study we have analyzed preoperative factors that may be associated with DI following this procedure.

A retrospective study was done at Upendra Devkota Memorial National Institute of Neurological and Allied Sciences, which is a tertiary level neurosurgical center. Histologically proven cases of pituitary adenomas who underwent transsphenoidal pituitary adenectomy over the past five years were included in the study. Patients' demography like age and sex of the patients along with size and functional type of tumor were analyzed to see if they predicted the occurrence of DI post-operatively. Post-operative DI was defined as hourly urine output more than 250 millilitre for three consecutive hours or more than one litre in an hour with urinary specific gravity less than 1.003⁶. Age and size were dichotomized according to their median. Chi-square test was performed to check for association with post-operative DI. Level of significance was chosen at 0.05. Statistical Package for the Social Sciences was used for analyzing the data.

A total of 46 cases were eligible for analysis. There were 31 males and 15 females with male to female ratio of 2:1. Median patient age was 37 years (range 15 to 72). Nonfunctional tumors were at the top of the list with 25 cases (54%), while prolactinomas were 16(35%), growth hormone (GH) secreting tumors were 4(9%) and adrenocorticotrophin (ACTH) secreting tumors were 1(2%). Thirty patients had tumor less than three centimetres (65.2%) while 16 had tumors three cm or larger (34.8%). Median tumor size was 2.35 cm (range 0.5 cm to 5 cm). A total of 13 patients developed post-operative DI (28%). No significant association was found when data was dichotomized at 40 years and Chi-square test was used (p= 0.299).

Age	With DI	Without DI
<40	10	15
>40	3	18

Table 1: Age distribution No significant association with gender was found (p= 0.308).

Gender	With DI	Without DI
Male	10	21
Female	3	12

Table 2: Sex Distribution

When data was dichotomized at 3 cm, no significant association was found between those larger or smaller than 3 cm with postoperative DI (p=0.315).

Size	With DI	Without DI
<3 cm	7	23
>3 cm	6	10

Table 3: Distribution according to size

No significant association was found between tumor functional type and the occurrence of post-operative DI (p=0.132).

Functional type	With DI	Without DI
Prolactinoma	5	11
GH	3	1
ACTH	0	1
Non functional	5	20

Table 4: Distribution according to functional type

Overall incidence of DI in our study was 28% which is within the range seen in other studies^{2,5}. The development of post-operative DI has been associated with higher morbidity and the length of hospital stay⁷. Various pre-operative factors has been associated and believed to predict post-operative DI⁸. A study by Nemergut and colleague showed that patients with microadenomas and ACTH secreting tumors were more likely to have DI post-operatively⁸. However no such association was seen in our study. This is likely because we had only one case of ACTH secreting tumor which was a microadenoma whereas all of the rest were macroadenomas in our study. We used 3 cm to dichotomize the data as it was close to our median and was supported by a study based on volumetric classification⁹. Even then the size of the tumor did not show any significant association in our study.

Most common type of tumor was functional followed by prolactinoma. There was no association between functional type of tumor and post-operative DI in our study. However, Pesky and colleague found that hormone secreting tumors are significantly associated with post-operative DI¹⁰. However, other studies found no association¹¹. There was no association between age or sex of the patient with DI similar to other studies.

The limitation of the study is that we could not study the association of post-operative DI with extent of resection

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as we could not retrieve post-operative imaging findings of the included patients.

Pre-operative factors like age, sex, size and functional tumor type are not associated with post-operative DI.

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