

Pituitary Adenoma: Role of the Nurse to Minimize Postoperative Complication Following Transsphenoid Surgery

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Abstract:

Background: The postoperative management of patients undergoing transsphenoidal pituitary surgery requires a multidisciplinary approach involving neurosurgeons, endocrinologists, and often intensive care teams. **Aim of the work:** the effect of nursing related role on minimizing bleeding from nose after transsphenoidal surgery for patients with pituitary adenoma. **Patients and Methods:** convenience sample of 30 adult male and female patients diagnosed with pituitary adenoma and undergoing transsphenoidal surgery in the neurosurgery department. Age ranged from 18 to 65 years. **Tools:** Patients assessment sheet and risk factors for postoperative nasal bleeding transsphenoidal surgery. **Results:** There were (33.3%) of study, patients had nasal bleeding with mean of frequency 2.77 times/day. **Conclusion:** Patients had different types of postoperative complications in which cerebrospinal fluid leak was the commonest followed by diabetes insipidus, postoperative nausea, vomiting and hematoma at operation site. Tumor size or pathology may be the contributory factor for these findings. Nursing play an important role in reducing postoperative nasal bleeding after transsphenoid surgery for pituitary adenoma.

Keywords: *Transsphenoidal surgery, Postoperative complications, Nasal bleeding, Role of nurse & Pituitary adenoma.*

Introduction:

Pituitary adenomas are generally divided into three categories dependent upon their biological functioning: benign adenoma, invasive adenoma, and carcinomas. Most adenomas are benign, approximately 35% are invasive and just 0.1% to 0.2% are carcinomas. Pituitary adenomas represent from 10% to 25% of all intracranial neoplasms and the estimated prevalence rate in the general population is approximately 17% (Ezzat et al., 2014). Pituitary tumors, which account for 15–20% of all brain tumors, are benign tumors arising from anterior pituitary cells. The incidence has been found to be up to 20% in the community according to the epidemiological studies (Melikoğlu et al., 2018). It can be seen in all age groups, but its frequency peaks between the ages of 30 to 60 years. Pituitary tumors are classified as hormone-secreting and non-secreting tumors (Leng & Zhang 2016).

Most pituitary adenomas are detected incidentally on routine computed tomography “CT” imaging. An magnetic resonance imaging “MRI” with gadolinium is necessary for the distinction of a mass from an aneurysm and to assess for hemorrhage into the mass. Additionally, screening for hypopituitarism and assessing for hyper-secretion is warranted. The Endocrine Society clinical practice guidelines

recommend a complete biochemical assessment, even in asymptomatic patients. This evaluation includes the measurement of various hormones such as prolactin, thyroid stimulating hormone “TSH”, Thyroxine “free T4”, follicle-stimulating hormone (FSH), Insulin growth factors “IGF-1”, growth hormone “GH”, Adrenocorticotrophic hormone “ACTH”, estradiol, testosterone, Bone morphogenetic protein “BMP”, and morning cortisol (Samperi et al., 2019).

The incidence of surgical complications after transsphenoidal surgery for pituitary lesions is low if surgery is performed by an experienced neurosurgeon (Miljic et al., 2018). The most common complication is diabetes insipidus (DI), especially in patients with pituitary microadenomas and Cushing disease. Other complications include adrenal insufficiency, syndrome of inappropriate antidiuretic hormone (SIADH), cerebral salt wasting syndrome (CSW), and neurosurgical complications such as vision loss, Cerebral spinal fluid (CSF) leak, subdural hematoma, epistaxis and nasal bleeding (Go & Rajamohan 2017).

As the intracranial pressure, increase may cause nose bleeding, the patient and his/her family should be informed and recommended to avoid activities that may lead to increase intracranial pressure such as

heavy lifting, coughing, and sneezing, especially during the first month after surgery (Peker & Yolcu 2014).

Postoperative management is critical to the overall successful treatment of patients with pituitary tumors. Assessment of the hypothalamic–pituitary–end organ axis and screening for specific abnormalities coupled with monitoring for relatively uncommon nonendocrine complications (such as visual loss, cerebrospinal fluid “CSF” leakage, meningitis, stroke) occurring in less than 2% of patients are central constituents of postoperative care (Grubu et al., 2017).

Transsphenoidal surgery is currently the principal technique employed for resecting pituitary lesions within the sellar and parasellar region. This operative procedure commonly involves using an endonasal incision to create a route to the anterior wall of the sphenoid sinus. If greater exposure is required, a sublabial incision can be employed instead. Once the sphenoid bone is reached, it is fractured to provide entry into the sphenoid sinus. The sellar floor is then penetrated, and a durotomy is performed to provide an unobstructed view into the sellar (Larkin & Ansonge 2017).

The nurse needs to identify early signs and symptoms of dehydration, hypernatremia, and hypokalemia to initiate treatment quickly by following critical pathways per individual institutional standard for transphenoid pituitary surgery. Diabetes insipidus manifests as polyuria, polydipsia, fever, excessive thirst, hypovolemia, and hypotension. The patient often produces a large amount of diluted urine, as much as 2.5 L/day and even up to 4Y18 L/day, because of an inability to concentrate urine. As a result, urine-specific gravity, sodium, and osmolality are low, whereas serum sodium and osmolality are high (Peker & Yolcu 2014).

Necessary measures are taken to prevent constipation. It should be explained that nasal obstruction may occur in the early postoperative period, thus he/she should be advised to avoid hard nasal cleanup since it may cause bleeding and the use of suitable nasal spray to relieve nasal obstruction is explained. If protective measures do not stop the bleeding, the patients should be strongly advised to apply to the nearest health institution for nasal pad application. It should be ensured that the patients and his/her family are informed about the risky situations that may lead to the bleeding, and that they have learned the necessary safety precautions (Prather et al., 2013).

Nurses should inform patient and his/her relatives about the disease process, treatment methods and results, information requirements about care practices, signs and symptoms of pituitary tumor, type and duration of surgery, and possible

complications. Patients and relatives are encouraged to ask questions (Grubu et al., 2017).

The importance of home care is emphasized. A written education plan for discharge instructions should be developed the possible complications after surgery (nose bleeding and CSF escape) and signs and symptoms of the disease are explained to the patients and their relatives. Available phone numbers should be provided for used in emergency situations. Patient appointments for outpatient visits should be arranged (Yuan, 2013).

Modern transsphenoidal surgery is usually often performed using a direct transnasal route, in some cases the incision is made under the lip. In these patients, performing oral care every 4 hours may help to prevent suture line infection. In addition, applying a humidified oxygen mask to keep optimal oxygen saturation and facilitate easy breathing by mouth may make the patient less uncomfortable. The nurse should monitor for sleep apnea (especially for the patient with acromegaly), teach the patient not to blow the nose, use an incentive spirometer, cough hard, or sneeze forcefully through the nose due to risk of dislodging the surgical repair or forcing air into inflamed sinuses. “Moustache” dressings placed under nose and held by non-adhesive tape can be changed as needed (Sert et al., 2013).

Significance of the study:

Patients with pituitary tumors are faced many problems after transsphenoidal surgery especially nasal bleeding. It is very important to increase the patients and family member’s knowledge about nasal bleeding critical in helping individuals with pituitary tumors to reach optimal health conditions and reduce hospitalization length.

Aim of the work:

It was evaluated the effect of nursing role on minimizing bleeding from nose after transsphenoidal surgery for patients related instruction with pituitary adenoma.

Research hypothesis:

Nursing role related instructions will have significant effect on minimizing bleeding from nose after transsphenoidal surgery for pituitary adenoma.

Patients & Methods

The study conducted in the neurosurgery department of Neurology, Psychiatry and Neurosurgery Assiut University Hospital.

Convenience sample of 30 adult male and female patients diagnosed with pituitary adenoma and undergoing transsphenoidal surgery in neurosurgery department. Age ranges from 18 to 65 years.

Exclusion criteria:

1. Unconscious patient,

2. Bleeding tendency,
3. Receiving anticoagulant

Tools: The following tools utilized to collect data for this study

Tool (1): Patient assessment sheet

It developed by the researcher based on literature review, it consists of:

Part (1): Demographic data of patients such as name, age, sex, level of education, occupation and marital status.

Part (2): Neurological assessment “Glasgow coma scale” (Teasdale & Jennett, 1974).

Part (3): Presence or absence of postoperative complications.

Tool (II): Risk factors for postoperative nasal bleeding

It develops by the researcher after reviewing many literature review to identify risk factors for post-operative complications after transsphenoidal surgery for pituitary adenoma.

Nursing instructions for patient undergoing transsphenoidal surgery (teaching booklet).

- Nursing instructions based on patient’s needs, researcher experience and opinion of the medical and nursing expertise. It includes:
- Definition of transsphenoidal surgery
- Brief description of surgery
- Complications of transsphenoidal surgery.
- Nursing management to minimize bleeding from nose after transsphenoidal surgery, reduce postoperative infection, wound care, improve physical activity, rest and improve nutritional status.

Methods:

An official permission obtained from the head of the neurosurgery department to conduct the study.

Patient’s agreement for voluntary participation obtained and the purpose and nature of the study explained.

Patients meeting the inclusion criteria were approached by the researcher.

Data is assured confidentiality and anonymity. A pilot study conducted on 10% (3) of patients to examine the feasibility of the study.

The content validity done by three special expertise in the medical and nursing field.

Data about patient’s current medical condition and risk factors for postoperative complications collected through tool I and tool II.

Application of nursing instructions (teaching booklet) conducted by the researcher to minimize complications for patients after transsphenoidal surgery for pituitary adenoma

After application of the nursing instructions patients assessed for the presence or absence of complications after transsphenoidal surgery for pituitary adenoma.

All patients followed up in neurosurgery out patients clinic for 2 weeks after surgery to evaluate postoperative complications after transsphenoidal surgery for pituitary adenoma (tool 1 part 3).

Ethical approval:

An approval for the study be obtained from the ethical committee in the Faculty of Nursing -Assiut University.

Risk-benefit assessment: There is no risk affecting the patient in this study.

Confidentiality: Any data taken from the patient either from the history, the examination or from the investigations dealt with in confidential manner.

Research statement: Every patient was informed about the nature and steps of the study.

Informed consent: Oral informed consent was obtained from patient.

Statistical analysis: It was done using Statistical Package for Social Sciences (SPSS/version 24) software. Patients was analyzed and descriptive values were expressed as mean \pm SD or number (%). Chi-squared test to compare proportions between both groups. P value was considered significant if < 0.05 .

Results

Table (1): Frequency and percentage distribution for patient participant (n =30)

Variables	N	%
Age		
• 18-39 yrs.	18	60.0
• 40 -59yrs.	12	40.0
Sex		
• Male	12	40.0
• Female	18	60.0
Level of education		
• High education	11	36.7
• Secondary education	14	46.7
• Primary education	1	3.3
• Read and write	3	10.0
• Illiterate	1	3.3
Occupation		
• Office work	16	53.3
• Manual work	2	6.7
• House wife	11	36.7
• Not work	1	3.3
Marital status		
• Married	29	96.7
• Widow	1	3.3

Table (2): Frequency and percentage distribution of medical data for the studied patients. (n=30)

Variables	Yes		No	
	N	%	N	%
Head trauma	0	0.0	30	100.0
Previous neurological problems				
• Change in consciousness	1	3.3	--	--
• Visual disturbance	7	23.3	--	-
Chronic illness				
• Diabetes mellitus	2	6.7	28	93.3
• Hypertension	6	20.0	24	80.0
• Cardiovascular disease	1	3.3	29	96.7
• Malignancy	0	0.0	30	100.0
Current health history				
• Blurring vision	22	73.3	8	26.7
• Double Vision	5	16.7	25	83.3
• Vision Loss	0	0.0	30	100.0
• Diminution of vision	4	13.3	26	86.7
Investigation				
• CBC (complete blood count)	0	0.0	30	100.0
• Urea and Creatinine	0	0.0	30	100.0
• Prothrombin time	0	0.0	30	100.0
• Prothrombin concentration	28	93.3	0	0.0
Urine analysis	25	83.3	5	16.7
Diagnostic procedure				
• Imaging test or MRI:	27	90.0	3	10.0
• X-ray	29	96.7	1	3.3
• CT	15	50.0	15	50.0
Tumor size "ml"	3.23±1.715			

Table (3): Frequency and percentage distribution of present complain and Glasgow coma scale for the studied patient participant (n=30)

Variables	Yes		No	
	N	%	N	%
Headaches	8	26.7	22	73.3
Unexplained tiredness	0	0	30	100.0
Vision problems	28	93.3	2	6.7
Mood changes	0	0	30	100.0
Irritability	0	0	30	100.0
Glasgow coma scale				
Eye opening				
Spontaneous	30	100.0	0	0
Verbal response Oriented	30	100.0	0	0
Motor response				
Obey commands	30	100.0	0	0
Total Glasgow coma scale				
15 normal	30	100.0	0	0
Mental status "oriented"	30	100.0	0	0

Table (4): Frequency and percentage distribution of cranial nerve and motor function for the studied patient. (n=30)

Variables	Yes		No	
	N	%	N	%
• Olfactory	30	100.0	0	0.0
• Optic	5	16.7	25	83.3
• Oculomotor	29	96.7	1	3.3
• Trochlear	30	100.0	0	0.0
• Trigeminal	30	100.0	0	0.0
• Abducens	30	100.0	0	0.0
• Facial	30	100.0	0	0.0
• Acoustic	30	100.0	0	0.0
• Glossopharyngeal	30	100.0	0	0.0
• Vagus	30	100.0	0	0.0
• Accessory	30	100.0	0	0.0
• Hypoglossal	30	100.0	0	0.0
Motor Function				
• Muscle Size	30	100.0	0	0.0
• Muscle tone	30	100.0	0	0.0
• Muscle power(full strength)	30	100.0	0	0.0
• Gait	30	100.0	0	0.0
• Sensory	30	100.0	0	0.0
Involuntary movements :				
Yes			2(6.7%)	
No			28(93.3%)	

Table (5): Hormonal assessment mean scores for studied group (n=30)

Hormonal assessment:	Patient results	Normal value	Unit
	Mean \pm SD	Mean \pm SD	
Prolactin	21.53 \pm 5.29	Less than 25	Ng/ml
L.H	14.03 \pm 8.360	5-25	Iu/l
F.S.H	14.20 \pm 6.614	7.4-21.5	Iu/l

Table (6): Frequency and percentage distribution of risk factors for post-operative nasal bleeding among the studied patients. (n=30)

Risk factors	Yes		No	
	N	%	N	%
Hypotension	0	0.0	30	100.0
Hypertension	7	23.3	23	76.7
Large size of tumor	6	20.0	24	80.0
Sneezing after surgery	2	6.7	28	93.3
Coughing after surgery	3	10.0	27	90.0
Bad hemostasis	0	0.0	30	100.0
Hereditary atelectasis	1	3.3	29	96.7
Carotid injury	0	0.0	30	100.0
Bleeding tendency	0	0.0	30	100.0
Vascular tumor	0	0.0	30	100.0

Table (7): Frequency and percentage distribution of post-operative complications among the studied patents. (n=30).

Complications	Present		Not present	
	N	%	N	%
Complications related to anesthesia	0	0.0	30	100.0
Post operative nausea & vomiting "PONV"	3	10.0	20	90.0
Increased intracranial pressure	0	0.0	30	100.0
Wound infection	0	0.0	30	100.0
Cerebrospinal fluid leak	13	43.33	17	56.67
Meningitis	0	0.0	30	100.0
Speech disturbances	0	0.0	30	100.0
Vision loss	2	6.7	28	93.33
Damage to normal pituitary gland	0	0.0	30	100.0
Diabetes insipidus	5	16.67	25	83.33
Sinus congestion	0	0.0	30	100.0
Hyposmia	1	3.3	29	96.7
Nasal deformity	0	0.0	30	100.0
Stroke	1	3.3	29	96.7
Nasal bleeding	3	10.0	27	90.0
Frequency /day "mean ± SD"	2.77± .9718			

Table (8): Correlation between personal data, diagnostic test, hormonal and postoperative nasal bleeding for patients participant (n=30)

Postoperative nasal bleeding	Age	Hyper-tension	Prothrombin concentration	Size of tumor	Prolactin	L.H	F.S.H
R	-.144	.000	.094	-.279	.018	-.453*	-.326
p-value	.447	1.000	.619	.135	.924	.012	.079
Negative correlation between postoperative nasal bleeding and L.H hormone Not significant P>0.05 *: significant P<0.05							

Table (1): Showed that high percentage (60.0%) of patients in age group 18-39 years, also there (60.0%) in study group was female. About education level, less than half of study group (46.7%) was secondary education and (36.7%) of study group were high education. As regard occupation, more than half of study group had office work (53.3%) and (36.7%) of

them were housewives. The majority of study group (96.7%) were married.

Table (2): Showed that no cases were having head trauma. About previous neurological problems there was (23.3%) of study group were having visual disturbance, also about chronic diseases there was (20.0%) them had hypertension. About current health

history there was (73.3%) of study group were having blurring vision. As regard investigation there was (93.3%) of study group done prothrombin concentration and (83.3%) done urine analysis. About diagnostic procedure, there were (90.0%) of study group were done imaging test or "MRI", (96.7%) were done X-ray and (50.0%) were done "CT".

Table (3): Showed frequency and percentage distribution of present complain and Glasgow coma scale for the studied patient. There were (93.3%) of study group were having vision problems and (26.7%) of them were having headaches, with normal Glasgow coma scale and oriented mental status.

Table (4): Showed that all the studied patients (100%) were having normal cranial nerves except for optic (83.3%) and oculomotor nerves (3.3%), regarding motor function (6.7%) patients were having involuntary movements.

Table (5): Showed that all patients were having normal range of all hormones (Prolactin, LH, and F.S.H) "21.53±5.29, 14.03±8.36 and 14.20±6.614 respectively

Table (6): Showed that there was (23.3%) of the studied patient were having hypertension, (20.0%) of them had large size of tumor, (10.0%) of them were having cough coughing, (6.7%) were having sneezing after surgery and (3.3%) of hereditary atelectasis.

Table (7): Showed frequency distribution of post-operative complications. There was no complication related anesthesia, there was (10.0%) of patients have PONV, there was (43.33%) of patients have CSF leak, (6.7%) them had diabetes insipidus, there was (3.3%) of them had have hyposmia, there was (3.3%) of t have stroke and there was (33.3%) of study patients have nasal bleeding, with mean of frequency 2.77times/day.

Table (8): Showed that there was negative correlation between nasal bleeding and L.H. hormone $P < 0.05$, also there was no correlation between age, hypertension, prothrombin concentration, size of tumor, prolactin, F.S.H and postoperative nasal bleeding $P > 0.05$.

Discussion:

The postoperative management of patients undergoing transsphenoidal pituitary surgery requires a multidisciplinary approach involving neurosurgeons, endocrinologists, and often intensive care teams. Most postoperative complications resolve in the short term, but some persist and will require lifelong surveillance and treatment (Prete et al., 2017).

Nurses who have care for a patient with a pituitary tumor should be well aware of the signs and symptoms of the disease, potential side effects and complications of the treatment, care interventions to

prevent these complications and to solve the problems when arise (Melikoğlu et al., 2018).

In present study there was high percentage of patients in age group 18-39 years. This agrees with Chowdhury et al., (2014) who reported median age of patient was 38 (12-79) years.

In present study there was only three of the studied patients were having postoperative nasal bleeding, with mean of frequency 2.77 times/day. This agree with Goyal et al., (2020) who reported that in the 1st postoperative week, (12.29%) developed septal hematoma. Three patients had epistaxis, two were managed conservatively, while one suffered delayed major bleeding from mucosal branches of the sphenopalatine artery.

In particular, patient, who had nasal bleeding, nasal packing, failed twice. Fearing some major vessel injury, diagnostic angiography was done which came out to be negative. Finally, nasal re-exploration was done under anesthesia, and bleeding from the mucosal branches of sphenopalatine artery was found which was controlled with cauterization and repacking. Another complication seen was hyposmia in two of patients (Bhat, 2019).

The most common problem a beginner faces during this stage is poor exposure and continuous oozing from the nasal mucosa in an under prepared nasal corridor. This oozing can make the surgery difficult and frustrating at times. Hence, adequate time for nasal decongestion should be given, which saves a lot of time and makes life easier during the rest of the steps of surgery (Thawani et al., 2017).

Also Younus et al., (2019) reported nasal vascular complications are described in 0.7%–7% of cases had an incidence of bleeding in three of cases.

In present study there was less than half of study patients have CSF leakage. This agree with (Chowdhury et al., 2014) who reported CSF leak was the most common complication noted in each group in study was less than half.

It was noted in all types of pituitary tumors with highest incidence in acromegalics was more than half followed by about half of study patients in prolactinomas and about third of patients in NFPA. Postoperative CSF leak has some relationship with the tumor type and size. This complication has been most commonly reported with FSH adenoma and Cushing's disease in the retrospective study of 592 patients (Han et al., 2016).

Surgical revision, tumor consistency, and tumor margins were independently associated with intra-operative leaks, while the tumor size, consistency, and margins were risk factors of postoperative leaks (Jane et al., 2015).

Nasal bleeding after transsphenoid surgery for pituitary adenoma can be avoided if nasal mucosa is

treated respectfully. Hemostasis should be ensured at the end of surgery and no foreign bodies or free bone chips should be left behind (Tabaee et al., 2018).

Sphenopalatine artery arises near superior meatus or between superior and middle meatus. Hence, caution should be exercised while doing mucosal dissection in this region, especially while raising nasoseptal flap (Berker et al., 2012).

Delayed bleeding can occur from these vessels after surgery when blood pressure returns to normal levels. Hence, adequate hemostasis should be ensured to prevent any such issue (Bhat, 2019).

Previous studies reporting nasal symptoms after pituitary surgery have been largely qualitative in nature and undertaken by retrospective review of case records in range (2.0-12.0%) (Wang et al., 2011).

Nurse's instruction showed effect in reducing post-operative nasal bleeding after transsphenoid surgery for pituitary adenoma

After transsphenoid surgery the patient are taken to the recovery room, nurse should monitor vital signs. As patients, a wake they transfer to a regular room or the intensive care unit (ICU) for observation and monitoring. Nurses should encourage patients to get out of bed as soon as able (sitting in a chair, walking). (Wang et al., 2011).

After surgery patient may experience nasal congestion, nausea, and headache. Medication can control these symptoms. An endocrinologist may see patient the day after surgery to check that the pituitary gland is producing appropriate levels of hormones. If it is not, hormone-replacement medications may be given. An MRI of the brain will be obtained the day after surgery. In 1 to 2 days, patients will be released from the hospital and given discharge instructions. (Samperi et al., 2019).

Nurse should instruct patients to follow the surgeon's home care instructions for 2 weeks after surgery or until patient follow-up appointment.

Nurse should give patient some instructions to avoid complications. Patient should not blow his nose. If patients must cough or sneeze, do so with patients mouth open, don't use straws, strain using the toilet, or bend over at the waist until patients follow-up. If patients have sleep apnea, do not use patients continuous positive airway pressure "CPAP" until surgeon describe it, don't smoke or use nicotine products: vape, dip, or chew. It may delay healing, don't lift anything heavier than 5 pounds. Don't drive, return to work, or fly air travel until surgeon describe that. (Ezzat et al., 2014).

Nurse should assess and observe surgical site incision. Nasal drainage is expected and usually yellow or blood tinged with a mucous consistency. Drainage should lessen and stop within 1-2 weeks. Patient may dab at a runny nose. Nasal crusts and

congestion are normal for several weeks to months after surgery. It will diminish over time. Patient may lose patients sense of smell for several weeks. Patient may be given two sprays for the nose: a decongestant and a salt water spray. Patient may shower the day after surgery. Don't submerge patients head or belly incision in water (bath, pool or tub). If patient had a belly or thigh incision to obtain a fat graft, it will be covered with Derma bond skin glue. Leave it open to the air with no bandage. Gently wash the area with soap and water. Pat dry. Don't apply lotion/ointment on incision. (Leng & Zhang, 2016).

Conclusion:

Based on the study results, it can be concluded that the studied patients had different postoperative complications in which CSF leak was the commonest followed by diabetes insipidus, PONV and hematoma at operation site. Tumor size or pathology may be the contributory factor for these findings.

Recommendation:

Nursing instructions (Teaching booklet) should be distributed to all patients after transsphenoid surgery for pituitary adenoma.

Replication of the same study on larger probability samples at different geographical locations for data generalization.

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