

Impact of Nursing Educational Program on Reducing or Preventing Postoperative Complications for Patients after Intracranial Surgery

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Abstract:

Intracranial surgery means any surgery performed inside the skull to treat problems in the brain and surrounding structures. **Aim:** Evaluate the impact of nursing educational program on reducing or preventing postoperative complications for patients after intracranial surgery. **Subjects and methods:** Sixty adult patients had intracranial surgery (burr hole, craniotomy and craniectomy) were included in this study. Their age ranged from 18-65 years old, fully conscious after operation. Patients divided into two groups; control group (30 patients who received routine care) and study group (30 patients who received nursing educational program). Three tools were used for data collection; **tool I** patient assessment sheet, **tool II** nursing educational program after intracranial surgery and **tool III** patient evaluation sheet. **Results:** A good improvement in total knowledge scores of study group patients after application of nursing educational program. Significant reduction and/or prevention of systemic and neurosurgical postoperative complications for study group patients after application of nursing educational program. **Conclusion:** Improving patients' knowledge in study group had a favorable effect in reducing or preventing systemic and neurosurgical postoperative complications than in control group. **Recommendation:** Establishment of health care educational center in neurosurgery department to educate patients about their conditions.

Keywords: Nursing educational program– Intracranial surgery– Postoperative complications.

Introduction:

The neurosurgical cranial procedures are relatively frequent in the daily practice and a wide range of neurosurgical techniques has been developed (burr holes, craniotomy and craniectomy) to treat patients with intracranial disorders. The entire treatment plan aiming to improve the patient physically, mentally and emotionally. The postoperative period is the weakest and the most vulnerable phase of a patient's life (Guilbert, 2014).

Surgical burr hole is a hole made in the skull by a special drill to gain direct access of the brain (Wilson et al., 2013). A craniotomy is a surgery during which a piece of the skull (bone flap) is removed in order to allow direct access to the brain. After the surgery is performed, the bone flap is returned to its previous location. Craniectomy procedure includes removal of part of the skull bone (Heisler, 2014).

Complications after intracranial surgery may include intracranial bleeding, cerebral edema, further neurological impairment, behavioral changes, electrolyte imbalance, infection, seizures, venous thrombosis or hydrocephalus. Hemorrhage at the operative site can occur within hours after surgery. Bleeding may occur in the subdural or subarachnoid space or within the ventricles or at the bed of the lesion (Yarbro et al., 2011).

The patient needs comfort and reassurance at all times after intracranial surgery. Despite normal feelings of anxiety and fear, the caregivers should act strong and provide support with proper guidance and accurate information from the medical team. Postoperative care after intracranial surgery might not end soon in some cases; it could last for months or even for years. The caregiver should be mentally prepared for this fact and not spend all their energy right at the beginning. Also, clarify with the doctor the nature of symptoms; those which are a natural part of the recuperation process and the ones which would signal an emergency (Suzanne et al., 2010).

Because of nurses act as a vital members of the health care team and considered as a vital component in the overall patient outcome based on the expert neurological assessment, they are involved to care for intracranial surgery patient at various levels of intervention and health education. The nurse must have a thorough understanding of patients' needs to provide optimal nursing intervention and education and thus improve patients' health (McGlinsey and Kirk, 2014).

Patient education is defined as any educational activities designed to improve patients' health behaviors and health status. Its main purpose is to maintain or to improve patient health or, in some cases, to slow deterioration. An informed and educated patient can actively participate in his or her own treatment, improve outcomes, help identify errors before they occur, and reduce his or her length of stay in the hospital. Medical component of health education involves medical information and preventive measures concerning health and well-being. Research has demonstrated that effective health education begins with identification of

various important needs for the patients (Haddad et al., 2013).

Aim of the study:

This study aimed to:

Evaluate the impact of nursing educational program on reducing or preventing postoperative complications for patients after intracranial surgery.

Research hypothesis:

To fulfill the aim of this study, the following research hypothesis was formulated:

Participants will have fewer symptoms or complications as compared to prior application of nursing educational program.

Subjects and methods:

Research design:

Quasi experimental research design was utilized to fulfill the aim of this study.

Technical design

Setting:

This study was conducted in neurosurgery department and neurosurgery outpatient clinic at Assiut University Hospital.

Subjects:

Sixty adult patients of both sexes after intracranial surgery (burr hole, craniotomy and craniectomy) were included in this study. They had the following criteria; the age ranged from 18-65 years old, fully conscious. The patients divided into two groups: the control group (30 patients who received routine care) and the study group (30 patients who received nursing educational program). The number of males include: (18 in control and 17 in study groups) while the number of females include: (12 in control and 13 in study groups). Data were collected during the period from (December 2012 to June 2014); this period included both the time of assessment and follow up. Patients were assessed immediately after intracranial surgery (burr hole, craniotomy and craniectomy) and daily during hospitalization. Those patients were followed up before discharge in the neurosurgery department, 3 months and 6 months after intracranial surgery in the neurosurgery outpatient clinic. Their ages ranged from 18 to 65 years with a mean value of (43.27±6.38) for control and (41.25±5.83) for study groups.

Exclusion criteria:

- Disoriented patient.
- Uncooperative patient.
- Patients on mechanical ventilation.

Tools:

Tool I: Patient assessment sheet: This tool consisted of four parts:

Part 1: Socio-demographic characteristics of patients.

Part 2: Patients' nursing needs: This included structured items to identify patients' nursing needs; it is used to assess:

1. Medical history.
2. Neurological physical examination (level of consciousness by Glasgow coma scale (Teasdale and Jennett, 1974), cranial nerves, motor and sensory function, sphincter control and vital signs).
3. Psychological problems (social and emotional problems).
4. Laboratory investigation and diagnostic procedures.

Part 3: Systemic and/or neurosurgical postoperative complications that may develop for patients after intracranial surgery.

Part 4: Patients' knowledge regarding intracranial surgery: It included 39 questions.

Tool II: Nursing educational program after intracranial surgery: This tool developed by researcher based on patient's assessment needs after reviewing current national and international literature to maintain health promotion for patients and reduce or prevent postoperative complications. It includes:

- Brief anatomy of the brain.
- Definition and indication for intracranial surgery.
- Various diagnostic procedures and how to be prepared for it.
- Benefits of surgical management and types of intracranial surgery.
- Systemic and neurosurgical postoperative complications after intracranial surgery.

- Information about how to reduce or prevent postoperative complications through:
 - Medical therapy after intracranial surgery.
 - How to deal with seizures.
 - Care of wound site.
 - Routine follow up and when it is necessary to seek medical help and immediately go to the hospital
 - Life style modification:
 - Nutrition.
 - Weight control.
 - Rest.
 - Physical activity and exercises.
 - Smoking cessation.
 - Stress reduction.
 - Effective communication.
 - Control of diabetes mellitus and hypertension.

Tool III: Patient evaluation sheet: This tool consisted of two parts:

Part 1: Patients' knowledge regarding intracranial surgery, it included 39 questions.

Part 2: Systemic and/or neurosurgical postoperative complications that may develop for patients after intracranial surgery.

II. Operational design:

Procedure:

Phase I: Preparatory phase: An official permission to proceed with the proposed study was obtained from the head of the neurosurgery department. The researcher designed and tested health promotion program after reviewing extensive literature.

Content validity:

It was done by five expertise from the medical staff and medical –surgical nursing staff.

Pilot study:

It was conducted on 10% of sample (6 patients) in a selected setting for testing clarity and applicability of the study tools. The purpose of the pilot study was to detect any particular problem in the statements clarity, feasibility, and applicability of the tool. The data obtained from the pilot study were analyzed, no change was done in the assessment sheet, so the 10% of subjects selected for the pilot study were included in the main study.

Phase II: implementation phase: At initial interview the researcher introduce herself to initiate communication, explain the nature and purpose of the study.

The study group visited daily during hospitalization to fill out the patient assessment sheet (tool I) to assess patients' knowledge and needs and implement nursing educational program (tool II).

Regarding control group, they received the routine postoperative hospital care. They visited daily during hospitalization to fill out (tool I).

The nursing educational program was introduced to patients through individualized sessions. 10 educational sessions were conducted for each patient. The duration of each session was 30 – 45 minutes, including 10 minutes for discussion and feedback. Each session usually started by a summary of what has been taught during the previous sessions and the objectives of the new topics. Feedback and reinforcement of teaching was performed according to the patients' needs to ensure their understanding. Each session ended by a summary of its contents and feedback of the patient through discussion and questions.

Phase III: Evaluation phase: After application of the nursing educational program, the patients' knowledge and condition have been evaluated by the researcher through filling the patient evaluation sheet (tool III). Follow up has been done for patients in study and control groups for a period of 6 months on three phases (before discharge, 3months and 6 months after intracranial surgery).

Ethical considerations:

Informed consent was obtained from patients who are willing to participate in the study after explanation of the nature and purposes of the study. Confidentiality of the subjects was certainly assured.

Statistical design:

Data were collected and analyzed by computer program SPSS (version 17). Data expressed as mean, standard deviation, number and percentage. T-test is used to determine significant for numeric variable. Chi-square test is used to determine significant for non-parametric variable. A probability level of <0.05 was adopted as a level of significance for testing the research hypotheses.

Limitations of the study:

1. The patient's anxiety may interfere with the ability to learn information provided.

2. During preparation of a teaching booklet, the level of literacy in the patient population was considered. A lack of reading skills limited the ability of patients to access and use critical information.
3. Participants suffered from transportation and financial problems. So, some patients interview after 6 months by telephone.

Results:

Table (1): Distribution of socio-demographic characteristics of patients (control and study groups).

Table (2): Distribution of patients' medical history (control and study groups).

Table (3): Distribution of patients' past history (control and study groups).

Table (4): Distribution of patients (study and control groups) as regard level of consciousness (GCS).

Table (5): Comparison between assessment and follow up total score of patients' knowledge (study and control groups).

Fig (1): Distribution of systemic postoperative complications of control group.

Fig (2): Distribution of systemic postoperative complications of study group.

Fig (3): Distribution of neurosurgical postoperative complications of control group.

Fig (4): Distribution of neurosurgical postoperative complications of study group.

Table (1): Distribution of socio-demographic characteristics of patients (control and study groups).

Socio-demographic characteristics	Control (n =30)			Study (n =30)		
	No.	%	X + SD	No.	%	X + SD
Age:						
18< 35 yrs	1	3.3	43.27±6.38	3	10	41.25±5.83
35<50yrs	19	63.3		17	56.7	
50-65yrs	10	33.3		10	33.3	
Sex:						
Male	18	60	-	17	56.7	-
Female	12	40		13	43.3	
Marital status:						
Single	11	36.7		4	13.3	
Married	19	63.3	-	26	86.7	-
Level of education:						
High education	2	6.7		2	6.7	
Secondary school education	6	20	-	8	26.7	-
Read and write	5	16.7		6	20	
Illiterate	17	56.7		14	46.7	
Occupation:						
Office work	3	10		5	16.7	
Machinery work	6	20		2	6.7	
Manual work	14	46.7	-	11	36.7	-
Housewife	6	20		9	30.0	
Not working	1	3.3		3	10	

Table (2): Distribution of patients' medical history (control and study groups).

Patients' medical history	Control (n =30)		Study (n =30)	
	No.	%	No.	%
1.Diagnosis:				
Brain tumor	16	53.3	10	33.3
Brain abscess	1	3.3	2	6.7
Subdural hematoma (SDH)	8	26.7	9	30.0
Cystic lesion	5	16.7	9	30.0
2.Surgical management:				
Burr holes	8	26.7	12	40.0
Craniotomy	18	60.0	13	43.33
Craniectomy	4	13.33	5	16.7
3.Medical treatment after surgery: (More than one)				
Anticonvulsants	30	100	30	100
Analgesics	30	100	30	100
Antibiotics	30	100	30	100
Steroids	23	76.7	26	86.7
4. Patient's habits:				
Smoking.	9	30.0	5	16.7

Table (3): Distribution of patients' past history (control and study groups).

Patients' past history	Control (n=30)		Study (n=30)	
	No.	%	No.	%
1.Trauma:				
Yes	11	36.7	4	13.3
No	19	63.3	26	86.7
2. Previous neurological problems: (More than one)				
Change in consciousness	7	23.33	3	10
Visual disturbances	10	33.33	11	36.67
Persistent headache	30	100	30	100
Dizziness	8	26.67	13	43.33
Motor deficit	3	10	1	3.3
Seizures	3	10	4	13.33
3. Chronic illness: (More than one)				
- Diabetes mellitus	3	10	2	6.7
- Hypertension	4	13.3	2	6.7
4. Previous neurosurgery:				
Craniotomy	1	3.3	2	6.7
Burr holes	1	3.3	-	-

Table (4): Distribution of patients (study and control groups) as regard level of consciousness (GCS).

GCS	Control (n=30)			Study (n=30)		
	No.	%	X ± SD	No.	%	X ± SD
Mild	30	100	15.00±0.00	30	100	15.00±0.00
Moderate	-	-		-	-	
Severe	-	-		-	-	

Table (5): Comparison between assessment and follow up total score of patients' knowledge (study and control groups).

Patients' knowledge	Control (n=30)			Study (n=30)			P-value
	No.	%	X±SD	No.	%	X±SD	
At assessment			13.73±5.97			12.26±4.50	P =0.273 n.s
Satisfactory	-	-		-	-		
Unsatisfactory	30	100		30	100		
Before discharge			14.46±4.84			47.23±3.16	P <0.0001***
Satisfactory	-	-		30	100		
Unsatisfactory	30	100		-	-		
After 3 months			17.80±5.12			45.73±4.57	P <0.0001***
Satisfactory	-	-		28	93.3		
Unsatisfactory	30	100		2	6.7		
After 6 months			19.49±5.63			43.36±4.83	P <0.0001***
Satisfactory	-	-		27	90.0		
Unsatisfactory	30	100		3	10.0		

N.B. total score of knowledge is 50.

***: Highly significant (P<0.0001).

Fig (1): Distribution of systemic postoperative complications of control group.

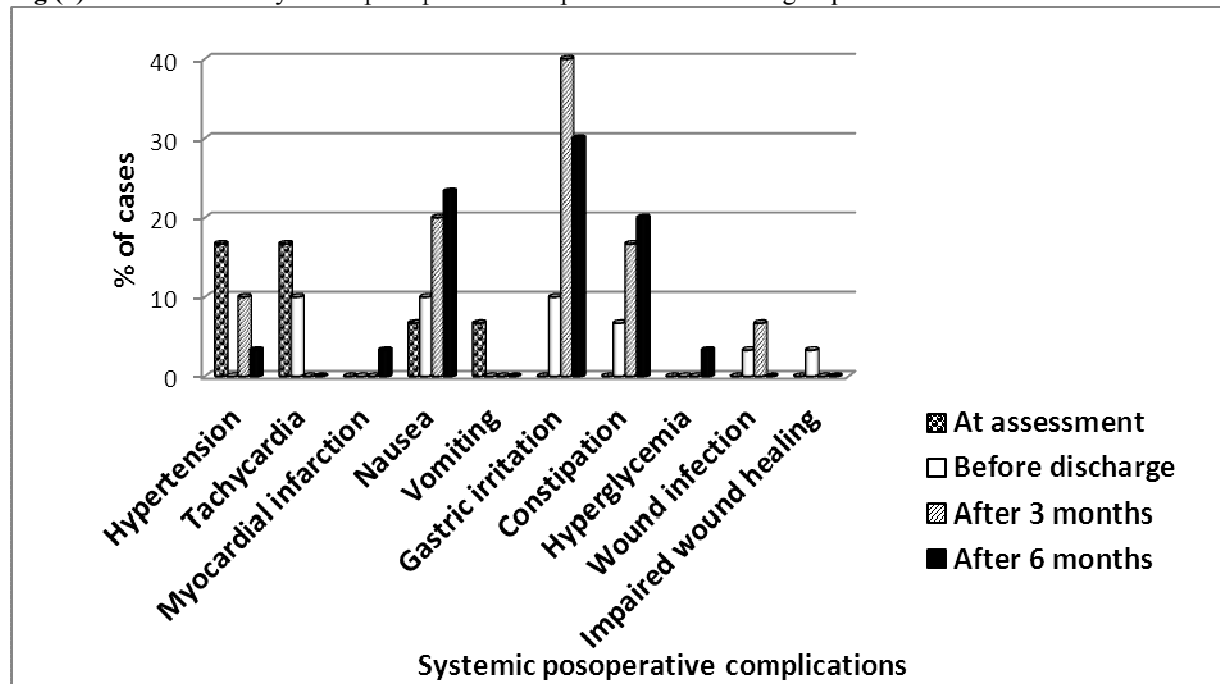


Fig (2): Distribution of systemic postoperative complications of study group.

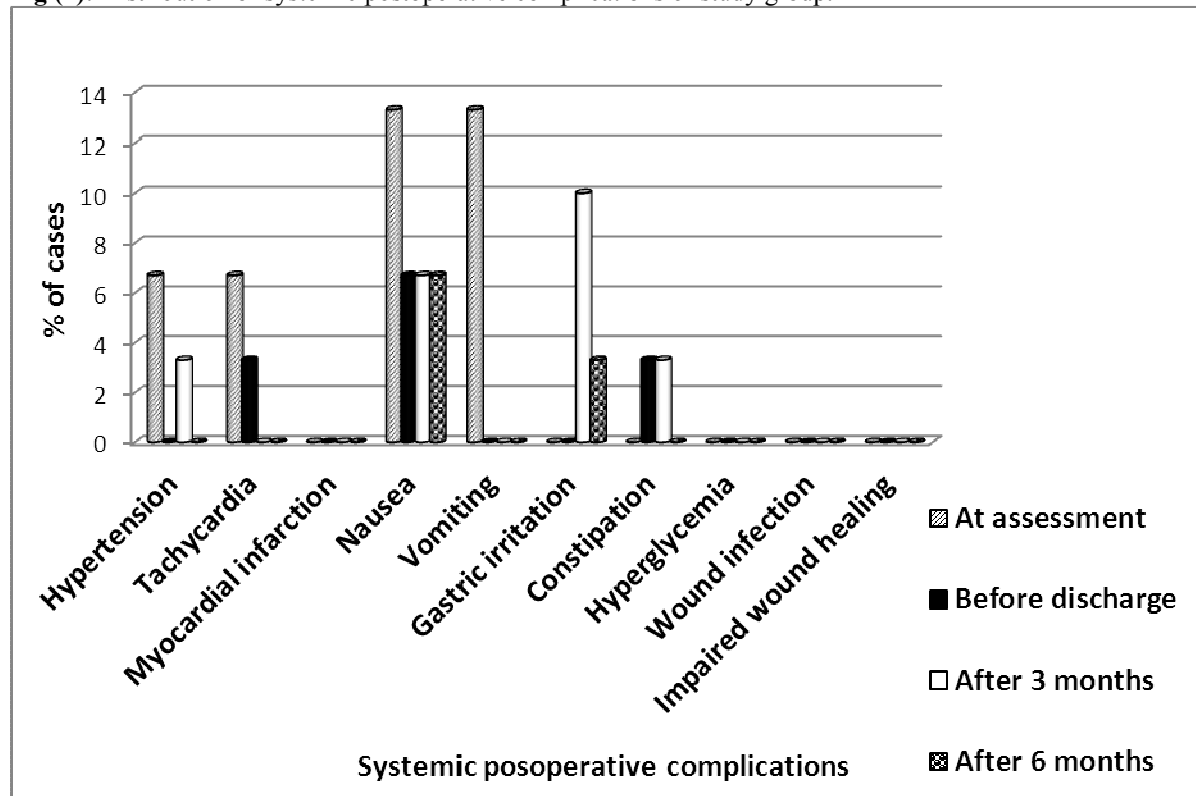


Fig (3): Distribution of neurosurgical postoperative complications of control group.

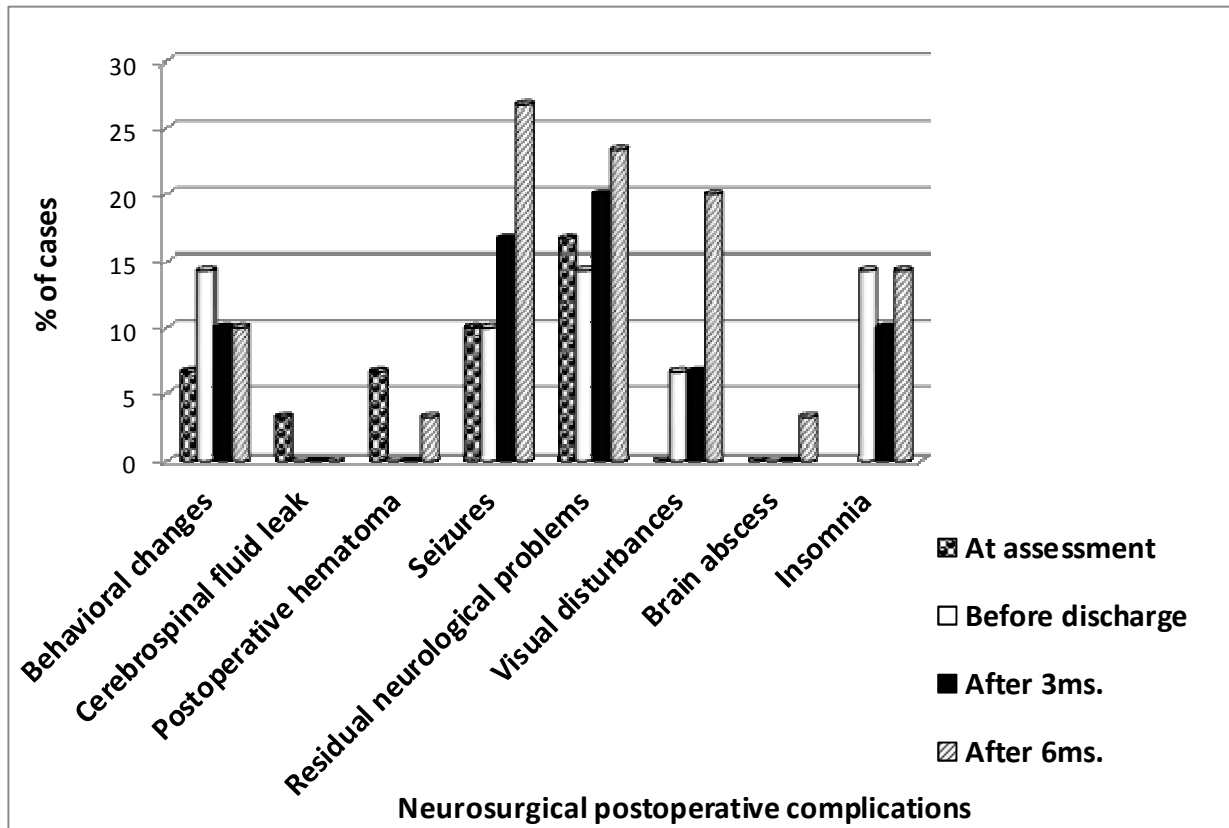


Fig (4): Distribution of neurosurgical postoperative complications of study group.

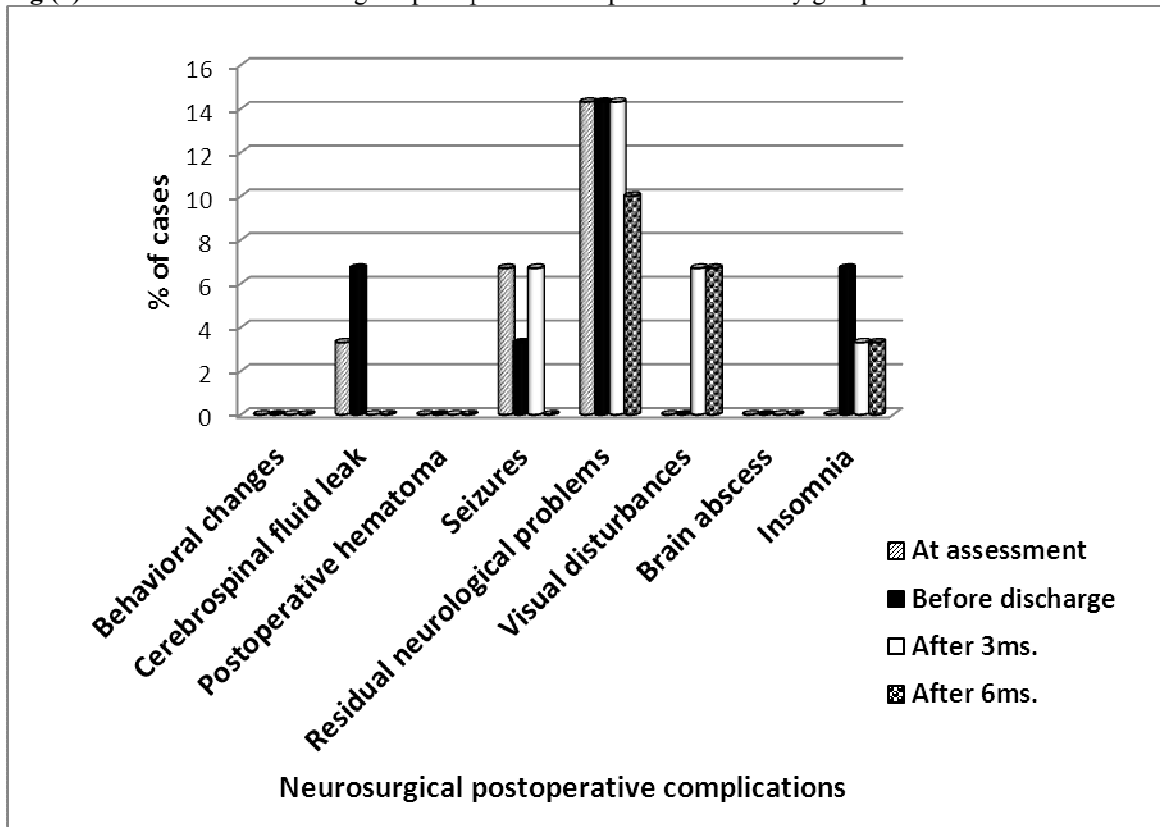


Table (1): This table illustrates that, more than half of patients were males in both control (60.0%) and study (56.7%) groups. More than half of patients in control (63.3 %) and study (56.7%) groups were having an age ranged from (35<50) years with a mean value of (43.27±6.38) and (41.25±5.83). Regarding the patients' marital status; the majority of patients were married which include (63.3%) in control and (86.7%) in study groups. Regarding education; (20.0%) in control and (26.7%) in study groups were secondary school education and (56.7%) in control and (46.7%) in study groups were illiterate. Regarding occupation; (46.7%) of patients in control and (36.7%) in study groups were manual work.

Table (2): Illustrated that, more than half of patients in control (53.3%) and one third of study (33.3%) groups were diagnosed with brain tumor. More than half of patients in control (60.0%) and less than half of patients in study (43.33%) groups were performed craniotomy. All of patients in both study and control groups received anticonvulsants, analgesic and antibiotic, the majority of them received steroids. 30% in control and 16.7% of study groups give history of smoking.

Table (3): Illustrates that, the majority of patients in both control (63.3%) and study (86.7%) groups were not having previous history of trauma. All of patients in both control (100%) and study (100%) groups were having headache, also (26.67%) of patients in control and (43.33%) in study groups were having dizziness. As regard for patients' medical history (10%) in control and (6.7%) in study groups were having diabetes mellitus and (13.3%) in control and (6.7%) in study groups were having hypertension. Regarding previous neurosurgery; (3.3%) in control and (6.7%) in study groups were having craniotomy.

Table (4): GCS of all patients in both study and control groups presented with a mean value of (15.00±0.00).

Table (5): This table shows that, all patients (study and control groups) had unsatisfactory level of knowledge at the time of assessment and had non significant difference (P =0.273). At the time of follow up, there was high significant difference (P <0.0001) between patients' knowledge (study and control groups) in relation to total knowledge score.

Fig (1 and 2): There was non significant difference between study and control groups as regard systemic postoperative complications at assessment and before discharge. After 3 and 6 months of follow up there was significant difference between study and control groups regarding systemic postoperative complications.

Fig (3 and 4): There was non significant difference between study and control groups as regard neurosurgical postoperative complications at assessment, before discharge and after 3 months of follow up. There was significant difference between study and control groups after 6 months of follow up regarding neurosurgical postoperative complications.

Discussion

The present study aimed to:

Evaluate the impact of nursing educational program on reducing or preventing postoperative complications for patients after intracranial surgery.

One of the most critical surgeries performed on the human body is intracranial surgery. The entire treatment plan affects the patient physically, mentally and emotionally. To accomplish quality care and best possible outcome after intracranial surgery; nurses should be knowledgeable of the type of surgery planned, its course and possible complications (Guilabert, 2014).

The results of the present study showed that more than half of patients in both control and study groups were males their age ranged from 35<50 years old and the majority of them were married and employ.

In this regard this result agree with the study of (Bin-Madhi, 2012) entitled as "Brain tumors excision guided by neuronavigation: Practical application and results" which revealed that intracranial surgery is more common in males than females with a mean age of 47 years old.

The results in the present study revealed that all patients after intracranial surgery receive anticonvulsants medication, analgesics and antibiotics. The majority of them receive steroids.

In the same line this result agree with (White et al., 2013) who reported that patients after intracranial surgery require a variety of medical treatment. Anticonvulsant medication is frequently given to suppress the possibility of seizures. Antibiotic is usually given to prevent infection. Analgesic is usually given to reduce pain and steroid is given to reduce cerebral edema after intracranial surgery.

The results in the present study showed that 36.7 % of control and 13.3 % of study groups were having previous history of trauma. Regarding smoking 30 % of control and 16.7% in study groups were smokers. Regarding diabetes mellitus and hypertension at the time of assessment 10% of control and 6.7 % in study groups were diabetic and 13.3% in control and 6.7 % in study groups were having hypertension.

In the same line this result similar to the study of (Edlinger et al., 2012) which revealed that thirty percent of patients in the study sample were having hypertension. So, brain tumor risk may be higher in people with high blood pressure.

Also, (Tong et al., 2012) reported that brain tumor risk is 24% higher in females with diabetes while (Mandelzweig et al., 2009) reported that smoking is associated with glioma risk (10% risk increase).

In the same line (Meagher and Lutsep, 2013) stated that risk factors for chronic subdural hematoma include head trauma, diabetes mellitus and hypertension

The results in the present study revealed that most of patients in both control and study groups were having previous neurological problems; persistence headache, visual disturbances, dizziness, change in consciousness, motor deficit and seizures.

This result agree with (Urden et al., 2010) and (Krucik, 2012) who reported that the more common clinical manifestations of brain tumor, brain abscess, SDH and cystic lesion within the intracranial cavity are headache, drowsiness, visual disturbances, change conscious level, seizures and motor deficit.

The results in the present study revealed that patients' GCS=15 at the time of assessment after intracranial surgery indicate good prognosis for both study and control groups. Most of patients after intracranial surgery are clinically improved because pressure of the tumor, haematoma, abscess or cyst is relived.

In the same line this result agree with the study of (Abbass et al., 2007), entitled as (Glasgow coma scale on admission is correlated with postoperative Glasgow outcome scale in chronic subdural hematoma) which revealed that there is positive correlation between admission GCS and GCS after operation in chronic SDH.

The results of the present study showed that there were non significant differences related to systemic and neurosurgical complications at the time of assessment; before application of the nursing educational program. This may be attributed to that the majority of studied patients suffer from anxiety and fear in addition to the immediate postoperative effect of anesthesia and this is also the opinion of the neurosurgeon and anesthesiologist in the neurosurgery department.

The results of the present study showed significant difference as regard systemic complications after application of the nursing educational program at the time of follow up (after 3 and 6 months).

As regard neurosurgical complications, there was significant difference after application of the nursing educational program at the time of follow up (after 6 months).

The study finding was supported by (Buttaro, 2008) who demonstrated that unmanaged stress is linked to hypertension, heart diseases and gastrointestinal problems. Also, unmanaged stress is linked to some emotional health disorders. An elevated level of stress increases the frequency of abnormal behaviours.

(Silver et al., 2011) said that patients who have a successful outcome after intracranial operation may still experience residual neuropsychological symptoms that may be not noticed by the examiner but devastating to the patient. Over the years, many patients have expressed the opinion that some discussion of such possible sequelae before and after surgery would have been helpful to them. Neurosurgeons should routinely discuss possible neurological sequelae with patients before and after brain surgery. Providing patients with a simple brochure describing possible temporary or long-term neuropsychological consequences is suggested. Such information must be shared in a manner that does not frighten or upset the patient but provides true informed consent.

In the present study, all patients in both study and control groups before application of nursing educational program for patients after intracranial surgery had unsatisfactory level of knowledge regarding intracranial surgery.

This could be explained by the fact that, patients didn't receive enough information from health care team. Some patients were lacking interest to know any information while others were interested to know but they didn't find the person who had enough time to provide them with enough information. In the same line this result agree with (Desoky, 2014) study who said that "Impact of a designed nursing teaching protocol on quality of life of patients with chronic lower limb ischemia at Assiut University Hospital" which revealed that all patients in both study and control groups had unsatisfactory level of knowledge before application of a designed nursing teaching protocol.

After application of the nursing educational program for patients after intracranial surgery (before discharge, after 3 months and after 6 months), patients' knowledge score levels regarding intracranial surgery were highly significantly improved for study group patients. This improvement emphasis the fact that, most patients have a strong desire to learn more knowledge about their conditions and show the effect of the program.

This result is in the same line with the study of (Ali, 2004) entitled as "Impact of a designed nursing intervention protocol on performing self-care activities among rheumatoid arthritic women" which revealed that all studied sample had unsatisfactory level of knowledge about their disease at initial assessment, however, after application of a designed nursing intervention protocol, founded that, there was a significant increase in knowledge of study group patients regarding disease.

The results of the present study showed positive effect for the nursing educational program on reducing or preventing systemic and neurosurgical postoperative complications for study group patients.

These results were supported by (Piper and Stewart, 2009) who revealed that effective health educational program will result in changes that demonstrate increased knowledge about specific medical and health-related issues for a prolonged period of time. Effective health education will yield both short-term and

long-term changes in behavior that reduce risky behavior and reduce or prevent many postoperative complications. These changes in behavior can be recorded through evaluator observations and learner feedback. However, (Krug, 2008) who conducted study entitled as "Functional outcome and self-perceived overall health status following surgery to remove primary brain tumor" which revealed that postoperative complications may delay improvement, though at three months, these complications and their effect on function should have been overcome. Functional recovery following surgery for brain tumor was not significant overall. When examined individually, a majority of subjects demonstrated improvement of a clinically relevant nature.

Conclusion

Based on the result of the present study, it can be concluded that:

- Patients after intracranial surgery; burr holes, craniotomy and craniectomy are at high risk for systemic and/or neurosurgical postoperative complications which had a bad effect on patients' health.
- Before application of the nursing educational program all patients in both study and control groups had unsatisfactory level of knowledge.
- There was a high significant improvement in patients' knowledge for study group patients after application of the nursing educational program (at the time of follow up). Control group patients who did not receive the nursing educational program had unsatisfactory level of knowledge at the time of follow up.
- Improving patients' knowledge in study group had a favorable effect in reducing or preventing systemic and neurosurgical postoperative complications than in control group; there is a significant decrease in systemic and neurosurgical postoperative complications for study group than in control group. So, patients after intracranial surgery are in essential need for postoperative educational program to help them to improve their health and thus avoid many postoperative complications

Recommendations

Based on results of the present study the following can be recommended:

For patients:

Patients are to be provided with sufficient information to remind them with specific instructions regarding treatment, how to cope with postoperative period; wound care, activity, rest, diet, stress and maintain effective communication to avoid certain postoperative complications that may develop and when they must notify physician.

For nurses:

Nurses should be aware by instructions that given to patients before discharge and inform patients about them to reduce or prevent many postoperative complications.

For administration:

Establishment of health care educational center in the neurosurgery department to educate patients about necessary instructions regarding their conditions using booklet and illustrated pamphlets for each patient especially those who cannot read and write.

For research:

Similar studies should be replicated on longitudinal bases till one year as a minimum time period for follow up.

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