



## The Importance of Postoperative Delirium (POD) on Elderly Patients in Urology in Increasing the Day Stay in Hospital

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### Authors' contributions

*This work was carried out in collaboration between all authors. Author HG designed the study and wrote the paper. Author PP performed the statistical analysis. Authors RD and MN collected the literature data. Authors BH and VB managed the patients data, and author AJ wrote the protocol. All authors read and approved the final manuscript.*

### Article Information

DOI: 10.9734/BJMRR/2016/25865

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Complete Peer review History: <http://www.sciencedomain.org/review-history/16357>

Original Research Article

Received 24<sup>th</sup> March 2016  
Accepted 7<sup>th</sup> August 2016  
Published 27<sup>th</sup> September 2016

### ABSTRACT

**Introduction and Objectives:** The Postoperative delirium on elderly patients (P.O.D.) is a frequent post operative disorder in sick and elderly patients, and always has been associated with prolongation of day stay in hospital, and certainly more cost for the hospital as well.

The Postoperative delirium on elderly patients causes an increased mortality and an increasing of mental status deterioration characterized by reduction of environmental recognition as well as the disorder of alertness.

This study is accomplished by Anesthesiology and Intensive Therapy Service of the Urology Clinic of the University Hospital Center "Mother Theresa", Tirana, Albania.

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The purpose of this study is to reveal the importance of Postoperative delirium on elderly patients (POD) admitted in Urologic Clinic, and impact of this complication on the day stay in hospital.

**Materials and Methods:** In this study are included 1496 patients aged over 65 years who underwent an operation at the urologic clinic. Period of study: from January 2010 to December 2012.

This study is prospective and random. All patients with psychological problems in admission and that were treated for these pathologies before admission in Urology Clinic are excluded from the study.

The effectiveness of routine screening of Postoperative Delirium in the elderly patients using Confusion Assessment Method (CAM) from Psychiatrists, were not necessary in these cases.

**Results:** Are evaluated all the data taken from patients and from their examinations as: age, usage of medications, symptoms, biochemical analysis, clinical balance, hemodynamic examinations, and preoperative, intra operative and postoperative evaluations.

In 1496 patients, 270 of them (18%) had of Postoperative Delirium in the elderly patients (POD). On the average, patients with delirium stayed in the hospital more than patients without delirium with a significant statistical difference between them  $t=5.12$   $p<0.01$ .

On the average, the patients with of Postoperative Delirium in the elderly patients (POD), stayed in the hospital more than the patients without delirium with a significant statistical difference between them ANOVA  $F=26.2$   $P<0.01$ .

**Conclusion:** From this study, even though small in number and short in time, it is evidently noticed that Postoperative Delirium in the elderly patients in urology has an important influence in the prolongation of the day stay in hospital. (ANOVA  $F=26.2$   $P<0.01$ ).

*Keywords: POD; CAM.*

## 1. INTRODUCTION

Increasing numbers of elderly patients are undergoing an increasing variety of surgical procedures [1].

Effects of aging on the nervous system include: selective atrophy of cerebral and cerebellar cortical neurons, neuron loss within certain areas of the thalamus, locus ceruleus, and basal ganglia of the brain, general reduction in neuron density, with loss of 30% of brain mass by age 80, decreased of number of serotonin receptors in the cortex, reduced levels of acetylcholine and acetylcholine receptors in several regions of the brain, decreased levels of dopamine in the neostriatum and substantia nigra of brain, and reduced numbers of dopamine receptors in the neostriatum part of brain, as well.

The association of serotonergic, cholinergic, and dopaminergic systems, respectively with mood, memory, and motor function, may partially account for depression, loss of memory and motor dysfunction in the elderly.

With the increase of the life span of the patients, the urologic surgeries in these group of elderly patients are also increased.

The surgery plays an important role on emotional and spiritual deterioration on elderly patients.

According [2] to the American Psychiatric Association, Delirium is defined as "a disturbance of consciousness with the reduction of the ability to focus, sustain, or change in focus, a change in the recognition (memory deficit, disorientation, spoken of untidiness), or the development of perception mess.

Specific Postoperative Complications of the elderly surgical patients such as delirium will be increasingly relevant in the coming decades.

The prevalence of postoperative delirium in elderly patients ranges from 0% to 73%, depending on the study and type of surgery [3].

Postoperative delirium is a medical emergency, which can occur within hours of surgery and has the potential to last up to 7 days [4].

At least a quarter of elderly patients, who develop postoperative delirium, may continue to have symptoms for up to 6 months after hospital discharge [5].

Postoperative delirium in the elderly patients has been associated with increased morbidity and mortality and prolonging of day stay in urology clinic.

With increase of the life span, the urologic surgery in the elderly patients is increasing as well.

## 2. PATHOGENESIS

The reasons of postoperative delirium in elderly patients are multi factorial. Many theories emphasize aberrant neurotransmission. Other hypotheses invoke abnormalities in melatonin, serotonin [6,7] and abnormal tryptophan metabolism.

Because of tryptophan causes Neuronal damaging, that is an alternative explanation, secondary either to oxidative stress [8] or inflammation.

Proinflammatory cytokines increase in postoperative delirium [9] especially interleukin-6 and interleukin-8 [10].

In addition, elevations in C-reactive protein occur in delirious patients.

A link between inflammation and neurotransmission has been proposed, with inflammation-induced perivascular edema leading to hypoxia and subsequent reduced synthesis of acetylcholine [11].

It is generally thought that delirium represents global brain dysfunction. Electroencephalographic findings (EEG), reveals a decreasing of the fast alpha frequencies and an increasing in the slower theta rhythm.

[12] In hypoactive delirium, hypoperfusion occurs globally in the frontal, temporal, and occipital lobes, and focally in the caudate head, thalamus, and lenticular nuclei of the Brain.

Delirium can be improved, once blood flow returns to normal, suggesting that cerebral hypoperfusion may play a role [13]. One of the most widely accepted mechanisms, are cholinergic deficiency, and increased serum anticholinergic activity. Both of them are associated with delirium [14]. The function capacity of organs deteriorates, resulting in decreased capability to overcome surgical stress. As a result, the elderly surgical patients have higher rates of peri-operative morbidity and mortality. Anesthesia and peri-operative care should be customized to this population. Practicing management of older patients undergoing surgery will increase the experience of all caregivers and, in time, improve outcome [15].

Postoperative delirium is common, but underdiagnosed, in elderly surgical patients, and delays rehabilitation. Multimodal intervention

strategies are recommended for preventing postoperative delirium [16]. Excessive anaesthetic depth is implicated in the mechanism of haemodynamic compromise, has been associated with myocardial infarction and stroke, postoperative delirium and, when combined with hypotension and low inspired anaesthetic concentration, increased mortality [17]. Purposes of this study are to reveal the importance of postoperative Delirium in the elderly patients and prolongation of the day stay in hospital.

## 3. MATERIALS AND METHODS

In this study are included 1496 patients aged over 65 years who underwent an operation at the urologic clinic. Period of study: from January 2010 to December 2012. Pt with Insult cerebral, Alzhemimers, phsicos, Parkinson are excluded from the study. The effectiveness of routine screening of postoperative Delirium in the elderly using Confusion Assessment Method (CAM). Psychiatrists are not necessary in this case.

This study is prospective and random. This study is accomplished by Anesthesiology and Reanimation Service of the Urology Clinic of the University Hospital Center `Mother Theresa`, Tirana, Albania. Some Anesthesiologists have completed preoperative and intraoperative data but did have no idea of the Study.

These data are opened only at the end of the study by team in charge of the study composed by other Anesthesiologists and Reanimators. The Team in Charge of the study has collected other data too about the incidence of acute postoperative complications in elderly patients.

Cognition is made with evaluation of MMSE, 24 hour preoperative data from one Anesthesiologist not included in the Team in charge of study. Patients with less than 23 points, are not included in this study. Elderly patients included on the study are monitored pre, intra, and post operative period with monitoring of Blood pressure, cardiac frequencies, ECG, pulse-oxymeter. Monitoring has been non-invasive, and some of them are monitored invasively and central venos cateter as cistectomy Patients that underwent cystectomy operations are made with Endotracheal General Anesthesia and epidural anaesthesia.

Induction of anesthesia was performed with Fentanyl. Tiopental. Intubation was facilitated

using Suxamethonium, whereas the maintenance was realized with sevoflurane.

Other Patients were made with Spinal Anesthesia or Peridural Anesthesia, with needle G 25, intruded between L2-L3. As anesthetics, are used Bupivacine 0.5% -3 ml (15 mg), and/or Morphine 200 ug (microgram).

MAP and cardiac frequency are maintained  $\leq$  20% of normal values. In cases of increasing of normal values above 20%, then we have deepening anesthesia with bolus of fentanyl.

In cases of problems as temporary Hypotension or bradycardia, they are maintained with adrenaline, atropine and liquids.

With the ending of the operation, i/v and inhalator anesthetics are interrupted. Patients are maintained with oxygen mixed with air 50%-50% and have been de-curarized with prozerine 2.5mg accompanied with Atropine 1mg diluted with physiologic solution and injected slowly i/v.

### 3.1 Statistical Analysis

Statistical analysis was performed using SPSS statistical software (SPSS 21.0). This is a single blind, randomized controlled clinical trial with three parallel arms, combined, Spinal, Endotracheal and Local anesthesia group.

#### 3.1.1 Patient recruitment and baseline data collection

The day before surgery the principal investigator checked the list of patients planned for surgery and their medical charts to identify potential participants according to our inclusion and exclusion criteria. They will then visit these patients to formally invite them for participation. Anesthesiologists that completed preoperative and intraoperative data were blinded to the study. Randomization was performed.

#### 3.1.2 Sample size

The incidence of postoperative delirium varies greatly between studies so our sample size was calculated to reach a confidence level of 95%

with a power of 80% and a precision of 3% to detect an incidence of 50% and accounting for a 25% dropout rate. Chi-square test was used to compare the proportions between variables. Student's t test was used to compare the duration of stay of patients with and without delirium and analysis of variance ANOVA was used to compare the duration of stay of patients throughout years. A p value  $\leq$ 0.05 was considered statistically significant. All testes are two tailed.

## 4. RESULTS

In this study, 488 cases of group patients of age 65-70 years, 375 (76.8%) of patients underwent Spinal Anesthesia; 108 (or 22.1%) of patients underwent General anesthesia with Intubation; and 5 (or 1%) of patients underwent local Anesthesia.

Is observed that from 424 cases of age 71-75 years, 271 (or 63.9%) of patients underwent Spinal Anesthesia; 148 (or 34.9%) of patients underwent General Anesthesia with Intubation,; and 5 (1.2%) of patients underwent local Anesthesia.

Is observed that from 402 cases of age 76-80 years, 260 (or 64%) of patients are underwent Spinal Anesthesia; 142 (or 35.3%) of patients are underwent General Anesthesia with Intubation, and 5 (1.2%) of patients are underwent local Anesthesia.

It is observed that from 182 cases of age above 80 years, 125 (or 68.7%) of patients underwent Spinal Anesthesia; 57 (or 31.3%) of patients underwent General Anesthesia with Intubation, and no one is maintained with local Anesthesia.

The patients' days stay in hospital is analyzed, taking in consideration whether they have had postoperative delirium or not.

Patients of the study have had no difference between them concerning: the type of surgery, pre-existing diseases, hemodynamic intraoperative changes, biochemical balances, and the blood framework, as well as the pre and postoperative electrolytic balance.

**Table 1. Patients maintained with different Anesthesia divided in male and female**

		Female	Male	p
Type of anesthesia	Spinal	69 (40.1%)	997 (75.3%)	<0.01
	Endotracheal	93 (54.1%)	362 (27.3%)	<0.01
	Local	10 (5.8%)	0	<0.01

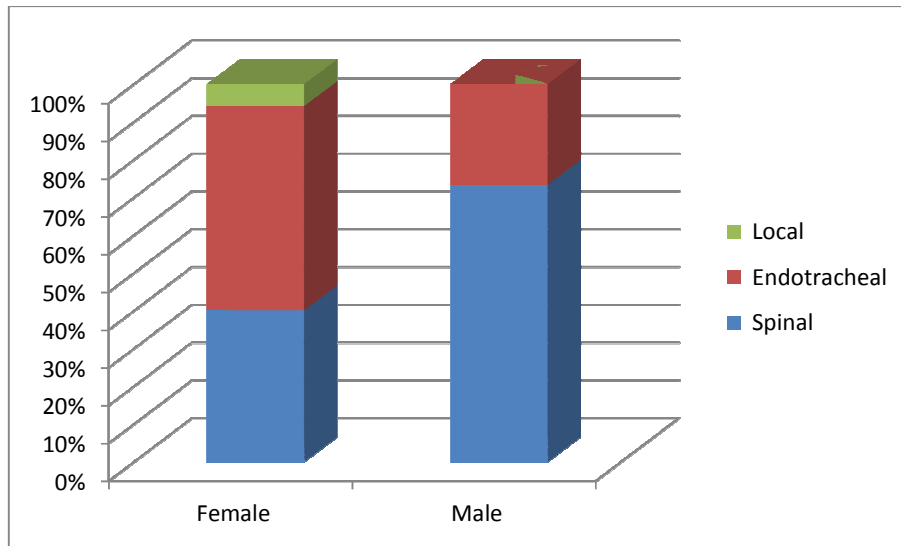
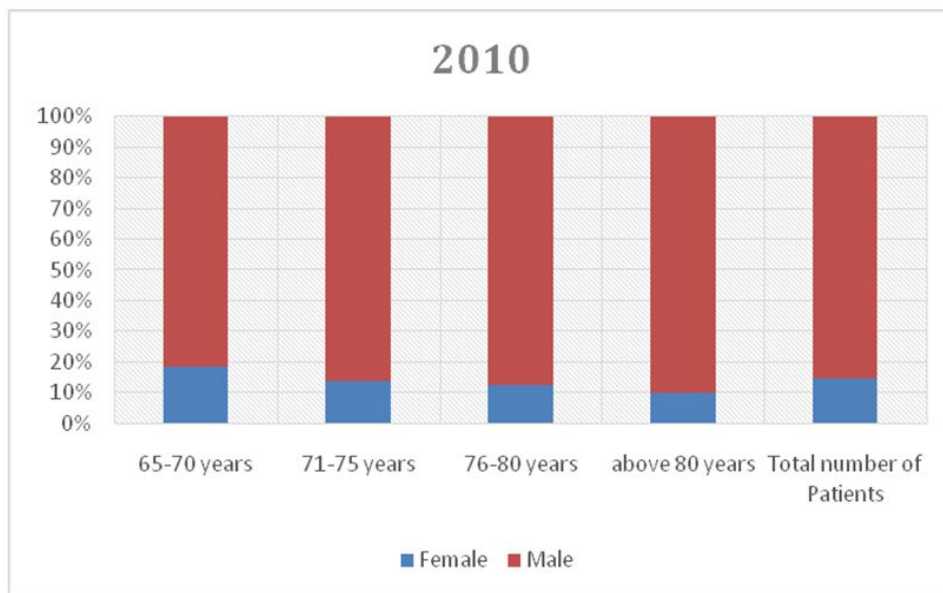


Fig. 1. The performed anesthetic techniques

Table 2. General data

Year	Age	65-70 years	71-75 years	76-80 years	>80 years	Total number of patients
2010	Females	36	22	19	6	83
	Males	162	138	133	56	489
2011	Females	20	12	10	8	50
	Males	148	149	147	50	494
2012	Females	15	10	8	6	39
	Males	142	80	78	41	341





**Fig. 2. The demographic data of the patients**

Elderly Patients with Postoperative Delirium have stayed in average longer in the hospital, compared to patients with no delirium, with a significant statistical difference between them of  $t=5.12$ , and  $p < 0.01$ .

If these results are observed more in particular we can analyze the following:

- During 2010, the average day stay of patients was 9.22 days, while patients with delirium stayed for about 10.1 days.

- During 2011, the average day stay was 9.2 days. Patients with delirium stayed for about 10.0 days.

- During 2012, the average day stay was 8.25 days, and patients with delirium stayed for about 9.3 days.

In these three years, elderly patients with postoperative delirium, stayed in average longer in the hospital than patients without postoperative delirium, with a significant statistical difference between them ANOVA  $F=26.2$   $P<0.01$ .

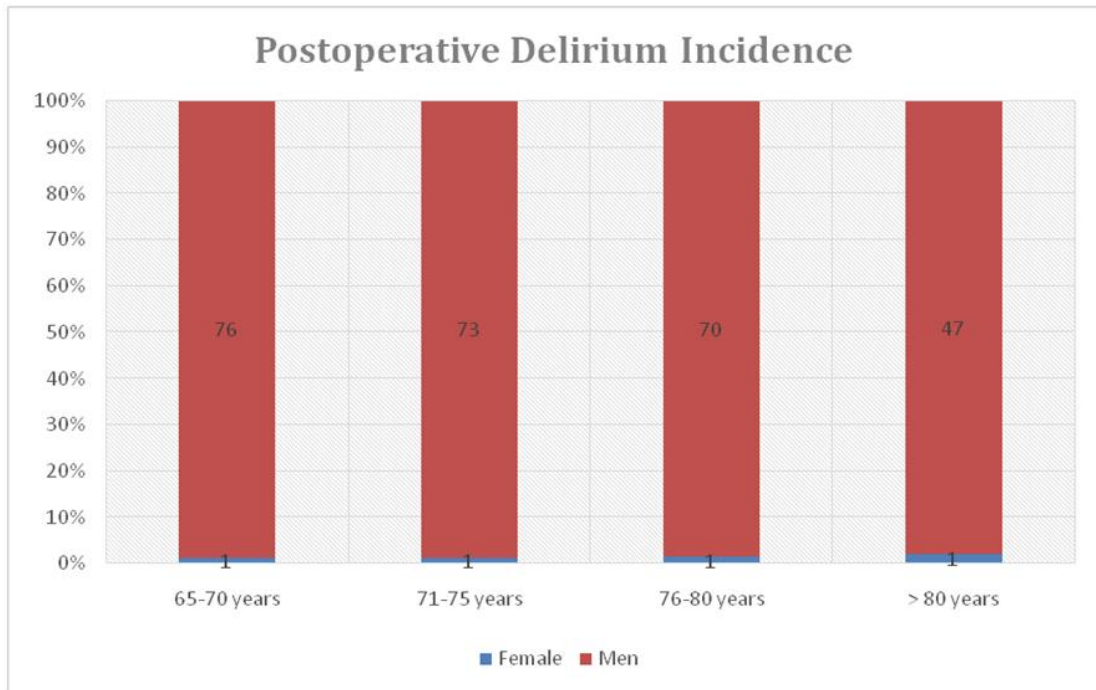


Fig. 3. Postoperative delirium incidence

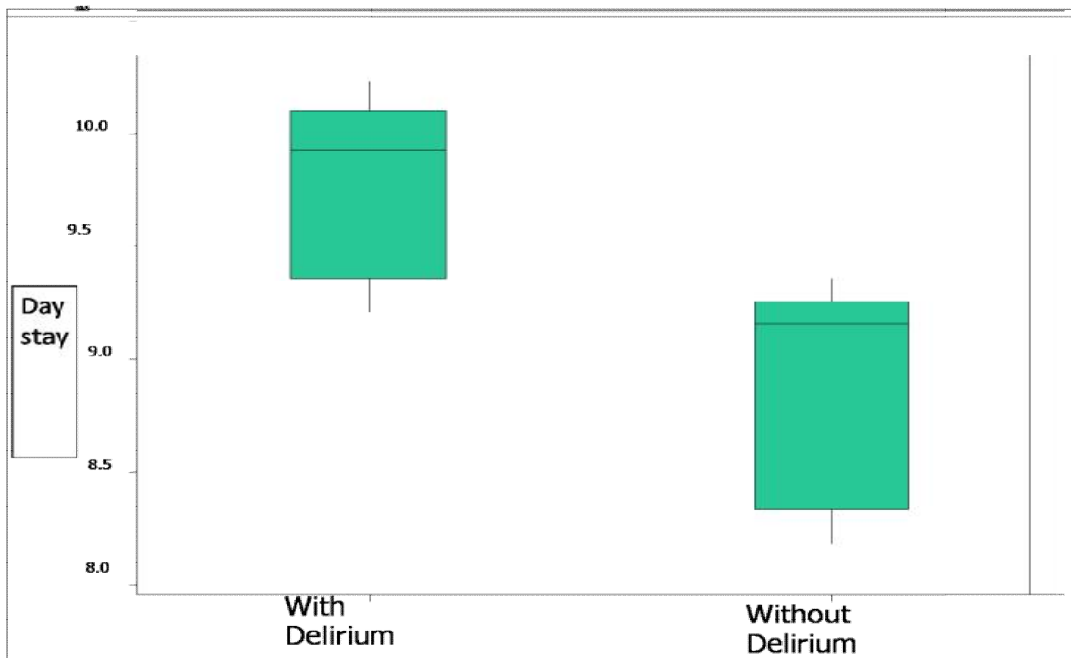


Fig. 4. Average day stay in hospital for elderly patients with postoperative delirium and elderly patients without postoperative delirium

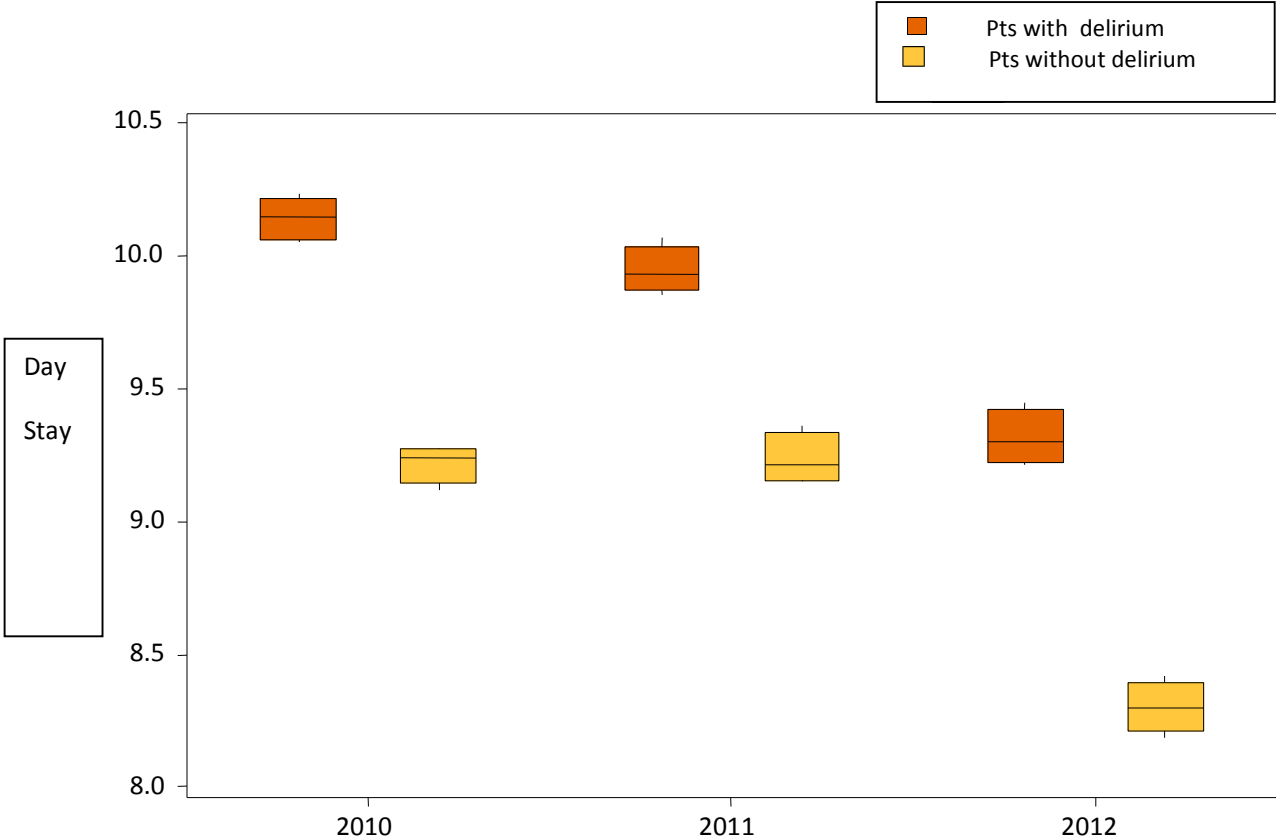


Fig. 5. Average day stay in hospital for elderly patients with postoperative delirium and elderly patients without postoperative delirium through the years



**Table 3. Elderly patients with postoperative delirium incidence**

Age	Female	Men	Total
65-70 years	1	76	77
71-75 years	1	73	74
76-80 years	1	70	71
>80 years	1	47	48

## 5. DISCUSSION

Early postoperative delirium is a problem [18], not only for the welfare of the patients during surgery, but also for the prolongation of the patients' day stay in hospital, and is also a predisposing factor that these patients have postoperative delirium, even after being discharged from the hospital.

Cognitive postoperative deterioration, is a general and important problem in elderly patients, after cardiac and non cardiac surgery [19].

As a general summary, Authors also note that patients with postoperative delirium, have a tendency to increase their day stay in hospital, compared to patients with no postoperative delirium with the same preoperative and intraoperative physical status, who undergo the same type of surgery and anaesthesia.

The role of postoperative analgesia in the improving of health conditions is seen during first postoperative day because a patient who is not fully responsible can rip off his own intravenous catheter, or urinary catheter, and sometimes the central intravenous catheter as well. Those actions can have their own negative results in the performance of the disease.

## 6. CONCLUSION

Elderly Patients with postoperative delirium, had a longer day stay in hospital compared to elderly patients without postoperative delirium, despite the same conditions such as morbidity and physical status, with a significant statistical difference between them ANOVA  $F=26.2$   $P<0.01$ .

A part of elderly patients underwent urologic surgery, during postoperative period have Postoperative Delirium. All elderly patients with

postoperative delirium must have an intensive medical care during postoperative period.

## CONSENT

It is not applicable; because it is a descriptive study and no new drug or anesthesia technique is performed.

## ETHICAL APPROVAL

It is not applicable; because it is a descriptive study and no new drug or anesthesia technique is performed.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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