The role of age in the incidence of postoperative delirium in urology

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Summary

The aim of the study was to investigate the role of age in the incidence of postoperative delirium (POD) in urology.

Material and methods: The patients were up to 65 years old. After preoperative informed written consent, the enrolled subjects had baseline cognitive and functional assessments. Postoperatively, subjects were assessed daily for delirium using the confusion assessment method. The effectiveness of routine screening of postoperative delirium in the elderly using the Confusion Assessment Method (CAM). Psychiatrists are not necessary in this case.

Results: The study design was prospective and descriptive. During the study period, 1496 patients were enrolled before urology operations. All patients that were admitted in the urology clinic were over 65 years old (1496 patients). The study period was from January 2010 to December 2012. Patients that had been diagnosed and treated for psychiatric problems (Alzheimer's, senile dementia, schizophrenia) were excluded from the study. All patients were routinely preoperative analysed and were then analysed to determent which factor had a greater effect and which had no effect on those complications. The overall incidence of delirium was 18% (270/1496).

Conclusions: In the current study, delirium occurred in 18% of the elderly patients after urology operations, and the incidence of delirium was higher in male patients. Several preoperative variables were associated with an increased risk of delirium including older age (χ^2 for trend = 14.3; $p < 0.01$).

Key words: surgery, old age, POD, CAM.

Introduction

Age-related diseases such as cerebral arteriosclerosis, Alzheimer's, and Parkinson's disease are more common with advancing age. Most strokes affect those over 70 years of age and the risk doubles every 10 years after age 55. The prevalence rates for dementia and Alzheimer's disease double approximately every five years from rates of 2-3% in the age category 65 to 75 years to more than 30% in persons aged 85 years and above. Onset of symptoms in Parkinson's disease usually occurs between ages 60 and 69 years, although in 5% of patients the first signs are seen prior to age 40. About 1% of persons aged 65 years and older and 2.5% of those aged over 80 have Parkinson's disease [1–5]. The increase in magnitude with advancing age represents ageing. The effects of ageing on the nervous system include: selective attrition of cerebral and cerebellar cortical neurons, neuron loss within certain areas of the thalamus, locus ceruleus, and basal ganglia, general reduction in neuron density, with loss of 30% of brain mass by age 80, decreased numbers of serotonin receptors in the cortex, and reduced levels of acetylcholine and acetylcholine receptors in several regions of the brain, decreased levels of dopamine in the neostriatum and substantia nigra, and reduced numbers of dopamine receptors in the neostriatum. The association of the 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. Nevertheless, the physiological and psychological age is not the same as the chronological one. Old age is a multi-factor process where adaptive capacity is gradually reduced, and so a gradual reduction of the functional ability of many systems is seen. While trying to analyse and discover factors (not

the above one because we could not intervene but the ones that are associated with intervention and anaesthesia). We could take interventional measures to prevent or minimise those complications. In the cases when it cannot be prevented, the treatment is not only symptomatic, as it was until now, but also aetiological and physiopathological as well. Successful prevention or effective treatment of those complications has a very positive and direct effect on surgery outcome and patients' quality of life.

Pathogenesis

Many theories emphasise aberrant neurotransmission. One of the most widely accepted mechanisms is cholinergic deficiency; increased serum anticholinergic activity is associated with delirium [6]. Other hypotheses invoke abnormalities in melatonin and serotonin [7, 8]. The abnormal tryptophan metabolism unifies these ideas because tryptophan is neuronal damage is an alternative explanation, secondary either to oxidative stress [9] or inflammation as well. Proinflammatory cytokines increase in postoperative delirium [10], especially interleukin-6 and interleukin-8 [11]. In addition, elevations in C-reactive protein occur in delirious patients. A link between inflammation and neurotransmission has been proposed, with inflammation-induced perivascular oedema leading to hypoxia and subsequent reduced synthesis of acetylcholine [12]. It is generally thought that delirium represents global brain dysfunction. Electroencephalographic findings reveal a decrease in the fast alpha frequencies and an increase in the slower theta rhythm [13]. In hypoactive delirium, hypoperfusion occurs globally in the frontal, temporal, and occipital lobes and focally in the caudate head, thalamus, and lenticular nuclei. Delirium improves once blood flow returns to normal, suggesting that cerebral hypoperfusion may play a role [14].

Nevertheless, the physiological and psychological age is not the same as the chronologic one. Old age is a multi-factor process in which adaptive capacity is gradually reduced and a gradual reduction of functional ability of many systems is seen. While trying to analyse and discover factors (not the above one because there we could not intervene, but the ones that are associated with intervention and anaesthesia). We could take interventional measures to prevent or minimise those complications. In the cases when it cannot be prevented, the treatment is not only symptomatic, as it was until now, but also aetiological and physiopathological as well. Successful prevention or effective treatment of those complications has a very positive and direct effect on surgery outcome and patients' quality of life.

Material and methods

This study was a prospective and a descriptive one. There was no new anaesthetic drug or technique to be applied, so there was no need to have special consent from the patients or the National Ethical Committee. The Confusion Assessment Method (CAM) was used. All patients that were admitted to the urology clinic were over 65 years old (1496 patients). The study period was from January 2010 to December 2012. The patients previously diagnosed and treated for psychiatric problems (Alzheimer's, senile dementia, schizophrenia) were excluded from the study. All patients were analysed in order to determine which factor or factors were more important in causing post-operative delirium.

Preoperative assessment for delirium risk consisted of preoperative evaluation of the patients, their medical history, and of course their habitudes. All patients underwent a detailed assessment (possible existing illness). Some of them were receiving medication for other health problems or life style (alcohol, smoke, etc.). The readiness for surgery and knowledge about the procedure that was to be done. The kind of anaesthesia which was planned to be performed, and biochemical laboratory parameters were analysed.

Intra-operator assessment for delirium risk included all the anaesthetic sheet records. The medications used for anaesthesia, the anaesthesia technique (local anaesthesia, epidural/spinal, and general anaesthesia), what kind of muscle relaxants were used, intra-operative haemodynamic and respiratory changes (blood pressure, heart rate, SaO_2, respiratory rate), mental status changes, blood loss, and all the non-anaesthetic drugs used during surgery (atropine, pethidine, morphine, diuretics, antibiotics, etc.).

We reviewed all the recordings made during the postoperative period. The following were analysed: blood count, biochemistry values, electrolytes, pain, and haemodynamics. Post-operation medications used, such as anti-inflammatory, cortizonic, morphine, anxiolitic, atropine, diuretics, antihistamine H_1 and H_2, immunosupressor, insulin, and oral drugs, antihypertensive and other cardiac medications, and anticonvulsants. The patients were divided in four groups depending on the interval of age (65-70, 71-75, and 76-80 years old) to which they belonged. There were no differences between the age groups in anaesthesia technique and used medications.

Results

The demographic data are summarised in Table 1, and the incidence of postoperative delirium are shown in Table 2.

Table 1. General data

Year	Sex	Age (years)				Total number of patients
		65-70	71-75	76-80	> 80	
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

Table 2. Post-operative delirium incidence

Age (years)	Females	Males	Total
65-70	1	76	77
71-75	1	73	74
76-80	1	70	71
> 80	1	47	48

Delirium occurred in 57 (10.9%) of 523 patients aged 65-70 years old, where 57 were males and there were no females, $p < 0.01$.

Delirium occurred in 52 (12.3%) of 424 patients aged 71-75 years old, where 52 were males and there were no females, $p < 0.01$.

Delirium occurred in 61 (14.9%) of 402 patients aged 76-80 years old, where 60 were males and there was one female, $p < 0.01$.

Delirium occurred in 39 (21.4%) of 182 patients aged over 80 years old, where 38 were males and there was one female, $p < 0.01$.

A lineal, statistically important trend of increasing incidence of delirium with increasing age can be seen (χ^2 for trend =14.3, $p < 0.01$).

There seems tobe a lower incidence in the age group > 81 years old (χ^2 for trend = 14.3, $p < 0.01$). There was no recorded significant difference between groups regarding anaesthesia technique and drugs, and perioperative medical status (blood pressure, heart rate, respiratory rate, SaO_2, electrolytic and metabolic changes).

Discussion

Identification of risk factors for developing postoperative delirium allows surgeons to implement interventions aimed at reducing the incidence of delirium in this high-risk group of patients [15]. Previously identified risk factors for delirium after an operation include: age, dementia, functional impairment, depression, psychotropic drug use, increased comorbidity, laboratory abnormalities, visual impairment, hearing impairment, alcohol use, institutional residence, and prior postoperative delirium [16, 17]. There is substantial heterogeneity in the findings of these studies, which determine risk factors for developing postoperative delirium. The heterogeneity is in part accounted for by the inclusion of patient populations with various susceptibilities to the development of delirium and various surgical stressors.

Conclusions

In this study it was noticed that the incidence of post-operative delirium is associated with age, which means that with increasing age, the chances of this complication also increase (χ^2 for trend = 14.3, $p < 0.01$).

Authors report no conflict of interest.

References

1. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders (ed. 4) – Text revision (DSMIV-TR). American Psychiatric Association, Washington 2000.
2. Dyer CB, Ashton CM, Teasdale TA. Postoperative delirium. A review of 80 primary data-collection studies. Arch Intern Med 1995; 155: 461-465.
3. Muravchick S. The physiologic and pharmacologic implications of aging. 37th Annual Refresher Course Lectures and Clinical Update Program. American Society of Anesthesiologists 1986; No. 275.
4. Uitti RJ. Tremor: how to determine if the patient has Parkinson's disease. Geriatrics 1998; 53: 30-36.
5. Hendrie HC. Epidemiology of Alzheimer's disease. Geriatrics 1997; 52 Suppl 2: S4-S8.
6. Mussi C, Ferrari R, Ascari S, et al. Importance of serum anticholinergic activity in the assessment of elderly patients with delirium. J Geriatr Psychiatry Neurol 1999; 12: 82-86.
7. Balan S, Leibovitz A, Zila SO, et al. The relation between the clinical subtypes of delirium and the urinary level of 6-SMT. J Neuropsychiatry Clin Neurosci 2003; 15: 363-366.
8. Lewis MC, Barnett SR. Postoperative delirium: the tryptophan dysregulation model. Med Hypotheses 2004; 63: 402-406.
9. Karlidag R, Unal S, Sezer OH, et al. The role of oxidative stress in postoperative delirium. Gen Hosp Psychiatry 2006; 28: 418-423.
10. Rudolph JL, Ramlawi B, Kuchel GA, et al. Chemokines are associated with delirium after cardiac surgery. J Gerontol A Biol Sci Med Sci 2008; 63A: 184-189.
11. de Rooij SE, van Munster BC, Korevaar JC, et al. Cytokines and acute phase response in delirium. J Psychosom Res 2007; 62: 521-525.

12. Hala M. Pathophysiology of postoperative delirium: systemic inflammation as a response to surgical trauma causes diffuse microcirculatory impairment. Med Hypotheses 2007; 68: 194-196.
13. Plaschke K, Hill H, Engelhardt R, et al. EEG changes and serum anticholinergic activity measured in patients with delirium in the intensive care unit. Anaesthesia 2007; 62: 1217-1223.
14. Yokota H, Ogawa S, Kurokawa A, et al. Regional cerebral blood flow in delirium patients. Psychiatry Clin Neurosci 2003; 57: 337-339.
15. Dasgupta M, Dumbrell AC. Preoperative risk assessment for delirium after noncardiac surgery: a systematic review. J Am Geriatr Soc 2006; 54: 1578-1589.
16. Inouye SK, Bogardus ST Jr, Charpentier PA, et al. A multicomponent intervention to prevent delirium in hospitalized older patients. N Engl J Med 1999; 340: 669-676.
17. Demeure MJ, Fain MJ. The elderly surgical patient and postoperative delirium. J Am Coll Surg 2006; 203: 752-757.