RESEARCH ARTICLE

Determining the incidence of postoperative delirium in elderly patients who undergo orthopaedic surgical interventions in Turkey

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Abstract

Objectives: To determine the incidence of postoperative delirium in elderly patients having undergone orthopaedic surgical interventions.

Methods: The cross-sectional study was conducted at the traumatology clinic of GATA Haydarpasa Training and Research Hospital in Istanbul, Turkey, from April 2014 to April 2015 and comprised patients who underwent orthopaedic surgical interventions. The subjects included were aged >65 years, had no mental disorders, no acute cerebrovascular disease, no known history of delirium and/or dementia. Data was collected using a self-generated questionnaire, mini mental state examination and delirium rating scale. SPSS 18 was used for data analysis.

Results: Of the 60 participants, 39(65%) were female and 21(35%) were male. The overall mean age was 77.07±8.66 years. Besides, 22(36.7%) patients had moderate cognitive impairment preoperatively, and 51(85%) had no delirium postoperatively while 9(15%) had delirium.

Conclusion: Degree of cognitive impairment,advanced age and type of surgery were determined to be risk factors for delirium.

Keywords: Delirium, Elderly, Hip fracture, Nursing, Orthopaedic surgery. (JPMA 68: 867; 2018)

Introduction

Delirium is a temporary mental disorder characterised by changes in consciousness and attention.[1] Although delirium is substantially common, it is not recognised in 64-84% of patients and not diagnosed in 33-66%.[2]

Prevalence of delirium varies between 14% and 56% for inpatients, while the rates go up to 20-79% for elderly patients. Postoperative delirium causes longer hospital stay, decreases functional capacity and increases care-related costs.[1,3,4] Yearly costs associated with delirium in the United States are reported to be $150 billion.[5]

Delirium risk is especially high in postoperative period, in orthopaedics clinics and intensive care units.[3,6] Delirium incidence after orthopaedic surgical interventions is reported between 5 and 14.3%.[7] Moreover, delirium incidence in patients older than 65 years, undergoing hip fracture surgery, which is an orthopaedic surgical intervention, and with a history of previous psychiatric disorders, is higher than 62%.[8,9]

Several factors, including advanced age, male gender, alcohol use, dehydration, poly-pharmacy, pain, use of neuroleptic and narcotic agents, immobility, visual and auditory disturbances, electrolyte imbalances and cognitive impairment contribute to delirium.[3,5,7,9] Risk factors for developing delirium after orthopaedic surgical interventions are hip fracture surgery, advanced age, waiting for surgery for a long time, poly-pharmacy, electrolyte imbalances and immobility.[10] Hip fracture surgery is the most important risk factor for developing delirium. Brauer et al. found that delirium developed in 7% of hip fracture patients at the time of admission, in 30% before surgery, in 9% on the day of surgery and in 54% postoperatively.[11]

Along with aging and age-related changes, people face greater risk of developing other problems. Orthopaedic disorders are one of the physical problems that the elderly are exposed to. Changes in the musculoskeletal structure of the elderly individual, falls and cognitive impairment play a role in the development of these problems.[12] Another common and life-threatening problem of the elderly individuals is the delirium.[5] Therefore, recognising delirium and alleviating its effects is crucial for elderly patients who undergo orthopaedic surgical interventions. The current study was conducted to determine the incidence of postoperative delirium and risk factors that cause delirium in elderly patients who undergo orthopaedic surgical interventions.

Patients and Methods

This cross-sectional study was conducted at orthopaedics

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and traumatology clinic of GATA Haydarpasa Training and Research Hospital in Istanbul, Turkey, from April 2014 to April 2015, and comprised patients aged >65 years who underwent orthopaedic surgical intervention.

Approval was obtained from the institutional ethics review committee, and informed written consent was obtained from the subjects.

The sample size was calculated based on the prevalence of the delirium and the annual patient number matching the inclusion criteria which was 75. In different studies the prevalence of the delirium was 4-42%.[4,11] The expected prevalence for delirium was set as 25%. The acceptable value for α and β was set as 0.05 and 0.20, respectively. The required sample was determined to be minimum 59.67. Subjects enrolled were >65 years of age, had no mental disorders, no acute cerebrovascular disease, no known history of delirium and/or dementia who volunteered to participate.

Data was collected using self-generated Questionnaire Form, Mini Mental State Examination (MMSE) and Delirium Rating Scale (DRS) through face-to-face interview.

Questionnaire Form included questions about patient's age, gender, marital status, type of surgery, type of anaesthesia and analgesic use.

MMSE developed by Folstein et al. was used to assess the patients' cognitive states preoperatively.[7] The scale is easy to administer and provides information about the degree of cognitive impairment. It includes categories that evaluate orientation, registration, attention and calculation, recall and language. Turkish version of MMSE was developed by Güngen et al. in 2002.[13] MMSE was reported to be reliable and valid in diagnosing mild dementia in Turkish population. The maximum score is 30; greater than or equal to 24 points is considered as normal cognition, 19-23 points as mild, 10-18 points as moderate and $\leq$9 points as severe cognitive impairment.[13]

DRS was developed by Trazepacz et al. in 1988. Turkish version of DRS was developed by Aydemir et al.[14] The original version tested the validity and reliability of DRS based on the criteria of Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV).[15] It includes psychomotor behaviour, orientation, concentration, memory, thought process, thought content, sleep-wake cycle disturbances and liability of mood. Cut-off score is 11/12; any score above is considered delirium.

Questionnaire Form and MMSE were administered on the day of admission. DRS was used 24 hours after surgery.

SPSS 18 was used for data analysis. Number and percentage were used for descriptive characteristics. Mean and standard deviation were used for MMSE and DRS score distributions. Normal distribution was examined with Kolmogorov-Smirnov test and nonparametric analysis was determined. Nonparametric Mann Whitney test waspreferred for determining the difference between variables, and Spearman correlation test was used to determine the correlation between scales. P<0.05 was considered significant.

Results

Of the 60patients, 39(65%) were females and 21(35%) males. Mean age of the patients was 77.07±8.66. Besides, 39(65%) were married; 34(56.7%) were operated for hip

Table-1: Individual characteristics and the comparison of DRS points with individual characteristics.

		N	%	Mean±SD	Median (IQR)	p*
Age				77.07±8.66	76,5 (69-83)	
Gender	Female	39	65	4.61±5.27	3 (1-7)	p>0.05
	Male	21	35	4,09±5,04	2(0-7)	
Marital status	Married	39	65	5.46±5.19	4 (2-9)	p<0.01
	Single	21	35	2.52±4.62	1(0-2)	
Type of surgery	Hip fracture	34	56.7	6.14±5.70	4 (1-10)	p<0.01
	Other orthopaedic interventions	26	43.3	2.19±3.26	2 (0-2,2)	
Type of anaesthesia	General	36	60	5.11±5.71	2 (1-10)	p>0.05
	Spinal	24	40	3.41±4.12	2(0,2-4,7)	
Use of analgesics	Yes	60	100	4.43±5.15	2 (1-6,5)	
	No	0				

*Mann Whitney U
DRS: Delirium rating scale
SD: Standard deviation.

Table-2: The points and classification of MMSE and DRS.

		N	%	Mean±SD
MMSE				16.38±7.64
MMSE	Normal cognition	12	20	
	Mild	15	25	
	Moderate	22	36.7	
	Severe	11	18.3	
DRS	Psychomotor activity			0.62±0.76
	Orientation			0.63±0.78
	Attention			0.87±0.68
	Memory			0.62±0.85
	Perceptions			0.23±0.50
	Thought process			0.35±0.58
	Thought content			0.27±0.58
	Sleep-wake cycle disturbance			0.37±0.58
	Variability of symptoms			0.23±0.46
	Liability of mood			0.25±0.51
	Total			4.43±5.15
DRS	No Delirium	51	85.0	
	Delirium	9	15.0	

MMSE: Mini Mental State Examination
DRS: Delirium Rating Scale.

Table-3: The Correlation between Age, MMSE and DRS.

	AGE	MMSE	DRS
AGE	1	-0.47*	0.42*
MMSE	-0.47*	1	-0.90*
DRS	0.42*	-0.90*	1

*Spearman Correlation is significant at the 0.05 level.
MMSE: Mini Mental State Examination
DRS: Delirium Rating Scale.

surgery; 36(60%) were operated under general anaesthesia; and 60(100%) were given analgesics after surgery. Patients who were married and underwent hip fracture surgery had significantly higher mean DRS scores ($p<0.05$) (Table-1).

Mean preoperative MMSE score was 16.38±7.64 while 22(36.7%) had moderate cognitive impairment. Mean postoperative DRS score was 4.43±5.15 and 9(15%) patients were identified as having delirium (Table-2).

The correlation between age, MMSE and DRS, showed that as the age increased, MMSE scores decreased, while DRS scores increased. Similarly, DRS scores increased with decreasing MMSE scores (Table-3).

Discussion

Although delirium is observed in all ages and with various diagnoses, incidence in the elderly population is substantially higher. Particularly, it is one of the most common conditions in elderly patients after orthopaedic surgical interventions.

The current study investigated the incidence of delirium in elderly patients who underwent orthopaedic surgical interventions. It determined that 15% of all participants had delirium. Patients who were of advanced age, had cognitive impairment and underwent hip fracture surgery had a higher rate of delirium.

Previous studies have reported that delirium rate in patients older than 65 years is 10-15% and delirium risk of elderly patients who undergo orthopaedic surgery, especially hip fracture surgery, is 10-45%.[10,16-21] A meta-analysis of 5 studies showed that likelihood of delirium increased in patients who underwent total hip prosthesis surgery.[19] One study reported that incidence of postoperative delirium in elderly patients who undergo hip fracture surgery was 27.9%.[22] Another study investigated the incidence of delirium in hip fracture in a meta-analysis of 4 studies and found that the rate of delirium increased in orthopaedic patients with hip fracture surgery performed.[23] We think that the reported rates of delirium differ because of the studies were conducted in separate fields and different data-collecting process, delirium scales and diagnosis criteria were used.

Postoperative cognitive impairment in elderly patients is reported to be at a rate of 28.1 to 30.2%.[20] Studies have shown that patients with cognitive impairment who undergo orthopaedic surgical interventions have a higher risk or developing delirium. In their meta-analysis study, Yang et al. reported that mild dementia augments the rate of delirium after hip surgery.[19] Wu et al. found that postoperative delirium in elderly patients who undergo hip fracture surgery under general anaesthesia is associated with preoperative poor cognitive functions.[21] In this study, we found the incidence of delirium to be higher in patients with preoperative cognitive impairment. Ageing is a period when cognitive impairment worsens and related problems are observed. Deteriorating musculoskeletal structure of the elderly and resulting falls is a major cause of hip fractures.[24] In this study, increased rate of delirium in both the elderly with cognitive impairment and the elderly with hip fracture surgery may be as a result of this.

Studies have shown that preoperative pain management is associated with the delirium. Patients with unsuccessful pain management after hip fracture

surgeries were found to have a higher rate of delirium. In this study, all patients received analgesics for postoperative pain managements and therefore a comparison was not possible.[6,21] Further studies with bigger sample groups that compare patients with and without pain management using analgesics may be recommended. However, it would be difficult to conduct since postoperative pain management ensures patient comfort.

Certain studies have found that delirium incidence is higher in male patients and male gender is a risk factor for delirium.[8,19] On the contrary, certain other studies have shown no significant association between gender and delirium.[10] In this study, we also found no significant association between gender and delirium. Further studies with bigger sample group are required to confirm this finding.

Different studies about the effects of general and spinal anaesthesia on postoperative delirium have yielded different results. Ilonga et al. found that type of anaesthesia used in orthopaedic operations had no statistically significant effect on the rate of postoperative delirium.[16] Atay et al. showed that delirium was significantly higher in patients receiving general anaesthesia; however regression analysis proved otherwise.[10] In a meta-analysis that compared spinal anaesthesia versus general anaesthesia, Mason et al. reported that type of anaesthesia did not influence postoperative delirium; yet they observed that postoperative cognitive impairment was insignificantly higher in patients receiving general anaesthesia.[25] In our study, we found no significant difference between elderly patients receiving either general or spinal anaesthesia regarding delirium. Further studies with bigger sample size are required to clarify this.

The major limitation of the current study is the small sample size. Secondly, with data being retrieved from one hospital, the results may not be generalised. Further studies with bigger sample size that ellaborate physical diseases of patients is recommended.

Conclusion

Diagnosing postoperative delirum, practising preventive interventions on patients under risk and treatment is of vital importance. Healthcare workers should identify patients who are at a high risk for developing delirium, and should develop appropriate approaches. Providing education for identifying delirium risk to healthcare workers, and implementing these to daily practice is recommended.

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