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Treatment of dementia patients with fracture of the proximal femur in a specialized geriatric care unit compared to conventional geriatric care

Recently, specialized wards have been established in geriatric hospital departments in Germany, reflecting the growing need of special care for acutely ill older patients who are also cognitively impaired. Some characteristics of such wards are extended geriatric assessment, special education of staff, and particular equipment and architecture. However, there is wide variability with respect to the designation of these wards, the number of beds, length of stay, and admission criteria [1]. One qualitative study showed a favorable treatment outcome [5]. However, no comparison to conventional geriatric treatment has been published yet.

Methods

Data collection

For 12 months, we prospectively collected demographic and assessment data of all consecutive patients with a fracture of the proximal femur and dementia ($n=53$) who were admitted to the specialized ward (cognitive geriatric unit, CGU). They were all referred from traumatology departments on day 3–5 after their surgical procedure. The patients of the CGU were matched to patients admitted to geriatric wards (non-CGU) of the same geriatric department, i.e., from 2008 until the opening of the CGU ($n=76$). The patients of the comparison group had received conventional treatment including physiotherapy, occupational therapy, and neuropsychological

assessment (CERAD battery). The matching criteria were sex, age group (65–69, 70–74, 75–79, 80–84, 85–89, and ≥ 90 years), Mini-Mental Status score (1: 0–9; 2: 10–19; 3: 20–24 points out of a total of 30 points), and the type of operation (endoprosthesis vs. nail). We were able to match 48 of the 53 CGU patients to patients of the non-CGU treatment. For 5 patients, we could not find a matching partner in all four categories. Four of these patients belonged to the first or second age group with severe cognitive impairment.

Intervention

The CGU has additional components compared to conventional geriatric treatment: hidden exit doors, increased light in hallways and patient rooms, night-lights, a treatment room on the ward to decrease patient transferral, a living and eating room, and a loop track for wandering patients. The number of beds was decreased from 28 (non-CGU ward) to 23 on the CGU. All team members of the CGU volunteered to work on this specialized ward. The initial assessment included the Barthel index, Tinetti score, Mini-Mental State Examination (MMSE), Geriatric Depression Scale (5-item version), the Mini-Nutritional Assessment, grip strength, calf circumference, and the Albertinen Dysphagia Screen. External supervision is provided for all team members once a month, a class of Integrative Validation for all members of the team, a

teaching session once a month about gerontopsychiatric issues, an extension of the morning meeting duration as well as the weekly team session, and an additional 15-min meditation session once a week. The number of nurses was increased in the CGU from 14 (non-CGU) for 28 beds to 18.5 nurses for 23 beds. The other staff (physicians, physiotherapists, occupational therapists, and neuropsychologists) remained unchanged in number. Physicians were obliged to take the patient history additionally from the relatives and the general practitioner. The main steps of clinical work-up were standardized by a flowchart.

Statistical methods

For quantitative variables, we present mean and standard deviation. When groups were compared using MMSE scores, percentages of neuroleptic, antidepressant, and antidementia medication as well as the percentage of definite diagnosis, the χ^2 test was used. For comparison of the in-hospital length of stay, t-test for independent variables was used, while the ANOVA test was used to compare the two groups on geriatric assessment data (Barthel index and Tinetti score). For the Tinetti score, which differed significantly between both groups, we additionally calculated an ANCOVA with the length of stay as a covariate variable. Tests were conducted by a statistician (C.M.) with SPSS statistical software, version 15.0.

Tab. 1 Comparison of forms of dementia between conventional care (*non-CGU*) and cognitive geriatric unit (*CGU*)

	Non-CGU		CGU	
	(n)	(%)	(n)	(%)
Alzheimer's disease	7	14.6	14	29.2
Subcortical vascular D	2	4.2	4	8.3
Multi-infarct dementia	3	6.3	4	8.3
"Mixed"	2	4.2	5	10.4
Others	1	2.1	6	12.5
Unknown	33	69	15	31.3

Tab. 2 Comparison of the Barthel index (*BI*) and the Tinetti score (*TS*) between conventional care (*non-CGU*) and cognitive geriatric unit (*CGU*)

	Group	Number	Mean	SD	T	Df	p
BI _{admission}	Non-CGU	48	34.17	17.63	-0.194	94	0.847
	CGU	48	34.90	19.20			
BI _{discharge}	Non-CGU	48	49.06	20.98	-0.689	94	0.493
	CGU	48	51.98	20.52			
Gain in BI	Non-CGU	48	14.90	11.87	-0.808	94	0.421
	CGU	48	17.08	14.51			
TS _{admission}	Non-CGU	48	5.19	4.48	-0.756	87.3	0.452
	CGU	48	6.00	5.95			
TS _{discharge}	Non-CGU	48	8.19	6.47	-2.918	94	0.004
	CGU	48	12.40	7.61			
Gain in TS	Non-CGU	48	3.00	4.82	-3.520	94	0.001
	CGU	48	6.40	4.63			

SD standard deviation.

Tab. 3 Comparison of medications between conventional care (*non-CGU*) and the cognitive geriatric unit (*CGU*)

		Non-CGU		CGU		Total		χ^2	df	p
		(n)	(%)	(n)	(%)	(n)	(%)			
Neuroleptic drugs	No	41	85.4	46	95.8	87	90.6	3.07	1	0.080
	Yes	7	14.6	2	4.2	9	9.4			
Anti-depressants	No	38	79.2	35	72.9	73	76.0	0.52	1	0.473
	Yes	10	20.8	13	27.1	23	24.0			
Antidementive drugs ^a	No	45	93.8	41	85.4	86	89.6	1.79	1	0.181
	Yes	3	6.3	7	14.6	10	10.4			

^aMemantine or acetylcholinesterase inhibitor.

Results

The mean age of all patients was 84.1 years (standard deviation (SD) 7.8, range 65–102 years), and 73% were women. The mean MMSE score was 14.6 ± 6.27 for the conventional treatment group and 14.4 ± 6.41 for the CGU group ($\chi^2 = 0.062$, $df = 2$, $p = 0.969$).

A specified clinical dementia diagnosis according to ICD-10 including CT or MRI scan of the head, neuropsychological assessment, and laboratory investigation was made in 29% of the non-CGU ward compared to 69% of the CGU patients

($\chi^2 = 15.048$, $df = 1$, $p = 0.000$). The distribution of dementia diagnoses is shown in

■ **Tab. 1.**

The length of stay was longer for patients on the CGU than patients on the non-CGU ward (19.9 ± 4.9 vs. 17.7 ± 4.7 days ($t(94) = -2.188$, $p = 0.031$).

Both patient groups improved comparably in functional status as reflected by the Barthel index (BI) score levels (■ **Tab. 2**). The length of stay had no influence ($F(1/93) = 6.258$, $p = 0.014$, $\eta^2 = 6\%$). Tinetti score increased significantly in both groups, and there was also a significant repeated-measure and

group interaction ($F(1/94) = 12.391$, $p = 0.001$, $\eta^2 = 0.12$). The increase of the Tinetti score was significantly higher in the patients on the CGU (■ **Tab. 2**), irrespective of the length of stay (analysis of covariance: treatment (CGU/non-CGU): $F(1/93) = 9.421$, $p = 0.003$; covariate (length of stay): $F(1/93) = 3.452$, $p = 0.066$, $\eta^2 = 3.6\%$).

In the non-CGU group, 26 patients (54.2%) were discharged back home, 12 (25%) back to nursing homes, and 10 (20.8%) were discharged to a nursing home for the first time. The percentages of patients discharged from the CGU to these destinations were not different (58.4, 20.8, 20.8%, respectively) ($\chi^2 = 1.089$, $df = 3$, $p = 0.780$).

Medication with neuroleptics, antidepressants, and antidementive drugs (acetylcholine inhibitors or memantine) at the time of discharge was compared between both patient groups. In the CGU group, there were 2 patients (4.2%) on neuroleptic drugs at discharge compared to 14.2% of patients in the non-CGU group. However, the difference did not reach statistical significance (■ **Tab. 3**).

Discussion

The treatment of patients with a fracture of the proximal femur in a specialized care unit, offering a multidimensional approach to their dementing illness, led to an increase in mobility, and was associated with a higher number of specified dementia diagnoses.

In a previous case-control study comparing proximal femur fracture patients with and without dementia, we found that patients with dementia received less physiotherapy than non-demented patients [2]. The main reason for this was the occasional rejection of physiotherapy or mobilization by the patients.

In the CGU described here, physiotherapists and nurses tried to activate patients more individually by catching the right moment rather than working according to strict time schedules. However, we cannot pin down the effect of a multidimensional intervention to a single factor. The selection of nurses and therapists on a volunteer basis led to an increase of internal motivation. The reduction from

28 to 23 beds makes individual work easier but increases costs. Both factors might be important for a better outcome.

Improvement in diagnostic accuracy for the dementive syndrome was the result of a systematic work-up including the fact that the medical history also had to be taken from a third party, usually the relatives and/or the GP. If an imaging of the brain had not been performed previously, it was performed during the hospital stay as long as the dementia was mild to moderate.

The use of antidementive medication for Alzheimer's disease was low and did not differ between CGU and non-CGU patients partly because only 21.9% of all patients had probable Alzheimer's disease and 27.1% of all patients had severe dementia with an MMSE of ≤ 9 points. The number of patients with vascular dementia in our study population was high; geriatric multimorbidity, as a requirement for geriatric admission, might be more common in patients with vascular disease.

It is known from nursing home studies that segregation of dementia residents from those without dementia resulted in a higher level of volunteer caregiver involvement, more social contact to staff, fewer physical restraints, more home activities of the residents, and more frequent involvement of psychiatrists. These findings would favor specialized dementia care. Furthermore, residents in special dementia care used antipsychotics less often, but antidepressants more often [4]. There was a similar trend in our study. The percentage of patients on antipsychotic medication was particularly low in the CGU (4.2%). In general, reduction of unnecessary antipsychotic medication in a geriatric population might be one of the main goals of specialized care for geriatric patients with cognitive impairment. In a US nationwide survey for nursing home residents, 26% had prescriptions of antipsychotic medication, of which 40% had no appropriate indication for such use [3].

The treatment of this small group of patients did not result in a significant increase in ADL (activities of daily living) scores and consecutively did not increase the number of patients discharged back home.

However, the improvement of mobility in the patients treated in the CGU is encouraging and may justify further studies.

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Abstract

To prove the efficiency of a specialized geriatric ward (cognitive geriatric unit, CGU) for patients with a fracture of the proximal femur and additional dementia, we conducted a matched-pair analysis comparing 96 patients with fracture of the proximal femur and additional dementia matched for age, sex, surgical treatment and the degree of cognitive impairment by MMSE score. A total of 48 patients were treated in the CGU, offering extended geriatric assessment, special education of staff, and architecture appropriate for patients with cognitive decline. Target criteria were a gain in the Barthel index and Tinetti score, the length of stay, new admissions to nursing home, the frequency of neuroleptic, antidepressant, and antidementive medication, and the number of specified clinical diagnoses for the dementia syndrome. Length of stay was significantly longer in the

CGU. The increase of the Tinetti score was significantly higher in the patients in the CGU, regardless of the length of stay (analysis of covariance: treatment (CGU/non-CGU): $F(1/93)=9.421$, $p=0.003$; covariate (length of stay): $F(1/93)=3.452$, $p=0.066$, $\eta^2=3.6\%$). In the intervention group, the number of definite diagnoses concerning the dementia syndrome was also higher. Comparison of drug treatment and the percentage of new admission to a nursing home did not differ between groups. Treatment in a specialized, "cognitive geriatric unit" seems to result in better mobility of demented patients with proximal fractures of the femur.

Keywords

Dementia · Geriatrics · Cognition · Rehabilitation · Outcome

Vergleich der Behandlung dementer Patienten mit proximaler Femurfraktur auf einer Spezialstation für kognitive eingeschränkte Patienten versus konventioneller geriatrischer Behandlung

Zusammenfassung

Um die Effektivität einer Spezialstation („cognitive geriatric unit“, CGU) für kognitiv eingeschränkte Patienten mit zusätzlichen Akuterkrankungen zu überprüfen, untersuchten wir in einer Matched-Pair-Analyse 96 Patienten mit proximaler Femurfraktur und zusätzlicher Demenzerkrankung. Insgesamt 48 Patienten wurden in einer Spezialstation für „kognitive Geriatrie“ behandelt, die anderen 48 Patienten waren vor Gründung der Station in der gleichen Krankenhausabteilung behandelt worden. Die Patienten waren nach Alter, Geschlecht, Art der chirurgischen Vorbehandlung und dem Ergebnis des Mini-Mental-Status paarweise zusammengefasst. Die Behandlung in der Spezialstation umfasste u. a. ein erweitertes geriatrisches Assessment, spezielle Ausbildung der Mitarbeiter und architektonische Ausrichtung für Patienten mit kognitiven Einschränkungen. Untersucht wurden der Zuwachs im Barthel-Index und Tinetti-Mobilitätsscore, die Aufenthaltsdauer, Ziel

der Entlassung, die Medikation und die Spezifität der Demenzdiagnosen. Die Aufenthaltsdauer auf der Spezialstation für kognitive Geriatrie war signifikant länger. Der Zuwachs im Tinetti-Score war in der Spezialstation signifikant größer als bei konventioneller Behandlung, unabhängig von der längeren Aufenthaltsdauer [Kovarianzanalyse: Behandlung (CGU/Nicht-CGU): $F(1/93)=9.421$, $p=0.003$; Kovariate (Aufenthaltsdauer): $F(1/93)=3.452$, $p=0.066$, $\eta^2=3.6\%$]. Auch die Anzahl der spezifizierten Demenzdiagnosen war in der Spezialabteilung größer. Die Behandlung von Patienten mit proximaler Femurfraktur und Demenz in einer Spezialeinheit für kognitiv eingeschränkte Patienten scheint mit einer zusätzlich verbesserten Mobilität einherzugehen.

Schlüsselwörter

Demenz · Geriatrie · Kognition · Rehabilitation · Prognose

Conclusion

Patients with a fracture of the proximal femur and additional dementia treated in a “cognitive geriatric unit” with a multidimensional therapeutic approach seemed to improve more in mobility and balance than similar patients treated with conventional geriatric care. In addition, the dementing illness was more often classified correctly in the “cognitive geriatric unit.” There was a trend towards fewer antipsychotic and more antidepressant-drugs being prescribed during the stay in the “cognitive geriatric unit” in comparison to the conventional geriatric care group. Evaluating and developing the new group of “cognitive geriatric units” in Germany seems necessary and promising.

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Conflict of interest. The corresponding author states that there are no conflicts of interest.

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