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Short Report

Application of the Abbey Pain Scale for Assessment of Acute Perioperative Pain in Elderly Patients with Impaired Communication Following a Femur Fracture

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A B S T R A C T

Pain resulting from physical trauma and surgical procedures is very strong. In elderly patients, especially those with impaired communication or cognitive damage, it is assessed rarely or not at all. The importance of pain assessment is reflected in quality supervision and adequate treatment which decrease complications and speed up recovery. The aim of the study was to determine the metric characteristics (reliability and validity) of the Abbey Pain Scale on a population of elderly patients with impaired communication in Croatia and to demonstrate the correlation between the assessed acute pain level and analgesia efficacy. The sample consisted of 31 patients above the age of 65 hospitalized after a femur fracture at the Department of Traumatology, Sestre Milosrdnice University hospital, Zagreb, Croatia. The Abbey Pain Scale and Visual Analogue Scale were used for pain assessment. The patients' mental status was evaluated using Mini-Mental State Examination. The data was processed using Chi-squared and Cronbach's alpha tests, and small dependent samples were tested using T-test. The value of Cronbach's alpha coefficient of 0.561 for the Abbey Pain Scale was considered acceptable. The score on the Abbey Pain Scale correlates significantly with the result of a standardized self-assessment of pain intensity ($r = 0.739$, $p= 0.001$). We conclude that the Abbey Pain Scale serves as a convenient tool for assessing pain intensity in patients with impaired communication, and its use is indirectly related to satisfactory analgesia, due to good metric characteristics of validity and reliability.

***Key words:** femur fracture, pain assessment, elderly, impaired communication, Abbey Pain Scale*

Introduction

Aging of the population is one of the greatest social, economic and health challenges of the 21st century, especially in Europe where the percentage of people above the age of 65 in the total population is 15%. The Republic of Croatia is among the countries with an aging population (17.7% above the age of 65)[1].

Attenuation of motor and sensory functions results in more frequent physical trauma. Fractures of the hip and upper leg are the most common (27% of all injuries), followed by head injuries (20.5%). Fractures of the femoral neck represent 74% of all hip or thigh injuries[2]. Patients with hip fractures suffer from high intensity acute pain that exacerbates existing chronic pain and other comorbidities. The complexity of the pain and its complicated assessment and treatment is also contributed by surgery as treatment of choice for fractures.

Aging decreases the content of β – endorphin, γ-aminobutyric acid (GABA) synthesis, concentration of central GABA and serotonin receptors, rate of nociception and signal transmission of C and Aδ fibers, and changes the perception threshold[3].

Painful fractures are associated with an increased risk of acute cognitive disorders such as delirium[2]. Acute pain and trauma affect many aspects of daily activities in the long run: mobility, nutrition, sleep. They result in

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agitation, aggression and resistance in the elderly, and ultimately lead to use of psychopharmaceuticals, along with analgesics[4].

Surgery and anesthesia have negative effects on the elderly population, which is demonstrated by a high prevalence of postoperative delirium and cognitive dysfunction[5]. They are the result of stress response to trauma, as well as altered pharmacokinetics and pharmacodynamics of prescribed drugs in the perioperative period.

Pain assessment is not performed at the required quality level in elderly patients[6]. Pain should be assessed in all patients, including patients with cognitive disorders, using verbal numerical scales (VNS). Acute perioperative pain in elderly patients is assessed using one-dimensional scales – numeric or visual analogue scales, while the Faces Pain Rating Scale (Wong-Backer) is not recommended since facial expressions in the elderly can be linked to certain emotions unrelated to pain. These tools can also be used for people with visual and hearing impairment, as well as people with light cognitive impairment. Around 75% of the elderly with mild cognitive impairment and 57% of those with moderate impairment can use standardized one-dimensional scales. None of the patients with severe cognitive impairment can use these tools[2]. Descriptive pain assessment is more appropriate for elderly people, people with cognitive impairment or mild dementia[6].

Dementia is the most common cognitive disorder in the elderly. It is characterized by weakened memory, personality changes, difficulties in communicating and processing commands, and loss of judgment, abstract thinking, and language skills. In this complex state, patients have a lower threshold of susceptibility to pain with an increased tolerance threshold, since they are unable to cognitively recognize and interpret pain[7]. Dementia significantly hampers pain assessment. Common behaviors associated with pain can be absent, while symptoms attributed to dementia can actually be pain-related behaviors. Aggressive behavior can actually be pain that the patient cannot otherwise express[8].

Pain assessment in patients with impaired communication, with cognitive impairment and dementia is performed during the course of treatment, always alongside analgesia, to see if the behavior is related to pain. Preliminary assessment of mental status using the Mini Mental State Exam (MMSE) or other cognitive instruments is required beforehand[9]. In the MMSE the maximum score is 30, and the cognitive function limit is 24, but may be lower depending on the level of education of the participant.

Although one-dimensional scales are standardized pain assessment tools, elderly patients are assessed using observational tools – by observing behaviors that are indicative of pain (facial expression, vocalization, body position, and level of cooperativity). Each behavior is evaluated individually, and their sum formulates the final pain score. In this way the assessor recognizes painful behaviors that have been shown to be valid in assessing pain in patients with impaired communication skills when it is difficult to distinguish between pain-related behavior and the basic diagnosis.

The Abbey Pain Scale (APS), an observational pain assessment tool, was originally developed in 2004 for people with dementia[10]. It consists of six elements (vocalization, facial expression, change in body language, behavioral change, physiological changes, and physical changes) which are assessed through 4 response modalities: absent (0), mild (1), moderate (2) and severe (3), with total value ranging from 0–18. After adding up the points assigned to the modalities, the result is interpreted based on the following scale: 0–2 stands for no pain, 3–7 stands for mild pain, 8–13 stands for moderate pain, and 14 or more points stand for severe to unbearable pain.

The aim of this study was to determine the metric characteristics (reliability and validity) of the Abbey Pain Scale on a population of elderly patients with impaired communication in Croatia and to demonstrate the correlation between the assessed acute pain level and analgesia efficacy.

Patients and Methods

The study was conducted on 31 patients aged 65 or older, hospitalized after a femur fracture in the Department of Traumatology, Sestre milosrdnice University hospital, Zagreb, Croatia. The approval of the Institution's Ethics Committee was obtained for the purposes of the research, and patients or their next of kin signed informed consent forms. The research was conducted in a period of 8 months. Patients younger than 65 years of age, and patients from whom the informed consent was not obtained were not included in the study.

The Abbey Pain Scale (APS) was used for pain assessment in all patients regardless of their physical and/or cognitive impairment. Permission to use the scale was obtained from its co-author, Dr Anita De Bellis. Mental status was assessed using the Mini Mental State Exam (MMSE) in all patients before the APS was used. After assessing pain with the Abbey Pain Scale, the Visual Analogue Scale (VAS) was used. Numeric Rating Scale (NRS) was used in visually impaired patients. In both, VAS and NRS, pain is assessed with values 0–10, where 0 denotes no pain, 1–3 denotes mild pain, 4–6 denotes moderate pain, and 7–10 denotes severe pain.

The SPSS statistical program was used for data processing. The data was processed using Chi-squared and Cronbach's alpha tests, i.e. correlation tests, with the statistical significance level $p < 0.05$ and small dependent samples were tested using t-test.

Results

Out of 31 patients (74.2% women and 25.8% men) at the age of 65 or above hospitalized after a femur fracture, 12.9% patients had impaired vision, 12.9% patients had impaired hearing, and 6.45% patients had Alzheimer's disease.

The reliability of the Abbey Pain Scale was determined by the internal consistency method, expressed by the Cronbach's alpha coefficient. The value of Cronbach's alpha coefficient of 0.561 is considered acceptable. If we removed the ''Physical Changes'' item from the calculation of the internal consistency coefficient, the reliability of the Abbey Pain Scale in this sample would increase to 0.7, which would put it into the category of a sufficiently reliable measuring instrument (Table 1).

In order to determine the validity of the Abbey Pain Scale, the assessment of the pain of our subjects using the Abbey Pain Scale was correlated with the VAS scale before and after analgesia. This correlation is r = 0.739 and it is significant at P = 0.001. The score on the Abbey Pain Scale correlates significantly with the result of a standardized self-assessment of pain intensity (VAS) (Table 2).

Analysis of the results obtained with the Abbey Pain Scale before and after analgesia shows a statistically significant difference in the results obtained (mean: 4,677; SD 2,880; SEM 0,517; CI 95%; t 9,044; df 30). T-test on small dependent samples (results of the same subjects on

TABLE 1

RELIABILITY OF THE ABBEY PAIN SCALE AFTER EXCLUSION OF ONE ITEM

	Arithmetic mean if the item is cancelled	Variance (dispersion) if the item is cancelled	Corrected items – corrected total	Squared multiple correlation	Cronbach's Alpha if the item is cancelled
VOCALISATION (quiet whimpering, groaning, crying)	10.65	3.503	.500	.547	.416
FACIAL EXPRESSION (looking tense, frowning, looking frightened)	10.29	4.280	.354	.337	.502
CHANGE IN BODY LANGUAGE (fidgeting, rocking, guarding part of body, withdrawn)	10.58	4.652	.199	.179	.554
BEHAVIOURAL CHANGE (increased confusion, refusing to eat, alteration in usual patterns)	11.26	3.131	.586	.466	.355
PHYSIOLOGICAL CHANGE (temperature, pulse or blood pressure outside normal values, redness or paleness)	10.94	4.062	.345	.200	.498
PHYSICAL CHANGES (skin tears, bedsores, arthritis, contractures, previous injuries)	11.29	4.546	-.007	.187	.692

TABLE 2

CORRELATION OF TOTAL SCORES OBTAINED WITH ABBEY PAIN SCALE BEFORE AND AFTER ANALGESIA

		APS score before analgesia	VAS score before analgesia	APS score after analgesia	VAS score after analgesia
APS score before analgesia	Pearson correlation coefficient	1	.612**	.394*	.195
	Significance		.001	.028	.362
	N	31	24	31	24
VAS score before analgesia	Pearson correlation coefficient	.612**	1	.434*	.458*
	Significance	.001		.034	.024
	N	24	24	24	24
APS score after analgesia	Pearson correlation coefficient	.394*	.434*	1	.739**
	Significance	.028	.034		.000
	N	31	24	31	24
VAS score after analgesia	Pearson correlation coefficient	.195	.458*	.739**	1
	Significance	.362	.024	.000	
	N	24	24	24	24

* Correlation is significant at level 0.05
** Correlation is significant at level 0.01.
APS - Abbey Pain Scale, VAS - Visual Analogue Scale

TABLE 3
DEPENDENT SAMPLE T-TEST

Pair	Paired Differences					t	df	Significance (2-tailed)
	Mean	SD	SEM	95% Confidence Interval of the Difference				
				Lower	Upper			
APS score before analgesia - APS score after analgesia	4.677	2.880	.517	3.621	5.734	9.044	30	.000

APS - Abbey Pain Scale

the Abbey Pain Scale measured before and after analgesia) showed a statistically significant difference in pain experience before and after analgesia, showing that the Abbey Pain Scale was sensitive to determining the effect of analgesia in patients in the perioperative period (Table 3).

Discussion

The results of this study show that the Abbey Pain Scale (Cronbach's alpha= 0.561) possesses good metric characteristics and that the previously set hypotheses of validity and reliability have been confirmed. In older age patients, communication is usually hindered due to hearing and visual impairment, as well as cognitive impairments, making it difficult to assess pain. As the subjects could not independently verbalize the pain intensity, it was necessary to use a tool to assess the pain subjectively.

It is precisely the Abbey Pain Scale, developed to assess pain in patients with late stages of dementia, that proved efficient and effective[10]. The development of this tool and its testing was carried out in 24 different care institutions for elderly patients in four Australian states (South Australia, New South Wales, Queensland and Victoria). 236 elderly patients with late-stage dementia participated in research, ranging in age from 60 to 97 (average age 83). The second study was conducted in 17 homes for the elderly and infirm in Belgium[11]. 157 subjects who could not verbalize pain (78% women and 22% men) participated in this study, having similar sex distribution as in our study.

General cognitive abilities can be affected by different social, demographic and health variables. Age and level of education have a significant impact on MMSE results, with the level of education having a greater impact than age[12]. In our study, assessment of mental status using the MMSE did not give realistic results, which is explained by the fact that 42% of the patients listed primary school as their highest level of education.

Out of a total of 31 patients in our study, 7 could not verbalize their pain level. Visually impaired patients could not express pain intensity using VAS. Instead, they reported it using a numeric rating scale of 0–10. In patients with impaired hearing it was necessary to speak more slowly, in a more pronounced manner and more loudly. Due to difficulties with a mathematical question (counting backwards of 100, subtracting 7), subjects with a lower level of education received a lower score on the MMSE. Most of them also could not assess their pain intensity using VAS.

Quality pain assessment is critical for its treatment. Pain can and must be assessed in all patients, regardless of age and cognitive impairment, under the condition that a proper tool is selected. Pain intensity scores measured before and after analgesia show that the Abbey Pain Scale is a good tool for patients with impaired communication. In our study, pain intensity reduction was statistically significant ($p<0.001$), with total pain scores before and after administration of analgesia of 13±3 and 9±2, respectively. An Australian study showed an average pain score of 9.02±3.75 before analgesia, followed by 4.21± 3.20 after administering analgesia, $p <0.001$[10].

Reliability and validity are one of the basic metric characteristics of a test or measuring instrument in general. Reliability and validity of the Abbey Pain Scale were confirmed by Jennifer Abbey and associates[10]. Another study compared the validity of three pain assessment scales in patients with impaired communication and also showed that the Abbey Pain Scale had good psychometric values and provided evidence of its reliability and validity[12]. Both studies do not rule out further revisions, but consider the Abbey Pain Scale to be sufficiently valid and reliable. The previously mentioned Belgian research concluded that facial expression, vocalization and body language serve as pain indicators in 80% of cases, and physiological changes (pressure, pulse, temperature) were not considered as reliable indicators[13]. In the United Kingdom, the Abbey Pain Scale is recommended by institutions such as the Royal College of Physicians, British Geriatric Society, and British Pain Society[6].

Conclusions

Elderly patients with femur fractures suffer from severe pain. The cause lies in inadequate pain assessment or its absence in situations when communication is hampered. Quality pain assessment is an important precondition for adequate analgesia, positive course of treatment and faster recovery and return to daily activities. The golden standard for the assessment of pain is the patient's self-reporting. However, a tool for quality subjective assessment of pain is required if pain cannot be verbalized. The Abbey Pain Scale proved to be valid and reliable in assessing pain in our patients, and its use was indirectly related to satisfactory analgesia.

Conflict of interest

None to declare.

Contribution of individual authors

All authors were equally involved in the conception of the idea of the study, contributed to the literature review, statistical analysis and revision of the manuscript.

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PRIMJENA ABBEY SKALE ZA PROCJENU AKUTNOG PERIOPERATIVNOG BOLA KOD FRAKTURE FEMURA U STARIJIH BOLESNIKA S OTEŽANOM KOMUNIKACIJOM

SAŽETAK

Bol koji proizlazi iz fizičke traume i kirurških zahvata je vrlo jak. U starijih bolesnika, osobito onih s oštećenom komunikacijskim ili kognitivnim oštećenjem, ovaj bol se rijetko ili nikada procjenjuje. Važnost procjene bola ogleda se u kvalitetnom nadzoru i adekvatnom liječenju koji smanjuju komplikacije i ubrzavaju oporavak. Cilj studije bio je utvrditi metrijske karakteristike (pouzdanost i valjanost) bola na populaciji starijih bolesnika sa smetnjama u komunikaciji u Hrvatskoj i pokazati povezanost između procijenjene razine akutnog bola i učinkovitosti analgezije. Uzorak se sastojao od 31 pacijenta starijeg od 65 godina hospitaliziranog nakon frakture butne kosti na Odjelu za traumatologiju Sveučilišta Sestre Milosrdnice u Zagrebu, Hrvatska. Za procjenu bola korišteni su Abbey skala bola i vizualna analogna ljestvica. Duševni status pacijenata ocijenjen je korištenjem ljestvice Mini-mentalnog stanja. Podaci su obrađeni koristeći Chi-kvadrat i Cronbachov alfa test, a mali ovisni uzorci testirani su pomoću T-testa. Vrijednost Cronbachovog alfa koeficijenta od 0,561 za Abbey ljestvicu smatra se prihvatljivom. Ocjena na ljestvici bola značajna je u korelaciji s rezultatom standardizirane samoprocjene intenziteta boli (r = 0,739, p = 0,001). Zaključujemo da Abbey skala bola služi kao prikladan alat za procjenu intenziteta bola u bolesnika s oštećenom komunikacijom, a njezina uporaba neizravno je povezana s zadovoljavajućom analgezijom zbog dobrih metričkih karakteristika valjanosti i pouzdanosti.