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## Evaluation of influence of posttraumatic hand disability on patient's psyche

### Ocena wpływu kalectwa pourazowego rąk na psychikę chorych

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#### Słowa kluczowe:

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**Background:** Hand injuries are one the most commonly found injuries. Frequently after complete course of treatment some decrease of hand function limiting performing of occupation and performing of everyday activities remains with sometimes concomitant disfigurement (esthetic disability) inducing complexes and hampering interpersonal relations. Attempt to evaluate influence of permanent posttraumatic hands disability on patient's psyche constituted the aim of the study. **Material and methods:** From amongst 1287 patients treated from 1991 to 2006 the group of 189 patients with permanent limitation of hand function exceeding 15% according to Swanson's method was included in the study. Originally developed questionnaire for assessment of posttraumatic hand disability on patient's psyche was used. Reliability of questionnaire was assessed on the basis of Cronbach's alpha coefficient that equaled 0,9. Results were statistically evaluated. **Results:** Strong influence of posttraumatic hand disability on patient's psyche was found. It was directly proportional to the severity of injury and extent of disability. Particularly strong influence was found in the realm of internal life (self-esteem) and occupation. There was also strong correlation between influence of disability on psyche and quality of performing of everyday activity found. **Conclusions:** In cases of hand injuries with assessed initially severity suggesting different extent of posttraumatic disability it's purposeful to start psychotherapy and rehabilitation as early as possible with occupational therapy right after completion of surgical treatment to allow for return to former occupation or retraining the patient to get substitute job.

#### Introduction

Influence of injury and its results in the form of permanent disability on the psyche of patients suffering from injuries of hands is widely known. During the first period after the injury symptoms of psychological stress dominate [1-8]. Later, apart from physical disability limiting ability to work and performing of everyday activities, difficult to be hidden deformity develops [9-11]. It can unfavorably influence family and social life [4-10]. With time passing from injury symptoms

**Wstęp:** Obrażenia ręki należą do najczęstszych obrażeń ciała. Często po zakończeniu leczenia pozostaje pewien ubytek funkcji ręki utrudniający wykonywanie pracy zawodowej i czynności codziennych a niekiedy również kalectwo estetyczne powodujące kompleksy i utrudniające kontakty interpersonalne. Celem pracy jest ocena wpływu utrwalonego kalectwa pourazowego na psychikę chorych. **Materiał i metodyka:** Spośród 1287 chorych leczonych w latach 1991 - 2006 wybrano grupę 156 chorych z utrwalonym ograniczeniem funkcji ręki przekraczającym wg metodyki Swansona 15%. Opracowano oryginalny kwestionariusz oceniający wpływ kalectwa pourazowego ręki na sferę psychiczną chorych. Kwestionariusz poddano analizie rzetelności uzyskując współczynnik alfa Cronbacha 0,9. Wyniki opracowano statystycznie. **Wyniki:** Wykazano znaczący wpływ kalectwa pourazowego ręki na psychikę chorych. Był on wprost proporcjonalny do ciężkości obrażenia i rozmiaru kalectwa. Szczególnie dotyczył on sfery życia wewnętrznego (postrzeganie samego siebie) oraz pracy zawodowej. Wykazano również ścisły związek pomiędzy wpływem kalectwa na psychikę a jakością wykonywania podstawowych czynności codziennych. **Wnioski:** W przypadkach obrażeń rąk, których oceniona pierwotnie ciężkość pozwala na przewidywanie różnego stopnia kalectwa pourazowego celowe jest podjęcie jak najwcześniej psychoterapii i rehabilitacji a po zakończeniu leczenia chirurgicznego terapii zajęciowej mającej na celu powrót do uprzednio wykonywanej pracy zawodowej lub przekwalifikowanie chorego do pracy zastępczej.

of psychological burden related to disability diminish, but frequently remain for years [1,4, 9,12].

Attempt to evaluate influence of permanent posttraumatic hand disability on patient's psyche constituted the aim of the study.

#### Materials and methods

There were 1287 patients treated due to hand injuries in 2nd Department of Surgery, Jagiellonian University in Krakow from 1991 to 2006. All of them were

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treated as emergency cases. Severity of injuries was assessed during initial management according to Hand Injury Severity Score by Campbell and Kay [13]. Long-term follow-up examinations were performed at least 36 months after a completion of full course of treatment, assuming that that this period was sufficient for total fulfillment of surgical and rehabilitating treatment and most of the symptoms of posttraumatic shock diminished. Thus time from injury varied from 3 to 19 years. Long-term follow-up was performed in 1071 patients. Extent of motoric and sensoric hand impairment was evaluated with the use of Swanson's examination protocol [14]. According to originally developed questionnaire for subjective assessment of function of posttraumatic hand in performing everyday activities Hand Disability Score (HDS) was calculated for all patients [15]. Its structure was similar to Watts's questionnaire [16]. Group of 189 patients with different types of permanent hand disability exceeding 15% (according to Swanson's method) were included in the study. They received originally developed questionnaire composed of 12 statements (P1 - 12) regarding self-esteem in respect of disability (P1 - P3), influence of the disability on family life (P4 - P6), job or occupation (P7 - P9) and social life (P10 - P12). Every patient had opportunity to choose one of the seven answers thus scoring from 1 point (lack of influence of disability) to 7 points (significant influence of disability on this particular realm of life) (Figure 1). Reliability of questionnaire was assessed on the basis of Cronbach's alpha coefficient that equaled 0,9. There were 156 questionnaires (82,53%) fulfilled properly and only they were included in further calculations. Spearman's test for non-parametric measure of correlation was used for verification of correlation between all statements included in the questionnaire and it confirmed presence of such correlations at significance level  $p < 0,001$  (Table I).

## Results

Statistically significant correlation was found ( $p < 0,001$ ) between extent of disability and general assessment of patient's psyche and between extent of disability and four aspects isolated from general psychic assessment including self-esteem, influence of disability on family life, job or occupation and social life. The more extensive disability was diagnosed, the more severe influence on patient's

Please mark with the circle the closest to the truth answer for every below-mentioned statement:

	definitely no	no	rather no	don't know	rather yes	yes	definitely yes
	1	2	3	4	5	6	7
1. My disability made me less valuable person	1	2	3	4	5	6	7
2. Because my disability I feel less physically attractive, deformed	1	2	3	4	5	6	7
3. I'm ashamed of my disability and I try to hide it from people	1	2	3	4	5	6	7
4. Because of my disability my relations with my family worsened.	1	2	3	4	5	6	7
5. My disability unfavorably influenced my passages (intimate life)	1	2	3	4	5	6	7
6. It's annoying that due to my disability my relatives replace me in performing some everyday activities at home	1	2	3	4	5	6	7
7. My disability caused that I perform my job worse	1	2	3	4	5	6	7
8. Due to my disability my bosses consider me to be less valuable employee	1	2	3	4	5	6	7
9. Due to my disability my colleagues treat me indulgently and sometimes replace me in performing more precise activities	1	2	3	4	5	6	7
10. My surroundings negatively respond to the appearance of my hand (e.g. ridicule, distrust, limitation or severance of relations)	1	2	3	4	5	6	7
11. Due to my disability I avoid social parties and I feel worse in the company of friends and acquaintances	1	2	3	4	5	6	7
12. Due to my disability I had to limit or change previous way of spending my spare time	1	2	3	4	5	6	7

Figure 1  
Questionnaire for subjective assessment of function of posttraumatic hand.

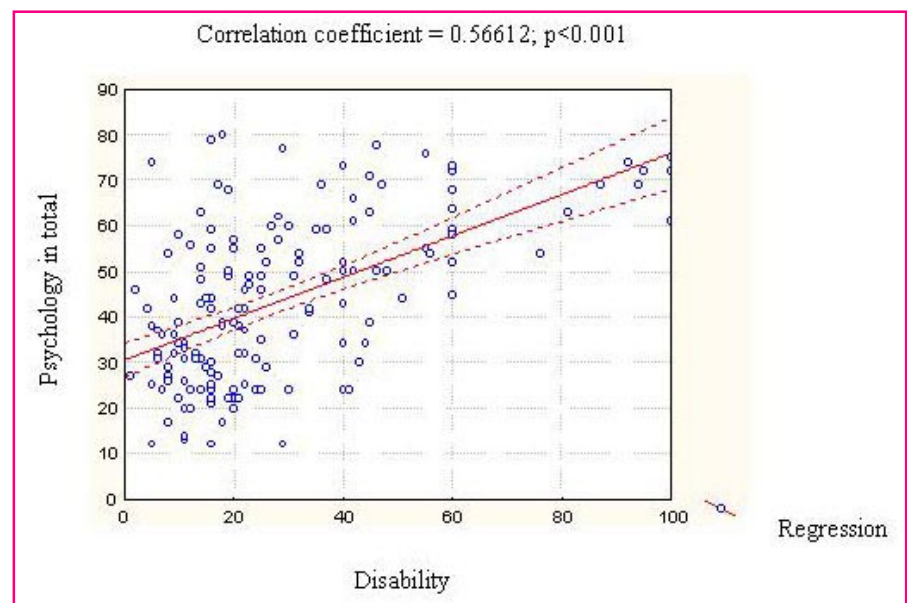


Figure 2  
Influence of disability on patient's psyche.

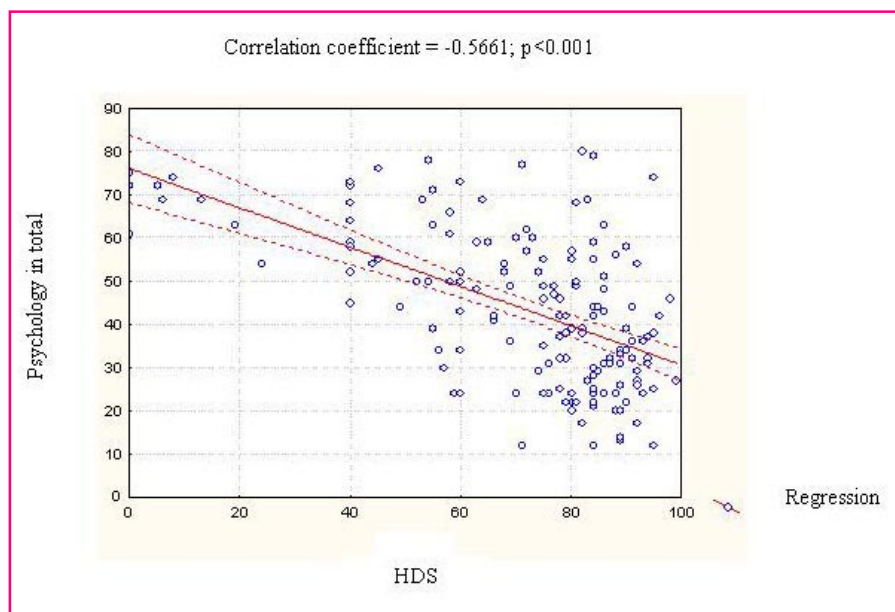
**Table I**  
Internal correlations of test for subjective assessment of results of disability.

	Psychology	P1	P2	P3	Self-esteem	P4	P5	P6	Family life	P7	P8	P9	Occupation	P10	P11	P12	Social life
Psychology in general	1,000	0,760	0,749	0,683	0,860	0,651	0,702	0,747	0,872	0,805	0,779	0,819	0,872	0,701	0,803	0,757	0,870
P1	0,731	1,000	0,582	0,474	0,802	0,485	0,558	0,601	0,693	0,545	0,582	0,578	0,620	0,462	0,508	0,514	0,581
P2	0,742	0,582	1,000	0,704	0,882	0,399	0,487	0,501	0,576	0,585	0,496	0,495	0,573	0,542	0,611	0,446	0,580
P3	0,682	0,474	0,704	1,000	0,856	0,338	0,413	0,424	0,482	0,453	0,366	0,386	0,440	0,510	0,660	0,419	0,595
Self-esteem	0,848	0,802	0,882	0,856	1,000	0,464	0,561	0,589	0,676	0,627	0,575	0,574	0,647	0,549	0,700	0,531	0,686
P4	0,580	0,485	0,399	0,338	0,464	1,000	0,692	0,417	0,760	0,441	0,447	0,471	0,495	0,657	0,569	0,482	0,611
P5	0,658	0,558	0,485	0,413	0,561	0,692	1,000	0,424	0,799	0,468	0,450	0,531	0,516	0,657	0,649	0,489	0,643
P6	0,717	0,601	0,501	0,424	0,589	0,417	0,424	1,000	0,823	0,656	0,607	0,712	0,710	0,391	0,430	0,570	0,542
Family life	0,818	0,693	0,576	0,482	0,676	0,760	0,799	0,823	1,000	0,660	0,637	0,729	0,730	0,644	0,643	0,632	0,721
P7	0,760	0,545	0,585	0,453	0,627	0,441	0,468	0,656	0,660	1,000	0,768	0,779	0,919	0,387	0,525	0,525	0,575
P8	0,747	0,582	0,496	0,366	0,575	0,447	0,540	0,607	0,637	0,768	1,000	0,756	0,909	0,452	0,480	0,594	0,602
P9	0,772	0,578	0,495	0,386	0,574	0,471	0,531	0,712	0,729	0,779	0,756	1,000	0,914	0,495	0,552	0,592	0,633
Occupation	0,830	0,620	0,573	0,440	0,647	0,495	0,516	0,710	0,730	0,919	0,909	0,914	1,000	0,485	0,567	0,608	0,656
P10	0,000	0,462	0,452	0,510	0,549	0,657	0,657	0,391	0,644	0,387	0,452	0,495	0,485	1,000	0,726	0,586	0,817
P11	0,670	0,508	0,611	0,660	0,700	0,569	0,649	0,430	0,643	0,525	0,480	0,552	0,567	0,726	1,000	0,681	0,908
P12	0,781	0,514	0,446	0,419	0,531	0,482	0,489	0,570	0,632	0,525	0,594	0,592	0,608	0,586	0,681	1,000	0,877
Social life	0,840	0,581	0,580	0,595	0,686	0,611	0,643	0,542	0,721	0,575	0,602	0,633	0,656	0,817	0,908	0,877	1,000

**Table II**  
Correlation between psychological assessment with severity of injuries, disability and assessment according to HDS.

	Severity of injuries	Disability	HDS
Psychology in general	0,363	0,529	-0,561
Self-esteem	0,274	0,436	-0,405
Family life	0,258	0,479	-0,547
Occupation	0,402	0,544	-0,592
Social life	0,308	0,389	-0,399

of disability on patient's psyche (Figure 3). Patients included in the study scored from 12 to 80 points, with the mean score of 43,49±17,51 points. Disability affected self-esteem the most. Mean score was 12,32±5,00 points as compared with maximal score for this part that was 27 points (3 x 7 pts.). Self-assessment of patient in regard to job or occupation was another strongly affected realm of psychic life. Mean score for this part was 12,16±5,58 points. Far lesser influence of disability on family life (9,50±4,38 points) and social life (9,41±5,00 points) was found (Fig. 4). With the use of formerly calculated Spearman's coefficient strong correlation ( $p < 0,001$ ) was found between severity of injury (0,363), disability (0,529), number of points scored during examination of hand function according to HDS (-0,561) and assessment of patient's psyche. Negative values found for correlation between hand function (HDS) and assessment of patient's psyche reflect the fact that the higher number of points is scored in assessment of hand the less extensive disability is found. Analogous results were found in all subgroups of psychological assessment at significance level  $p < 0,001$  (Table II).



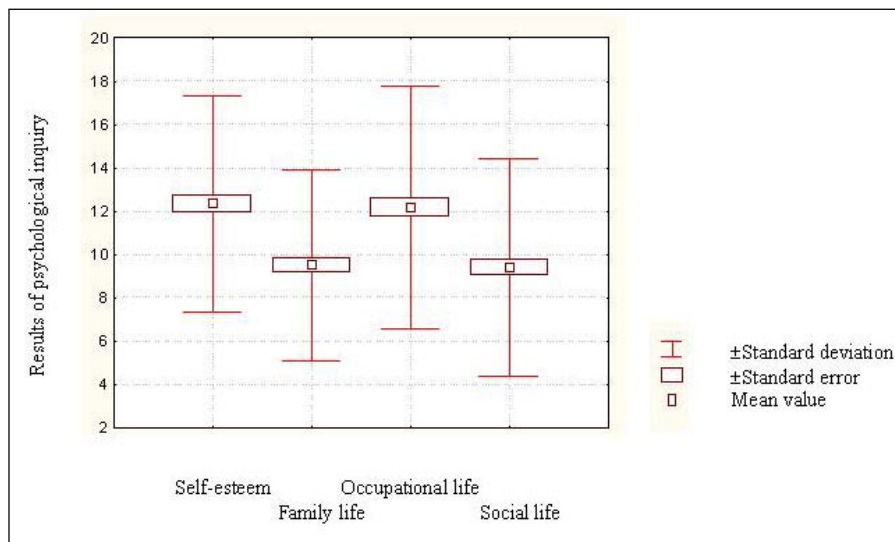
**Figure 3**  
Comparison of patient's psyche with HDS.

psyche was found (Figure 2). Comparison of general assessment of patient's psyche with number of points scored during examination of hand function according

to HDS revealed their significant correlation ( $p < 0,001$ ): the lower result of HDS was found (reflecting more extensive disability) the more evident was influence

### Discussion

Hand injuries are one the most commonly found injuries [17] with the ratio of patients suffering from hand injuries



**Figure 4**  
Influence of disability on patient's psyche.

among all other injuries reaching even 28,6% [18]. Patients suffering from hand injuries constitute the youngest group amongst all traumatic patients [19, 20]. Despite proper management of hand injuries different severity of permanent impairment or disability can result. In our formerly presented material disability was found in as much as 58,5% of patients. Extent of severity ranged from 1 to 100%, with 13,6% on the average [21]. Gustafson found slight or moderate functional limitation of hand function in 80% of patients during follow-up examination year after injury [22].

Of course slight limitation of hand function or posttraumatic deformity shouldn't have strong influence on patient's psyche, cause with time passing from injury patients adapt, to a certain extent, to some degree of discomfort and pay little attention to it. On the other hand they can have significant influence on patients whose occupation requires precise hand movements. According to Meyer such patients include carpenters, chefs, dentists and surgeons [7]. In our opinion carpenters and chefs can adapt to the changed working conditions and usually can return to previous job. But we would include musicians in the group of patients whose occupation requires precise hand movements. Even seemingly insignificant limitation of hand function in surgeons and musicians can strongly affect their quality of life.

More extensive limitations of hand function and/or posttraumatic hand deformities can hamper everyday activity, occupation and social life including marital harmony [4-6,9,10,22,23,24]. During first period after injury symptoms of po-

straumatic stress disorder (PTSD) related to the injury itself dominate [1-4,6,22]. They can widen time of whole treatment and rehabilitation, thus delaying return to work [4]. With time passing from injury intensity of those symptoms diminish, though in many cases they can be present for years [1,4]. Permanent posttraumatic disability can influence patient's psyche in two different ways. First - limitation of hand function can hamper to different extent performing of former job or some everyday activities leading to irritation, sometimes discouragement and decreased self-esteem [3,5,6]. Second - as hard to be hidden disfigurement of the hand [2, 3,4, 10]. This can create greater negative influence on patient's psyche than just limitation of hand function alone [2, 6]. In retrospective analysis of patients treated in the Department we took into consideration distant influence of permanent posttraumatic disability of hand on patient's psyche. This assessment was performed at least 36 months after a completion of full course of treatment assuming that early influence of injury itself in the form of PTSD would diminish then.

Inclusion criterion was limitation of hand function exceeding at least 15% according to Swanson's method assuming that slight or moderate functional limitation of hand function or its deformity shouldn't affect patient's psyche very much. This was the only way of objective qualification for the study group. Such decisions couldn't be based on esthetic view of the hand, because assessment of such parameter is subjective. There are patients with reduced, average or increased sense of esthetics, sometimes not coherent with

doctor's sense. Originally developed questionnaire named HDPRQ fulfilled reliability principle confirmed with the use of Cronbach's alpha coefficient that was as high as 0.9. That reflects proper selection of statements included in the questionnaire, regarding both problems related to limitations of hand function as well as problems resulting from esthetics. High quality of the questionnaire was also supported by assessment of reciprocal correlations between parameters included in it. Results of presented study interchangeably suggest strong influence of permanent posttraumatic disability on patient's psyche - the more extensive posttraumatic hand disability was, the stronger influence on patient's psyche was found. The strongest influence was exerted on self-esteem and sense of worse performing of former occupation. Disability less intensively influenced family and social life. HDS questionnaire was used to check if limitation of hand function in performing everyday activities alone can influence patient's psyche. Its use excluded any influence of esthetic impairment of the hand on psyche.

Strong correlation was proven - the worse function of the hand in everyday activity was, the stronger influence on patient's psyche was found. Formerly strong correlation ( $p < 0.001$ ) was found between assessment of hand function in everyday activities, severity of injury and extent of disability [17]. Now we also found strong correlation ( $p < 0.001$ ) between influence of posttraumatic hand disability on patient's psyche and severity of injury as well as extent of disability. This remains at some variance with Meyer's study who found only limited correlation between tissue damage and functional loss and the psychological adjustment to traumatic injury as well as limited correlation between mutilating hand injuries and psychological adjustment, while cited in this study Lee et al. found no correlation between severity of hand injury and subsequent psychological, social and occupational adjustment [7].

However many authors emphasize purposefulness of early beginning of psychotherapy and occupational therapy in patients suffering from severe hand injuries in whom permanent limitation of hand function is expected [3,4,6,7,12, 25]. Only close cooperation of surgeons, psychotherapists and hand therapists allow for complex treatment of patients with hand injuries in order to optimize their quality of life, because "Health is a state

of complete physical, mental and social well-being and not merely the absence of disease or infirmity" [26].

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