Scandinavian Journal of Surgery 99: 180–186, 2010

QUALITY OF LIFE IN PATIENTS OPERATED FOR PELVIC FRACTURES CAUSED BY SUICIDE ATTEMPT BY JUMPING

T. Borg[1], M. Holstad[2], S. Larsson[1]

[1] Department of Orthopaedic Surgery, Uppsala University, Uppsala, Sweden,
[2] Department of Psychiatry, Uppsala University, Uppsala, Sweden

ABSTRACT

Background and Aims: **Jumping from great height is an aggressive method of suicide attempt where the frequent combination of psychiatric disorder and somatic injuries makes treatment difficult. Our aim was to evaluate survival rate and get patient-reported outcome in patients operated for a pelvic or acetabular fracture sustained when jumping from a height as a suicide attempt.**

Patients and Methods: **During the period 2003–2004, 12 patients (11 women) of whom eight were below 30 years of age, were prospectively included. At two years HRQoL (Health-Related Quality of Life) questionnaires (SF-36 and LiSat-11) were used to describe outcome, and at four years a structured psychiatric interview SCID-I (Structured Clinical Interview for DSM-IV Axis I Disorders) was done.**

Results: **At four years all patients were alive. One patient had made a new suicide attempt. Eight patients gave adequate reply on SF-36 and LiSat-11 at two years. In all domains patients scored lower than a norm group with the relatively lowest values in physical domains. Younger patients assessed life as better when compared with middle aged patients.**

Conclusions: **This study showed a very low recurrence rate into suicidal behaviour in a group of jumpers and all patients were alive at four years after a suicidal attempt by jumping. The high proportion of psychiatric disorder in these patients highlights the need for a combined treatment effort between orthopaedic and psychiatric expertise.**

Key words: Jumpers; suicidal attempt; pelvic fractures; SF-36; LiSat-11; SCID

INTRODUCTION

Jumping from great height is an aggressive method of suicide attempt, often resulting in completed suicide or, in the case of survival, a high incidence of recurrence of suicidal behaviour. In 2003, there were 60 persons, 40 male and 20 females, in Sweden who committed suicide by jumping from height. This was out of a total of 1108 persons, 775 men and 333 women, who committed suicide that year, i.e. 5.4 % of those who committed suicide did so by jumping from a height. The variation between countries is large when it comes to jumping as the method of suicide, ranging from less than 4% of all suicides in the US to 60% in Singapore (7).

Severe pelvic and acetabular fractures are frequent when jumping from great height due to the high energy involved. In a study comparing survival jumpers and fallers Teh et al (18) reported a higher proportion of pelvic injuries in jumpers when compared to fallers. They also showed that jumpers sustained more fractures per person, while fewer head injuries, when compared with fallers. In survivors following

Correspondence:
Tomas Borg, M.D.
Department of Orthopaedic Surgery
Uppsala University Hospital
S - 75185 Uppsala, Sweden
Email: tomas.borg@surgsci.uu.se

suicidal jumping pelvic or acetabular fractures is therefore common (1, 4, 11, 19). Several studies have shown that a high proportion of patients committing suicide by jumping have mental disorders (3, 4, 9, 14, 15, 19). In a comparative study between persons who made suicide attempts by jumping and another group who used firearms, persons who made suicide attempts by jumping from heights were more often psychotic (3). The combination of severe somatic injuries and severe psychiatric disorder should be addressed with a combined orthopaedic and psychiatric management, although such a shared effort can be difficult in the acute phase. The staff in orthopaedic wards are not familiar with treating patients with psychiatric disorders which might result in limited involvement. Due to the limited number of survivors following such severe suicide attempts it is also difficult to accumulate knowledge reflecting the outcome for the survivors.

The primary aim of the present prospective study was to evaluate the recurrence of self-destructive behaviour in patients operated for a pelvic or acetabular fracture sustained when jumping as an attempt to commit suicide, and as a secondary aim we wanted to assess if patient-reported outcome instruments could be used in these patients.

PATIENTS AND METHODS

Patients 16 years of age or older, referred to Uppsala University Hospital for surgical treatment of pelvic or acetabular fractures 2003–2004 were prospectively included in a specific research database. The present study reports on the subgroup that sustained their injury following suicide attempt by jumping. Twelve patients (eleven female, one male, aged 17–51 years) with ten pelvic and two acetabular fractures qualified for inclusion out of a total of 102 patients surgically treated for pelvic ring and/or acetabular fractures during the time period. Attempted suicide by jumping was the third most common (13%) trauma mechanism among patients operated for a pelvic or acetabular fracture. The two most common trauma mechanisms were motor vehicle accident (41%) and fall (15 %). Of the pelvic fractures there were six type B and four type C (12). The acetabular fractures included one anterior column and one associated transverse and posterior wall.

In eleven patients the jump was done from a building or a bridge with a fall between seven and twenty meters while one patient jumped from a building without any information of the exact height. One or several associated injuries were seen in 10/12 (77 %) of the jumpers compared to 45/90 (50 %) for those with other injury mechanisms treated for similar fractures during the same time period. ISS was $\geq$16 in 5 patients. Demographics and general information is given in Table 1.

Hospital routines included consultation by psychiatrists for evaluation and treatment. Within a few days after the operation, patients were sent back to their local hospital where psychiatric treatment and somatic rehabilitation continued.

PATIENT REPORTED OUTCOME

Patients were prospectively followed for two years using two validated HRQoL questionnaires, SF-36 (13, 17) and LiSat-11 (Life Satisfaction-11 items) (5, 6, 8), and at four years patients were asked to participate in a structured psychiatric interview SCID-I (16). SF-36 is a well-known, widely used and validated generic health outcome measure that consists of eight dimensions. Higher scores are associated with better quality of life and state of health. Normative data from Sweden were used as references (17). LiSat-11 is a one-page, 11-item generic questionnaire on life satisfaction. The first item characterizes satisfaction with life as a whole. The remaining items characterize satisfaction with ADL-capacity, physical health, psychological health, sexual life, partner relationship, family life, leisure, friends and acquaintances, work and financial situation. Each item has six answering alternatives: 1=very dissatisfied, 2 = dissatisfied, 3 = rather dissatisfied, 4 = rather satisfied, 5 = satisfied and 6 = very satisfied.

INTERVIEW PROCEDURE

The psychopathological background of the patients was analyzed by a psychiatrist (MH), who first scrutinized medical records and searched for information regarding earlier suicide attempts, substance abuse and history of mental illness. At four years after the suicide attempt patients were contacted with an introductory letter followed by a telephone call utilizing the SCID-I introductory interview. The semi-structured SCID-I telephone interviews were performed thereafter. SCID-I is used to diagnose depression and personality disorders. As a base for the interview the clinical version of SCID-I was used. The interview was semi-structured in the sense that the patient was stimulated to talk freely, but the interviewer ensured that areas of interest always were covered. In the final part of the interview, a summary was made with comments on the questions put by the patients. Their own reactions and their need for assistance were also discussed. During and immediately after the interview the structured forms comprising 24 pre-printed variables were filled out. The patients were asked if they had regularly seen a psychiatrist after the trauma, if they had taken any prescribed psychiatric drugs or if they had taken sick leave not directly related to the somatic injury. If the patient had a treating psychiatrist, this person was consulted as needed. Seven patients were interviewed at four years but in one case it was not possible to get reliable answers due to the psychiatric status. Among the five patients who were not interviewed, two were not able to participate in an interview according to their psychiatric status and in three patients it was not possible to get a response either by mail or phone. Of the four non-responders to HRQoL questionnaires at two years, two were among those interviewed. Three of the responders to the HRQoL questionnaires were not available for the interview.

The study was approved by the local ethics committee. Patients were asked for consent to participate including permission to get access to their psychiatric medical records.

RESULTS

At two years all patients could be located for the HRQoL questionnaires. Due to severe psychiatric disorder, or severe drug abuse, four patients could not respond to the questionnaires, leaving eight patients answering the two HRQoL questionnaires at two years. At four years all patients were still alive. Seven gave informed consent to be interviewed. Due to severe psychiatric disorder it was not possible to get reliable answers from one, leaving six patients with

TABLE 1

Demographic and general information for 12 pelvic fracture patients surviving suicide attempt by jumping.

Patient	Age	Gender	Injury mechanism	Pelvic injury			Associated injuries
				Fracture	Description	Operative procedure	
1	17	F	Bridge 11 m	Pelvic type C	SI-dislocation right sacral fracture left	Percutaneous SI-screws and anterior external fixation	Pneumothorax Lung contusion Liver laceration
2	17	F	Bridge 10 m	Pelvic type C	Bilateral SI-dislocation Ilium fracture left	Percutaneous SI-screws and anterior plate and screws	Pneumothorax Orbital floor fracture Extremities Monteggia injury ankle fracture humeral shaft fracture
3	18	M	Building 20 m	Pelvic type C	Bilateral sacral fractures	Spinal-pelvic fixation	Spine fracture Paraplegia Extremity fractures distal tibia tibia plateau calcaneus humeral shaft
4	19	F	Building 10 m	Acetabular	Anterior column	Internal fixation with plate and screws through Ilioinguinal approach	None
5	29	F	Building 10 m	Acetabular	Associated transverse and posterior wall, hip dislocation	Internal fixation with plate and screws through Kocher-Langenbeck approach	Brain contusion Pneumothorax Haemopericardium Liver contusion Burn injury
6	46	F	Building 10 m	Pelvic type B	Sacral fracture Bilateral rami fractures	Percutaneous SI-screws	Spine fracture Sternal fracture Extremities talus fracture calcaneus fracture mid foot fracture dislocation
7	47	F	Building 12 m	Pelvic type C	Sacral fractures bilateral, symphysis dislocation	Percutaneous SI-screws and anterior plate and screws	Spinal fracture Paraparetic Splenic haemorrhage Elbow dislocation
8	51	F	Building 10 m	Pelvic type B	SI fracture-dislocation	Fixation with screws and plate through open procedure	Proximal humerus fracture Suprakondylar elbow fracture
9	19	F	Building 12 m	Pelvic type B	Sacral fracture	Spinal-pelvic fixation and percutaneous SI-screws	Open calcaneus fracture
10	28	F	Building 7 m	Pelvic type B	Sacral fracture	External fixation	Femur shaft fracture Open tibia shaft fracture
11	29	F	Building unknown height	Pelvic type B	Bilateral sacral fractures	Spinal-pelvic fixation	Rib fractures Extremity fractures open talus open tibia shaft open bilateral ankle open proximal humerus
12	43	F	Building 7 m	Pelvic type B	Sacral fracture Rami fractures	Percutaneous SI-screws	None

reliable responses during the interview at four years.

SF-36

At two years the patients scored on average lower than the norm groups in all eight domains with the most pronounced differences in physical function (PF), role physical (RP) and vitality (VT). As the number of patients was small it was not possible to draw any firm conclusions from subgroups, although patients at or below age 29 scored much higher than the three patients at the age of 46 or above (Figs 1 and 2).

LISAT-11

Responses at two years were dichotomized into unsatisfied (alternative 1–3) and satisfied (alternative 4–6; Table 2). Four of the five young patients were

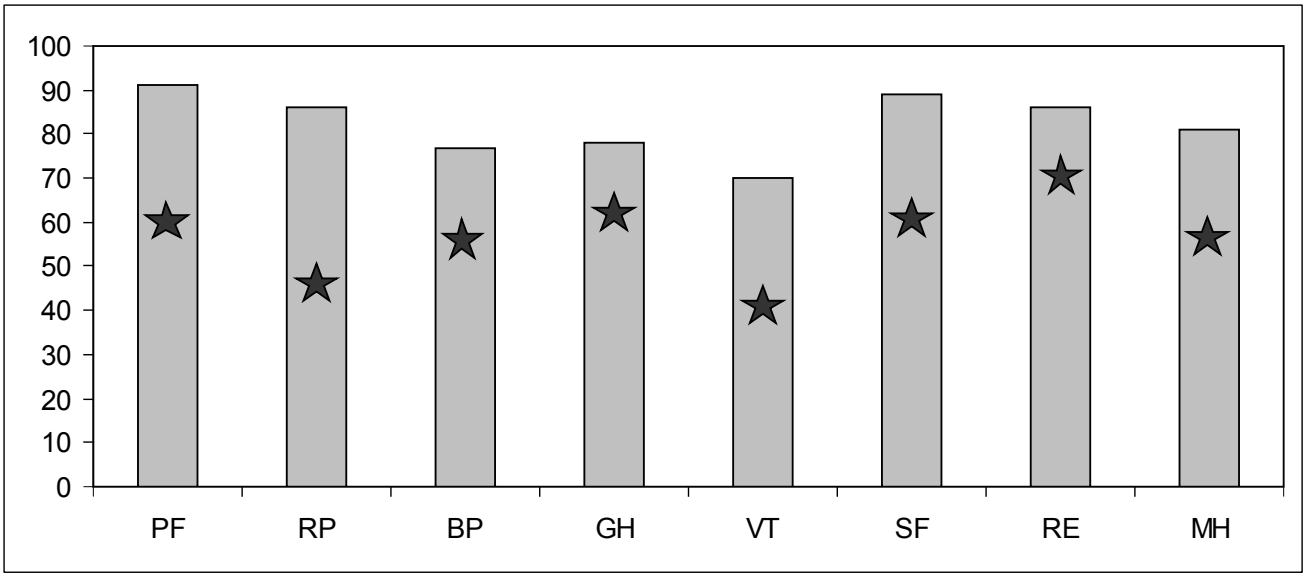

Fig. 1. SF-36 profiles in 8 pelvic fracture patients surviving suicide attempt by jumping. Stars indicate average and bars represent norm group. PF: physical functioning, RP: role limitations due to physical function, BP: bodily pain, GH: general health, VT: vitality, SF: social functioning, RE: role limitations due to emotional problems, MH: mental health.

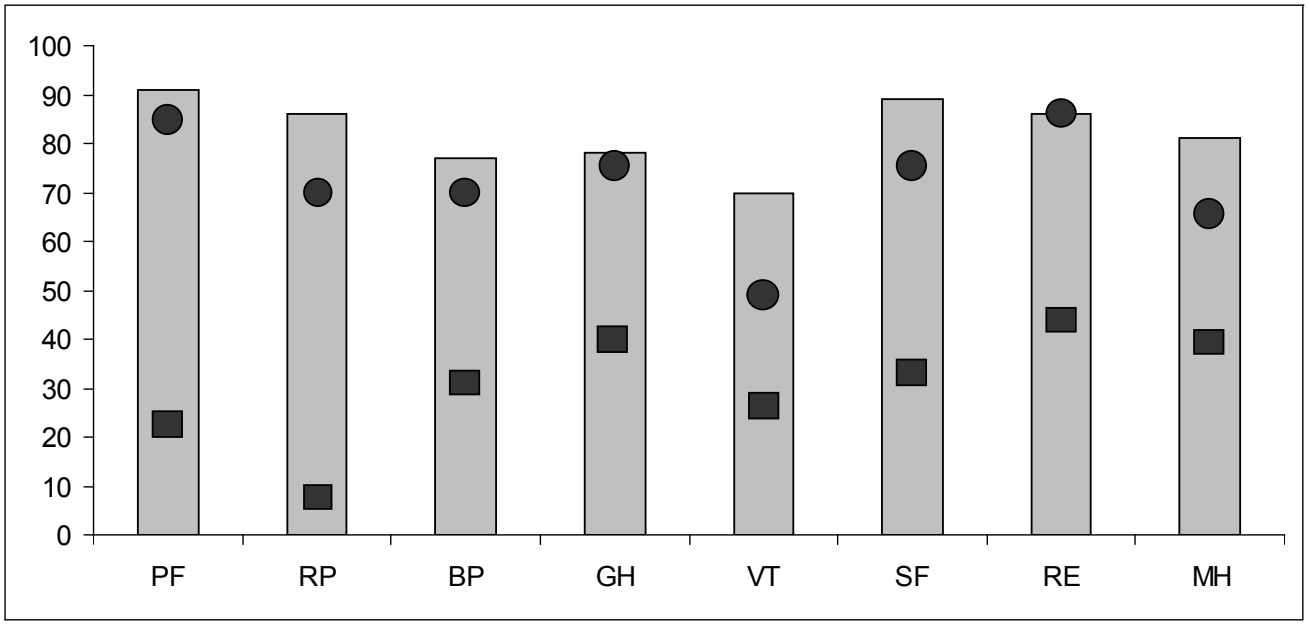

Fig. 2. SF-36 profiles in 8 pelvic fracture patients surviving suicide attempt by jumping. Circles indicate average for patients 1–5, in Table 1, (age 17–29) and squares patients 6-8 (age 47–51). Bars represent norm group.

satisfied with life as a whole, as well as one out of the three middle-aged patients. In all ten items except friends and acquaintances there were more satisfied patients than unsatisfied.

PSYCHIATRIC HISTORY

Based on medical charts all twelve patients were known by psychiatric and/or primary health care providers before they jumped. Three had a history of previous suicide attempts and another two had previous incidents with self destructive behaviour not assessed as a suicide attempt. Seven were described in the medical records as psychotic. Six of the patients had a diagnosed psychosis and four patients suffered from affective disorders. Five patients were substance abusers. Two patients had a personality disorder with emotional instability and one patient had PTSD (post-traumatic stress disorder). For one patient the medical records were insufficient for a diagnosis.

TABLE 2

Life satisfaction at two years in 8 pelvic fracture patients surviving suicide attempt by jumping.

LiSat-11 Item	Pelvic fracture patients	
	Unsatisfied	Satisfied
Life as a whole	3	5
ADL	2	6
Physical health	3	5
Psychological health	3	5
Sexual life	2	6
Partner relationship*	2	4
Family life″	2	5
Leisure	3	5
Friends/acquaintances	4	4
Work	2	6
Financial situation	2	6

* Two patients with no partner
″ One patient with no family

SCID-INTERVIEWS

Interviews and medical records showed that in all patients except one the present suicide attempt was very serious. There was ongoing treatment with medication for a psychiatric disorder at the time of the jump in six patients. Three of these had not taken their medication prescription before the jump.

Only one patient made a new suicide attempt during the follow-up period. In four patients the jump resulted in the start of a proper psychiatric investigation and rehabilitation plan. A summary of the psychiatric history and evaluation is given in Table 3.

DISCUSSION

Among all patients surgically treated for pelvic fractures in our institution during this time period, suicidal jump was the third most common fracture cause. The most important findings in this study were that all patients were still alive at four years and only

TABLE 3

Psychiatric evaluation in 12 pelvic fracture patients surviving suicide attempt by jumping.

Patient	Diagnosis	Before and/or at time of jump				At time of interview			
		Psychiatric treatment	Selfdestructive behaviour	Prescribed psycho-pharmacy	Alcohol/drug abuse	Psychiatric treatment ongoing	Selfdestructive behaviour or suicide attempt	Social functional level	Global assessment of function
1	Depression Unspecified personality disorder	Yes	Yes	Yes	No	Yes	No	Work part-time Studies Family, friends	60–70
2	Depression	Yes	No	No	Alcohol	–	–		
3	Asperger	No	No	No	No	Yes	No	Studies, limited Protected living Daily professional support, few friends	50–60
4	–	No	No	No	–	–	–	–	
5	Depression Psychosis	Yes	Yes	Yes	No	Yes	No	Sick leave part-time Studies Hobbies, friends	60–70
6	Drug abuse	–	No	No	Amphetamine	–	–		
7	Depression Psychosis	Yes	Yes	Yes	No	Yes	No	Sick leave full-time Daily professional support	20–30
8	Alcohol abuse	Yes	Yes	Yes	Alcohol	Yes	No	Work part-time Sick leave part-time Family/children and friends	60–70
9	None	No	No	No	Alcohol Amphetamine Cannabis	No	No	Work part-time Sick leave part-time Family and few friends	50–60
10	Psychosis	Yes	No	Yes	–	Yes	–		
11	Depression Personal disorder of emotional instability PTSD*	Yes	Yes	Yes	–	Yes	Yes	Sick leave full-time Daily professional support	20–30
12	Psychosis	Yes	No	Yes	–	Yes	No	Sick leave full-time	30–40

* Post traumatic stress disorder

one patient had made a new suicide attempt. These findings are in contradiction to the common belief that states a high risk for further attempts in this group of patients (7). An increasingly important outcome measure after major injuries and surgery is the use of generic instruments describing HRQoL. One such generic, well-validated and widely spread instrument is SF-36 (13, 17). A limitation when using it within this specific category of patients with a combination of severe somatic injuries and in many patients a pre-existing psychiatric condition is the validity of the norm groups and the ability of the patients to respond to the questions in an adequate manner. Consequently we have not found quality of life measurements reported in the literature for survivors after severe suicide attempt by jumping. Therefore, the finding that these instruments could be used in most of our patients was of interest. Quality of life, at follow up, was reported to be high in at least some of these severely traumatized patients. In addition, by adding a careful approach by a psychiatrist it was possible to increase the number of patients where information regarding quality of life aspects could be retrieved, as two of the patients who did not respond to the SF-36 accepted to be interviewed. As the number of patients was limited it was obviously not possible to draw any firm conclusions from subgroups. However, there was a difference from the patient's perspective in quality of life variables between young and middle aged patients with younger patients scoring higher in all domains. Based on the LiSat-11 instrument "satisfaction with life as a whole" was also higher in the younger patients.

Studies in survivors after jumping have shown a high proportion of patients being treated for psychiatric disorders already prior to the suicide attempt (2, 3, 7, 9, 14, 15, 19). It has also been shown that patients with mental disorders sustain more severe injuries when falling from a height, compared with patients with no mental disorder (4). In the present study eight out of 12 patients had a psychiatric diagnosis and more than half were on psychotropic medication. This is in line with previous studies showing a high proportion of persons with psychiatric disorder among jumpers (3, 4, 14, 19). In the study by de Moore et al (3) a comparison was made between persons who attempted suicide by firearms and by jumping. In their study 54% of jumpers and only 4% of those who shot themselves were psychotic at the time of the incident. When treating patients following a suicidal jump the importance to use an interdisciplinary cooperation between orthopaedic and psychiatric expertise has previously been emphasised. With such a combined approach it is possible not only to address the acute somatic injuries, but also the very frequent underlying psychiatric problems.

Eleven of the twelve patients were women, with four below the age of twenty. From previous studies the gender ratio for persons committing suicide by jumping has not been consistent. In the UK the proportions between genders with regards to jumping as a suicide act has been reported as equal (7). On the other hand, various case series from other parts of the world have shown that suicide attempt by jumping is three to five times more common in men compared with women (7). The gender ratio in the present study was completely different when compared with the gender distribution among those who committed suicide through jumping during the same time period based on the Swedish national statistics. According to the national statistics there were 40 men and 20 women, i.e. 5.2% of all men and 6.0% of all women who committed suicide, who did so by jumping. Based on the height for the jump in combination with the outcome from the interviews of the patients, their suicide attempt was considered as very serious. The reason why there was such predominance for women among survivors in our study is unclear. One possible explanation is that males jumped from more extensive height than females and this made chances of survival smaller. In a case series of 50 individuals who committed suicide by jumping there were 64 % men (10). As the prerequisite for inclusion in our study was a pelvic fracture we do not have any information about jumpers who survived without a pelvic injury, or jumpers who died at scene.

The strengths of the study include the prospective study design and the cooperation with a dedicated psychiatrist while the most obvious limitation of the study was the small number of patients. It is very difficult to get a large number of patients in a study where the two major inclusion criteria are survival after jumping from great height and presence of a severe pelvic or acetabular injury. Another limitation is that the follow up was four years. Even though such a follow up seems reasonable when addressing many clinical questions it might seem short from the patient's perspective when describing the period after such a severe physical and emotional trauma. There are also inherent methodological problems when studying this group of patients. If psychiatric disorder is present patients can be difficult to approach, as especially paranoid features make them reluctant to respond to mail or phone-calls.

Despite those limitations we believe that the present study provides valuable information. The staff in the somatic acute wards is faced with a challenging, and for them, uncommon situation when dealing with patients following a serious suicide attempt. A sense that the patients might return to a serious self destructive and potentially fatal behaviour might cause a feeling of hopelessness and a risk for limited involvement in the somatic ward. The information revealed in the present study therefore brings positive feed-back to the staff in the somatic acute wards.

REFERENCES

1. Beale JP, Wyatt JP, Beard D, et al: A five year study of high falls in Edinburgh. Injury 2000;31:503–508
2. Cantor CH, Hill MA, McLachlan EK: Suicide and related behaviour from river bridges. A clinical perspective. Br J Psychiatry 1989;155:829–835
3. de Moore GM, Robertson AR: Suicide attempts by firearms and by leaping from heights: a comparative study of survivors. Am J Psychiatry 1999;156:1425–1431

4. Fang JF, Shih LY, Lin BC, Hsu YP: Pelvic fractures due to falls from a height in people with mental disorders. Injury 2008;39: 881–888
5. Fugl-Meyer AR, Eklund M, Fugl-Meyer KS: Vocational rehabilitation in northern Sweden. III. Aspects of life satisfaction. Scand J Rehabil Med 1991;23:83–87
6. Fugl-Meyer AR, Melin R, Fugl-Meyer KS: Life satisfaction in 18- to 64-year-old Swedes: in relation to gender, age, partner and immigrant status. J Rehabil Med 2002;34:239–246
7. Gunnell D, Nowers M: Suicide by jumping. Acta Psychiatr Scand 1997;96:1–6
8. Hallin A, Bergqvist D, Fugl-Meyer K, Holmberg L: Areas of concern, quality of life and life satisfaction in patients with peripheral vascular disease. Eur J Vasc Endovasc Surg 2002;24: 255–263
9. Katz K, Gonen N, Goldberg I, et al: Injuries in attempted suicide by jumping from a height. Injury 1988;19:371–374
10. Lindqvist P, Jonsson A, Eriksson A, et al: Are suicides by jumping off bridges preventable? An analysis of 50 cases from Sweden. Accident Anal Prev 2004;36:691–694
11. Lowenstein SR, Yaron M, Carrero R, et al: Vertical trauma: injuries to patients who fall and land on their feet. Ann Emerg Med 1989;18:161–165
12. Marsh JL, Slongo TF, Agel J, et al: Fracture and dislocation classification compendium – 2007: Orthopaedic Trauma Association classification, database and outcomes committee. J Orthop Trauma 2007;21:S1–133
13. McHorney CA, Ware JE, Jr., Raczek AE: The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. Med Care 1993;31:247–263
14. Prasad A, Lloyd GG: Attempted suicide by jumping. Acta Psychiatr Scand 1983;68:394–396
15. Reisch T, Schuster U, Michel K: Suicide by jumping from bridges and other heights: social and diagnostic factors. Psychiatry Res 2008;161:97–104
16. Spitzer RL, Williams JB, Gibbon M, First MB: The Structured Clinical Interview for DSM-III-R (SCID). I: History, rationale, and description. Arch Gen Psychiatry 1992;49:624–629
17. Sullivan M, Karlsson J, Ware JE, Jr: The Swedish SF-36 Health Survey-I. Evaluation of data quality, scaling assumptions, reliability and construct validity across general populations in Sweden. Soc Sci Med 1995;41:1349–1358
18. Teh J, Firth M, Sharma A, et al: Jumpers and fallers: a comparison of the distribution of skeletal injury. Clin Radiol 2003; 58:482–486
19. Wirbel RJ, Olinger A, Karst M, Mutschler WE: Treatment of severe injuries caused by attempted suicide: pattern of injury and influence of the psychiatric disorder on the postoperative course. Eur J Surg 1998;164:109–113

Received: April 21, 2009
Accepted: February 19, 2010