

Injuries in attempted suicide by jumping from a height

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Summary

This study was undertaken to investigate the pattern of injuries and the management of 28 patients who attempted suicide by jumping from a height. Most of the patients had serious psychiatric disorders. All but two of the patients sustained multiple injuries. The most common injury patterns were fractures of the spine and lower extremities.

It was concluded that, in addition to urgent orthopaedic and surgical care, early psychiatric assessment and therapy with transfer to a psychiatric department as soon as possible facilitates the recovery and rehabilitation of these patients.

INTRODUCTION

THE injuries sustained in high free-fall have been investigated by several authors (Lewis et al., 1965; Snyder, 1965; Reynolds et al., 1971; Roy-Camille et al., 1984). The majority of free falls occur accidentally and only a minority result from suicidal self-destructive behaviour (Lewis et al., 1965; Snyder, 1965; Reynolds et al., 1971). This latter group usually have serious psychiatric disorders and as a result of the fall suffer from multiple injuries (Sims and O'Brien, 1979; Prasad and Lloyd, 1983).

Only scarce details are available about the patterns of injury and the management of patients who attempt suicide by jumping from a height. Snyder hypothesized that psychiatric patients are physically relaxed at the time of impact and withstand impact forces more successfully than the normal individual (Snyder, 1965). The small number of cases reported in the various studies and lack of specific details do not allow for confirmation of this hypothesis.

Prasad and Lloyd (1983) reported that the majority of such patients required psychiatric treatment which had to be initiated in the surgical ward. Sims and O'Brien (1979) indicate that highly trained staff are essential for safe management of these patients. Neither in these two articles, nor in previously published articles, are there details about the management of these patients at the time of injury and thereafter.

The aim of this article is, therefore, to study the pat-

terns and extent of injuries and present our experience in the combined orthopaedic and psychiatric management of patients who attempt suicide by jumping from a height.

CLINICAL RESULTS

During the years 1974 to 1986 a consecutive series of 28 patients who attempted suicide by jumping from a height were treated. There were 18 females and 10 males; the average age was 38 years (range 15-61 years).

All but two of the patients jumped from a window or balcony in their home. Of the other two, one jumped from a bridge over a road and the other through a window at school. The height of the falls ranged from 6 to 12 m and all patients landed on solid ground.

Each patient underwent a psychiatric evaluation by a consulting psychiatrist as soon as his condition and co-operation permitted. Sometimes there was a need for several assessments to determine psychopathological characteristics.

The assessment included an interview and a complete mental status examination. The patient was diagnosed according to axis I of the DSM III (principal mental disorder) and in accordance with axis II of the DSM III (personality disorder) (American Psychiatric Association, 1980).

When it was possible to establish an accurate diagnosis of a major psychiatric disorder, the patient was treated accordingly, taking into consideration possible drug interactions of both orthopaedic and anaesthetic medications.

When an accurate psychiatric diagnosis was difficult to establish, recommendations for symptomatic treatment were given (anxiolytic drugs, antidepressants, etc.). Any active suicidal patient who posed a risk of a second attempt was seen frequently, carefully monitored, kept away from potentially dangerous instruments that could be used to inflict self-injury, and placed on a one-to-one evaluation status, if necessary.

During the hospitalization each patient was followed up for necessary adjustment of the psychopharmacological treatment. Where possible the patient was offered supportive psychotherapy as well.

The psychiatric status of the patients is reported in Table 1. The majority suffered from schizophrenia. Fourteen had had psychiatric treatment previously. In seven

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Table 1. Psychiatric diagnosis of patients

Diagnosis	No. of patients
Schizophrenia	10
Major depression	7
Alcoholism	2
Personality disorders	2
Paranoid psychosis	1
Maladjustment reaction	2

In four patients the psychiatric diagnosis was not available.

patients it was a second suicide attempt. All but two patients sustained multiple combined injuries (Table II).

In order to assess the severity of injuries we used the abbreviated injury scale (AIS) (Committee on Medical Aspects of Automotive Safety, 1971), and the injury severity scale (ISS) (Baker et al., 1974). The AIS of the different body areas ranged between 2 and 4 while the ISS ranged between 9 and 41. Patients who jumped from 9 m or more sustained the most serious injuries.

Four patients (Cases 6, 11, 19, 20) sustained linear fractures of frontal skull, but none of them lost consciousness.

Eleven patients had a chest injury which included: one to five rib fractures in eight patients, pneumothorax or haemothorax in six patients, which associated with rib fractures in four patients. In three patients, assisted ventilation was necessary. One of these cases (Case 5), died 7 days after admission.

Two patients, on admission, underwent emergency exploratory laparotomy. In one patient (Case 20) rupture of the spleen and liver was found, and in the second (Case 2), haematoma of the kidney was noted. All patients sustained 1 to 8 fractures.

Spinal fracture, with or without associated injuries, occurred in 18 patients, most of which occurred in the lumbar spine (Table II). Six of the spinal fractures were associated with paraplegia. Of eleven fractures of the vertebrae, which were unstable, eight were treated by open reduction and spinal instrumentation with Harrington rods, while two were treated by plaster jacket and one died before spinal stabilization (Case 5). Twelve fractures of the spine were associated with fractures of the lower limbs; three of them also had a fracture of the pelvis. Four fractures of the spine were combined with fractures of the upper and lower limb and only two were isolated fractures of the spine.

On admission, long bone fractures were treated by closed reduction and immobilization in plaster or temporary splint. Subsequently, reduction and internal fixation, when it was necessary, were performed from 8 h to 5 days later.

Four fractures of the femur were treated by internal fixation and two with plaster cast. One of the latter, a supracondylar fracture, failed to heal and 6 months later was fixed by plate and bone graft.

Two fractures of the shaft of the tibia, three bimalleolar fractures and two fractures of the upper extremities were treated by open reduction and internal fixation. The remainder of the long bone fractures were treated by closed reduction and plaster casts. Fractures of the calcaneum occurred in 12 patients, most of which were comminuted. These fractures, if not associated with fractures of the tibia were treated by cold packs, elevation and early mobilization.

DISCUSSION

Patients who attempt suicide by jumping from a height usually suffer from multiple injuries. These may be of two types: deceleration type injuries and direct impact injuries (Mauhl et al., 1981). The former, which are internal organ injuries, result from the tendency to displace the tissue in the direction of motion upon impact, while the movement of the body is arrested by the ground (Mauhl et al., 1981). The small number of such injuries among our patients (four) can be explained either by the fact that most of these patients succeed in their suicide attempt, or that psychiatric patients are physically relaxed at the time of impact and tolerate deceleration injuries better than normal patients (Snyder, 1965).

The injuries resulting from direct impact are mostly fractures (Lewis et al., 1965; Reynolds et al., 1971). The area over which the impact force is applied influences the severity of the fractures (Snyder, 1965). The smaller the area over which the patients land, the greater the load/unit area. Patients who land on their legs tend to sustain more serious injuries than those who land on their sides. Case 18 landed on his right side and sustained a fracture of the greater trochanter; however, most patients land on their legs and sustain multiple comminuted fractures.

There were two main combinations of fractures in our patients. Sixteen patients presented with spinal fracture combined with pelvic and extremity fractures. Only four of them sustained upper extremity fractures. Twelve patients presented with pelvic or lower extremity fractures associated with upper extremity fractures. The difference between the two groups shows that fractures in the upper extremities usually exclude fractures of the spine. Upon impact the falling body has a kinetic energy which is converted in its major part into fracture energy. In the first group most of the kinetic energy is dissipated in the lower extremities, pelvis and spine, causing fractures at these sites. In the second group, patients use their upper extremities in an attempt to protect themselves, possibly via more flexion at the hip level. This increased flexion converts the remaining energy into forward rotational energy of the trunk exposing the extended upper extremities to fractures. It is probable that this form of energy dissipation protects the spine from fracture.

The initial treatment should be limited to life-saving procedures and short spine and limb stabilization procedures (Burri et al., 1982).

Fractures should be treated by methods that will allow early mobilization and transfer to the psychiatric ward. Treatment by traction or spica cast are not well tolerated by these patients and interfere with their nursing care. Rigid internal fixation, whenever possible for unstable fractures, is recommended.

The results of our study and others show that most of the patients who attempt suicide by jumping suffer from serious psychiatric disorders (Sims and O'Brien, 1979; Prasad and Lloyd, 1983). These patients suffer from a broad spectrum of psychiatric symptoms: anxiety, tension, depression, hostility, irritability, agitation, disruptive behaviour, disorder of thinking and perception, etc. Sometimes they have active suicidal ideation or even a detailed suicidal plan. Thus, the treatment approach for such patients must take into account their psychiatric state. The psychiatric manifestations create subjective distress for the patient and may hinder or even prevent the medical and surgical care of the patient in some instances.

Table II. Clinical data on 28 patients

Patient	Sex	Age	Height of fall (m)	Fracture and lesion site						ISS
				Head	Chest	Spine	Abdomen	Upper extremity fracture	Lower extremity fracture	
1	F	35	9	—	Rib 1 fract.	—	—	Bil. Monteggia fract.	Fract. prox. tibia (intra-articular) rt	13
2	F	56	12	—	Rib fract.	Compression fract. L1	Hematoma of kidney	—	Fract. femur shaft, Rt. distal distal tibia fibula lt.	29
3	F	15	9	—	—	Fract. sacrum S1	—	Distal radius rt.	Rt. tibia	25
4	M	30	9	—	Pneumo-thorax	Fract. dislocation L1	—	—	Fract. tibia	34
5	F	57	9	—	Rib 4-6 Bil. haemo-thorax	Fract. dislocation L2 paraplegia	—	—	Fibula lt. Ischium pubis, ileum lt.	34
6	M	61	9	Fract. frontal skull	—	—	—	Rt. olecranon Lt. distal radius	Ischium pubis, ileum lt. rt. tibia rt. calcaneus	20
7	M	49	12	—	—	Fract. dislocation L2 paraplegia	—	—	Bil. calcaneus	25
8	F	32	12	—	—	—	—	Rt. scapula	Ischium pubis, ileum rt. supracondylar lt. femur. Bil. calcaneus	16
9	M	35	9	—	—	—	—	Open distal radius ulna lt.	Greater trochanter lt. Pubis, superior ramus rt.	16
10	M	32	12	—	Sternum	Fracture dislocation L1 paraplegia	—	—	—	24
11	F	56	9	Frontal skull	—	—	—	—	Proximal tibia rt. Bimalleolar calcaneus lt.	20
12	F	48	9	—	Rib 2-8 rt	—	—	Rt. head of radius	Ischium pubis ilium rt.	18
13	M	41	9	—	—	Compression L5	—	Rt. distal radius + ulna	Calcaneus lt.	10
14	M	58	9	Pneumo-hydro-thorax	Fract. dislocation L4	—	—	—	Distal tibia fibula lt.	22
15	M	15	9	—	—	Transverse process L1	—	Distal radius lt. supracondylar rt.	Lt. distal ribia Bil. calcaneus	25
16	F	40	9	—	—	Burst L4 Paraplegia	—	—	Distal tibia fibula lt.	25
17	M	39	6	—	—	—	—	Greater tuberosity of humerus rt.	Subtrochanteric rt. femur rt. patella rt. calcaneus	16
18	F	36	6	—	—	Fract. dislocation L2	—	—	—	9
19	F	29	6	Frontal skull	—	—	—	Subcapital lt. humerus comminuted fract. lt. elbow, distal radius rt. elbow	Fract. lt. femur rt. patella open fract. tibia fibula rt.	20
20	M	30	12	Frontal skull	Rib 4-6 fract. lt.	—	Ruptured liver, spleen	Comminuted rt. elbow	Bil. fract. tibia + fibula	41
21	F	24	9	—	—	—	—	Lt. dislocated shoulder	Ischium, pubis ileum lt., calcaneus lt.	16
22	F	40	12	—	Pneumo-thorax, ribs 2-5	Fract. dislocation D12 sacrum	—	—	Central dislocation lt. acetabulum, bimalleolar lt., femur rt., bil. calcaneus	41
23	F	15	9	—	—	Burst L1, compression L2-3	—	—	—	9
24	F	31	9	—	Rib fract. 3-4 rt. pneumo-thorax	Burst L4	—	Bil. fract. distal radius, ulna	Calcaneus lt.	27
25	F	44	6	—	—	Compression fract. L2	—	—	Calcaneus rt.	13
26	M	30	9	—	—	Compression D8, sacrum	—	—	Lt. pubis, subtrochanteric femur rt. patella rt.	18
27	F	37	12	—	Pneumo-thorax rt. rib 5-10	Burst fract. L2	—	Fracture dislocation of elbow rt.	Rt. ramus pubis	
28	F	30	6	—	—	Compression L2-L4	—	—	Distal tibia fibula rt., calcaneus lt.	

ISS = Injury severity score; lt. = left; rt. = right; Bil. = bilateral; fract. = fracture

It has been our experience that psychiatric conditions, and especially the suicidal risk, should be evaluated and treated as early as possible during the orthopaedic or surgical hospitalization. Management requires both psychopharmacological therapy and psychotherapy. It has to be directed towards the achievement of symptomatic relief and, if possible, towards the remission of the primary psychiatric disorder.

An important role of the psychiatric consultation is to aid in accomplishing the needed orthopaedic therapy by increasing the cooperation of the patient, decreasing agitation, preventing outbursts of rage, etc. Since pain is a major problem, along with other psychiatric symptoms, in these patients, a second consideration in prescribing certain psychotropic drugs is their potential for raising the pain threshold, thus making the patient more amenable to treatment.

The management of these patients in the orthopaedic or surgical ward is difficult, because of restlessness, non-cooperation of the patient and the problem of staff inexperienced in handling the psychiatric patient (Silverman et al., 1985).

When prolonged orthopaedic and rehabilitation management are necessary, it is suggested that the patient be transferred to the psychiatric hospital while continuing the necessary orthopaedic treatment.

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