ORIGINAL ARTICLE

A new prognostic pelvic injury outcome score

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ABSTRACT

Aim To propose a new prognostic classification system for pelvic injuries based on a new detailed and all-encompassing evaluation of the injury pelvic outcome score and to check the prognostic value of this classification and evaluate its reliability and reproducibility.

Methods From January 2017 to June 2020 from 156 pelvic fractures treated at our hospitals, 98 patients with pelvic fractures were recruited according to inclusion and exclusion criteria. All patients compiled three scores (New Score System, Majeed Score, SF-12) sessions two times during the hospital stay to evaluate the endpoint before the trauma and two years after the trauma. All patients carried out three tests independently. The evaluation of three scores included a pelvic and general complication after the surgery, the times needed to compile three score system. For reliability of the new score systems we evaluated the inter-observer or intra-observer agreement, the prediction strength of each score, and a prognostic value.

Results A total of 98 patients were enrolled (74 were males and 24 females) with mean age of 43.6 (±18.6) (range 16-75) years. Tau B Kendall value was 0.827 for the new score system, 0.673 for the Majeed score, 0.746 for SF-12, there was $p<0.05$ for the new score system.

Conclusion The new score system is prognostic, reliable, reproducible and can become a useful instrument to adequately correlate the long-term outcomes of pelvic injury fractures. Also, it provides a better evaluation of pain, work, sexual possibilities and satisfaction, balance-sitting-walking and psychological status.

Key words: dysfunction, outcomes, pain, work

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INTRODUCTION

Pelvic injuries are rare and still represent a major cause of death and disability in patients involved in high-energy trauma (1). These fractures are among the most complex injuries of the lower limb and their management is technically demanding (2). Surgical treatment of these fractures is challenging, and creates several difficulties, both in restoration of the pelvic anatomy and sagittal balance alignment or reduces pre surgery or post-surgery complications (2,3).

Chronic posttraumatic pelvic dysfunctions after pelvic ring fracture impact negatively quality of life and mental health (4). The importance of the pre-operative and post-operative subjective or objective score to evaluate the pelvic injuries outcomes has been demonstrated in several studies (1-4).

Pelvic injury outcome is classified according to the Majeed score (5) prognostic classification systems, which are based only on five assessed and scored factors: pain, standing, sitting, sexual intercourse and work performance. The total score gave a clinical grade as excellent, good, fair or poor. The scoring system allows comparison between early and late results and also between various methods of treatment. This grading outcome of pelvic fractures is a non-validated self-developed pelvic fracture specific functional assessment instrument, and the disadvantage of the Majeed score is neurological impairments, which has relevant prognostic influence, not integrated and measures exclusively the functional component of the long-term pelvic injury (6).

The aim of this study was to propose a new prognostic classification system for the pelvic injuries based on a new detailed and all-encompassing evaluation of the injury pelvic outcome score, to check the prognostic value of this classification, and evaluate its reliability and reproducibility.

PATIENTS AND METHODS

Patients and study design

From January 2017 to June 2020 out of 156 patients' pelvic fractures treated at the Department of Orthopaedics, Vito Fazzi Hospital, 98 patients were recruited according inclusion criteria of the Tile classification (7); polytrauma, high energy trauma, low energy trauma, age 16- 75 years, sexual activity almost once a week. All patients joined at one follow-up year.

The exclusion criteria were: haematological or oncological patients, acute or chronic infections, age under 16 and over 75 years, no sexual activity, no bone metabolism diseases, no rheumatoid diseases, sexual or urological dysfunctions before the trauma, previous pelvic or lower limbs vascular/nerve diseases. .

All injuries were classified by seven pelvic surgeons; among them, four were senior surgeons with more than 20 years of experience in orthopaedics trauma pelvic surgery, the other tree had more than 5 years of experience.

The polytrauma patients were classified according to the Tile classification (7), the Injury Severity Score (ISS) (3). Complete neurological examination according to the American Spinal Injury Association (ASIA) (8) was performed in all patients.

Patients were treated according to the ethical standards of the Helsinki Declaration, and were invited to read, understand, and sign an informed consent form.

Azienda Sanitaria Locale (ASL) Lecce/Italy Ethical Committee approved this research.

The new score system is based on 6 labelling factors (Table 2), evaluated on common problems that patients suffered after pelvic injuries: pain, work, sexual possibilities, sexual satisfaction, balance-sitting-walking, and psychological status. Each labelling factor is assigned a maximum score whose sum has a minimum of 0 and a maximum of 100 points: 100 points equals the patient's state of health despite the fracture of the pelvis while 0 equals the maximum degree of dysfunction. Each labelling factor is composed of subcategories to which it refers or a specific score or range.

Methods

All patients underwent radiological exams: pelvic X-rays in AP position and CT scan with reconstructions in 3D.

The patients were treated by conservative or surgical treatment as previously described (1,2).

To evaluate the overall outcome of our patients, three scores were administered: new score system, Majeed score (5) and the Short Form (12) Health Survey (SF-12) (4).

All patients compiled the three score sessions two times during hospital stay with the help of medical staff to evaluate the endpoint before the trauma and two years after the trauma. The three scores, betwe-

en the endpoint before the trauma and the endpoint trauma, were administered one week apart.

All patients carried out three tests independently during the waiting time for the clinical and radiographic check-ups (other endpoints) at 1 month, 3 months, 6 months, 12 months from the trauma.

The chosen criteria to evaluate the three scores during clinical and radiological follow-up were: pelvic and general complication after the surgery, the time needed to compile the three score systems. The reliability of the new score system was evaluated by inter- or intra-observer agreement, the prediction strength of each score and prognostic value. Each labelling factor is assigned a maximum score whose sum has a minimum of 0 and a maximum of 100 points: 100 points equals the patient's state of health despite the fracture of the pelvis, while 0 equals the maximum degree of dysfunction. Each labelling factor is composed of subcategories to which it refers or a specific score or range.

The evaluation end point was set at 1 year of follow up.

Statistical analysis

Descriptive statistics were used to summarize the characteristics of the study group and subgroups, including mean and standard deviation of all continuous variables. The t-test was used to compare continuous outcome. The test or Fisher's exact test (in subgroups smaller than 10 patients) was used to compare categorical variables. Pearson correlation coefficient (r) was used to compare the predictive score of outcomes and quality of life. Mean age (and the range) of the patients were rounded at the closest year. The predictive score of outcome and quality of life and their ranges were approximated at the first decimal, while the Pearson correlation coefficient was approximated at the second decimal (r).

The Kendall Tau-B correlation between the Tile classification (7) at the last follow-up and the new score, the Majeed score (5) and SF-12 was used to assess the prognostic value of each type of fracture according to the Tile classification (7).

A multivariate analysis using the multiple regression with backward Wald method was performed to detect: sex, age, associated lesions, type of surgery, etc.

The general linear model (GLM), with the Tile classification (7) as a dependent variable and three scores as covariates, was finally performed to compare prediction strength of each score. The partial Eta squared ($\eta 2$) was used to measure prediction strength.

To investigate the reliability of the new score systems the inter-observer agreement for the Tile classification using the weighted Kappa (K) statistics described by Fleiss was evaluated (9,10). Three Kappa statistics were compared using the Wald test. To evaluate the reproducibility of the new proposed classification system the intra-observer agreement was calculated using the Kappa statistics. The Wald test was performed according to Shoukri et al. (11). Classification for K value was: less than 0.4 poor agreement, 0.4-0.6 moderate agreement, 0.6-0.8 good agreement and 0.8-1 excellent agreement (12). The statistical significance was defined as $p<0.05$.

RESULTS

A total of 98 patients were enrolled, 74 were males and 24 females. The mean age was 43.6 (±18.6; range 16-75) years. The industry sector was more represented in previous work, in 31 (31.63%) patients. Traffic accidents and agricultural accidents were the most frequent causes of injuries, in 32 (32.65%) and 26 (26.53) patients, respectively (Table 1).

Table 1. Characteristics of 98 patients with pelvic injury

Characteristic	
Gender ratio (M:F)	3.08:1 (74:24)
Average age (SD) (years)	43.6 (±18.6)
	No (%) of patients
Age range (years)	
Overall	16-75
16-35	28 (28.57)
36-50	24 (24.49)
51-59	20 (20.41)
60-65	12 (12.25)
65-70	8 (8.16)
70-75	6 (6.12)
Occupation (n;%)	
Agricultural activity	30 (30.61)
Industrial sector	31 (31.63)
Tertiary industry	26 (26.53)
Unemployed	11 (11.23)
Type of accident	
Fall from height	22 (22.45)
Traffic accident:	32 (32.65)
Accident agriculture:	26 (26.53)
Other accidents:	18 (18.37)
Type of fractures according Tile classification	
A	16 (16.33)
B1	29 (29.59)
B2	18 (18.37)
B3	8 (8.16)
C1	17 (17.35)
C2	6 (6.12)
C3	4 (4.08)

The new score system is based on 6 labelling factors (Table 2) evaluated on the common problems that patients suffered after pelvic injuries: pain, work, sexual possibilities, sexual satisfaction, ba-

Table 2. The new pelvic outcome system score after pelvic injury

Patients suffered after pelvic injuries	Point	Subcategory point
Pain (10 points)		
Intense or continuous rest	0	
Intense with slight activity	0-2	
Tolerable, but limiting slight activity	3-4	
With moderate activity, abolished by rest	5-6	
Mild, intermittent, normal activity	7-9	
Slight, occasional or no pain	10	
Work (25 points)		
No regular work	0-3	
Light work	4	
Change of job	7	
Same job, reduced performance	10	
Same job, same performance	25	
Sexual possibilities (10 points)		
Type of intercourse or no intercourse	0	
Only oral sex	1-2	
Oral sex or anal sex	3-4	
Intercourse possible in uncomforted position	5-8	
Intercourse possible in any position	0	
Sexual satisfaction (25 points) (Inverse Modified Arizona Sexual Experiences Scale)		
How strong is your sexual drive	0-5	
Are you sexually turned on?	0-5	
Can you easily reach and maintain an erection? (for man only)	0-5	
Does your vagina become moist during sex? (for female only)	0-5	
How easily can you reach an orgasm?	0-5	
Are you orgasms satisfying?	0-5	
Balance-sitting-walking (20 points)		
1. Bedridden or almost	0	
2. Wheelchair	0	
3. Cannot walk or almost	0-2	2
I cannot walk		0
I take less than 10 steps		1
I take more than 10 steps		2
4. Painful sitting	0-5	
no pain		0
armchairs / chair with backrest reclining at 40 °		1
armchairs / chair with backrest reclining at 60°		2
stool / high chair (65 ° - 70 °)		3
stool / low chair (40 ° -45 °)		4
armchair / chair with backrest around 90 °		5
5. Standing & Walking Balance	0-5	
no balance		0
balance in orthostatism and walking		1
balance in orthostatism and loss of balance when walking		2
loss of balance with imbalance on the operated limb		3
loss of balance with imbalance on the healthy limb		4
loss of balance both in orthostatism and when walking		5
6. Walking with aids	0-4	
independent		0
supervised in an extra and home environment		1
with crutches in an extra and home environment		2
with rollator in an extra and home environment		3
addicted to		4
7. Limp walking without aids	0-4	
no lameness		0
slight lameness (+ 200 mt)		1
moderate lameness (- 200 mt)		2
limb length discrepancy		3
severe lameness (- 100 mt) so it needs aids		4
8. Free	20	20
Psychological status (10 points)		
1. Depression	0	
2. Anxiety	1-2	
cognitive symptoms (irritability, insomnia, difficulty concentrating, restlessness…)		1
somatic symptoms (tachycardia, choking sensation, excessive sweating, dizziness, stomach pain, diarrhoea, nausea, chills, hot flashes, frequent urination, muscle twitching, tremors)		2
3. Heavy stress in life-chronic stress	3-4	
endless worries, traumatic episodes in early childhood		3
suicidal thoughts		4
4. Middle stress in life-acute episodic stress	5-6	
severe abuse, anger, tension		5
constant concern (migraine, hypertension, chest pain, heart disease)		6
5. Little stress in life-acute stress	7-9	
emotional stress (anger, irritability, anxiety, depression)		7
muscle problems, stomach problems, liver and bowel problems		8
high blood pressure		9
6. Normal for age and general condition	10	10

lance-sitting-walking, and psychological status. Compared to the Majeeed Score and the SF-12, the New Pelvic Score System expands the range of scores available to the patient to characterize his

Table 3. Associated injures, type of fixation and complications for each pelvic fracture type according Tile classification (3)

Variable	Groups according Tile classification							
	Non surgery	Surgery	B1	B2	B3	C1	C2	C3
Associated injures with pelvic trauma (No of patients)								
Cerebral concussion	9	3	16	12	8	16	6	4
Fat embolism	0	0	2	0	2	3	4	3
Hemopneumothorax	2	0	8	9	7	11	5	4
Liver injuries	1	1	3	5	6	5	4	3
Spleen injuries	2	1	4	6	4	5	4	3
Blow injuries	2	0	1	1	2	3	2	3
Tibial injuries	5	0	3	5	5	15	4	2
Femoral injuries	8	0	6	3	4	13	3	3
Rib fractures	2	3	22	8	8	12	6	4
Ankle and foot	0	0	6	4	0	19	5	2
Clavicle fractures	0	0	12	3	1	6	3	3
Proximal humerus	0	0	8	9	2	4	1	2
Humeral shaft	0	0	12	2	2	4	1	1
Elbow	0	0	2	4	1	5	1	2
Forearm	0	0	6	7	1	3	2	1
Wrist and hand	0	2	10	5	6	6	6	3
Spine fractures or sacral injuries	0	0	3	6	7	17	6	4
Lumbo-sacral nerve injuries	0	0	0	6	3	9	5	4
Cranial maxillofacial surgery fractures	0	0	0	6	2	8	2	3
Urogenital injuries	0	0	14	5	4	11	6	4
Average injury severity score (±; range) (3)	12 (±2.3; 1-15)	23 (±6.8; 1-31)	22 (±5.8; 1-33)	31 (±8.3; 21-44)	30 (±8.7; 21-42)	40 (±4.2; 34-50)	42 (±11.4; 32-55)	45 (±12.6; 32-55)
Type of pelvic fixation (No of patients)								
Rest in bed for 21 days	12	4	29	18	8	17	6	4
Anterior double plates	none	0	23	16	6	17	6	4
anterior plates	none	2	6	2	2	0	0	0
Posterior sacral plates	none	0	0	5	4	6	0	0
Posterior sacral roars	none	0	0	7	1	1	0	0
Spinopelvic	none	0	0	6	3	10	6	4
Cannulated Screws	none	2	0	0	0	0	0	0
X-ray reduction (No)								
Excellent	12	3	26	14	2	4	0	0
Very Good	0	1	3	4	2	6	1	1
Good	0	0	0	0	3	5	3	1
Fair	0	0	0	0	1	2	1	1
Bad	0	0	0	0	0	0	1	1
Complications (No of patients)								
Pelvic floor relapse	0	0	2	6	3	12	2	2
Bowel stoma	0	0	1	2	1	6	3	3
Impotence to erection	0	0	9	6	6	7	2	3
Urinary incontinence	0	0	3	3	2	4	1	1
Dyspareunia	0	0	4	4	5	5	4	1
Anal incontinence	0	0	0	1	2	2	1	1
Neurological bladder	0	0	0	0	1	2	1	1
Bladder prolapse	0	0	0	0	1	1	0	1
Sexual limitation	0	0	22	13	6	17	6	4
Reduced sexual interest	0	0	8	10	8	11	6	4
Less frequent orgasm	0	0	6	7	6	14	6	4
Sensitive crural Nerve injury	0	2	0	0	0	14	6	4
Other complications	0	0	10	12	9	12	6	4
New scoring System: Partial Eta squared	0.22	0.18	0.18	0.18	0.22	0.18	0.14	0.14
Majeed score: Partial Eta squared	0.15	0.16	0.12	0.11	0.11	0.11	0.14	0.14
SF-12: Partial eta squared	0.19	0.16	0,14	0.14	0.15	0.15	0.13	0.14

dysfunction or incapacity for work and daily life. Compared to the Majeed score, the patient's working capacity is emphasized. The psychological aspect not considered by the Majeed score instead of the same SF-12 is typified by 6 sub-categories that allows us to understand what the sequelae of dysfunctions and deficits really leave in the psychological state. The analysis of the injuries associated with pelvic fractures and their outcomes showed that the largest subgroup was represented by type B1 fracture, according to the Tile classification, with 29 patients. The group with the most related trauma was represented by the C1 group with 175 associated injuries. The highest injury severity score was that of the C3 subgroup with 45 (± 12.6; range 32-55) points. In all surgical subgroups the anterior stabilization was performed mainly with 2 plates, while the posterior one with spinopelvic stabilization. We noticed that according to the difficulty of the fracture the anatomical reduction was reduced on radiographic control. Except in the non-surgery subgroup, in all other subgroups sexual dysfunctions were the most common complications in all subgroups and with any fixation method (Table 3).

Time patients need to compile the functional score

The time needed for patients to complete the test before the trauma was: 23.4 minutes (±12.3; range 11-46) for new score system, 16.4 minutes (±5.4; range 9-37) for the Majeed score and 18.5 minutes (±6.7; range 13-35) for SF-12 (p=0.046). At the moment of trauma, the time needed for patients to complete the test was: 21.2 minutes (± 10.4; range 9-42) for the new score system, 15.9 minutes (±5.2; range 8-38) for the Majeed score and 16.3 minutes (±6.4; range 13-34) for SF-12 p=0.044. There was no statistical significance (p>0.05) between the three scores at 1-month follow up after the surgery: the time needed for patients to complete the test was 16.9 minutes (±12.3; range 8-34) for the new score system, 16.4 minutes (±5.6; range 7-35) for the Majeed score and 18.5 minutes (±5.6; range 13-35) for SF-12 (p=0.0623). At the third month (p=0.0544) between the three scores, the time needed for patients to complete the test was: 14.2 minutes (±4.7; range 8-28) for the new score system, 15.1 minutes (±5.8; range 8-30) for the Majeed score and 15.5 minutes (±3.9; range 13-24) for SF-12. At 6 months from the revision surgery, the time needed for patients to complete the test was: 13.8 minutes (±3.8; range 8-26) for the new score system, 14.2 minutes (±4.1; range 9-25) for the Majeed score and 16.5 minutes (±6.8; range 9-27) for SF-12 (p=0.0536). At twelve months after the surgery, the time needed for the patients to complete the test was: 12.5 minutes (±3.3; range 8-18) for the new score system, 15.2 minutes (±4.1; range 9-21) for the Majeed score and 15.9 minutes (±5.5; range 13-23) for SF-12 (p=0.0512) (Figure 1).

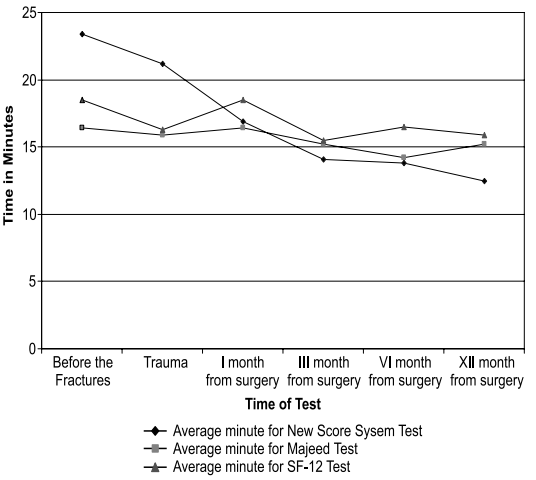

Figure 1. The overtime frequency trend time patients need to compile the functional score (New Pelvic Score System): at the first month post-surgery there was no statistically significant difference compared to other two scores, while after 6 and 12 months there was a statistically positive difference in favour of the New Pelvic Score System in the compilation time

Prognostic value

The new score showed a higher ordinal correlation with the Tile classification (7) score than the Majeed score. Tau B Kendall value was: 0.827 for the new score system, 0. 673 for the Majeed score, 0.746 for SF-12 (p.<0.05). The result of the analysis of factors other than the considered classification to predict outcomes of the Tile (7) classification fractures showed that no other factors besides the type of fractures according the Tile

Table 4. Prognostic value and inter/intra-observer agreement of three different score systems

Prognostic value score system	Partial Eta squared	p
New score system	0.18	0.0012
Majeed score	0.13	0.053
The Short Form (12) Health Survey (SF-12)	0.15	0.023
	K weighted value	
Inter-observer agreement score system		
New score system	0.91	0.016
Majeed score	0.73	0.064
The Short Form (12) Health Survey (SF-12)	0.82	0.051
Inter-observer agreement score system		
New score system	0.93	0.009
Majeed score	0.79	0.056
The Short Form (12) Health Survey (SF-12)	0.82	0.0503

classification influenced the SF-12 score, new score system, and Majeed score. A comparison of the prediction strength of each classification showed that the new score was the significant and had a higher partial Eta squared (Table 4).

Inter-observer agreement

Using the new score system, the average K weighted value among seven reviewers was 0.91±0.083 showing significantly higher inter-observer agreement than the other two commonly used, Majeed score classification and the SF-12, with 0.73±0.172 and 0.82±0.083, respectively (p=0.016) (Table 4).

Intra-observer agreement

Using the new score system, the average K weighted value showed a significantly higher intra-observer agreement than Majeed classification and the SF-12, 0.93±0.056, 0.79±0.074 and 0.86±0.037, respectively (p=0.009). No differences were found between experienced and inexperienced observers (Table 4).

DISCUSSION

An ideal pelvic outcome score system should be simple, all inclusive, reliable and reproducible. Furthermore, a pelvic outcome score system classification should provide prognostic information based on the outcomes of different fracture patterns to help a surgeon to improve preoperative planning and treatments and predict the patient's possible outcome. The dysfunctions due to pelvic ring injuries are mainly due to the fracturing mechanism as reported by Duramaz et al. (15). Anteroposterior compression (APC) is the most common cause of sexual dysfunction in both genders, independent of surgery, and in addition, the most common cause of erection disorder in males is vertical shear (VS) (15). Patients with APC and VS injuries should be especially multidisciplinary evaluated at gynaecology, urology, and psychiatry departments (15).

Currently tibial pilon fractures are classified according to the Majeed score (5). The Majeed score is a non-validated self-developed pelvic fracture specific functional assessment instrument with a maximum of 100 points for patients working before injury or 80 points for patients not working before injury (32). The score items are pain (30%), return to work (20%), sitting disturbances (10%), sexual impairments (4%) and walking ability (36%). The latter is subdivided into use of walking aids (12%), analysis of unaided gait (12%), and walking distance (12%). The SF-12 is one of most commonly used validated outcome instruments and is used for subjective self-assessment of mental health, physical and social aspects (4,12,13). It is a meaningful measurement instrument for evaluating the overall quality of life. A potential disadvantage is that relevant impairments of quality of life are captured, but the relative individual importance of these limitations is not sufficiently analysed (14). Scores range from 0 to 100, with higher scores indicating a better health state (14). Eight different parts are analysed: physical functioning (PF), role limitations due to physical health (RP), body pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and general mental health (MH). Of these PF, RP, BP and GH are summarized to measures of physical (PCS) and VT, SF, RE and MH to mental (MCS) health. SF-36, SF 12- SF 8 Health Surveys measure the same eight health domains for adults aged 18 and older but the limit of adult age is a great limit to use in pelvic fracture in young sexual adulthood (14).

The results of our study have shown that the new score system is simple, all-inclusive and has a high prognostic value; it is based on 6 labelling factors evaluated on the common problems that patients suffered after pelvic injuries (pain, work, sexual possibilities, sexual satisfaction balance-sitting-walking, and psychological status).

Chronic posttraumatic pelvic pain after pelvic ring fractures impacts negatively on quality of life issues. Our study aimed to identify and quantify the problem more clearly. However, this unidimensional definition of chronic pain does not represent the biopsychosocial impact caused by chronic pain that can occur particularly after severe trauma like pelvic injury (16-17). In all previous studies on outcomes of pelvic ring fracture, unidimensional pain measures were used, such as pain on sitting, standing, or strenuous activities (yes, no) (17): pain intensity, time since onset of pain, or the SF-12 bodily pain subscale, which combines one item each of pain magnitude and interference (17). The pain subcategory in our new

score system is extremely easy and intuitive for the patient because it traces the concept of pain determination from 1 to 10 of the Visual Analogue Scale (VAS) compared to the Majeed score and SF-12. Furthermore, the description of the type of pain and the range of quantification of it allows an excellent determination of the correct pain related only to the pelvis.

The return to work category was awarded the highest score of 25 points in the new score system. The ability to return to work is dictated by various factors besides fracture osteosynthesis, and the reduction of complications and dysfunctions is also related to associated injuries and their outcomes. According McMinn et al. poor mental health outcomes are known to have a significant effect on recovery from an injury, including more re-admissions and follow-up visits, delayed return-to-work, and higher rates of disability. Indeed, relative to the number of patients who returned to work at 3 months, there was a significant increase at 12 months (18).

Pelvic fractures are usually a result of high energy trauma, and sexual dysfunction after a pelvic fracture is a frequent complication (18). Though organic pathologies can be the reason for sexual disorders, and psychological factors following a trauma may also be linked to sexual problems (18). Our third categories of the sexual possibilities are formed by a very intuitive score from 1 to 10, which allows the subject to outline his sexual ability after pelvic injuries. As for the pain scale, the descriptive sub-categories of the type of limitation have a range for which the patient knows which score to attribute to his limitation. This category has been modulated to make males and females of any age respond. In fact, many studies demonstrated that differences in mood status exist between older and younger males or females following pelvic injuries and those injuries are associated with increased depression in older patients. Assessment of mood status in both short and long terms following fracture in the elderly seems justified, with early detection and treatment likely to result in improved outcomes (18-22).

The Arizona Sexual Experience Scale is the simplest and most intuitive scale for evaluating patient sexual dysfunctions (22,23). It is also most validated (22,23). To make it easier and more adaptable to the structure of our score system, we have inverted the score on this scale, bringing it from a range of 1 to 6 points to 0 to 5 where zero is the pineal dysfunction and 5 is well-being. The Majeed score outlines only the sexual functional capacity (6), while SF-12 only the psychological aspect of a possible dysfunction (24).

There was no clear correlation between the fracture types treated and the weight-bearing protocols reported, or any apparent trend in the management over time (25). There was, however, a slight trend in the management of type C fractures. Scientific literature papers reporting non-weight-bearing protocols, 86% included type C fractures, the figure being 84% for partial weight-bearing protocols but only 33% for full weight-bearing. The same figures for type B injuries were 56% for non- and full weight-bearing, and 68% for partial weight-bearing protocols (25).

Balance-sitting-walking is the fifth point of new outcomes pelvic score. This category of the score to which we have attributed 20 points summarizes 5 points of the Majeed score (29). The 8 subcategories allow to understand the patient's working capacity and his return to work based on the ability of the movement and maintaining balance. The SF-12, on the other hand, is a non-specific test for this dimension of the pelvic injuries problem.

Previous literature has suggested that traumatic pelvic injuries are predictive of lowered quality of life due to their association with dysfunction, correlated injuries, and chronic pain (1-25).

Concurrent with this dysfunction, correlated injuries and chronic pain, participants also reported worsening physical and mental health and quality of life in the year after their injuries (18, 26-28).

The sixth and final evaluation category of the new score system is the one that evaluates the patient's psychological state. In the Majeed score this evaluation is absent (5), while in the SF-12 it is well evaluated in general (18).

The main limitation of this study is a low number of patients. Another problem is in scientific validation and cross-cultural adaptation of the patient's lifestyle and cultural adaptation between Italian and Spanish culture. Additionally, the main limitations are the weakness of a longitudinal study applied on a great variability of surgical techniques. Other limits include various sexual

and daily patients' activities before the trauma. These limits probably resulted in some biases, such as that of surgeons' intra- and inter observational capacity.

In conclusion, the new score system is prognostic, reliable, reproducible and can become a useful instrument to adequately correlate long-term outcome of these fractures. In our opinion, the new proposed score system provides a better evaluation of pain, work, sexual possibilities, sexual satisfaction, balance-sitting-walking, and psychological status of pelvic injuries; it can improve preoperative planning and subsequently rehabilitation and psychological support, which affect the quality of life more than other diseases.

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