ORIGINAL ARTICLE / ORJİNAL MAKALE

# SPINAL TRAUMA CLASSIFICATION AND PRINCIPLES OF TREATMENT: A RETROSPECTIVE STUDY OF 234 CASES

*SPİNAL TRAVMALARDA SINIFLAMA VE TEDAVİ PRENSİPLERİ: 234 OLGULU BİR RETROSPEKTİF ÇALIŞMA*

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## SUMMARY:

**Objective:** To determine the age, gender, reason of injury, neurological status, level of fracture, type of fracture of the cases that are hospitalized in our clinic due to spinal trauma and that are practiced medical or surgical treatment in a retrospective way and to compare the results with the literature and to discuss them.

**Material and Method:** This research has been conducted in between January 2004 – December 2011 by evaluating 234 patients who were exposed to spinal trauma. They were exposed to cervical, thoracic and lumbar area. Trauma has been included to this research. A classification for each patient has been made separately according to the results of X-ray, computerized tomography and magnetic resonance imaging of patients, performed just after the patients consulted to the hospital. The patients have been classified in 5 groups according to upper cervical, lower cervical, thoracic, thoracolumbar and lumbar area traumas and each group has been evaluated in itself.

**Conclusion:** In our research, the most frequent reason of spinal traumas has been determined to be motor vehicle accidents and the most affected area has been determined to be thoracolumbar area (T11-L1). Using a general classification system has turned to be compulsory in determining the treatment that is to be applied to the patient.

**Key words:** Spinal trauma classification, TLICS, AO classification

**Level of evidence:** retrospective clinical study, Level III.

## ÖZET:

**Amaç:** tedavi uygulanan olguların retrospektif olarak yaş, cinsiyet, yaralanma nedeni, nörolojik durumu, kırık seviyesi, kırık tipi belirlemek, sonuçlarımızı literatürle karşılaştırmak ve tartışmaktır.

**Materyal Metod:** Bu çalışma Ocak 2004-Aralık 2011 tarihleri arasında Spinal travmaya maruz kalan 234 hasta değerlendirilerek yapılmıştır. Servikal, Torakal ve Lomber bölge travmasına maruz kalan 234 hastanın hastaneye başvurduklarında çekilen Direkt Grafi, Bilgisayarlı Tomografi (BT) ve Magnetik Rezonans Görüntüleme (MRG) sonucunda her bir hastaya ayrı ayrı sınıflandırma yapılmıştır. Hastalar Üst Servikal, Alt Servikal, Torakal, Torakolomber ve Lomber bölge travmalarına göre 5 ayrı gruba ayrılmış, her bir grup kendi içinde değerlendirilmiştir.

**Sonuçlar:** Çalışmamızda spinal travmaların en sık nedeni olarak motorlu taşıt kazaları ve en sık etkilenen bölgede torakolomber bölge ( T11-L1) bulunmuştur.

**Sonuç:** Hastalara uygulanacak tedavinin belirlenmesinde genel bir sınıflama sisteminin kullanılması artık zorunlu hale gelmiştir.

**Anahtar kelimeler:** Spinal travma sınıflaması, TLICS, AO sınıflaması

**Kanıt Düzeyi:** Retrospektif klinik çalışma, Düzey III.

## INTRODUCTION:

Traumatic spine and spinal cord injuries are serious problems causing significant work force and economical loss currently, by resulting in paraplegia, paraparesis and psychosocial problems[6,18]. Although it shows regional differences in global data, the prevalence of the spinal cord injuries are 236-1009 per million (median value is approximately 853 per million in USA)[9,21]. Its incidence, on the other hand, ranges between 10.4 and 83 (median value is approximately 39 per million in USA)[21,34]. Although there are no reliable statistical data in our country, if it is calculated with the USA data, approximately 2800 new cases emerge in a year and 63.000 people continue their lives as disabled as a result of the spinal cord injuries[21,34]. Even though it shows regional differences and it is seen 4 times more in males, the frequent reasons are motor-vehicle accidents, falling down from height, occupational accidents, violence including accidents, sports accidents and other trauma reasons in order[6,9,21].

Most of the spinal injuries consist of lower cervical region and thoracolumbar joint. Those regions are highly mobile. Cervical vertebras are examined as upper cervical region (C0-C1-C2) and lower cervical region (C3-C7) as anatomically and biomechanically. The vertebra in the lower cervical region resemble to each other anatomically and biomechanically[10,22]. They are generally formed by high energetic traumas. With the increasing technology, traffic accidents, injuries with gun, falling down from height and occupational accidents happen in an increasing rate. The cases with cervical vertebra trauma are mostly cases with multiple injuries. It becomes the situation more dramatic to see the current traumas in young population[10,14].

The most frequently encountered pathological problem is fractures. The injuries in the thoracolumbar region (T11-L1) which is the transition region between thoracic kyphosis and lumbar lordosis are frequent. While some of this injury is stable mechanically and the neurological injury risk is too low, there is instability in most of them and it causes acute or delayed neurological deficit.

There are still discussions in the treatment of potentially life-threatening injuries. New techniques and instrumentation systems allows a more aggressive surgical approach in the treatment of those injuries. There is a need for the use of a classification system in the spinal trauma cases. The used classification system helps the direction of follow-up and treatment when it not only indicates the bone lesion but also showing the accompanying soft tissue and ligament injury.

Any classification system should provide competence in gaining and storage of the data and the access of the data. The system not only should present a way for the documentation of the fractures, but also should provide the understanding them biologically and biomechanically[22].

The aim of this study is to compare the surgical decision as a result of the determination of the fracture type with the age, gender, neurological condition, fracture level and the classifications in the spinal traumas retrospectively in cases who were administered medicine or surgery as a result of the application to our clinics due to spinal trauma, and to discuss the results. In this study, also, we aimed to compare reflections of similarities, consistencies and contradictions of the spinal trauma classifications in general practices and all those results and to obtain the data which will help to reach to the suitable classification system.

## MATERIAL VE METHODS:

234 patients, who were exposed to cervical, thoracic and lumbar region trauma and who were treated in hospital between 2004 and 2011, were included in this study. Each patient were classified as a result of the Direct Graphy, Computerized Tomography (CT) and Magnetic Resonance Imaging (MRI) taken when they first applied to hospital. The patients were classified into 5 different groups according to upper cervical, lower cervical, thoracic, thoracolumbar and lumbar region traumas and each group was evaluated in itself.
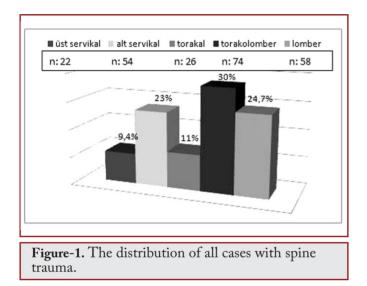
For the Atlantoaxial Rotatory Dislocation (AARD), which is an upper cervical vertebra injury, Fielding and Hawkins classification was used[10]. The Subaxial Cervical Spine Injury (SLIC), which is a lower cervical vertebra (C3-C7) injury, were evaluated according to Magerl-AO and ASIA classification[1,5,26,33].

The same classification was used in thoracic, thoracolumbar and lumbar traumas. The patients were evaluated according to Dennis[11], McAfee[27], Mc Cormak[28], Vaccaro[31], Magerl-AO[25] and ASIA[1] classifications. In the Dennis classification, the patients were classified according to compression, blow-out, safety belt and fracture dislocation. In the Mc Afee classification, the patients were grouped as compression, blow-out, chance, flexion-distraction and translation. In Vaccaro classification, the morphological features, the integrity of posterior ligamentous structures and neurological condition was considered, each was graded, the severity of the injury was determined according to the grade and the suitability of the administered treatment was compared with the literature. The grades were determined according to the disintegration of vertebra corpus, detachment of the corpus fracture and correction of the traumatic kyphosis and compared with the administered treatment.

The radiological and patho-morphological features of the injury were used as the base in Magerl-AO classification. Classification was performed according to the neurological examination in ASIA classification.

## RESULTS:

The 130 of the cases (56%) were males and 104 of them (44%) were female, 32% of them were diagnosed with upper and lower cervical trauma, 30% with thoracolumbar joint trauma, 24% with lumbar trauma and 11% with thoracic trauma. The upper cervical constituted the 9% of all cases and lower cervical constituted 23% (Figure-1). The cases who had surgical operation were 154 patients in total (66%) with 7 cases in upper cervical, 33 cases in lower cervical, 22 cases in thoracic, 60 cases in thoracolumbar and 42 cases in lumbar.



**Figure-1.** The distribution of all cases with spine trauma.

When the reasons of the injuries were examined, 59% were vehicle or motorcycle accidents, 26% were falling down from height, 6% were direct trauma on head and neck, 4% were falling while walking and 5% were the others in cervical region, and 61.5% were 16 cases with traffic accidents, 23.2% were 6 cases with falling down from height, 7.6% were 2 cases with occupational accidents and 7.6% were 2 cases with other reasons resulting in fractures in thoracic region.
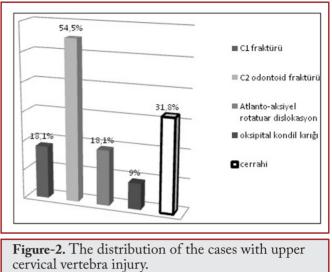
There were fractures in the thoracolumbar region in 42 cases due to traffic accident as 56.7%, 20 cases due to falling down from height as 20%, 8 cases due to occupational accident as 10.8%, and 4 cases due to other reasons as 5.4%.

There were fractures in the lumbar region in 32 cases due to traffic accident as 55.1%, 18 cases due to falling from height as 31%, 6 cases due to occupational accident as 10.3% and 2 cases due to other reasons as 3.4%.

There were accompanying injuries in our cases at a rate of 22% and 22% of those were extremity injuries, which was the most frequent, and 1% was cranial injury.

The 14 of (63%) the 22 patients, whose upper cervical region trauma was followed, were females and 8 of them (37%) were males, and this was mostly seen in ages 20-29 with 36%. 4 of those cases (18%) were detected as C1 fracture, 12 of them

(55%) as C2 odontoid fracture, 4 of them (19%) as Atlantoaxial rotator dislocation and 2 of them (9%) as occipital condyle fracture (Figure-2).



**Figure-2.** The distribution of the cases with upper cervical vertebra injury.

3 of the patients (25%) with C2 odontoid fractures were classified as type 1, 8 of them were (67%) type 2 and 1 of them (32%) was type 3.

While the mostly affected region in our study was C4-C5 with 35%, it is followed by C5-C6 with 31%, C6-C7 with 15% and C3-C4 with 11%. The most frequent lesion in terms of the affected vertebra fracture was encountered in C5 vertebra with 19%. 32 (59%) of the 54 cases were male and 22 (41%) of them were females. Most of the cases were in 20-29 age range with 24% and 40-49 age range with 20 %. There was neurological deficit in 37% of the cases and 36 of them (67%) were in ASIA E group. When evaluated with Subaxial Cervical Spine Injury Classification (SLIC), 13 of them (24%) got 2 points, 20 of them (37%) got 3 points, 15 of them (28%) got 4 points and 5 of them (9%) got 5 points.

When the cases were analyzed according to Magerl-AO classification, mostly Group B1 was encountered in 12 patients (22.2%). 33 of all patients (61%) who has lower cervical region injury were treated with surgery.

16 of 26 patients (61.5%) with thoracic vertebra trauma were males and 10 of them (38.5%) were females. Among the cases, there was 20-29 age group with 7 patients (26.9%) at most. In their first examination, 13 of them (50%) were ASIA E group. According to Dennis classification, 14 of them (54%) were classified as compression fracture, 8 of them (31%) as blow-out fracture, 3 of them (12%) were safety belt fracture and 1 of them (4%) was fracture dislocation. According to McAfee classification, 13 patients (50%) were classified as wedge compression fracture, 8 of them (31%) as blow-out

fracture, 3 of them (12%) as chance fracture, 1 of them (4%) as translational type.

When Mc-Cormak classification is used, 7 of the patients (27%) got 4 points, 12 of them (46.1%) got 5 points, 5 of them (19.2%) got 6 points and 2 of them (8%) got 7 points.

When evaluated according to Vaccaro classification, 7 of them (26.9%) were evaluated as 3 points, 10 of them (38%) were evaluated as 4 points, 8 of them (31%) were evaluated as 5 points and 1 of them (4%) was evaluated as 6 points. The mostly seen group was Group B1 with 6 cases (23%) according to Magerl-AO classification. 22 of all patients (85%) having thoracic vertebra injury were treated with surgery.

44 of the cases (59%) with thoracolumbar vertebra trauma were males and 30 of them (41%) were females. Among the cases, there was 20-29 age group with 20 patients (27%) at most. According to Dennis classification, 32 of them (43%) were classified as compression fracture, 26 of them (35%) as blow-out fracture, 10 of them (14%) were safety belt fracture and 6 of them (8%) was fracture dislocation.

According to McAfee classification, 28 patients (38%) were classified as wedge compression fracture, 30 of them (41%) as blow-out fracture, 8 of them (11%) as chance fracture, 4 of them (5%) as flexion-destruction, 4 of them (5%) as translational type.

According to Mc-Cormak classification, 10 of the patients (14%) got 3 points, 16 of them (22%) got 4 points, 26 of them (35%) got 5 points and 12 of them (16%) got 6 points and 10 of them (14%) got 7 points.

According to Vaccaro classification, 10 of them (14 %) were evaluated as 3 points, 16 of them (22%) were evaluated as 4 points, 40 of them (54%) were evaluated as 5 points and 18 of them (24%) were evaluated as 6 points.

In the ASIA classification of the cases, 40 cases (54%) were in ASIA E group at most.

According to Magerl-AO classification, Group A1, Group B2 and Group C2 were equal to each other with 10 cases (14%). 60 of all the patients (81%) having thoracolumbar vertebra injury were treated with surgery.

30 of the cases (52%) with lumbar vertebra trauma were males and 28 of them (48%) were females, there were patients in 50-59 age range with 20 patients at most (34%). According to Dennis classification, 24 of them (41%) were classified as compression fracture, 20 of them (34%) as blow-out fracture, 10 of them (17%) were safety belt fracture and 4 of them (7%) was fracture dislocation.

According to McAfee classification, 22 patients (34%) were classified as wedge compression fracture, 20 of them (34%) as blow-out fracture, 8 of them (14%) as chance fracture, 6

of them (10%) as flexion-destruction, 2 of them (3%) as translational type.

According to Vaccaro classification, 15 of them (26%) were evaluated as 3 points, 13 of them (22%) were evaluated as 4 points, 18 of them (31%) were evaluated as 5 points and 12 of them (21%) were evaluated as 6 points.

According to Mc-Cormak classification, 9 of the patients (16%) got 3 points, 12 of them (21%) got 4 points, 20 of them (34%) got 5 points and 8 of them (14%) got 6 points and 9 of them (16%) got 7 points.

In the classification made according to the first examination, 33 cases (57%) were evaluated as ASIA E.

12 cases at most (21%) were detected as Group B1 according to Magerl-AO classification.

42 of all the patients (72%) having lumbar vertebra injury were treated with surgery.

## DISCUSSION:

Spinal fractures are generally formed as a result of the severe and high energetic trauma[13], and the worst result, which is feared from beginning of the recorded date, the treatment seems impossible and which will not meet the expectations of both the physician and the patient, is the spinal cord injury[33]. In our study, 234 cases, who applied to our department due to spinal trauma, were analyzed retrospectively and the classifications affecting the treatment choices and the neurological conditions together with the related classification results, etiology of the pathology, the type, physical examination features, surgical or conservative approach and the obtained results were analyzed in company with the literature.

Goldberg et al. performed a prospective study including 21 centers with 34.069 patients to determine the exact prevalence, spectrum and distribution of the cervical vertebra injuries formed after blunt traumas. They detected 1496 different cervical spinal injuries in total in 24% of those patients. They also found that the second cervical spine is the level where the injuries most frequently form (24%) and the one third of those injuries was odontoid injuries[10,15]. 32% of the cases in our study was cervical region trauma. The cases who had upper cervical region trauma consisted of 29% of the patients with acute cervical trauma. It was observed that there was C2 fracture in 16% of the cases with acute cervical trauma and 55% of the cases with upper cervical region trauma.

When the patients with odontoid fractures were analyzed according to Anderson and D'Alonzo classification system[2], 25% of them was classified in Type 1, 67% was in Type 2 and 8% was in 8%. Greene et al. reported that they have achieved nearly total success in fusion rates in Type I and Type II fractures with the halo vest immobilization as a result of their
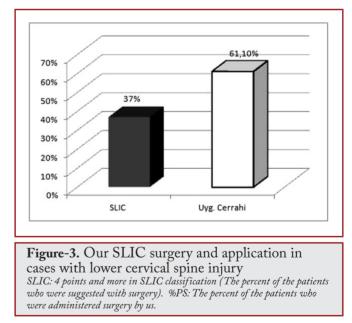
studies reviewing 199 patients with odontoid fractures among 340 patients. Non-union was detected in 28% of the Type II fractures who were administered external immobilization for 13 weeks. It was shown that this high non-union rate (86%), the replacement of dens 6 mm or more is independent from the age of the patient, direction of replacement or existence of neurological deficit[16]. Julien et al. found that the nonunion rates were 0%, 35% and 16% for Type I, II and III, respectively, in patients treated with halo/minerva fixation for 8-12 weeks in their review studies including 269 odontoid fractured patients[17].

In the review conducted by Longo et al. in 2010 and including 1078 cases by analyzing 43 publications, they found C1 fracture in 2-15% and C2 fracture in 17-25% of the patients with acute cervical trauma and they compared the halo transaction instability and they asserted that the Halo vest administration is safe and effective in indication[24]. In our series, 32% of the cases were followed surgically, 18% were followed with Halo Vest and 50% were followed with conservative treatment choices such as SOMI, and when the cases who were administered conservative treatment were ignored, the common inconsistency between Halo Vest and surgery in the literature was in favor of surgery in our clinics, but 1/3 of the cases with upper cervical vertebra trauma were treated with surgery. In the Type 2 fractures, the risk factors negatively affecting the union of the fractures were 6 mm and more dissociation, posterior subluxation and the age over 65[4,16]. Halo Vest is a quite significant treatment method besides the surgery requirement in risky groups and it should not be abandoned. Although the posterior or anterior methods are controversial in surgical techniques, nowadays it is changing in favor of the anterior approach[4].

Most of the cervical spine injuries occurs in the lower cervical region and the C3-C7 vertebra known as the subaxial cervical region[26]. Kocis et al. examined 363 patients with subaxial cervical injuries and they showed that 50% was traffic accident, 18 % was falling down from the height and the most frequently seen age is 20-29. They classified the neurological findings of cases in their study according to Frankel grading system and 54% were evaluated as Frankel E and 30 % were evaluated as Frankel A as having complete sensory and motor deficit. In their study, they showed that the mostly seen was C5 and C6-C7 vertebra fracture according to vertebra injury and the least one was C7-T1 segment[20].

Platzer et al. reported that the most frequent injury cause was vehicle or motorcycle accident with 44% in 367 cases, 212 of whom were subaxial, they examined and there was 38% neurological deficit[30]. Argenson et al., on the other hand, showed that the mostly seen trauma reason as the traffic accident with 60% in 255 cases with subaxial cervical vertebra injuries, and found that 28% was falling down from

height and 63% of the cases had neurological lesion[3]. In SLIC classification that we used in our study the patients are graded by evaluating the morphology, discoligamentous complex and neurological condition and while the scores which are 4 and more necessitates surgery, conservative treatment is administered to patients having scores lower than 4. When 54 patients are evaluated with SLIC, 24% of them got 2 points, 37% of them got 3 points, 28% of them got 4 points and 9% of them got 5 points. 61% of the cases in our series were administered surgery and 39% of them were administered conservative treatment, and 37% surgical indication forms according to SLIC classification (Figure-3). Due to the high rate of the cases getting 3 points, which is the lowest limit for the surgery in SLIC classification, although the complete spine injury was graded with 2 points in the classification system, since it is accepted as instable in our general perspective, most of the patients having 3 points and complete spine injury were operated. The distribution of cases getting 3 points according to SLIC classification in the population should be analyzed and we think that in the cases especially with neurodeficit, the surgical operation would be administered in other clinics in practice and this classification required modification.



**Figure-3.** Our SLIC surgery and application in cases with lower cervical spine injury
SLIC: 4 points and more in SLIC classification (The percent of the patients who were suggested with surgery). %PS: The percent of the patients who were administered surgery by us.

In Magerl-AO classification, the injury pattern is essentially consisted of 3 main types. It shows A (compression fractures), B (anterior and posterior element injury with destruction), C (anterior and posterior element injury together with rotation). In general, the most commonly seen group in cervical vertebra injuries is Type B. In this classification, instability potential increases through Type C. While group A1 and group A2 have the least complication, neurological deficit is seen in more than 60% of the patients in Group B1 and Group C2[7]. In our study, when we analyzed according to Magerl-AO,

12 patients (22.2%) at most were encountered in Group B1. Surgical operation was administered to 33 patients (61%) who are accepted as instable. The patients having minimal damage on the vertebra and the patients having complete spinal cord involvement with neurodeficit according to SLIC and Magerl AO classification are accepted as clinically instable and the surgical operation showed differences due to the requirement of decompression. The neurodeficit rates are high in injuries of those regions and we think that the classifications should be modified for SLIC and the neurological condition should be considered in cervical trauma in Magerl AO.

In a study conducted by Platzer *et al*. and including 367 cases, it was reported that there were 212 subaxial vertebra injury and the unnoticed or delayed diagnosis were analyzed and the 18 patients (5%) in the first level trauma center were exposed to unnoticed diagnosis[30]. In our study, on the other hand, it was seen that 4 cases (7%) of the 54 cases with subaxial cervical vertebra injury were evaluated in other trauma centers and they did not receive a diagnosis about cervical vertebra. Those cases applied to our clinics due to their ongoing neck pain and they were diagnosed with vertebra injuries after radiographic examination. The reasons of the delay in this diagnosis are thought as radiologically incorrect interpretation, not completing the radiography series and insufficient quality of radiography. Besides, insufficient clinical and neurological evaluation of the cases or lack of experience can be thought as the reason.

The aim of the surgical intervention in the vertebra fractures is basically to reform the stability. In this case, to define the stability gains importance. There is no discussion about this issue in cases having neuron damage; instability is certain. The blow-out fractures when the posterior structures such as facets, pedicles or lamina are injured should be accepted as instable according to Panjabi[29]. Marotti, on the other hand, accepts that progressive neuron damage, accompanying posterior structure damage, increasing kyphosis more than 20°, loss in the vertebra height more than 50% and presence of free bone pieces narrowing the spinal canal in CT cross section as the instability criteria[26].

After the report of Denis indicating that the delayed neurological worsening at a rate of 17% following the conservative treatment in the thoracolumbar spine fractures, those fractures were started to be treated by surgery frequently[12]. Surgical treatment has advantages such as providing early stabilization of the spine and thus decreasing the risk of neurological worsening, better correction of the kyphosis, which occurs after the fracture, and early mobilization[8,12].

While surgery is administered to 22 of the patients (85%) exposed to thoracic region trauma, conservative approach was preferred for 4 patients (16%). When the results were compared, surgical indication was decided to 20 patients

(70%) as 6 stable compression fracture, 8 instable compression fractures, 8 blow-out fractures and 1 fracture dislocation in Dennis classification (Figure-4). In Mc Afee classification, 7 patients were classified as stable wedge compression, 1 patient as stable blow-out, 7 patients as instable blow-out, 3 patients as chance, 1 patient as flexion-destruction and 1 patient as translational type and 18 patients (69%) were in groups suggested for surgery (Figure-4).

In Vaccaro classification, while 7 of 26 patients got 3 and lower points, 19 patients (73%) having surgical indication got 4 and higher points (Figure-4).

In Magerl AO classification, 4 patients were evaluated as Group A1 and 2 patients were evaluated as Group A2. According to this classification, 20 patients (77%) were found instable and surgical indication was formed (Figure-4).

While surgery was administered to 60 of 74 patients (81%) exposed to thoracolumbar region trauma, conservative approach was preferred in 14 patients (19%). When the results were compared, 10 stable compression fractures, 22 instable compression fractures, 26 blow-out fractures, 10 safety belt fractures and 6 fracture dislocation were found in Dennis classification, 64 patients (86%) requires surgery according to this classification (Figure-5). The number of the patients who were administered surgery by us shows similarity with the suggested one in the literature.
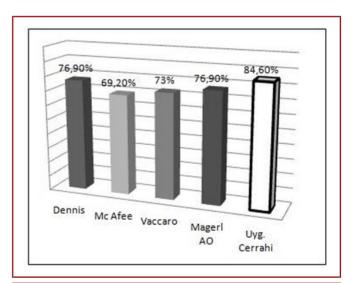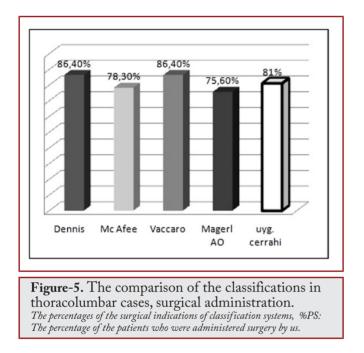


**Figure-4.** The comparison of the classifications in thoracic cases, surgical administration.
*The percentages of the surgical indications of classification systems, %PS: The percentage of the patients who were administered surgery by us.*

According to Mc Afee classification, 12 patients were classified as stable wedge compression, 16 patients as instable wedge compression, 4 patients as stable blow-out, 26 patients

as instable blow-out, 8 patients as chance, 4 patients as flexion-destruction and 4 patients as translational type, and 58 patients (78%) necessitated surgery (Figure-5). The number of the patients who were administered surgery by us shows similarity with the suggested one in the literature.

In Vaccaro classification, while 10 of 74 patients got 3 and lower points, 64 patients (86%) having surgical indication got 4 and higher points (Figure-5).

In Magerl AO classification, 10 patients were evaluated as Group A1 and 8 patients were evaluated as Group A2 and accepted as instable. According to this classification, 56 patients (76%) were found instable and surgery was suggested (Figure-5).



**Figure-5.** The comparison of the classifications in thoracolumbar cases, surgical administration.
*The percentages of the surgical indications of classification systems, %PS: The percentage of the patients who were administered surgery by us.*
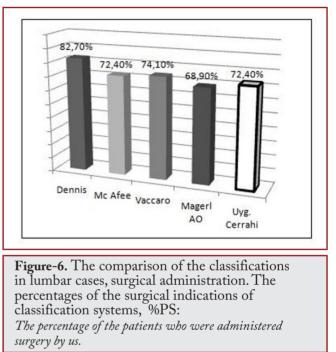
While surgery was administered to 42 of 58 patients (72%) exposed to lumbar region trauma, conservative approach was preferred in 16 patients (28%). When the results were compared, 10 stable compression fractures, 14 instable compression fractures, 20 blow-out fractures, 10 safety belt fractures and 4 fracture dislocation were found in Dennis classification, 48 patients (83%) requires surgery according to Dennis classification (Figure-6).

The number of patients who were administered surgery shows similarity with the one suggested in the literature.

According to Mc Afee classification, 12 patients were classified as stable wedge compression, 10 patients as instable wedge compression, 4 patients as stable blow-out, 16 patients as instable blow-out, 8 patients as chance, 6 patients as flexion-destruction and 2 patients as translational type, and 42 patients (72%) necessitated surgery (Figure-6).

In Vaccaro classification, while 15 of 58 patients got 3 and lower points, 43 patients (74%) having surgical indication got 4 and higher points (Figure-6).

In Magerl AO classification, 10 patients were evaluated as Group A1 and 8 patients were evaluated as Group A2 and accepted as instable. According to this classification, 40 patients (70%) were found instable (Figure-6).



**Figure-6.** The comparison of the classifications in lumbar cases, surgical administration. The percentages of the surgical indications of classification systems, %PS:
*The percentage of the patients who were administered surgery by us.*

Li *et al.* reported that approximately 70% of all blow-out fractures are in thoracolumbar region[23]. In our study, thoracolumbar joint was found as the mostly affected region with 48%.

Basically, as in the treatment of all fractures, there are two choices in the treatment of thoracolumbar region fractures; conservative and surgical treatment. The increasing biological lifetime nowadays increases the expectation of return to the active life after the injury; issues such as hospitalization period, rehabilitation need and cost-benefit ratio gain the currency. In this context, the choice of conservative or surgical treatment in thoracolumbar fractures gains high significance.

The main problem in spinal injuries formed generally due to high energetic trauma is the lack of a classification system which will help the surgeon for the optimum diagnosis and detection of the treatment, which is standardized, which is easy and which is extensively accepted. A number of studies show the absence of a classification system whose absence is felt until today, which is accepted by large masses, and which is the leader in prognosis estimation. It is true that the classification system has a number of purposes. Those purposes can be sorted

as helping the surgeon during decision, helping in detection of the treatment choices, helping to guess the existing problems before, directing the treatment, predicting the results, to be able to compare with the analysis and similar cases, helping documentation and facilitating the communication.

According to data of this study, the classifications used in different regions of the spine, the number of patients in each group shows differences and they include same rate of patients in terms of the determination of surgery. As a result, when all the classifications are analyzed, the opinion which states that currently there is no ideal classification which achieves all the purposes we mentioned above and which guides directing the treatment and determining the prognosis.

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