

# Thoracic and Lumbar Spine Fracture, Type C of Magerl: About Two Cases and Review of Literature

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## Abstract

**Introduction:** Thoracic and lumbar spine fracture, type C of MAGERL is one of the most biomechanically and neurologically unstable lesions, induced by significant damage to the bone, disk and ligament complex. **Materials and Methods:** We report two cases of Thoracic and lumbar fracture, type C of MAGERL hospitalized in the Neurosurgery department of the Grand Yoff General Hospital in Dakar during a period from June 2014 to June 2017. **Observations:** 1<sup>st</sup> case: 44-year-old patient, referred from abroad because of multi systemic trauma related on road traffic accident. On physical examination sustained a thoracic spine trauma classified ASIA D. Body CT scan showed T4 - T5 fracture-dislocation Type C of MAGERL, multiple ribs fracture with a right slight haemothorax, a sternal, a left humerus and scapulas fracture. Thoracic Posterior approach was done using laminar hooks. Clinical and anatomical results are good. 2<sup>nd</sup> case: 20-year-old patient, referred for thoraco-lumbar trauma because of occupational accident. The initial clinical examination classified it ASIA B. CT scan investigation, demonstrated a L1-L2 fracture type C of MARGERL. Thoraco lumbar spine posterior approach was done using pedicular screw fixation. Two years after trauma the patient recovered completely from his paraplegia. **Conclusion:** Thoracic and lumbar spine fractures, type C of MAGERL are compelling and instable fracture. Performing posterior instrumentation can achieve a good stabilization and reduction of the lesion.

## Keywords

Spine, Trauma, Magerl, Posterior Instrumentation

## 1. Introduction

Fractures of the thoracic and lumbar spine could lead to severe injuries that can dramatically compromise functional and vital prognosis of the patient [1]. Thoracolumbar is the second most common segment involved in the vertebral column following cervical segment in patients with spinal injuries. Magerl type C fractures are the most severe and devastating lesions with the worse prognosis because they are often complicated with neurological deficit [2]. The characteristics of this type of fracture are anterior and posterior column injuries with associated rotation and translation of vertebral bodies. Progress in neuroimaging with CT scan and MRI has allowed a better resolution of the lesion and a good understanding of the patho mechanism related usually on a high-velocity trauma. The aim of this study is to present our post-therapeutic results.

## 2. Patients and Method

From June 2014 to April 2017, 24 patients have been operated on for thoracic and lumbar spine fracture and among two came with Margel C thoraco lumbar fracture. We made demographic, clinical and therapeutic study.

## 3. Observations

1st case: 44-year-old Woman, with a clinical history of high blood pressure, referred from Banjul, Republic of the Gambia because of multi systemic trauma related on road traffic accident. She was sitting on the rear and wearing seat belt. Their vehicle went on somersault. Five deaths were reported on the theater. She was admitted in our department at day 3. Initial clinical examination did not show any hemodynamic and respiratory instability. The neurological examination revealed paraparesia quoted ASIA D. A rapid body-CT showed T4 - T5 Fracture-dislocation Type C2 of MAGERL (**Figure 1**), multiple ribs fractures with a right slight haemothorax, a sternal, a left humerus and the two scapulas fracture. Plaster immobilization was done for the humeral fracture and only conservative treatment for the others lesions. The chest X-ray control at Day 6 did not show pleural effusion. At day 7, a posterior approach was achieved with T3-T5 stabilization using 4 hooks and two rods, combined with a T4 laminectomy. Post-operative outcome was good with a good radiological realignment at imaging control (**Figure 2**). She enter an intensive physiotherapy program. Three months later, she was asymptomatic and classified ASIA E; but still 3 years later she is complaining from chest neuropathic pain controlled with pregabalin.

2<sup>nd</sup> Case: 20-year-old man, fisherman, was stuck from behind by a small boat, he referred from Saint Louis du Senegal 9-hour after his trauma. Upon arrival physical examination noted Asia B paraplegia quoted 2/5 overall muscle strength without any sensory or genito-urinary disturbance. CT scan with 3D reconstruction demonstrated a L1-L2 fracture type C3 of MARGEL (**Figure 3**, **Figure 4**). At day 5, the patient went on surgery, a posterior approach with thoracic spine

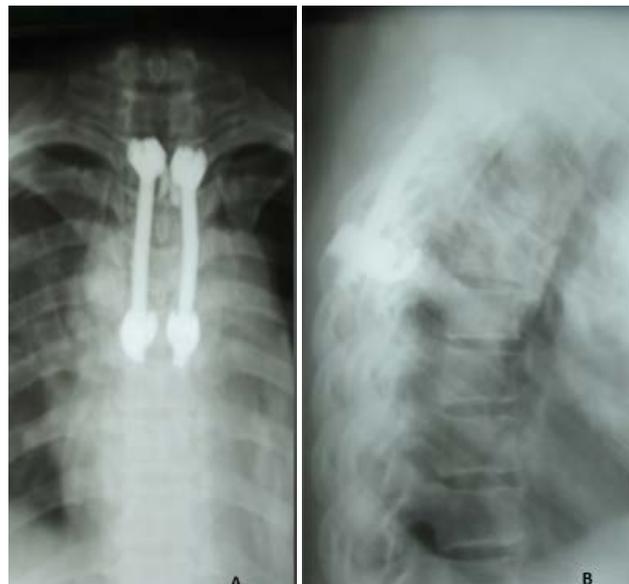
stabilization T12 - L1 -L3 - L4 using 8 pedicular screw and two rods combined with a laminectomy of L2 and hemi laminectomy of L1. The post-operative outcome was good and a radiological control at J1 post op was satisfactory (**Figure 5**). Two years after his trauma, the neurological examination is normal with a complete recovery of his deficit he is classified Asia E.

#### 4. Discussion

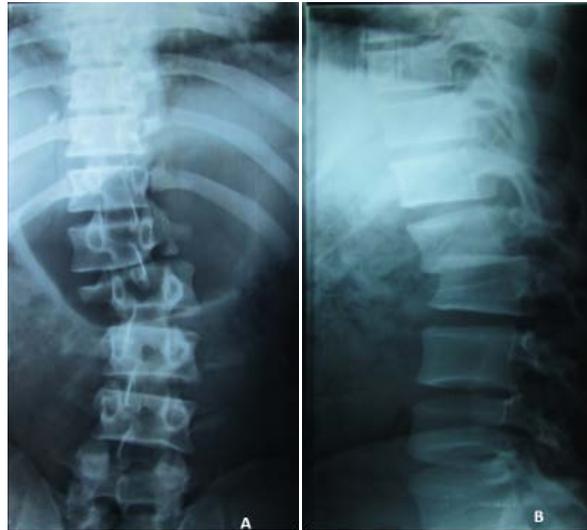
Type C fractures are subdivided into 3 categories: C1, represented by type A fractures with rotational force associated, C2, type B fractures with rotational force associated and C3, represented by purely rotational injuries.



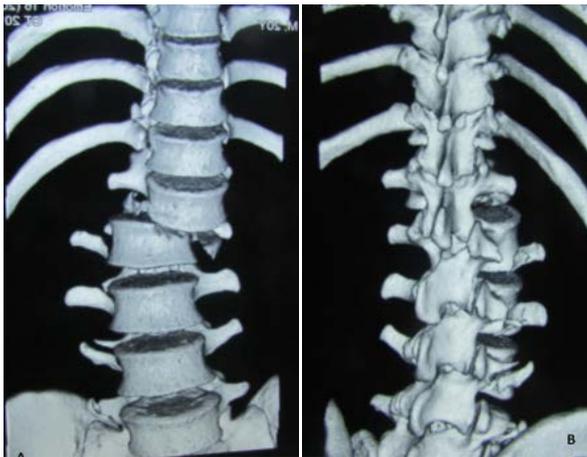
**Figure 1.** CT of the dorsal spine highlighting a fracture-bursting of T4 and T5, posterior distraction and translation.



**Figure 2.** Post-osteosynthesis, face (A) and profile (B) control X-ray, with a laminaire and stem hook mount.



**Figure 3.** X-ray of the thoraco-lumbar spine, face (A) and profile (B) incidence, highlighting an L1 - L2 luxation with rotation and translation.



**Figure 4.** Thoraco-lumbar spine CT scan in 3D reconstruction, anterior (A) and posterior (B) views highlighting a L1 - L2 type C3 Magerl fracture-luxation.



**Figure 5.** Post-osteosynthesis control x-ray in face incidence (A) and profil (B).

The Thoraco-lumbar fractures, type C of MAGERL is not very frequent in our experience. It represent or 8.3% of cases of all thoraco lumbar fracture. These spine injuries affect mostly young adults; usually male [3]. We had 1 man and 1 woman aged 20 and 44 years respectively. The causes of these traumas are diverse, but they share a high-energy mechanism. Alvine *et al.* recorded 52% of fall injuries [4] and Kushal *et al.* had 65% [3]. For other authors such as Checiu *et al.* [5] traffic accidents are implicated (46%). We have had a case of occupational injury.

The thoraco-lumbar trauma is often associated with other lesions. Harbrecht *et al.* [6] report a correlation between the AO classification and the associated lesions. 42% of patients with type A fractures had associated lesions, 64% in type B and 66% in type C. Reinhold *et al.*, out of a series of 733 patients operated on for thoraco-lumbar trauma, reported that patients with type B or C fractures were more likely to have neurological deficits, associated lesions and multiple vertebral fractures [7]. Our first case had multi systemic injuries.

The challenge in surgical management of these lesions is to obtain a reduction and maintain it after stabilization. In unstable fractures of the spine, surgical treatment to decompress nerve structures and restore a stable spine is recommended [8]. A surgical treatment was done in our two cases by posterior approach with stabilization by a hook or screw. It has been shown that most unstable lesions can be treated with these techniques without the need for a combined anterior approach [9]. However, there are currently some concerns about maintaining the reduction that would be lost over the long term by using these systems [10]. Reinhold *et al.* treated 51.8% of patients by posterior approach, 4.6% by anterior approach and 43.5% by a combined approach anterior and posterior [7]. The latter had a good correction of deformity and a low residual kyphosis over the long term [7]. Although this support remains a controversial subject, many authors agree on a posterior approach with a long instrumentation [11].

The surgery time was on average 7.5 days in our context. Our delay is longer. The timing of surgical treatment is an important problem for patients with thoracic type C fractures patients because presenting with an altered general condition and multiple lesions associated. Normally, the prognosis is better if an early surgical intervention with decompression and fusion of the spine is done. [5]. In our context, the transfer from another hospital, the presence of an extra spinal combined and the cost and availability of implant might be limiting factors to practice surgery rapidly. The neurological evolution was satisfactory in our patients.

## 5. Conclusion

The Thoracic and lumbar fractures, type C of MAGERL are severe lesions that may jeopardize functional and or vital prognosis. They therefore require an early management to decompress of the neural axis and make reduction and stabilization.

## Informed Consent

Written informed consent was obtained from the two patients for publication of this manuscript and any accompanying images.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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