

Research Article

MANAGEMENT OF CERVICAL SPINE INJURIES IN A NEUROSURGICAL DEPARTMENT IN A LOW INCOME COUNTRY

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ABSTRACT

Introduction: Cervical spine injuries are common and often threaten functional even vital prognosis. The complexity of the lesions and their classification make their management difficult even though it is now supported by specialized technology. The aim of this study was to evaluate the management of cervical trauma patients in our department. **Material And Methods:** We conducted a retrospective and descriptive study from January 2016 to July 2019 of all patients who presented to the neurosurgery department of Hospital general Idrissa Pouye (ex HOGGY) with a cervical spine injury. We studied their epidemiological, diagnostic, therapeutic and outcome aspects. **Results:** Sixty-three (63) cases were included with a sex ratio of 4.25. The mean age was 33 years [range, 4 - 63 years]. Road traffic accident was the main cause of injury (56%). Mean time of presentation of injured patient was 8.9 days [extremes : 1h ; 93days]. In our study, 44.4% of patients had ASIA A scoring and 9.5% ASIA E. The most affected level was C5-C6 (49.2%). The mean time from admission to surgery was 22.4 days. The Anterolateral approach was performed in 92.8% of patients. The most observed complications during hospitalization were bedsores (22.4%) and urinary tract infections (17.7%). The evolution was good in 62% of cases. Eight (8) deaths were noted, including five (5) prior to surgery. **Conclusion:** Cervical spine injuries are a public health concern closely linked to the growing fleet of vehicles in developing countries such as Senegal. The process of emergency care is still difficult.

Keywords: Trauma; Cervical Spine; CT scan; Surgery.

INTRODUCTION

Cervical spine injury is a potentially serious condition [Claude *et al.*, 2006]. Damages are often multiple involving different structures of the spine such as osseous destructions that can consolidate with time, definitive ligamentous injuries or spinal cord trauma, hence the lack of consensus in their management [Ahuja *et al.*, 2017]. Neurological patients in sub axial cervical spine trauma can survive with a risk of serious sequelae. On the other hand, severe lesions following upper cervical spine trauma are generally immediately fatal. These realities motivate a particular attention to reveal the limits and factors that condition the management of these lesions in our regions.

MATERIAL AND METHODS

We conducted a retrospective study from January 2016 to July 2019 in the neurosurgical department of Hopital general Idrissa Pouye (HOGIP, ex HOGGY) of Dakar. We included all patients admitted for a cervical spine injury with a complete medical file. We studied their epidemiological, diagnostic, therapeutic and outcome aspects. The main Challenges and limitations of care support were analyzed.

RESULTS

Out of 68 files collected, 63 were included. The average age was 33.7 years with extremes of 4 years and 63 years. The most affected age

group was between 15 and 30 years old with 46%. We noted 81% of patients (n = 51) under 45 years old and 51 patients were male versus 12 female (sex ratio = 4.25). The mean time to admission was 8.9 days with extremes of 1 hour and 93 days. Ten (10) injured patients (15.9%) presented within six hours after trauma. Pre-hospital care with medical transport was only carried out in 25 cases (39.7%). The cause most frequently incriminated was the road traffic accident, it was found in 35 cases (56%). A Multiple trauma was noted in 26 patients (42%). The most frequently associated lesion was head trauma (17.5%) compared to 14.2% for the musculoskeletal system and 5% of cases of thoracic involvement. On examination patients were classified as ASIA A: 28 patients (44.4%), ASIA B: 7 patients (11%), ASIA C: 8 patients (12.7%), ASIA D: 14 patients (22%) and ASIA E: 6 patients (9.5%). Priapism was noted in three cases (5%) and seven patients had respiratory impairment (11%). CT scan of the spine was performed in all patients and combined with magnetic resonance imaging in 2 patients with post-traumatic quadriplegia and in whom CT of the cervical spine was normal. The MRI revealed a spinal cord contusion. Thus the diagnosis of SCIWORA (spinal cord injury without radiographic abnormality) was made in these 2 patients. The lower cervical spine was the most frequent site of injury, found in 57 patients (90.5%) with a predominance of the C5-C6 level (49.2%). Different lesions were found, fracture-dislocation was the most common, found in 24 patients (38.1%). The surgical indication was postponed in all patients presented with respiratory impairment. Among them 5 died before surgery. Fifty-six (56) patients were operated (88.9%). Treatment consisted of bracing for the 2 patients with SCIWORA. The mean time from admission to surgery was 22.4 days (extremes: 2 - 22 days). We performed a right anterior approach alone in 52 patients (92.8%), three other patients were operated on

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via a posterior approach and a combined approach was performed in a patient presented 3 months after a motorcycle accident and in whom the scanner showed a C5C6 dislocation with joint fusion (Fig.1). We performed either a corpectomy or a discectomy with iliac boneau to graft. A 5 or 8 holes cervical plate was fixed to complete the technique (Fig.2 and Fig.3). For the posterior approach, we used steel wire. Functional rehabilitation sessions were started early in all patients with preoperative deficit. No case of postoperative worsening was noted. The mean length of hospital stay was 14.2 days with extremes of 1 and 138 days. We noted urinary tract infections complications in 17.7% of cases and bedsores in 22.4% of cases. During follow-up, 33 (56.9%) patients showed motor improvement; 22 patients (37.9%) remained stationary and 3 died from complications of lying down (5.2%). The overall mortality was 12.6% (8 patients including 5 prior to surgery).

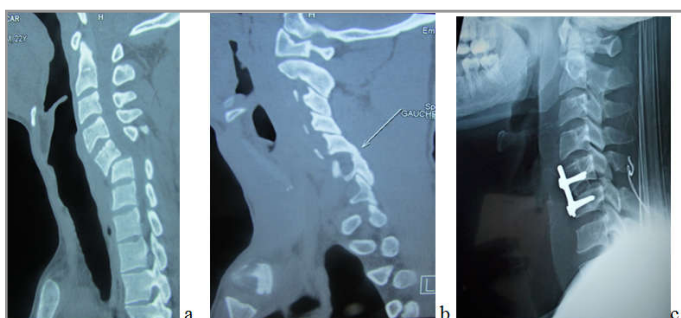


Figure 1: cervical spine CT scan, sagittal view showing neglected C5-C6 fracture dislocation (a) with joint fusion (arrow) (b), postoperative imaging control (c)

DISCUSSION

Cervical spine trauma is a public health concern because of its frequency and severity. In the United States, there are approximately 12,000 new cases per year [Hauwe *et al.*, 2020]. In our area, like many countries with limited resources, we are seeing an increase in the incidence of this condition with the development of the car fleet [WHO/NMH/NVI/18.20]. In our series, the average age is 33.7 years and the most observed cause is a road traffic accident. In the literature, the victim is most often a young adult male [Bracken *et al.*, 1981]. E.KPELAO [Kpelao *et al.*, 2013] in his series found an average age of 36 years with extremes of 13 to 79 years. Falls are the most common cause of cervical spinal cord injuries in older people, with over 70% of injuries in this age group resulting from this mechanism [Yue *et al.*, 2016], while road accidents are the one most often found in the young population. The most common associated injury is head trauma. Studies have shown that 45% of severe head trauma is associated with cervical spine injury [Iida *et al.*, 1999; Feron *et al.*, 1997; Ouhmich, 2019]. The context of polytrauma is not uncommon. This rate was 34.63% in the study by Joseph Synèse Bemora [Bemora *et al.*, 2017]. Although cervical spine fractures account for 20–30% of all spine fractures, only 10–20% of them result in spinal cord injury [Harrop *et al.*, 2004]. And these are responsible for 8.2% of trauma-related deaths [Marino *et al.*, 2003]. In our series, most of our cases were ASIA A (44.4%), and 11% of them had respiratory impairment. This reflects the degree of urgency we often face. In the study by M. Ouhmich [Ouhmich, 2019] in Morocco on 50 cases of trauma to the cervical spine in 4 years, the presence of neurological signs was observed in 29 patients (58%) with various neurological disorders: ASIA A : 26%, ASIA B: 20%, ASIA D and C: 6% each, ASIA E: 42%. The traumatic lesion is most often localized in the lower cervical spine [Engrand, 2005]. In our study, it was most often a C5-C6 fracture-dislocation as in many publications [Ouhmich, 2019;

Loembe *et al.*, 1991; Shakya *et al.*, 2014] and management consisted of surgery in 88.9% of cases. There is no consensus on the ideal time for decompression in case of cervical spine injury, but Fehling's recommends decompression within 24 hours [Fehlings *et al.*, 2012]. Indeed, recovery from spinal cord injury depends, among other things, on the initial severity of the injury or the American Spinal Injury Association (ASIA) impairment scale and also on the timing of management. This recovery can be facilitated by a good gas and hemodynamic balance and a better control of the systemic aggravating factors [Rabinstein, 2018].

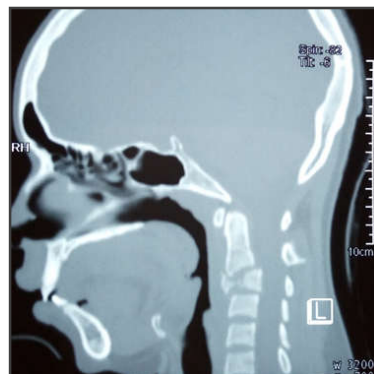


Figure 2: Tear drop fracture of C3 sagittal reconstruction CT scan

The choice of anterior, posterior or anteroposterior combined instrumentation depends on the clinic and the surgeon's experience but also on the availability of the technical facilities [Kpelao *et al.*, 2013; Shakya *et al.*, 2014]. Generally, the anterior and middle columns must be able to support a weight for the posterior instrumentation to be used alone [Omar and Mathur, 1995]. If the dislocation reduction fails, surgery with a posterior approach is performed to reduce the dislocation and ensure internal fixation. This was done in one case in our series. In patients with significantly impaired anterior column stability and those with anterior compression, such as a herniated intervertebral disc or a fragment of the vertebral body, anterior decompression and fixation are indicated.



Figure 3: C2 bipediculo-lamar fracture (Type III Effendi's classification): axial CT scan (a), sagittal reconstruction (b), postoperative imaging control (c)

The anterolateral approach with placement of an inter-somatic graft or cage associated with osteosynthesis is the most preferred by many authors [Ouhmich, 2019; Loembe *et al.*, 1991; Omar and Mathur, 1995]. Among factors that affect the prognosis we can quote the timing of hospital presentation which was on average 8.9 days for various reasons, ranging from traditional treatment to the financial problems, also the type of transport evacuating the injured patient. In our area, patients are often transported to hospital by a non-medical transport [Bemora *et al.*, 2017] as reported in our series with 60.3% of cases. It has been shown that bringing vehicles up to standard can considerably reduce the number of deaths and serious injuries

following traffic accidents. But progress in implementing the eight priority vehicle safety standards is very limited, as only 40, mostly high-income countries apply 7-8 of these standards. Eleven countries apply between 2 and 6 and 124 one or none [WHO/NMH/NVI/18.20].

CONCLUSION

Victims of cervical spine trauma in our area are exposed to a difficulty of care which requires multidisciplinary prevention ranging from compliance with road traffic rules to the establishment of logistics necessary for transport and emergency treatment. The results of this treatment are encouraging despite the limitations we face.

REFERENCES

- Claude EL, Lapeche F, Thins L, Vinchon M, Cotten A. Traumatisme du rachis cervical. *Feuillets de Radiologie* 2006, 46, n 1,5 – 37
- Ahuja CS, Schroeder GD, Vaccaro AR, Fehlings MG. Spinal cord injury – What are the Controversies. *J Orthop Trauma*. 2017 Sep; 31 Suppl 4:S7-S13.
- Hauwe L V D, Sundgren P C, Flanders A E, Hodler J, Kubik-Huch R A, Von Schulthess GK. Spinal Trauma and Spinal Cord Injury (SCI), editors. In: *Diseases of the Brain, Head and Neck, Spine 2020–2023: Diagnostic Imaging* [Internet]. Cham (CH): Springer; 2020. Chapter 19. DOI: 10.1007/978-3-030-38490-6_19
- Rapport de situation sur la sécurité routière dans le monde 2018 : Organisation mondiale de la Santé; 2018 (WHO/NMH/NVI/18.20). Licence : CC BY-NC-SA 3.0 IGO. Disponible sur : <http://apps.who.int/iris> [cited 2019 Oct 25]
- Bracken MB, Freeman Jr. DH, Hellenbrand K. Incidence of acute traumatic hospitalized spinal cord injury in the United States, 1970- 1977. *Am J Epidemiol*1981; 113:615-22
- Kpelao E, Diop A, Beketi K, Tine I, Thioub M, Thiam AB, et al. Problématique de la prise en charge des traumatismes graves du rachis cervical en pays sous-développé. *EMC Neurochirurgie* 59 (2013) 111–114.
- Yue JK, Chan AK, Winkler EA, Upadhyayula PS, Readdy WJ, Dhall SS. A review and update on the guidelines for the acute management of cervical spinal cord injury - Part II. . *J Neurosurg Sci*. 2016 Sep; 60(3):367-84.
- Iida H, Tachibana S, Kitahara T, Horiike S, Ohwada T, Fujii K. Association of head trauma with cervical spine injury, spinal cord injury or both. *J Trauma* 1999 ; 46: 450-2.
- Feron JM, Gleyzes V, Signoret F. Prévalence des associations lésionnelles dans les fractures du rachis cervical. *Rev Chir Orthop* 1997 ; Suppl. II 83 : 39.
- Ouhmich MM. La prise en charge du traumatisme du rachis cervical [thèse]. [Maroc] : Université Sidi Mohamed Ben Abdellah ; 2019. 198 p.
- Bemora JS, Rakotondraibe WF, Ramarokoto M, Ratovondrainy W, Andriamamonjy C. Aspects épidémiologiques des traumatismes du rachis : à propos de 139 cas. *The Pan African Medical Journal* 2017; 26:16
- Harrop JS, Sharan AD, Scheid EH Jr, Vaccaro AR, Przybylski GJ. Tracheostomy placement in patients with complete cervical SCI: American Spinal Injury Association Grade A. *J Neurosurg*2004;100 (1 Suppl Spine): 20–3
- Marino RJ, Barros T, Biering-Sorensen F, Burns SP, Donovan WH, Graves DE et al; ASIA Neurological Standards Committee 2002. International standards for neurological classification of spinal cord injury. *J Spinal Cord Med*. 2003 Spring;26 Suppl 1:S50-6. doi: 10.1080/10790268.2003.11754575. PMID: 16296564.
- Engrand N. Traumatisme vertébro-médullaire : prise en charge des 24 premières heures. Service d'Anesthésie- Réanimation, Centre Hospitalier de Bicêtre 2005 ; 94275: 148-170. <http://www.mapar.org/article> 10 avril 2012 20:00
- Loembe PM, Bouger D, Dukuly L, Ndong-launay M. Traumatismes vertébro-médullaires : Attitudes thérapeutiques au Gabon. *Acta Orthop. Belg*1991; 57: 31-43
- Shakya B, Bista P, Shrestha D. Instrumentation in cervical spine injury: neurological outcome measure mentusing ASIA impairment scale. *Nepal Med Coll J* 2014; 16(2-4): 156-160
- Fehlings MG, Vaccaro A, Wilson JR, Singh A, Cadotte DW, Harrop JS, et al. Early versus delayed decompression for traumatic cervical spinal cord injury: results of the Surgical Timing in Acute Spinal Cord Injury Study (STASCIS). *PLoS One* 2012; 7(2):e32037, <http://dx.doi.org/10.1371/journal.pone.0032037>.
- Rabinstein AA. Traumatic Spinal Cord injury. *Spinal Cord Disorders* p. 551-566 April 2018, Vol.24, No.2
- Omar M, Mathur N. Modified technique of Tension Band wiring in flexion injuries of the middle and lower cervical spine. *Spine* 1995; Vol 20(11):1241-1244
