WEST AFRICAN JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Outcome of Spinal Cord Injuries Managed in a Centre without Modern Imaging Facilities

Résultat des traumatismes de la moelle épinière gérés dans un Centre, sans installations modernes d'imagerie

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ABSTRACT

BACKGROUND: **The paucity of published reports from West Africa on the outcome of spinal cord injuries (SCI) reflects the limitations of the developing health care delivery system in this part of the world.**

OBJECTIVE: **To review the outcome of the spinal cord injuries managed in our centre and relate same to those of published reports.**

METHODS: **We conducted a prospective study by utilizing a structured proforma on all SCI cases admitted to and managed in our service from April 21, 2006 to April 20, 2008. The collated data were then analyzed and compared to the literature.**

RESULTS: **Spinal injury (neural and non-neural) was diagnosed in 62 (7.5%) of 826 total consultations in the two-year period under study. Thirty-five (56.5%) of them were ≤40years with fewer cases at the extremes of age, and most 47 (76%) were males. Forty-nine (79%) had neural injuries of which the majority (94%) involved the spinal cord. Treatment was non-operative in all cases, and all those with complete cord injury remained without neurological recovery, whereas 91% of cases of incomplete injuries made varying degrees of recovery. Mortality from the cord injuries was 13 (28.3%), and all were in the cervical region. Twenty (32.3%) were followed up in the out-patient clinic for a mean period of 13.7weeks (range 1.4 – 63.4weeks) following discharge.**

CONCLUSION: **Our findings support the reports that cases of incomplete cord injury make neurological recovery, while those of complete injury do not. Our mortality rate of 28.3% compares closely with the mortality rates from other local series. WAJM 2009; 28(6): 376–379.**

Keywords: **Spinal cord, injury, outcome, Frankel scale.**

RÉSUMÉ

CONTEXTE: *La rareté des rapports publiés à partir de l'Afrique occidentale sur le résultat de lésions de la moelle épinière (SCI) témoigne des limites du système de soins de développement de soins de santé dans cette partie du monde.*

OBJECTIF: *Passer en revue les résultats des lésions de la moelle épinière gérés dans le centre et portent même à celles des rapports publiés.*

Méthodes Nous avons mené une étude prospective en utilisant un proforma structuré sur tous les cas admis à la SCI et la gestion de notre service, à partir de 21 avril 2006 au 20 avril 2008. Les données recueillies ont ensuite été analysés et comparés à la littérature.

RÉSULTATS: *Les traumatismes spinaux (neurones et non-neural) a été diagnostiquée chez 62 (7,5%) de 826 consultations total dans la période de deux ans à l'étude. Trente-cinq (56,5%) d'entre eux étaient âgés de <40 années avec moins de cas aux extrêmes de l'âge, et la plupart des 47 (76%) étaient des hommes. Quarante-neuf (79%) avaient des lésions neuronales dont la majorité (94%) concernaient la moelle épinière. Le traitement a été non-opératoires dans tous les cas, et tous ceux qui ont des lésions de la moelle entière demeura sans récupération neurologique, alors que 91% des cas de lésions incomplètes fait des degrés divers de récupération. La mortalité due à la lésion de la moelle était de 13 (28,3%), et tous étaient dans la région cervicale. Vingt (32,3%) ont été suivis dans la clinique externe pour une période moyenne de 13,7 semaines (intervalle 1,4 - 63,4 semaines) suite à la décharge.*

CONCLUSION: *Nos résultats corroborent les rapports que les cas de lésion de la moelle incomplète rend la récupération neurologique, alors que ceux des blessures ne sont pas complètes. Notre taux de mortalité de 28,3% se compare en étroite collaboration avec les taux de mortalité de la série L'organisme. WAJM 2009; 28(6): 376–379.*

Mots-clés: *moelle épinière, les blessures, les résultats, Frankel échelle*

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Abbreviations: MRI, Magnetic resonance imaging; **SCI,** Spinal cord injury; **SCIWORET,** Spinal cord injury without radiological evidence of trauma.

INTRODUCTION

In the management of spinal cord injuries [SCI], modern investigative modalities like magnetic resonance imaging (MRI), facilitate precise evaluation of the extent of cord involvement, and could predict neurological outcome.[1–3] The major handicap is with cases of impaled and implanted ferro-magnetic materials where MRI is absolutely contraindicated, and computerized tomography (CT) may then be the preferred alternative, though the latter modality is, however, better at delineating osseous involvement than soft tissue lesions. Unfortunately, all these imaging modalities are expensive and not readily available in Nigeria.

Treatment of cord injuries could be operative or non-operative, depending on the nature of the injury, choice by the patient, experience of the surgeon, and available facilities.[3] There has not been any advantage of operative over non-operative treatment in long term neurological outcome, even though operative modalities and spinal stabilization ensure earlier mobilization out of bed.[4–6] Outcome is determined mostly by the pathological severity of the primary neural injury (i.e. whether complete or incomplete), appropriateness of the employed treatment modality, promptness in treating resultant secondary assaults, and prevention of re-injury to the cord during the post-traumatic period or in the course of treatment.[7–9,6]

There is no universal agreement on neurological recovery from complete cord injury even though few reports have suggested some grades of recovery. On the contrary, there have been widely correlated reports of recovery, to various grades, from incomplete cord injuries.[7,8]

We undertook a prospective study of the outcome of the spinal cord injuries managed in our centre in the first two years of neurosurgical service and to compare our results with other published reports.

SUBJECTS, MATERIALS, AND METHODS

A structured proforma was used to collect data from every patient diagnosed with spinal cord injury, complete or incomplete, from the point of entry into our service till discharge and follow-up in the outpatient clinic.

We diagnosed complete injury in those who had no preservation of function three segments below the site of injury, and incomplete injuries in those with some preservation of function three segments or more, below the site of injury, after the restoration of autonomic (anal/bulbocavernosus) reflexes.

We used the Frankel scale to grade outcome from treatment (A – complete loss of functions; B – sensory preservation without motor function; C – useless motor preservation; D – useful motor preservation; E – normal or near-normal function).

Our centre is a tertiary health facility that receives trauma patients directly, and also on referral from other health facilities within and around our health zone – one of Nigeria's six such zones. It was established in 1988, offering services and training in different medical and paramedical specialties, but it was not until 2006 that we established neurosurgical services.

RESULTS

Spinal injury was diagnosed in 62 cases, representing 7.5% of the 826 treated within the two-year period. The aetiological factors were road traffic accident 37(59.7%), fall 19 (30.6%), domestic/occupational accident four (6.45%), missile one (1.61%) and sport one (1.61%).

The distribution of the patients according to age is shown in Fig.2. Most [35 (56.5%)] of them were ≤40years with only a few at the extremes of age 0-10years two (3.2%) and >70years one (1.61%). Males were in the majority 47 (75.8%), giving a male:female ratio of 3.1:1.

Evaluation of the injuries was with plain radiography 55(88.7%) and computerized tomography three (4.84%); whereas four (6.45%) did not do requested investigations. We did not use intrathecal contrast for work up because we did not have the experience of using this modality in traumatic unstable injuries. There were neurological deficits in 49 (79%); 46 (74.2%) involving the spinal cord and three (4.84%) the spinal roots (radiculopathies). Thirteen (21%) of the 62 had bony / soft tissue injuries without deficits, two (3.23%) had neurological deficits without radiological evidence of trauma i.e. Spinal Cord Injury without Radiological Evidence of Trauma (SCIWORET).

Of the 46 cases involving the spinal cord, 34 (73.9%) were cervical, 10 (21.7%) thoracic and two (4.35%) lumbosacral. Twenty-two (47.8%) of them were incomplete, there were no lumbosacral incomplete injuries, see Tables 1 and 2.

Treatment was non-operative in all cases, with Gardner-Wells' Tongs traction, and reduction done under x-ray guidance at the Radiology Department with progressive weight loading up to a maximum of 50Kg, until alignment is achieved. Rigid neck collar was employed

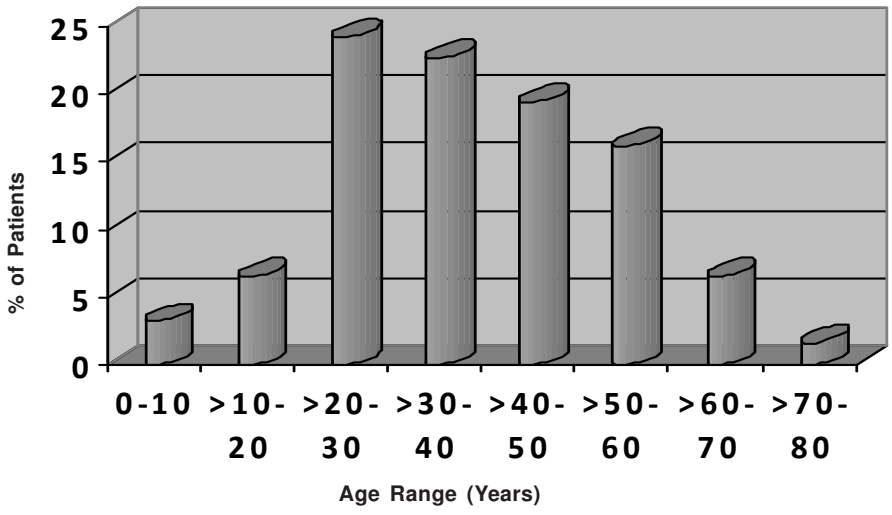

Figure: Distribution of Patients with Spinal Cord Injuries according to Age

Table 1: Distribution of Cord Injuries by Type and Region

Anatomical Region	Number (%)		
	Complete	Incomplete	Total
Cervical	18 (39.1)	16(34.8)	34(73.9)
Thoracic	6(13)	4(8.7)	10(21.7)
Lumbosacral	0(0.0)	2(4.35)	2(4.35)
Total	**24(52.1)**	**22(47.9)**	**46(100)**

Table 2: Distribution of Injuries by Cord Level and Type

Cord Level	Complete Injury	Incomplete Injury
C3	3	0
C4	11	12
C5	3	3
C6	1	0
C8	0	1
T4	1	1
T7	2	1
T8	1	0
T10	2	1
T12	0	1
L1	0	1
S2	0	1
Total	**24**	**22**

for those with no bony instability. Immobilization period was a minimum of 42 days for cervical injuries 32 (51.6%), and postural reduction for thoracic and lumbosacral injuries for a minimum of 84 days; we ensured mandatory anti-coagulation for the duration of treatment, after which stress studies were done to confirm the stability of the healing spines.

At discharge, all 24 cases of complete cord injury remained without any neurological recovery, whereas 20 of 22 incomplete cord injuries had varying degrees of recovery viz. From Frankel B to C – four cases, and B to D – one case; Frankel C to D – five cases, and C to E – two cases; and finally, from Frankel D to E – eight cases.

The complications were mostly pressure ulcers 10 (21.7%) and urinary tract infection eight (17.4%); then, pin tract infection three (6.52%), haematuria two (4.35%), hypostatic pneumonia two (4.35%), psychiatric disturbance one (2.17%), neurogenic shock one (2.17%), and tong displacement one (2.17%). There was no incident of symptomatic deep venous thrombosis. Average length of hospital stay for all the patients was 37.3 days, for patients with complete injury 51.8days and those with incomplete injury 29.1 days. Mortality was 13 (28.3%), and all had cervical cord injuries, eight (17.4%) of them high cervical injuries. Of the 13 mortalities, six were from sepsis (urinary tract infection one, pressure ulcer infections five), while respiratory failure accounted for the remaining seven deaths. Our follow-up rate was low, 20 (32.3%), for a mean period of 13.7 weeks (range 1.4–63.4 weeks) in the outpatient clinic.

DISCUSSION

Evaluation of spinal cord injuries is best done, like in other soft tissue injuries, with magnetic resonance imaging (MRI) which is known to give precise details on the extent of neural injury, as well as predict reliably, the possible neurological outcome.[10,3] Our centre does not have MRI facilities, thus most of our cases were investigated with plain radiography while the three cases that had CT scanning did so in another centre where the facility was available. The indication in all three cases was the inability to arrive at a diagnosis of the bony lesions based on radiography. With the inadequacy of plain radiography, there was no doubt that we would have missed out some important soft tissue lesions, a situation which could have impacted significantly on the outcome, not least the mortality rate of 28.3%, from our centre.

All our cases were treated non-operatively, using Gardner-Wells' tongs traction or rigid neck collar for cervical injuries, and postural reduction for thoracic and lumbosacral injuries, simply because beyond the bony lesions detected by radiography, we did not employ any other modality and we had no experience with intrathecal injection of contrast in the evaluation of spinal trauma. Otherwise, operative treatment of bony lesions has not been demonstrated, in the long term, to have advantage over the non-operative approach in terms of final neurological outcome, even though it allows for an earlier mobilization of the patient.[4,5] But in terms of overall quality of care, early mobilization after surgical treatment reduces the incidence of complications like pressure ulcers, hypostatic pneumonia and deep venous thrombosis. Perhaps, if our cases were optimally evaluated by imaging techniques, some of them might have benefited from operative intervention, and this would have impacted positively on the overall outcome.

Incomplete cord injuries were 47.8%, constituting nearly half of all our cord injuries, in keeping with reports by Stover and Fine, and Young, *et al* [11-13]. But the few reports on incomplete injuries from our sub-region appear to have lower figures; Igun, *et al* was 21% (10% had no neurological deficits and 69% complete cord lesions), whereas Obalum, *et al* reported 9% partial cord injuries, even though the latter used the ASIA Scale in their retrospective study.[14,15] Also, the recovery of neurological function in almost all cases of incomplete cord injury (20 of 22) corroborated the findings of other workers, who have reported that incomplete cord injuries would usually regain functions if well managed, unlike complete injuries.[7–9,6] None of our cases of complete injury made neurological recovery, and this was not particularly unexpected, going by the reports of these other workers.

Our mortality rate of 28.3% was much higher than the hospital rates of 17% reported by Burney, *et al*, from Michigan, USA and 17.5% by Obalum, *et al*, from Lagos, Nigeria, but compares closely with the mortality rates from other series in the sub-region, 25.6% by Solagberu, 26% by Igun *et al*, and 34.4% by Nwadinigwe *et al*.[14–18] It is worth noting that majority of our cases were cervical (73.9%) as in literature, and all the cases of mortality in this study were

from cervical cord injuries known to be associated with a high case fatality.[1]

The average duration of hospital stay was 37.3 days, and of the 13 patients that died, six (urinary tract infection one, pressure ulcer infections five) died from sepsis while respiratory failure accounted for the remaining seven deaths. Twenty (32.3%) were followed up in the outpatient clinic, for a mean period of 13.7weeks (range 1.4 – 63.4weeks).

Conclusion

Our findings support the opinion of most other workers that cases of incomplete cord injuries make neurological recovery, while complete injury would usually not recover. Our mortality rate of 28.3% compares closely with the mortality rates from other series in the sub-region. Our follow-up rate was low, 21.7%, for a mean period of 13.7 weeks.

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