International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

Socio-Demographic Profile and Management of Spinal Trauma in Benin City, Nigeria

David Okon Udoh & Emmanuel Chukwuemeka Obeta
Consultant Neurological Surgeon
University of Benin Teaching Hospital,
P.M.B.1111, Benin City, Edo State, Nigeria
Email: davidudoho7@gmail.com

ABSTRACT

Background: Spinal cord injury, especially cervical, is one the most devastating conditions in clinical medicine, the affected individual (usually with a keen an alert mind unlike in brain trauma) having to depend on others for most of his needs. Also, the family and society may have to bear that burden for very long. To determine the epidemiological profile and outcomes of treatment of spinal cord injuries in Benin City, Nigeria. Retrospectively analysed prospective data of 186 patients managed for traumatic myelopathy at our tertiary hospital, a major trauma referral centre in the Southern region of Nigeria, from June 2006 to May 2010. Data on demography, clinical and radiological characteristics as well as treatment outcomes were obtained from the computerised log of patient records. Data was analysed using SPPSS 21.0. A total of 186 patients, 149 (80%) males and 37 (20%) females, suffered traumatic spine injuries. One hundred and forty-two (142) patients, i.e. 76.3%, were aged 21 to 50 years. Young patients (21 - 40 years i.e. 104 patients, 55.9%), especially 21 to 30 years who accounted for 31.7% were the population mostly at risk and injuries were uncommon at the extremes of life. Eighty-three percent were civil servants, artisans, business persons and students while 82% were low income and middle income earners. Motor vehicle accidents caused 74% of injuries; the upper cervical spinal cord was affected in 51% of patients followed by lower thoracic, upper thoracic, lower cervical and lumbar regions in that order. In our study, 90% of patients were managed conservatively. Spinal trauma affects mostly the young, the active working class, low and middle income earners and is due almost exclusively to preventable causes. The latter should be the focus of government-propelled targeted remedies aimed at curbing this scourge.

Keywords: Spinal Cord Injury; Family and Society; Burden; Motor Vehicle Accidents; Scourge.

INTRODUCTION

Spinal cord injury (SCI) is an insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory or autonomic functions[1]. It is one of the most devastating conditions that can be encountered by patients and their careers, resulting in profound and long term disability[2, 3]. In Nigeria, SCI has been documented in the northern, south-western and south-eastern geopolitical zones[4, 5, 6, 7, 8]. SCI has, however, not been documented in the south-south geopolitical zone. In this study, we chronicled the pattern of SCI in Benin City, Nigeria comparing our findings with those from other parts of the country.

MATERIALS AND METHODS

The University of Benin Teaching Hospital (UBTH) was established in 1973. Located at the intersection of the nation's major geopolitical zones (and at the confluence of several interstate highways linking them), it was established as a level I trauma centre. The Neurological Surgery service, established in 2006, receives referrals from all the states in the south-south geopolitical zone as well as from adjacent middle belt, south-western and south-eastern states of Nigeria. One hundred and eighty-six (186) spine-injured patients were seen at our tertiary hospital facility from June 2006 to May 2010. They presented to

International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

the accidents and emergency unit from the scene of the injury or on referral from private clinics, general or mission hospitals or other tertiary centres where they spent a variable length of time (during which they may or may not have received initial care). Each patient had initial resuscitation by the trauma unit. A detailed neurosurgical evaluation followed to determine the level of consciousness, mental state, cranial nerves, motor and sensory neurological status, sphincteric functions. Social, demographic clinical and radiological data was gathered prospectively in a computerised log; outcomes were also documented. Data was retrospectively analysed using SPPSS 21.0. Each patient (in the presence of one or two first degree relative or spouse) was adequately educated given informed choice between conservative and surgical management. Almost all SCI were managed conservatively using the active physiological conservative management described and popularised by Wagih El Masri[9]. This began with active early vertebral column stabilisation in which all trauma victims, especially those complaining of neck or back pain, were quickly and properly immobilised while been resuscitated or after intensive care unit admission. They were immobilised in standard beds which could be tilted head up or head down.

Techniques of immobilisation included rigid cervical collar for stable cervical spine injuries, skull traction (which may require reduction under radiographic guidance) or operative spinal fusion for unstable cervical injuries. Skull tractions were done utilising either Gardner-Well's or Crutchfield tongs without any preference. Thoracic and lumbar injuries only had postural reduction i.e. supine nursing for reduction of the vertebral injury. Indications for operations included penetrating spine injury (gunshot, stabs etc), persistent facet lock, failed or failed conservative management. All were nursed supine and moved gently (using a log-rolling technique to avoid flexion or extension of the spine) only 2-hourly for skin care to prevent skin maceration and pressure ulceration or to change beddings. We nursed patient on improvised foam troughs (standard six-inch mattresses in which air openings were cut at the occiput and the sacral regions to prevent pressure ulceration at these bony prominences. The scapulae, elbows, and calcaneal regions were rested on improvised air (or water)-filled latex gloves. Bladder care was by 4-hourly clean, intermittent catheterization the maintain the bladder tone, prevent recurrent urinary tract infections and achieve "social" continence for Anti-embolic prophylaxis of choice (for affordability) was subcutaneous heparin (2,500 to 5,000 i.u. twelve-hourly) and warfarin (2.5 to 5.0 mg nocte); heparin was stopped after 72 hours while warfarin was continued throughout the period of immobilization. Occasionally enoxaparin was used. Holistic rounds were carried out in which included the patients, their relatives, nurses, neurosurgeons, physiotherapist, occupational therapist, social worker and, sometimes, a priest or counsellor. During this, all were educated on the nature of the pathology, treatment methods, complications and their prevention, and the prognosis in terms of ambulation, adjustments after the acute care and discharge. Questions were allowed and clarifications were made. Family Participation This was an integral part of our spinal cord injury protocol as patients' relatives were allowed to observe and were actively taught and allowed to carry out 2-hourly turning, 4-hourly clean, intermittent catheterization and bed baths in preparation for discharge and life at home. Patients who had useful upper extremity function were taught self-catheterization.

International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

Exclusion Criteria:
Fifteen (15) patients with significant abdomino-pelvic or thoracic trauma who required surgical interventions were excluded

RESULTS
There was a total of 186 patients with traumatic spine injuries. One hundred and forty nine (149) of them were male (80.1%) while only thirty seven (19.9%) were female; male to female ratio was 4: 1.

Age Distribution of Spinal Cord Injuries
Spinal cord injuries affected mostly young patients (21 - 40 years i.e. 104 patients, 55.9%), especially 21 to 30 years who accounted for 31.7%. One hundred and forty-two (142) patients, i.e. 76.3%, were aged 21 to 50 years. Others were those aged below 10 years (2.2%), 11 - 20 years (5.4%), 51 - 60 years (7.5%) and above 60 years (8.6%).(Table 1)

Occupational Status
Spinal cord injuries affected pre-school children (2.2%), the unemployed (4.8%), drivers (7%), students (15.6%), business people/traders (16.1%), artisans (20.4%) and civil servants (30.6%) and artisans constituting the majority of the patients 137 (73.6%). (Table 2).

Socio - Economic Status
Ninety-three patients (50%) were low income earners, 60 (32.3%) middle income earners and 25 (13.4%) were dependants. There were 5 (2.7%) high income earners and 3 (1.6%) were unemployed. (Table 3).

Aetiologies of Spinal Cord Injuries
Motor vehicle accidents caused 138 (74.2%) injuries, falls from a height 19 (10.2%) and penetrating injuries i. e. gunshots, knife stabs, etc were 13 (7%). The others were domestic accidents, objects falling on the head, sports injury, industrial accidents and miscellaneous accounting for the remaining 8.6%. (Table 4).

Neurological Level
The spinal neurological level affected by upper cervical spinal cord was affected in 94 patients (50.5%), lower thoracic in 31 patients (16.7%), upper thoracic in 14 (7.5%), lower cervical in 11 (5.9%) and lumbar in 6 (3.2%). Thirty (30) patients i.e. 16.1% had no neurological impairments. (Table 5).

Conservative Care versus Operations
Of 105 patients with cervical spine injuries, 92 (87.6%) had conservative care, 74 (70.5%) with skull traction and 18 (17.1%) with rigid cervical collar alone; 13 (12.4%) had surgery or cervical facetectomy with spinal fusion (interspinous wiring). Of 45 patients with dorsal spine injuries, 40 (88.9%) had conservative care with postural reduction and 5 gunshot-injured patients (11.1%) thoracic canal exploration with retrieval of metallic foreign bodies. All 6 patients with lumbar spine injuries were managed conservatively.

International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

Table 1: Age Distribution of Patients with Spinal Cord Injuries

Age group (years)	Number	%
≤ 10	4	2.2
11 – 20	10	5.4
21 – 30	59	31.7
31 – 40	45	24.2
41 – 50	38	20.4
51 – 60	14	7.5
> 60	16	8.6
Total	**186**	**100**

Table 2: Employment Status of Patients with Spine Cord Injuries

Occupation	Number	%
Driving	13	7
Business/Trading	30	16.1
Civil Servant	57	30.6
Artisan	38	20.4
Students	29	15.6
Unemployed	9	4.8
Pre-school	4	2.2
Unknown	6	3.2
Total	**186**	**100**

Table 3. Socio - Economic Status/Income Levels among Patients who Suffered Spinal Cord Injuries

Income Level	Number	%
Low income Level	93	50
Middle Income Level	60	32.3
High Income Level	5	2.7
Unemployed	3	1.6
Dependant	25	13.4
Total	**186**	**100**

Table 4. Causes of Spinal Cord Injuries

Aetiology	Number	%
Motor vehicle crash	138	74.2
Fall from a height	19	10.2
Falling object	4	2.2
Penetrating injury	13	7
Sports injury	1	0.5
Civil/Domestic accident	6	3.2
Industrial accident	1	0.5
Miscellaneous	4	2.2
Total	**186**	**100**

International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

Table 5. Spinal Region Involved

Region	Number	%
Upper cervical	94	50.5
Lower cervical	11	5.9
Upper thoracic	14	7.5
Lower thoracic	31	16.7
Lumbar	6	3.2
None	30	16.1
Total	**186**	**100**

DISCUSSION

Spinal trauma portends potential injury to both vertebrae and neural structures enclosed by them as well as, though often taken for granted, all other major organ systems whose visceral, endocrine and metabolic functions are made possible by the brain through the spinal cord. As such, spinal cord injury, especially cervical, is a multisystem physiological impairment rather than just a damage to the spine. Indeed, it is this multiple organ susceptibility in spinal cord injury which poses the greatest risk of death during the acute period and, less often, after the first few weeks of injury[9, 10]. The epidemiology of SCI varies significantly between developed and underdeveloped countries this resulting from socioeconomic, geographic and medical conditions as infrastructural development; interventions, therefore must be population specific[10]. In our study, SCI was prominently a disease of males, the young and the active working population presaging an unfavourable effect on the socioeconomic machinery. Worldwide, male to female ratio ranges in from 1.0 to 7.59 per million population taking into account both industrialised and underdeveloped nations[11-14]. Mean age, accordingly, ranges from 14.6 to 67.6 in industrialised nations and 29.5 to 46.0 in developed nations[15-17]. There causes of SCI, motor vehicle accidents motor vehicle accidents (MVAs), falls, sports-related accidents, violence, domestic accidents industrial injuries, inter alia. Certain differences exist between regions or countries; MVAs and falls are the most common causes of injury accounting in nearly equal proportions in developed countries, but, in recent literature, falls appear to be commoner[10,18-22]. In spite of the changing epidemiology of SCI, motor vehicle accidents (MVA) and falls remain the most common causes of injury in Nigeria[1-8, 10]. MVAs caused most SCIs in our study.

Geographically, the incidence of SCI varies according to regions or country, though it has increased slowly, but progressively (now ranging from 13.0 to 220.0 per million population) with the profusion of human endeavour, motorisation and urbanisation[11,23-25]. The cervical spinal cord was the most common region affected; thus there were significantly more SCI patients with traumatic quadriplegia than paraplegia in our study as reflected in almost all of literature[11,22-24,26-28]. About a century ago, treatment of spinal cord injuries were entirely non-operative involving forceful hyperextension of the spine in the prone or supine position with various devices and methods; others used prolonged recumbency in the supine position for sometimes up to 6 months or longer to allow the fractured spine to consolidate. These methods were all renounced being contrary to the principles of rehabilitation of spinal cord injured patients; furthermore, they were associated with poor attention and poor management of the associated multisystem physiological impairment and malfunction[29-32].

International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

However, the ideal management of SCI remains controversial arguments swinging between the superiority of surgical intervention over conservative approach and vice versa. Guttmann proved that most attendant complications following SCI were indeed preventable, contrary to previous belief, and attributed them to poor management rather than the neurological impairment or the patient or bed rest. Such evidence lent credence to the active physiological conservative management of SCI[33-37]. This involved bed rest, prevention of significant postural hypotension or significant reduction of vital capacity during the stage of spinal shock, minimising the risk of pressure sores during the vulnerable period of poor skin perfusion due to spinal shock, intermittent catheterisation, bowel care and nursing care during the first few weeks of paralysis. It also allows for some recovery of the sympathetic nervous system reflexes required for patient cooperation with the demands of physical rehabilitation[9]. Thus, with attention to all medical and non-medical effects SCI, a significant number of patients recover neurological functions to ambulate as well as remain pain free with conservative approach to treatment. In our study, ninety percent of patients were benefitted from conservative management[9,10]. To date there is no evidence to suggest that the early surgical decompression or stabilisation of the spinal cord injured patient is advantageous compared to early active conservative treatment of the injured spine; thus, patients should be encouraged to manage an informed choice[9,10]. Although some treatment methods such as cell therapy have played a beneficial clinical effect, there is no effective measure to cure[38,39]. The treatment cost for SCI, prolonged recovery and the loss of workforce and labour hours imposes a heavy burden on the individual, family and society. In this study, majority of persons affected belong to the active working class occupying indispensable responsibility to society and as such remedies targeted at curbing this scourge should address these specific concerns.

REFERENCES

1. DeVivo MJ. Epidemiology of traumatic spinal cord injury. In Kivshblums et al (Eds). Spinal Cord Medicine, Vol 1 Lippincort Williams and Wilkins: Baltimore, 2002 pp 69-81.
2. British Trauma Society. Guidline for initial management and assessment of spinal cord injury. 2003; 34: 405-425
3. Price C, Makintubee S, Hemdon W, Istre GR. Epidemiology of traumatic spinal cord injury and acute hospitalization and rehabilitation charges for spinal cord injuries in Oklahoma, 1988-1990. Am J Epidemiol 1994; 139: 37- 47
4. Kawu AA. Pattern and presentation of spine trauma in Gwagwalada-Abuja, Nigeria. Niger J Clin Pract 2012; 15: 38-41.
5. Olasode BJ, Komolafe IE, Komolafe M, Olasode OA. Traumatic spinal cord injuries in Ile-Ife, Nigeria, and its environment. Trop Doct 2006; 36: 181-2
6. Obalum DC Giwa SO, Adekoya-Cole TO, Enweluzo GO. Profile of spinal injuries in Lagos, Nigeria. Spinal Cord 2009; 47: 134-7.
7. Nwankwo OE and Uche EO. Epidemiological and treatment profiles of spinal cord injury in southeast Nigeria. Spinal Cord 2013; 51: 448-452
8. Solagberu BA. Spinal cord injuries in Ilorin, Nigeria. West Afr J Med 2002; 21: 230-2

9. Kumar N, Osman A, Chowdhury JR. Traumatic spinal cord injuries. J Clin Orthop Trauma. 2017 Apr-Jun; 8(2): 116–124.
10. Kang Y, Ding H, Zhou H, Wei Z, Liu L, Pan D, Feng S. Epidemiology of worldwide spinal cord injury: a literature review. Journal of Neurorestoratol 2018; 6: 1–9.
11. O'Connor RJ, Murray PC. Review of spinal cord injuries in Ireland. Spinal Cord. 2006; 44(7): 445–448.
12. Rahimi-Movaghar V, Saadat S, Rasouli MR, et al. Prevalence of spinal cord injury in Tehran, Iran. J Spinal Cord Med. 2009; 32(4): 428–431.
13. Oteir AO, Smith K, Stoelwinder JU, Cox S, Middleton JW, Jennings PA. The epidemiology of pre-hospital potential spinal cord injuries in Victoria, Australia: a six year retrospective cohort study. Inj Epidemiol. 2016; 3(1): 25.
14. Vitale MG, Goss JM, Matsumoto H, Roye DP, Jr. Epidemiology of pediatric spinal cord injury in the United States: years 1997 and 2000. J Pediatr Orthop. 2006; 26(6): 745–749.
15. Katoh S, Enishi T, Sato N, Sairyo K. High incidence of acute traumatic spinal cord injury in a rural population in Japan in 2011 and 2012: an epidemiological study. Spinal Cord. 2014; 52(4): 264–267.
16. Alshahri SS, Cripps RA, Lee BB, Al-Jadid MS. Traumatic spinal cord injury in Saudi Arabia: an epidemiological estimate from Riyadh. Spinal Cord. 2012; 50(12): 882–884.
17. Javadi M, Hafezi-Nejad N, Vaccaro AR, Rahimi-Movaghar V. Medical complications and patient outcomes in Iranian veterans with spinal cord injury. Adv Clin Exp Med. 2014; 23(2): 269–275.
18. van den Berg ME, Castellote JM, Mahillo-Fernandez I, de Pedro-Cuesta J. Incidence of spinal cord injury worldwide: a systematic review. Neuroepidemiology. 2010; 34(3): 184–192
19. Li J, Liu G, Zheng Y, et al. The epidemiological survey of acute traumatic spinal cord injury (ATSCI) of 2002 in Beijing municipality. Spinal Cord. 2011; 49(7): 777–782.
20. Ning GZ, Wu Q, Li YL, Feng SQ. Epidemiology of traumatic spinal cord injury in Asia: a systematic review. J Spinal Cord Med. 2012; 35(4): 229–239.
21. Nijendijk JH, Post MW, van Asbeck FW. Epidemiology of traumatic spinal cord injuries in The Netherlands in 2010. Spinal Cord. 2014; 52(4):258–263..
22. Montoto-Marqués A, Ferreiro-Velasco ME, Salvador-de la Barrera S, Balboa-Barreiro V, Rodriguez-Sotillo A, Meijide-Failde R. Epidemiology of traumatic spinal cord injury in Galicia, Spain: trends over a 20-year period. Spinal Cord. 2017; 55(6):588–594.
23. Löfvenmark I, Norrbrink C, Nilsson-Wikmar L, Hultling C, Chakandinakira S, Hasselberg M. Traumatic spinal cord injury in Botswana: characteristics, aetiology and mortality. Spinal Cord. 2015; 53(2): 150–154.
24. Pickett GE, Campos-Benitez M, Keller JL, Duggal N. Epidemiology of traumatic spinal cord injury in Canada. Spine (Phila Pa 1976). 2006; 31(7): 799–805.
25. Sabre L, Remmer S, Adams A, et al. Impact of fatal cases on the epidemiology of traumatic spinal cord injury in Estonia. Eur J Neurol. 2015; 22(5): 768–772. 26. Schmidt RD, Markovchick V. Nontraumatic spinal cord compression. J Emerg

Med. 1992; 10 (2): 189–199. 26. Schmidt RD, Markovchick V. Nontraumatic spinal cord compression. J Emerg Med. 1992; 10 (2): 189–199.
27. Thompson C, Mutch J, Parent S, Mac-Thiong JM. The changing demographics of traumatic spinal cord injury: an 11-year study of 831 patients. J Spinal Cord Med. 2015; 38(2): 214–223.
28. Sothmann J, Stander J, Kruger N, Dunn R. Epidemiology of acute spinal cord injuries in the Groote Schuur Hospital Acute Spinal Cord Injury (GSH ASCI) Unit, Cape Town, South Africa, over the past 11 years. S Afr Med J. 2015; 105(10): 835–839.
29. Watson-Jones R. Fourth ed.; 1955. Fractures and Joint Injuries.
30. Holdsworth F.W., Hardy A.G. J Bone Joint Surg. 1953; 35B: 540.
31. Guttmann L. Med Times, N Y. 1945; 73: 318.
32. Guttmann L. Nurs Times. 1946; 42: 798.
33. El Masri W. Management of traumatic spinal cord injuries: current standard of care revisited. ACNR. 2010; 10 (March/April):37–40.
34. Katoh S, El Masri(y) W.S. Neurological recovery after conservative treatment of cervical cord injuries. J Bone Joint Surg Br. 1994; 76B: 225–228.
35. El Masry WS. Editorial – physiological instability of the injured spinal cord. Paraplegia. 1993; 31: 273–275.
36. Folman Y, El Masri WS Spinal cord injury: prognostic indicators. Injury. 1989; 20: 92–93.
37. Katoh S, El Masry WS, Jaffray D. Neurologic outcome in conservatively treated patients with incomplete closed traumatic cervical spinal cord injuries. Spine. 1996; 21: 2346–2351.
38. Inman C. Effectiveness of spinal cord injury rehabilitation. Clin Rehabil. 1999; 13(Suppl 1): 25–31.
39. Huang H, Mao G, Chen L, Liu A. Progress and challenges with clinical cell therapy in neurorestoratology. J Neurorestoratol. 2015; 3: 91–95.