OVERVIEW OFTHE FIRST 2 YEARS OF NEUROSURGICAL PRACTICE AT THE KIFFA HOSPITAL CENTER (MAURITANIA)

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RÉSUMÉ : ***Introduction:*** Les conditions de la pratique neurochirurgicale sont loin d'être réunies dans la plupart des pays africains, par les difficultés d'accès des populations aux soins, le manque de neurochirurgiens, le caractère insuffisant du plateau technique. Le but de cette étude est d'évaluer les résultats de l'activité neurochirurgicale au Centre Hospitalier de Kiffa (CHK) en Mauritanie. ***Patients et méthodes :*** Il s'agit d'une etude rétrospective descriptive et analytique des dossiers des patients hospitalisés pour affections neurochirurgicales au CHK entre 1er Mars 2017 et le 31 Mars 2019. ***Résultats :*** La série comportait 176 patients (54 enfants et 122 adultes) hospitalisés pour affections neurochirurgicales dont 49 de sexe féminin et 127 de sexe masculine soit un sex-ratio de 2,5. L'âge moyen des patients était de 36 ans. Les traumatismes (crâniens et vertébro-médullaires), l'hématome subdural chronique et les affections dégénératives du rachis (herniediscale) étaient les plus fréquents en milieu hospitalier avec respectivement 57,6 % ; 10,8 % ; 9,1 %. 81 patients ontétéopérés. L'âge moyen des patients opérés était de 46,4 ans (extrêmes de 5 jours à 85 ans). Le sex ratio des opérés était de 2,6 (59 hommes et 22 femmes). La mortalité de la série était de 4 %. La durée moyenne globale du séjour hospitalier était de 7,9 jours. ***Conclusion :*** Ce bilan des 2 premières années d'activités de neurochirurgie a mis le point sur les caractéristiques de l'activité cette discipline. Les resultats sont encourageants malgré les conditions de pratique difficiles.

Mots clés *: Bilan de résultats;Neurochirurgie; Afrique subsaharienne; Mauritanie.*

ABSTRACT : ***Introduction*** **:** The basic requirements for adequate neurosurgical practice are far from being met in most African countries due to the lack of access to care for the general population, the lack of neurosurgeons and the lack of well-equiped medical facilities. The purpose of this study is to evaluate the neurosurgical practice at the Kiffa Hospital Center (KHC) in Mauritania. ***Patients and methods :*** This is a descriptive and analytical retrospective study of hospital patient records for neurosurgical cases at KHC between March 1, 2017 and March 31, 2019. ***Results:*** The series included 176 neurosurgical patients (54 children and 122 adults) requiring hospitalization, 49 of which were female and 127 male; a sex ratio of 2.5. The mean age of patients was 36 years old. Neurosurgical trauma (head and spinal cord injuries) among them chronic subdural hematoma and degenerative disc disease were the most common in hospitals with respectively 57.6%; 10.8%; 9.1%. A total of 81 patients were operated on. The mean age of patients undergoing surgical intervention was 46.4 years (range 5 days to 85 years). The sex ratio of those patients was 2.6 (59 men and 22 women). The mortality was 4%. The overall average length of hospital stay was 7.9 days. ***Conclusion :*** The assessment of the past 2 years of the neurosurgical practice has shed light on the essential characteristics of the practice. Despite the challenging conditions the results are encouraging.

Key words *:Results report; Neurosurgery ;Sub-Saharan Africa; Mauritania.*

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INTRODUCTION

The advancement of the practice of neurosurgery in developing countries is hindered greatly by poor financial and technical resources. The practice of neurosurgery fundamentally requires the use of basic diagnostic tools that include computed tomography (CT) and magnetic resonance imaging (MRI) as well as well trained staff that includes intensivists and anesthesiologists with experience in neurosurgical conditions[1].

These basic requirements for adequate neurosurgical practice are far from being met in most African countries due to the lack of access to care for the general population, the lack of neurosurgeons and the lack of well-equiped medical facilities [2]. Kiffa is the capital of the Assaba region (32,598 inhabitants), located in the South of Mauritania, 603 km from the capital, Nouakchott. The region of Assaba has a hospital center where our neurosurgical practice was started 2 years ago.

The purpose of this study is to evaluate the results of neurosurgical practice at the Kiffa Hospital Center (KHC).

PATIENTS AND METHODS

This is a descriptive and analytical retrospective study conducted at the general surgery and pediatrics department of KHC between March 1, 2017 and March 31, 2019. The bed capacity of the surgery department was 33 beds (7 of which are dedicated to neurosurgery), shared by gastrointestinal surgery (2 surgeons), ENT surgery (1surgeon), urological surgery (1 surgeon), orthopedic surgery (1 surgeon) and neurosurgery (1 surgeon). The pediatric neurosurgery cases were admitted to the pediatric department.

There are 6 operating rooms one of which is dedicated to neurosurgery. There is a 4 bed intensive care unit. During the first 13 months we had to perform neurosurgical interventions in the absence of an anesthesiologist.

All this neurosurgical practice was performed by the only neurosurgeon at KHC. We also performed CT scans without a radiologist for 7 months. The care was delivered by nurse practicioners in anesthiology and radiology.

The operating room is equipped with a C-arm X-ray machine, a surgical microscope with a single binocular head (for a single operator), a negatoscope, an operating table, unipolar and bipolar cauterization probe, a container of instruments for scheduled and another for emergency brain surgery in addition to another container of instruments for spinal surgery. A Yasargil spreader device is also available.

We included all neurosurgical patients requiring hospitalization and excluded 11 cases for incomplete data. The data was saved and processed in a Microsoft Excel file. Only a CT scan was available for neuroradiological assessments. Any patient who was a candidate for surgical intervention underwent a CT scan. The parameters evaluated in this study include epidemiological factors, diagnostic factors, surgical factors and outcome.

RESULTS

HOSPITALISATION

The series included 176 patients (54 children and 122 adults) hospitalized for neurosurgical conditions, 49 were female and 127 male, a sex ratio of 2.5. The mean age of patients was 36 (range 5 days to 85 years).

123 patients (70%) were admitted urgently. Traumatic (brain and spinal injury), chronic subdural hematoma (CSH), and degenerative disc disease were the most frequent with 57.6%; 10.8%; 9.1% respectively (Table I).

The pediatric population representing 30.8% of the series. Most cases were related to head trauma and congenital malformations (hydrocephalus and spinal dysraphism) with 34 cases (62.9%) and 11 cases (20.3%) respectively.

The overall average length of hospital stay was 7.9 days. The mortality of the series was 3,4 %.

SURGICAL DATA

81 patients were operated. The mean age of the patients was 46.4 years (range 5 days to 85 years). The sex ratio was 2.6 (59 men and 22 women).

Table II presents the diagnostic and progressive characteristics of operated patients. 44 cases (54.3%) represent scheduled surgeriesand 37 cases (45.7%) were urgent interventions. 4 cases required a repeat operation (4.9%).

Complete post-operative follow up was achieved through reminding patients of appointments via phone call if the patient doesn’t show at the scheduled visit. The mean duration of follow-up was 6 months.

Table I : Clinical and progressive characteristics of hospitalized patients				
PATHOLOGY	**NUMBER (n) %**	**HOSPITALIZATION (DAY)**	**EVACUATION**	**MORTALITY**
Traumatic pathology				
Traumatic brain injury	83 (47.2)	4		
Spinal trauma	18 (10.2)	7		
Chronic subdural hematoma	19 (10.8)	4.5		1
Infectious disease				
Tuberculous spondylodiscitis	7 (4)	4.6		
Intracranial suppurations	3 (1.7)	17.7		2
Scalp abscess	3 (1.7)	8.7		
Malformative disease				
Hydrocephalus	5 (2.8)	9.5		1
Spinal dysraphism	4 (2.2)	4.5		
Meningoencephalocele	1 (0.6)	5		
Spinal dysraphisme + hydrocephalus	1 (0.6)	25		
Cerebral arachnoid cyst	1 (0.6)	4		
Vascular disease				
Spontaneous intracerebral hematoma	8 (4.5)	3.3	4	2
Degenerative spine conditions				
Herniated disc	16 (9.1)	3,3		
Tumor disease				
Brain tumor	4 (2,2)	5	2	
Tumor of the vault	2 (1.1)	1		
Spinal tumor	1 (0.6)	20	1	
TOTAL	176 (100)	7,9	7 (4)	6 (3,4)

Table I : Clinical and progressive characteristics of hospitalized patients

Table II: Postoperative evolution

PATHOLOGY	NUMBER (n) %	HOSPITALIZATION (DAY)	FAVORABLE EVOLUTION	INFECTION	MORTALITY
Traumatic pathology					
Traumatic brain injury	9 (11,1)	6,2	8 (88,8)	1	
Spinal trauma	8 (10)	11.8	8 (100)		
Subdural chronic hematoma	19 (23,5)	6	18 (94,7)		1
Infectious disease					
Tuberculous spondylodiscitis	4 (4,9)	7.7	4 (100)		
Intracranial suppurations	3 (3,7)	17.6	1 (33,3)		2
Scalp abscess	3 (3,7)	7	3 (100)		
Malformative disease					
Hydrocéphalus	4 (4,9)	6.6	4 (100)		
Spinal dysraphism	4 (4,9)	5	4 (100)		
Meningoencephalocele	1 (1,2)	5	1 (100)		
Spinal dysraphism + hydrocéphalus	1 (1,2)	25	1 (100)	1	
Cerebral arachnoid cyst	1 (1,2)	4			
Vascular disease					
Spontaneous intracerebral hematoma	4 (4,9)	6	2 (50)		2
Degenerative spine conditions					
Herniated disc	16 (19,8)	3,2	16 (100)		
Tumor disease					
Brain tumor	2 (2,4)	7	2 (100)		
Tumor of the vault	2 (2,4)	1	2 (100)		
Spinal tumor	1 (1,2)	20	0 (00)		
TOTAL	81 (100)	9	74 (91,3)	2 (2,4)	5 (6,1)

Table II: Postoperative evolution

DISCUSSION

Understanding the demographics and characteristics of the neurosurgical patient population treated in our current underserved practice makes it possible to be better informed about the material and the skills needed [3].

The combination of several surgical specialties (gastro-intestinal surgery, orthopedics, otolaryngology, urology, neurosurgery) in a single department, without adequate presence of paramedical personnel is not conducive to optimal patient care or to the advancement of these surgical practices. Nevertheless, the availability of a dedicated operating room with its present level of equipment guarantees minimal conditions of care for the most common neurosurgical conditions.

The level of care can be improved in our African context by improvinghealth care access through reduction ofcosts for low-income patients as well as by acquiring a higher resolution CT scan and MRI[1].

In our study the majority of cases were secondary to trauma (57.4% of cases); this is the case with previously published case series reported by other authors [3-5]. The most common traumatic cases were related to head injury (47.2% of cases) Fig.1. In developing countries, head injuries are common and are a great public health concern with a mortality rate of 70% for severe head injuries [6].

70% of the patients were admitted as an emergency. Ekouele and Kassidi [3.5] reported in their study 72.96% and 67.99% respectively. The predominance of emergency cases is explained by the high prevalence of traumatic cases among all the admissions.

Our rate of surgical cases (46%) is close to that of previously reported studies with 37.9%, 42.58% and 56.15% respectively [3-5].

CSH surgery represents 23.5% of our surgical activity contrary to the cases reported by some authors [3,5], (Ekouele 15,8%, Kassidi 6,2%), this difference could be explained in that 45.6% of operated patients were between 50 and 85 years old.

Surgical repair of herniated disk constituted 19.8% of our surgical activity whereas in the studies of Mejdi [4] and Kassidi [5], it was 11% and 12.5% respectively.

9 head injuries (11.1%) required surgery; the surgeries wereindicated fordepressed skull fracture, penetrating head injury and fracture of the anterior cranialfossa.

The percentage of head injuries varies between 12.4% and 37.65% in previously reported studies [3,5].

44.4% of cases of spinal injury (Fig.2 and 3) required surgery, compared to 48% and 63.01% respectively according to Ekouele [3] and Kassidi [5].

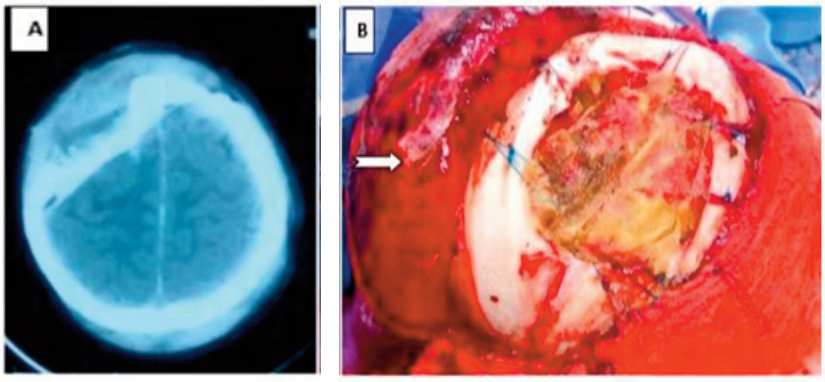


Fig. 1 Head CT (A) showing axial section of a right fronto-parietal skull depression fracture. Intraoperative view (B) of the lifting of the skull depression fracture, arrow indicating the patient's forehead.

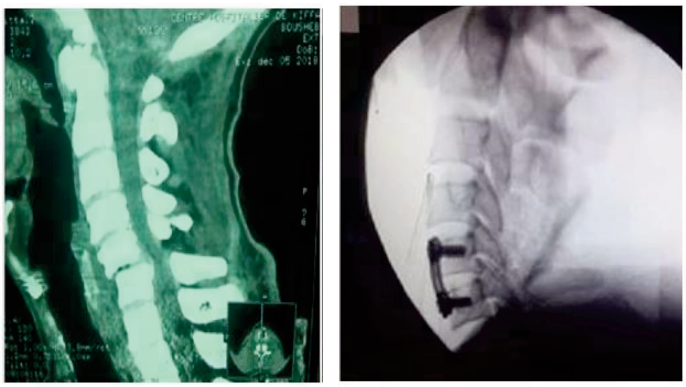
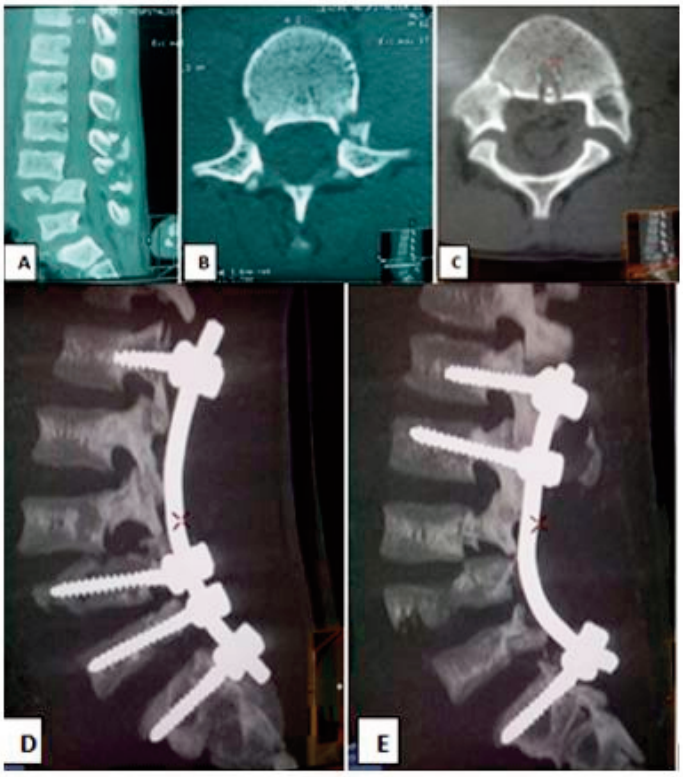


Fig .2 Cervical CT (A) in sagittal section showing cervical C5-C6 post traumatic cervical dislocation. Side view of a postoperative radiograph (B) showing reduction of dislocation with existing C5-C6 osteosynthesis equipment.perative view (B) of the lifting of the skull depression fracture, arrow indicating the patient's forehead.



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Hydrocephalus and spina bifida comprised most of the congenital malformations (Fig.4). They accounted for 6.8% of admissions to the department and 13.5% of neurosurgical activity. Potts disease (Fig.5) was the main neuroinfectious etiology with 4 out of 7 cases requiring surgery. We collected 13 cases (7.4% of hospitalized) with infectious pathology, 7 of which required surgery. The number of cases of vascular and tumoral pathology (Fig.6) is explained by the fact that we had practiced

neurosurgery for 13 months without a resuscitator, the anesthesia was performed by nurse anesthetic technicians, these patients had to be referred to the capital Nouakchott.

The best results were observed with spinal surgery (100%). In the literature, the postoperative results are considered excellent in the cervicaland spinal surgery involving degenerative disc disease 80 to 95% success rate [3,5,7].

Postoperative infections accounted for 5.5% of patients in our study. They were rare given with carefuland rigorous diagnostic and therapeutic approach [8].

Postoperative mortality was 6.1%, spontaneous cerebral hemorrhage being the most common (2 death cases out of 4 operated). Ekouele et al. reported a postoperative mortality of around 12%[3], in his series he also found 100% (3 cases) of deaths in patients operated for spontaneous cerebral hemorrhage. The optimal management of this group of pathologies requires an improvement of the skills and materials required including the operating facility and the competence in resuscitation.

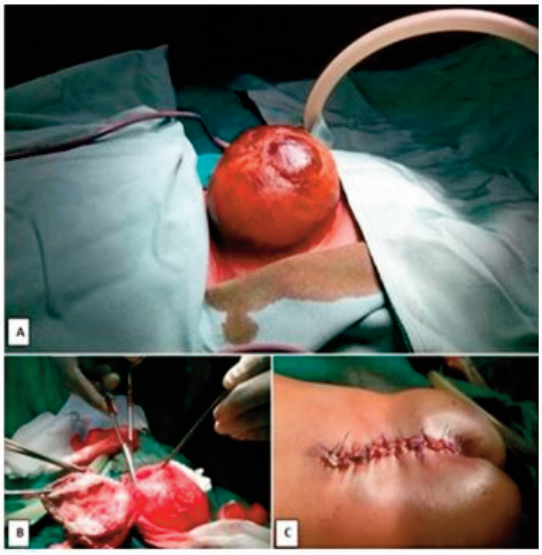

Fig.4 Spina bifida, meningocele lumbar type (A). Intraoperative dissection (B). Aspect at the end of the intervention (C).

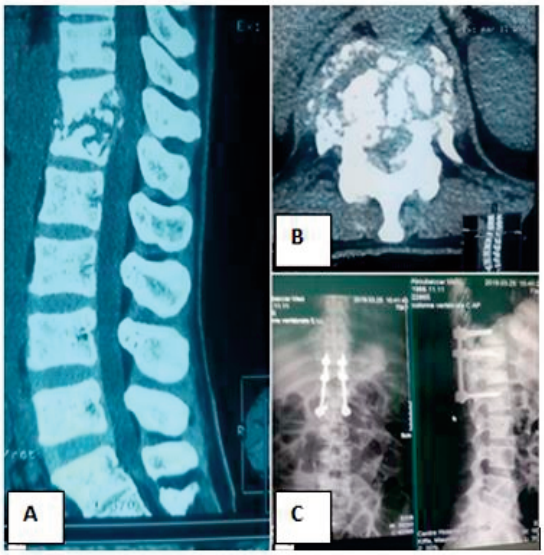

Fig.5 CT of the thoracolumbar spine in parenchymal window showing in sagittal (A) and axial (B) sections a tuberculous spondylodiscitis T12-L1 with medullary compression. Postoperative radiographs (C) (act: T12-L1 laminectomy medullary decompression and T11-T12-L2 transpedicular fixation stabilization).

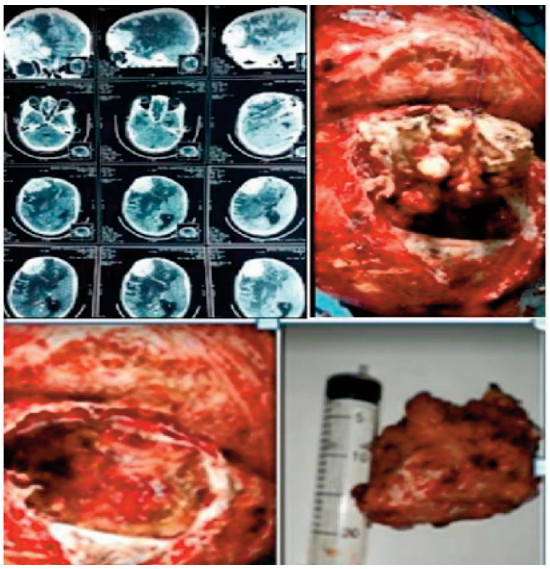

Fig.6 Head CT showing right fronto-temporal (meningioma) tumor (A) with enhancement after injection, surrounded by severe perilesional edema; bone involvement and skin infiltration. Intraoperative image (B, C) supine patient,forehead at the zenith. Aspect of the tumor after excision (D).

CONCLUSION

This review of the first two years of neurosurgical activity at the KHC high lighted the characteristics ofour practice.

The results are encouraging throughout our study. The improvement of care requires an MRI, a service that is specifically dedicated to neurosurgery, the improvement of material and equipment available, a team of anesthesiologist that are trained in neurosurgical intensive care.

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Declarations of interest

The authors declare no conflicts of interest in relation to this article.

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