

## Management of Craniocerebral Injuries in the Neurosurgery Department

Dr. Mukowa Mukendi Arnold<sup>1\*</sup>, Pr. Abdourafiq Hasna<sup>1</sup>, Pr. Zahrou Farid<sup>1</sup>, Pr. Hajhouji Farouk<sup>1</sup>, Pr. Laghmari Mehdi<sup>1</sup>, Pr. Ghannane Houssi<sup>1</sup>, Pr. Said Ait Benali<sup>1</sup>

<sup>1</sup>Department of Neurosurgery, Arrazi Hospital, University Hospital Center Mohammed VI, Cadi Ayyad University, Marrakech, Morocco

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\*Corresponding author: Dr. Mukowa Mukendi Arnold

Department of Neurosurgery, Arrazi Hospital, University Hospital Center Mohammed VI, Cadi Ayyad University, Marrakech, Morocco

### Abstract

### Original Research Article

The authors describe a retrospective study about 257 cases of cranio-cerebral wounds collected over a period of 7 years (2017 to 2024) in the neurosurgery department of CHU Mohammed IV of Marrakech. The craniocerebral wounds represent 19% of all head injuries. The male is very significant (75%). The average age was 28.6 years. Accidents highway is the major cause (44%) and assaults (35%). The majority of patients were admitted during weekends and summer months. On admission, 34.24% of head injuries were severe (GCS  $\leq$  8), signs deficits were noted in 17% of cases and autonomic disorders in 21.4%. scanner brain was performed in all patients, it has detected the CPC and the lesions associated with intracranial contusion ranked first with 42.39%. The therapeutic management consisted of medical treatment associated with surgery. (Craniotomy+ recovery plan dural and skin). The postoperative course was excellent in 84% cases while in 16% of complications occurred and dominated by neurological deficits.

**Keywords** head injury – cranio-cerebral wounds – scanner – treatment.

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## INTRODUCTION

Craniocerebral injuries (CCP) are lesions defined as a loss of continuity of all the planes separating the brain parenchyma from the external environment. The aim of this study is to analyze, with a review of the literature, the clinicoradiological aspects, the therapeutic management and especially the evolution of operated CCPs.

## MATERIALS AND METHODS

This is a retrospective study concerning a series of 257 cases of craniocerebral injuries (CCP), collected at the Neurosurgery Department of CHU Med VI, over

seven years (2017-2024). Data collection was carried out using an operating sheet.

## RESULTS AND ANALYZES

The average age of patients is 28.6 years with extremes ranging from 1 to 94 years. There was a male predominance (75%) with a sex ratio of 3. Public road accidents (44%) and assaults (35%) were the major causes. Most patients were admitted during weekends and summer months. The neurological examination on admission was normal in 65.76% of cases, localization signs were found in 17% of which monoplegia was the most common. 34.24% of head injuries were serious.

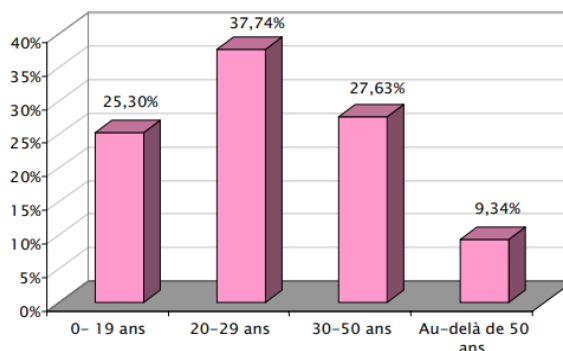
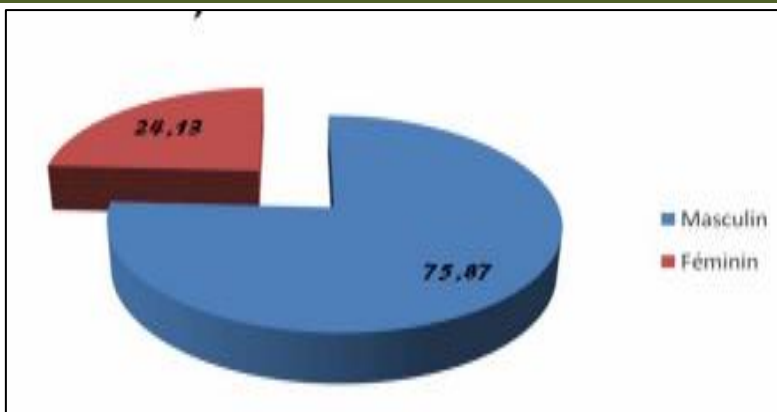
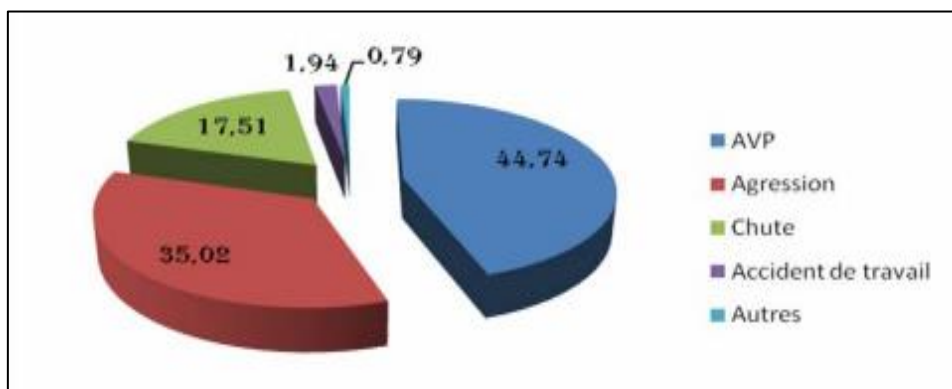


Figure 1: Distribution of PCCs by age



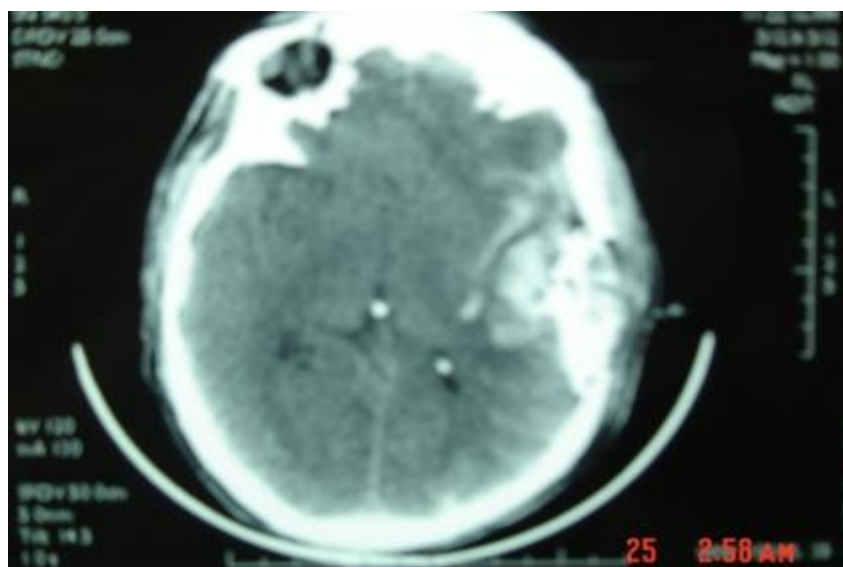
**Figure 2: Distribution of PCCs by gender**



**Figure 3: Distribution according to etiology**

The appearance of the wound varies from a small puncture wound to broken skin. The linear form represents 77.04% of cases. Brain CT performed in all patients made it possible to make the diagnosis of craniocerebral wound and to detect the associated intracranial lesions of which contusion occupied the first place (42.39%). A simple skull x-ray was done in only 6

patients; it revealed bone damage in the form of an imprint in 4 of them. Extracranial lesions were noted in 19% of cases and dominated by facial lesions. Therapeutic treatment consisted of medical treatment associated with surgical treatment (craniectomy + reconstruction of the dural and cutaneous plane) which involved 185 cases (72%).



**Figure 4: Brain CT scan in axial section without injection of contrast product showing a common fracture wound facing the left temporal focus with areas of parenchymal contusion**



**Figure 5: Craniocerebral CT scan (Bone window – axial section) showing a right frontal recess**

The early evolution was excellent in 84% of cases. Complications were noted in 15% of cases and dominated by neurological deficits. The late evolution was marked by normal survival in 90%, while the others presented sequelae of varying degrees dominated by subjective post-traumatic syndrome. Two deaths were recorded due to neurological worsening linked mainly to associated parenchymal damage.

## DISCUSSION

The frequency of craniocerebral injuries (CCI) is relatively low compared to the numerous consequences of head trauma in civilian practice [1]. The average age of our patients is 28.6 years with a male predominance, which is consistent with the results of similar studies. Public road accidents (44%) and assaults (35%) were the major causes and are explained by environmental factors, human factors, factors linked to the vehicle and factors linked to road infrastructure. Most of the patients were admitted during weekends and summer months and are partly explained by the importance of road traffic and the return of Moroccans living abroad [2, 3]. The transfer of the injured person must be done as quickly as possible. The initial clinical evaluation of a patient in the event of head trauma makes it possible to define prognostic predictive factors and a therapeutic strategy [2]. Respiratory disorders are common and have multiple causes, extra-pulmonary and thoracoparietal [3]. The neurological assessment is particularly important, because it conditions the diagnostic and therapeutic strategy [4] and includes the study of vigilance, the search for localization signs and the recognition of neurovegetative disorders [4, 5]. In our series, the neurological examination on admission was normal in 65.76% of cases, which is very close to the results found in the Casablanca series.

The appearance of the wound varies from a small puncture wound to skin disrepair linked mainly to

the intensity and mechanism of the attack [3]. The linear form represents 77.04% of cases. A crucial element, it must be simple, codified and repeated. The state of consciousness is assessed by calculating the Glasgow score [6, 7]. Neurovegetative disorders are associated with deep coma [5]: note respiratory, cardiovascular, thermal regulation and digestive disorders. Extracranial lesions must be systematically sought because they contribute to increasing morbidity and mortality. The management of head trauma and the request for paraclinical examinations refers to the conclusions of the 6th consensus conference in intensive care and emergency medicine and is based on the severity criteria proposed by Masters. Brain CT currently remains the first-line morphological imaging test in the acute phase of head trauma. The examination is carried out without injection of contrast product using contiguous cuts 5 to 9 mm thick extending from the foramen magnum to the vertex [5]. In our series, brain CT performed in all patients made it possible to make the diagnosis of craniocerebral wound and to detect associated intracranial lesions, of which contusion was the most frequent and presented in the form of more or less well-defined heterogeneous areas, containing hypodense areas corresponding to edema and necrosis. Extracranial lesions detected using CT were noted in 19% of cases and dominated by facial lesions. Most teams consider simple skull radiography unnecessary due to its low diagnostic yield and the absence of any real predictive value, positive or negative. Whereas for magnetic resonance imaging and despite its very high sensitivity, it has not demonstrated its benefit in the acute phase and adds nothing to the information provided by CT and therefore has no indication in emergency. Spine images may be requested depending on the location of the impact, or the pain, but cervical spine x-rays must be systematically requested for all head trauma patients. The same goes for chest and pelvis x-rays. The performance of vascular exploration (conventional

angiography, CT angiography or MRI angiography) remains very low; and above all have a great interest in the progressive prognosis of head trauma. The management of PCC falls within the framework of the main objective of the management of head trauma patients which requires correct control of the hemodynamic and ventilatory state in order to avoid intracranial hypertension and disturbances in cerebral blood flow. Which can lead to cerebral circulatory arrest, and which also requires control of the factors of secondary cerebral aggression of systemic origin (ACSOS) then the treatment of the PCC itself. First aid must be provided at the scene of the accident after marking the patient as well as coordination of responders which is better ensured by SAMU regulation. Once the patient is installed in the department, his resuscitation, as well as the monitoring of the evolution of his clinical condition must be done concomitantly. The preoperative preparation of the injured person consists of an antitetanus serum, systematic prophylactic antibiotic therapy targeting enterobacteria, staphylococci and anaerobic bacteria of the telluric flora, the administration of anti-epileptics and careful debridement of the wound of the injured person scalp. The use of surgery is in reality uncommon in the acute phase, but directly affects the vital prognosis, A delay of 24 to 48 hours is justified. It makes it possible to identify necrotic brain tissue more easily and the procedure becomes easy, without increasing the risk of infection. A craniotomy, esquillectomy will allow the removal of the stuck bone, the superficial bone fragments and the foreign bodies, and to better view the hard merian wound, the size, shape and location of which must be clarified, thus having better access to the brain damage. underlying, followed by treatment of intracranial lesions and reconstruction of the dural plane, the bony plane; finally the skin closure is done hermetically by points separated in two planes. The existence of a loss of skin substance may lead to the performance of a plastic surgery using rotational flaps. The use of antibiotic prophylaxis is indisputable in the presence of a craniotomy. In our series, 185 cases (72%) benefited from surgical treatment. Post-operative care with close clinical monitoring with nursing measures is of great importance. The early evolution was excellent in 84% of cases, and complications were noted in 15.17% of patients, dominated by neurological deficits. The postoperative course remains fraught with several complications dominated by meningitis and superficial suppurations. The postoperative mortality rate was 11%. Definitive healing is difficult to assess, requiring regular CT monitoring in all operated patients. The long-term evolution was marked by normal survival in 90%, while the others presented sequelae of varying degrees dominated by subjective post-traumatic syndrome. Prevention based on road education, involving the authorities and the media remains the main element given that road accidents (AVP) remain a major health problem because they cause severe disabilities and

deaths. The level of road insecurity in Morocco is very high, compared to other countries. To better guide preventive actions, it is necessary to know the causes of AVP, which are generally four types of factors: environmental factors (weather conditions, etc.), human factors (non-compliance with the highway code, recklessness, etc.), factors linked to the vehicle itself (running condition, maintenance, etc.) and, finally, factors linked to the road infrastructure (road conditions, signage), all of which is in fact linked to the human factor.

## CONCLUSION

PCCs are a very particular entity, in civilian practice, are rare, compared to all head injuries. Their diagnosis is based on a careful clinical examination coupled with CT scanning, which makes it possible to draw up a complete and reliable lesion assessment. However, confirmation of the diagnosis is only provided by intraoperative exploration. The initial neurological assessment makes it possible to define prognostic predictive factors and a therapeutic strategy. It must be simple, quick, concise and interpreted, if possible, after the stabilization of the major vital functions. The long-term consequences are significant, due to the handicaps and socio-economic consequences they cause. Finally, the best remedy remains good prevention of AVP (compliance with the highway code, regular monitoring of the mechanical condition of vehicles, improvement of road infrastructure, wearing helmets for motorcyclists, and use of seat belts for motorists), and above all, better education of the population with increased safety, in order to reduce the rate of attacks, which is too high in our context.

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