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Original article

Maxillofacial trauma by firearm at the National Center for Odonto-Stomatology in Bamako

Les traumatismes maxillo-faciaux par arme à feu au centre national d'odonto-stomatologie de Bamako

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Résumé

Les traumatismes maxillo-faciaux par arme à feu sont sources de lésions très variées, plus ou moins complexes, dont l'inventaire précis conditionne les modalités thérapeutiques. L'objectif de ce travail était d'étudier les aspects sociodémographiques, cliniques et thérapeutiques des traumatismes maxillo-faciaux par arme à feu.

Ainsi, une étude transversale descriptive portant sur les cas de traumatismes maxillo-faciaux par arme à feu a été menée sur une période de 6 ans au centre national d'odonto-stomatologie, centre hospitalier universitaire de Bamako. Il a été colligé 25 cas. Le sexe masculin était prédominant avec 96% des cas. Le sex-ratio était de 24 en faveur du sexe masculin. La tranche d'âge la plus représentée a été celle de 21-30 ans. La moyenne d'âge a été de 26,5 ans. Les agents des forces armées et de sécurité ont été les plus concernés avec 68% des cas. Les conflits armés ont été la principale cause avec 68% des cas. L'association lésion osseuse et des parties molles était prédominante avec 80% des cas. Le principal siège de lésion osseuse a été la mandibule avec 64%. La tomodensitométrie maxillo-faciale a été réalisée chez tous les patients. Le suivi post opératoire a pu être réalisé sur une durée de 3 à 6 mois chez 44% des patients. L'évolution a été jugée favorable avec une guérison sans séquelle chez 40% des cas.

La prise en charge des traumatismes maxillo-faciaux par arme à feu doit être rapide et très méthodique afin de limiter les séquelles fonctionnelles et esthétiques.

Mots-clés : Traumatisme, maxillo-facial, arme à feu, Bamako.

Abstract

Maxillofacial trauma by firearms is a source of a wide variety of injuries, more or less complex, the precise inventory of which conditions the therapeutic modalities. The objective of this work was to study the sociodemographic, clinical and therapeutic aspects of maxillofacial firearm trauma.

Thus, a descriptive cross-sectional study on cases of maxillofacial trauma by firearms was conducted over a period of 6 years at the National Center for Odonto-Stomatology, University Hospital Center of Bamako. 25 cases were collected. The male sex was

predominant with 96% of cases. The sex ratio was 24 in favour of the male sex. The most represented age group was 21-30 years old. The average age was 26.5 years. Armed and security forces were the most affected with 68% of cases. Armed conflicts were the main cause with 68% of cases. The association of bone lesion and soft tissue was predominant with 80% of cases. The main site of bone lesion was the mandible with 64%. Maxillofacial computed tomography was performed in all patients. Postoperative follow-up could be carried out over a period of 3 to 6 months in 44% of patients. The evolution was considered favorable with a cure without sequelae in 40% of cases.

The management of maxillofacial trauma by firearms must be rapid and very methodical in order to limit functional and aesthetic sequelae.

Keywords: Trauma, maxillofacial, firearm, Bamako.

Introduction

Maxillofacial trauma (FMT) caused by firearms is a source of a wide variety of maxillofacial injuries, more or less complex, the precise inventory of which determines the therapeutic modalities [1]. They are the consequence of the penetration into the body of a projectile: bullet, lead, metal fragment from the casing or contents of an explosive device (grenade, mine, shell, bomb, etc.). These traumas are no longer only a wartime pathology but also a peacetime pathology, especially since the diversity of weapons and ammunition available is considerable. Firearm suicides are the leading cause of facial ballistic trauma, with 24% in France and 47% in the United States of America [1,2]. In Mali, gun injuries are becoming more common due to the country's decade-long security crisis. In a study carried out in Mali, out of 250 cases of ballistic trauma, 14 cases of maxillofacial localization were collected over a period of 12 months [3]. In another study by Ba B et al [4], 1.81% of mandibular fractures were of ballistic origin.

The objective of this work was to study the sociodemographic, clinical and therapeutic aspects of maxillofacial firearm trauma in our context.

Methodology

This was a descriptive cross-sectional study that took place over a period of 6 years from 2012 to 2018 in the Department of Stomatology and Maxillofacial Surgery of the National Center of Odontostomatology, University Hospital Center of Bamako. All cases of firearm trauma with maxillofacial point of impact were included in this study with a complete medical-surgical record and who had accepted management. All patients underwent a complete clinical examination, computed tomography (CT) and a laboratory work-up, namely: Blood Count, Rhesus Grouping, Fasting Blood Glucose, HIV Retroviral Serology, Blood Creatinine, PT, TCK. The course was considered favorable when it was completely healed, without major aesthetic sequelae, and unfavorable when aesthetic and/or functional sequelae occurred. An exhaustive collection of the files meeting our selection criteria was carried out followed by the completion of the survey sheets. The variables studied (age, sex, occupation, residence, etiology, time to admission, site of the lesion, type of lesion, therapeutic modalities, type of anesthesia, post-operative follow-up, evolution, sequelae) were compiled, entered and analyzed with the SPSS 12 software. We have made a point of preserving the anonymity and confidentiality of the data collected.

Results

Over a 6-year period from 2012 to 2018, 25 cases of maxillofacial trauma by firearms were collected. The most represented age group was between 21 and 30 years old.

The average age was 26.5 years. The extreme ages were 4 and 40 years (Figure 1).

The male sex largely predominated with 96.0% of cases and the sex ratio
was M/F = 24. Agents of the armed forces and security forces (military/police) were the most concerned with 68.00%. The case the child occurred following a domestic accident (he shot himself in the face while playing with his father's gun). The lesions observed in this child were a complex fracture of the left horizontal branch of the mandible with lesions of the ipsilateral soft tissues of the cheek and chin (Table I). The Gao region was the most represented with 36.00% of cases.

The majority of patients were Malian (92.00%) and Guinean in 8.00% of cases (Table II).

The majority of patients were war-wounded, i.e. 68.00% (Table III). In the majority of cases, patients were admitted within 72 hours of the injury, a rate of 72.00%.The association of bone lesion and soft tissue lesion was the most common with 80.00% of cases (Table IV).

Mandibular fracture was predominant with 64% of cases (Table V). CT and laboratory work-up were performed in all patients. Of the 25 cases, 3 patients had superficial wounds and received only local care. The procedures were performed under general anesthesia with orotracheal or nasotracheal intubation in 84% of cases. The therapeutic attitude was both orthopaedic and surgical in 64% of cases. In the majority of cases, there was no secondary care, i.e. 88% of cases.

It was performed in only 3 patients: including prosthetic rehabilitation and two mandibular reconstructions by iliac bone graft. Postoperative follow-up at 6 months concerned 44% of patients. The course was considered favorable without sequelae in 40% of cases. Aesthetic and functional sequelae were observed in 60% of patients.

Table I: Distribution of patients by profession

Profession	Actual	Percentage
Military/Police	17	68,00
Child	1	4,00
Pupil/Student	3	12,00
Driver	1	4,00
Farmer	2	8,00
Merchant	1	4,00
Total	25	100,0

Table II: Distribution of patients by residence

Residence	Actual	Percentage
District of Bamako	5	20,00
Gao	9	36,00
Kidal	2	8,00
Menaka	3	12,00
Téssalit	1	4,00
Diabali	1	4,00
Mopti	1	4,00
Timbuktu	1	4,00
Guinea	2	8,00
Total	25	100,00

Table III: Distribution of patients by etiology

Etiology	Actual	Percentage
Assault	5	20,00
Accidents	3	12,00
Armed conflicts	17	68,00
Total	25	100,00

Table IV: Distribution of patients by type of injury

Type of injury	Actual	Percentage
Bone injury	2	8,00
Soft tissue injury	3	12,00
Associated lesions	20	80,00
Total	25	100,00

Table V: Distribution of patients by site of bone lesions

Site of bone lesions	Actual	Percentage
Maxillary	1	4,00
Mandible	16	64,00
Associated with	6	24,00
No bone damage	2	8,00
Total	25	100,0

Discussion

The study involved 25 cases of firearm-related FMD over a 6-year period. This frequency is relatively low despite the security crisis that Mali has been going through for a decade marked by inter-friendly or inter-community conflicts, terrorism, and socio-political demonstrations. Bérété PIJ et al. found 9% of cases of FMT related to aggression [5]. In Guinea, Diallo R et al. reported 42 cases of FMT by firearm out of 14624 facial traumas, i.e. a frequency of 0.29% [6]. In a study conducted in Mali over a period of 12 months, 14 cases of FMT by maxillofacial localization firearm were collected [3]. This difference could be explained on the one hand by the geographical location of our department, far from the operating theatres which are located in the centre and north of the country and on the other hand by the availability of maxillofacial surgery care in hospitals in the centre of the country. Young adults were the most affected in this study. The average age was 26.48 years. This trend has been reported by some authors [6, 7] who have found an average age between 26.9 and 29 years. This high frequency in young adults could be explained by

the daring behaviour of this subpopulation in the face of risk. On the other hand, other authors [1, 8] have found an average age hovering around 45 years. Male subjects are the most frequently affected. This male predominance has been widely reported by several authors [1, 6, 7, 8]. This observation was also made in the present study. This could be explained by the fact that men are massively present in the armed and security forces, which are generally in the theatre of operations, but also by the involvement of men in inter-community conflicts, socio-political demonstrations and acts of violence. The predominance of socio-professional strata affected by firearm trauma varies across studies. Students were the most affected according to some authors [9] while in a study by Sagara.S [3], growers were the most affected. Agents of the armed forces and security forces were the most concerned in the present work. This state of affairs could be explained by the fact that these agents are particularly exposed, given their profession. The circumstances of occurrence vary according to the studies. In the study by Diallo OR et al [6], the circumstances of occurrence were dominated by socio-political demonstrations with 73.81% and assaults with 11.90% of cases. For other authors [1,4], firearm suicides are the leading cause of facial ballistic trauma. France ranks second in the world after the United States, where the rate is 47%. The weapon used is the hunting rifle in rural areas and rather the handgun in urban areas [1]. In France, some authors [8] have found that the main causes for women are assaults, but for men it is suicide attempts. The main etiology found in our work has been armed conflict. This observation could be explained by the armed conflicts that are raging in our country, the almost present insecurity during this period and the large quantity of firearms circulating in the country.

The data in the literature agree that the mandible is the most affected in the case of FMT by firearm. In this series, the mandible was affected in 64% of cases. This finding has been reported by several authors [1,6,10]. This damage to the mandible could be explained by the forward position of this bone, probably associated with the profile position of the victims when the projectile was received. These traumas are responsible for injuries that are almost always very contaminated with significant destruction of soft tissues, as well as very often multiple and complex injuries. The association of bone lesion and soft tissue was predominant in the present series with 80% of cases.

In the study by Diallo OR et al. [6], the jugal region associated with the commissural region and masseterine were the most affected with a frequency of 33.33%. In the study by Shaltou SE et al.[11], zygomatic region involvement in 11.73% was reported. In the study by Caruhel J.B et al. [8], losses of mandibular complex substances were predominant with 34.5%. CT is the reference examination that provides valuable assistance in diagnosis, preoperative planning and therapeutic choice. It was performed in all patients.

Firearm FMTs remain the most feared maxillofacial emergency. They cause many physical and psychological sequelae. Their emergency care remains stereotypical. Secondary management (sequelae management) requires all maxillofacial reconstruction techniques in order to obtain the best possible functional and aesthetic results [1]. Initial management in our context consisted of surgical trimming of wounds and immobilization of fracture sites in 64% of cases. In the study by Shaltout S.E et al [11], tracheostomy was the most performed emergency procedure with a frequency of 15.64%. In the study by Diallo RO et al. [6], wound trimming and immobilization of fracture sites were the most common emergency procedures performed with a frequency of 47.60%. In the same study [6], 54.75% of patients underwent cutaneous-muscular loss plasty and in 47.61% of cases, reconstruction of bone loss by graft was performed. Regarding secondary management, it was performed in only 3 patients (one prosthetic rehabilitation and two mandibular reconstructions by iliac bone graft). The lack of financial resources and the inadequacy of the technical platform could explain this fact. In the study by Tholpady SS et

al. [12], the authors reported a reconstruction of substance losses in 20.4%. In the study by Caruhel J.B et al. [8], various reconstruction procedures were deployed, including reconstruction by one or more free flaps in 27.6%, including the fibula flap (24.4%). In our context, there was no use of micro-anastomosed flaps due to the inadequacy of the technical platform. FMT by firearm can be responsible for functional sequelae (i.e. relating to one of the three major motor, sensory or sensory functions of the face), but also morphological (bone or integumentary damage), and finally psychological through the effect of the trauma itself or the disorders it induces. Aesthetic sequelae were the most observed in the series of Diallo RO et al [6] (46.9%), followed by functional and aesthetic sequelae (31.2%). In the study by Edetanlen E.B et al [13], the authors reported 21.4% complications. In the present series, aesthetic and functional sequelae were found in 60% of patients.

Conclusion

Gunshot maxillofacial trauma (FMT) is common in our context as a result of acts of terrorism, armed conflict or assault, and primarily affects young adult males. The initial management of these injuries must be rapid and methodical, preceded by a complete clinical and radiological assessment, in order to limit the functional and aesthetic sequelae, which are often difficult to treat. In the most serious cases, the control of vital emergencies must be prioritized before any specific maxillofacial intervention. Reducing the incidence of such trauma requires peacekeeping, raising awareness of the dangers of weapons proliferation, and recovering them, in order to restore lasting peace in the country.

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