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EPIDEMIOLOGY OF INJURIES CAUSED BY CIVIL UNREST IN YEMEN. A CASE SERIES OF THE FIRST WAVE OF PATIENTS TREATED AT THE NATIONAL TRAUMA CENTER OF THE SULTANATE OF OMAN

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ABSTRACT

INTRODUCTION: Civil unrest leads to a significant healthcare impact. The unsettled Yemeni political scene has been present for a long time. This civil conflict has led to loss of innocent lives and long-lasting physical and emotional morbidity. To date, there has been no description of the initial impact of the Yemeni civil conflict on healthcare services.

OBJECTIVE: To describe the demographics and the pattern of injuries, management and follow-up for the first wave of civil war victims repatriated to the Sultanate of Oman in March 2015.

METHOD: A retrospective review of all civil victims repatriated from Yemen to the Sultanate of Oman after the March 2015 bombings. The data is extracted from medical records.

RESULTS: A total of 47 patients were evacuated from Yemen after 2 suicide bombings and treated initially in Oman. All patients were males and their mean age was 31 years, (range 6–66 years). Long bone fractures were the most common injury type (n = 39, 84%). Complex wounds were present in 36 (78%) patients, which required surgical intervention. Blast burns occurred in 7 patients (15%) and 10 patients (21%) had abdominal and chest injuries. Unfortunately, two patients succumbed to their injuries. The average length of stay for survivors was 25 days (6–156 days).

CONCLUSION: This study highlighted the complexity of injuries created by modern civil unrest situations. The study also indicated the regional impact of such situations on nearby countries. This study is a pioneering in describing the first wave of repatriated victims from the recent Yemeni conflict.

KEY WORDS: epidemiology of injuries, civil unrest in Yemen, firs wave of patients, Oman

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INTRODUCTION

Peace is a basic human right. Civil unrest is defined as disharmony or expressive dissatisfaction and disagreement between members of a community for several reasons. Such situations cause disruption in daily life and lead to damage in property, injuries and loss of life. With the current global political situation, such disharmony is likely to become a frequent phenomenon. Violence is one of the leading causes of death among the 14–55 year-old age group. As such situations have a spillover effect on nearby countries, medical preparedness in regions of civil unrest is critical.

Yemen has been known for the long-standing history of its unsettled political scene. On March 20th, 2015, the country witnessed one of the deadliest days in the modern history of Yemen. Two suicide bombings occurred in daylight hours in two

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separate mosques (Al Badr mosque and Hashoosh mosque in Sana'a) killing 137 innocent people of whom 14 were children. These deadly attacks also wounded 357 people.

Such a traumatic situation led to an international humanitarian response as the Yemeni healthcare system has been dysfunctional for years prior to such events. The Sultanate of Oman, being the nearest impartial country in the conflict, evacuated a group of patients from Yemen in the days following the March blasts. This group of patients constituted the first wave of war victims treated at the national trauma centre in Oman.

The Sultanate of Oman has always had a strong and noble external relations history with its neighbouring countries. Therefore, Oman's government has declined to participate in the current Saudi-led military effort in Yemen. Instead, the country's ruler, Sultan Qaboos, has called for "non-interference."

There is a lack of information about the type of injuries created by such events in the region and their impact on healthcare services. This study aimed to describe the demographics and the pattern of injuries, management and follow-up for the first group of war victims repatriated to the Sultanate of Oman in March 2015.

This study is the first of its kind to specifically describe the injuries from the current Yemeni conflict. We anticipate that the study will highlight the medical preparedness measures required to deal with such situations in the future as the consequences of civil unrest have a regional impact on nearby countries.

METHODS

This study describes a case-series of all patients evacuated from Yemen and treated at the national trauma centre (Khoula Hospital) in the Sultanate of Oman as a result of the March 20th, 2015 attacks. The study utilized the medical records of patients. A medical file review of all cases was used in order to extract demographic, clinical, management and follow-up information for the group of patients admitted and treated at Khoula Hospital in March 2015.

All cases were reviewed by two authors (S.A, A.H.) and the data extracted was crosschecked between the two data collectors. Data was collated in a pre-populated Excel sheet for analysis. A descriptive narrative analysis of these cases provided in this article. Full data is provided as an index for reference at the end of this paper.

Ethical approval for this study was sought and provided by the ethics committee of the hospital. Moreover, all data presented here has been de-identified and made anonymous for the purpose of this research.

RESULTS

There were 47 patients evacuated from Yemen and treated at the National Trauma Centre (Khoula Hospital) in the Sultanate of Oman as a result of the March 20th, 2015 attacks. All cases were reviewed retrospectively. All patients were males and were victims of blast injury with a mean age of 31 years, (range 6–66 years). All patients were evaluated initially in the Emergency Department and were all subsequently admitted. The majority of the patients were admitted to Orthopedics and Plastic Surgery services [41 (87%), 30 (65%) respectively]. In addition, 6 patients (13%) were admitted to General Surgery service, while only one patient (2%) needed admission to Neurosurgery services.

The type of injuries observed were long bone fractures (LBF), noted in 39 patients (84%), while wounds were noted in 36 patients (78%), Vascular injuries were noted in two patients (4%), burns were noted in 7 patients (15%), while 10 patients (21%) had abdominal and chest injuries. In term of surgical intervention, 39 patients (84%) needed open reduction and internal fixation (ORIF) / External fixation, 33 patients (71%) needed wound coverage, 6 patients (13%) were treated conservatively. In addition, 2 patients (4%) needed abdominal exploratory laparotomy, 4 patients (8%) required limb amputation, 1 patient (2%) required craniotomy and 2 patients (4%) required fasciotomy.

The final outcome and complications resulting from this attack resulted in 2 deaths, 10 wound infections and 4 nerve injuries. The average length of hospital stay was 25 days (6–156 days). There was no follow-up for 14 patients in the 4 weeks post discharge.

DISCUSSION

This study looked at the pattern of injuries sustained by suicide bombings executed during the Yemeni conflict in 2015. They were the result of a series of explosions that targeted people attending prayers at two separate mosques. The first blasts happened inside the buildings, followed two minutes later by

explosions outside, presumably to target the fleeing crowds. There was a total of 5 suicide bombings that day, including one car bombing outside one of the mosques. The injuries described in this series are from the survivors of these attacks who were air-lifted to neighbouring Oman. By definition, injuries sustained by such mechanisms are classified as "blast injuries". Blast injuries are generally categorized as primary to quaternary. Primary injuries are caused by the effect of the transmitted blast waves on gas-containing structures; secondary injuries, by the impact of airborne debris; tertiary injury, by the transposition of the entire body because of blast wind or structural collapse; and quaternary injuries, by all other forces [1]. Secondary blast injuries causing fragmentation wounds predominate in suicide bombings in open and/or semi-confined spaces [2].

The most common injuries found were fractures of the long bones followed by external wounds. These are mostly of the secondary and tertiary kind. In a larger series from Pakistan, Khan et al. have also reported a similar predilection to extremity injuries, attributing this to these areas being more exposed during such events [3]. The high incidence of operative orthopedic intervention reported here is therefore expected due to the predilection of these injuries.

It has been suggested that the incidence of abdominal injuries in the survivors of terrorist attacks tends to be low [1] and this was also seen in this study. However, we may also have not captured the true incidence of this injury as not all surviving victims were received in our facility. Similar to other reports, the predominant cause of the abdominal injuries was due to shrapnel leading to penetration of the abdominal cavity [4].

Another complication related to blast injuries is the development of wound infection. This is not unexpected as the resultant devitalized wounds tend to occur in the setting of high-energy mechanisms with a high likelihood of penetrating trauma and aerosolized environmental matter. Furthermore, these contaminated injuries will only receive attention later on, after addressing more serious ones, which allows enough time for these wounds to be colonized by multiple pathogens including fungi, the latter potentially resulting in invasive fungal infections (IFI) [5]. IFI has identified risk factors, which include dismounted blast injury, traumatic, above-knee amputation or progressive, proximal amputation transition [6]. This highlights the importance of early wound management and the administration of wide spectrum antimicrobials. The incidence of wound infection was relatively high in this study (around 20%). Unfortunately, we did not report the culture results of these infections.

The fact that all the patients are of the male gender is explained by the specific setting where the attacks took place, namely Friday prayers, which is exclusively observed by males in the Islamic faith.

This series is also unique in the sense that the victims studied were presented in a delayed fashion and to a geographically distant location to where the injuries took place. However, the fact that the cases included in this series were only the ones transferred to our facility does present a limitation in reporting such injuries as a significant number of victims either died in their home country or were treated elsewhere. It has been reported that compared to other causes of blasts, the kill:wounded ratio is higher in suicide attacks [7]. The victims included in this study were likely selected for transfer in view of their relative stability. Furthermore, we know from other studies that the pattern of such blast injuries is broader. Mirza et al. conducted an autopsy study and reported that shock due to multiple injuries was the leading cause of death, followed by head injury with or without haemorrhage [8].

Furthermore, transferring patients over such a large distance under suboptimal conditions adds to the potential of further complications which can either be related to inappropriate initial workup and management of these patients, as well as the delay in attending to time-sensitive injuries such as vascular injuries and compartment syndrome. However, the incidence of these complications was relatively low in our study.

CONCLUSION

This study highlighted the complexity of injuries created by modern civil unrest situations. The study also indicated the regional impact from such situations on nearby countries. This study is a pioneering in describing the first wave of repatriated victims from the recent Yemeni conflict.

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