Traumatic Amputation during Current War, Magnitude of Tragedy and complication (Taiz city)

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Abstract— Background: Trauma remains the important cause of limb amputation during war, especially in developing countries as Yemen, which is resulted in use several of weapons as mines. The aim of study to identify indications of traumatic amputation and its complications during war in Taiz-Yemen. **Materials and Methods:** This retrospective study was designed to find indications and outcomes of traumatic amputation, especially re-amputation in Taiz hospitals between 2016-2019. We found 244 patients fulfilling inclusion criteria of traumatic amputation. Non-traumatic amputations were excluded from the study. **Results**: 265 amputations were performed for 244 patients. The mean age was 26.6 ±11.3 years, 234 (95.9%) were males and 10 (4.1%) were females. The patients with lower-limb amputation were 164 (67.2%), upper-limb amputation 72 (29.5%), and both lower and upper limb amputation 8 (3.3%). The main cause of amputation was crushed limb injury due to bomb blast 145 (59.4%). Hospital stay more than 2 weeks was 85 (34.8%). Re-amputation was performed in 42 (17.2%), which was due to wound infection, overgrowth of bone, and unstable stump. **Conclusion:** Limb amputation is life-saving. Our review showed the most common cause of amputation was the blast bomb during war in the city. Furthermore, we found main complication post amputation is re-amputation, which could be decreased with an optimal level of amputation.

Index Terms— Amputation, Indication, Re-amputation, Trauma

1 Introduction

AMPUTATION is defined as partial or complete removal of a limb or part of the body covered by skin surgically or spontaneously.[1] It is considered one of the oldest surgical procedures in human history, which firstly is mentioned by Hippocrates 2500 years ago.[2],[3] When it is performed proximal to the ankle or wrist is called the major amputation.[1] While re-amputation is the removal of bone higher than the previous amputation level.[4] It is only viable option to save the life of patients.[3]

Indications for amputation are varied between countries.[1] Peripheral vascular disease is the commonest indication for amputation in the Western world.[5] Trauma is one of the leading causes to increase the death and disability among the population, which considers the second most common cause of amputation.[6] It may result from penetrating injuries (e.g. bullets, and knives), blunt injuries (such as due to road traffic accidents, falls from heights, etc.), or iatrogenic injuries.[7] In the war, different types of weapons have been used that lead to limb amputation and other body injuries, especially young people.[8]

Complications of amputation may involve early as any operation bleeding and infections.[9] In contrast, specific complications related to amputation comprise bone overgrowth, infection, and pain caused by neuroma that require revision amputation.[10]

2 Patients and Methods

A retrospective study of limb amputations performed from January 2016 to December 2019 was carried out in Taiz-hospitals. A total of 244 patients who underwent 265 amputations were studied. Data were collected on age, gender, residency, indication, level of amputation, and complications. We planned for processing and coding data, computer software to be used (e.g. Statistical Package for Social Sciences / SPSS, choice of statistical methods, confidence levels, significance levels, etc). Results were calculated in the form of frequencies and expressed via tables and figures. The association of each recorded variable had been evaluated by using the Chi-square (x2) in the qualitative category and

t-test in a quantitating category with a P-value of < 0.05 considered as statistically significant.

3 Results

A total of 244 patients had 265 amputations. Male patients were 234 (95.9%) and female were 10 (4.1%) with male to female ratio was 23.4:1.The mean age of these patients was 26.6 ± 11.3 years. The most common age group was between (20-29 years) which was presented by 127 (52%).

Regarding the occupation of patients, 122 (50%) patients were soldiers who underwent limb amputation.

Of 265 limb amputations, we found lower-limb amputation 180 (67.9%) was higher than the upper-limb amputation 85 (32.1%). From 180 amputation in lower-limb, below-knee was the most common level 84 (46.66%) amputation with major to minor limb amputation ratio was 3.8:1. While major to minor upper-limb amputation ratio was 1:1.6 as well as the most common level of upper-limb was minor amputation with 53 (62.35%).

We found the most common cause of amputation was blast bomb, which represented about 145 (59.4%), followed by shells and gunshot injuries were caused 46 (18.9%) and 30 (12.3%), respectively. In addition, we noted 22 (9%) caused by blunt trauma and 1 (0.4%) due to sharp object injury. Figure 1.

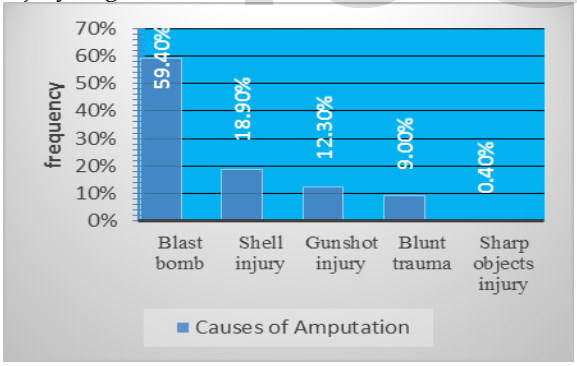

Fig.1. Causes of Traumatic Amputation.

Eighty-nine (73%) soldiers underwent amputation due to blast bomb. Therefore, we found a significant association between soldiers' amputees and the mechanism of injury as blast bomb. P= 0.00

Table (1) shows 75 (30.7%) patients were admitted to Intensive Care Unit. Regarding the hospital stay, admission for more than 2 weeks was represented 85 (34.8%) of patients, which was due to local stump complication and other body injuries. The hospital stay was longer in patients who were admitted to ICU compared to patients were admitted to a ward. P=0.00

About one-third of patients had have wound infection. There were 78% of patients had infected wound were injured by blast bomb, which demonstrated significant association compared to infection with other causes. P= 0.00 However, the mortality rate was reported in 7 (2.9%) as life quality.

Re-amputation was performed in 42 (17.2%) of patients; 36 (85.7%) in lower-limb and 6 (14.3%) in upper-limb. Unsuitable stump length 18 (42.9%), infection 14 (33.3%), and bone overgrowth 10 (23.8%) were the main causes of re-amputation. Figure 2.

TABLE 1
COMPLICATIONS OF TRAUMATIC AMPUTATION

Variable	No =244	%
Place of admission postoperative		
Intensive Care Unit	75	30.7
Ward	169	69.3
Hospital stay		
< 3 days	54	22.1
3-7 days	52	21.3
1-2 weeks	53	21.7
>2 weeks	85	34.8
Appearance of stump		
Infection	82	33.6
Re-amputation	42	17.2
Quality of life		
Recovery	237	97.1
Death	7	2.9

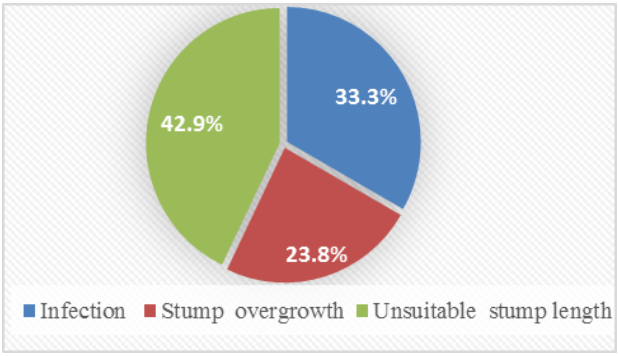

Fig. 2. Causes of Re-amputation.

4 Discussion

The decision of amputation performs after all other options have been finished, which it is often viewed as treatment failure. At the same time, limb amputation is considered the treatment of choice in severe traumatic injuries as the mangled limb. Trauma is still the commonest cause of amputation in developing countries.[11] Sangeeta et al. reported trauma is the main cause of amputation 70%.[12] However, There were not national data reported prevalence and causes of amputation in our country. Therefore, this is considered the first study field of amputation in the city.

The patients in this study were predominantly males 95.9%. This is similar to the findings of other studies in US and Gaza. [13],[14],[15] The young male is the most influence by traumatic amputation because they are more involved in trauma and participated and more likely to engage in risky behavior, especially during war. In our study, the mean age was 26.6 years which was similar to studies in Iran, US, and UK.[16],[17],[18]

Regarding the mechanism of amputation, the explosive injury represented 70% of traumatic amputation by Krueger et al.[19] and 50% among American soldiers amputation during Iraq and Afghanistan wars due to improvised explosive devices Jansen et al.[20], 56% by Barwell et al.[21] During last war, the number of amputation increased due to use modern weapons as explosive drone strikes and tanks in Gaza war.[15] That was similar to our study; the majority cause of amputation was blast bomb injury, which represented about 59.4% followed by shells 18.9% and gunshot 12.3%. In contrast, the blast injuries caused 1.34% among amputees in Pakistan,[22] and in Croatia study 1999, the shell was the most common of amputation related to war that represented 61%.[23] On other hand, in Saudi Arabia was the blunt trauma is the most common cause of traumatic amputation,[24] which was represented 9 % in our study.

Several of recent studies demonstrated traumatic

lower-limb amputation was higher than upper-limb.[1],[2],[24],[22] Similarly, in this study, lower-limb amputation was more common than upper-limb. Below-knee amputation can be used prosthetic walking with less energy expenditure.[25] In this study, below-knee amputation was the most common level of amputation that was similar to other studies.[1], [25],[26] Factors that led to ICU admit and prolong hospitalization were related to the mechanism of injury as explosive weapons and severity of the injury. In recent war increased disabilities and multiple body injuries due to the nature of involved weapons in military conflicts. Admission to ICU post-explosive bomb was 47% Luria et al.[27] This was higher than our study 30.7% of patients were reported admission to ICU. The length of hospital stay was 10 days which was similar to study of Dillingham et al.[28] but prolonged in Eric E L et al.[29] The highest rate of complication was infection in our study, which was as similar to study by Pascale et al.[30]and lower than Ajibade et al.[1]

The study carried out by Aleksandar S et al.[31] reported 12.8% of LL amputation performed re-amputation which was lower than our study 17.2%. In contrast, Vishwakarma N et al.[32] was higher than our study.

5 Conclusion

Trauma is the important cause of amputation in conflict areas as our country, especially working and young age people. The most common cause of traumatic amputation was the blast bomb. Therefore, the amputation accomplished with multiple body injuries that resulted from various types of weapons during wars. The complications of amputation in study were prolonged hospitalization, infection, and stump distortions. In addition, re-amputation was noted in 17.2% of patients of study due to improper stump, infection, and overgrowth of bone.

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