Patterns of extremity traumas leading to amputation in Iran: results of Iranian National Trauma Project

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Objective: To determine the patterns of traumatic extremity injuries leading to amputation in Iran.

Methods: Data of Iranian National Trauma Project was used to identify patients with upper and lower extremity traumas undergoing amputation. This project was conducted in 8 major cities during 2000-2004.

Results: Of 17 753 traumatic patients, 164 (0.92%) had injuries to the extremities that resulted in the limb amputation. Of these, 143 (87.2%) were men. The patient’s mean age was 29.0 years ± 15.4 years and the highest incidence was seen in the age group of 21 to 30 years (34.1%). One hundred and four cases were occupational accidents (63.4%). Blunt trauma was in 54.9% of the cases. The most common reasons for amputation were respectively stabbings (37.8%) and crush injuries (31.7%). Amputation of hand fingers was the most frequent type of amputation (125 cases, 76.2%). One patient died from severe associated injuries.

Conclusions: This study shows the patterns of traumatic limb amputation in Iran, a developing country. Results of this study may be used in preventive strategic planning.

Key words: Amputation, traumatic; Extremities; Accidents, occupational

According to the latest statistics of National Trauma Data Bank (NTDB), the incidents in involving the trauma to the extremities are about one fourth of all admissions to primary care trauma centers (24.2%) and the case fatality rate in such injuries are moderate (3.6%) in the United States.1 Although advances in surgical techniques of repair of injured vessels, bones, nerves, and other soft tissues has minimized the rate of amputation due to these injuries,2 amputation due to extremity trauma is still a major source of morbidity and a potential source of mortality in trauma patients in developing countries.3,4 Similar to other types of trauma, determination of the patterns of these injuries is necessary for establishment of preventive strategies.3

There are a few studies about limb amputation in Iran5-8 which mainly focused on amputation in war victims5,6 or merely focused on traumatic vascular injuries leading to amputation7,8. Thus, the patterns of these injuries has not yet been well defined. In this study we aimed to determine the epidemiologic patterns of extremity traumas leading to limb loss using Iranian National Trauma Project data.

METHODS

During a 4-year period (2000 to 2004), a cross-sectional study was performed as a part of the National Trauma Project in 8 major cities. The study was set up in accordance with the American College of Surgeons National Trauma Registry System (TRACS) and the National Trauma Data Bank (NTDB) using a valid questionnaire. A group of physicians were trained for the process of data collection during several sections. During the study period, the trained physicians visited traumatic patients at their first 24-hour admission to the emergency rooms and wards and completed the questionnaires.9
stay, and the outcome. In this study we divided the ISS into three ranks of <16, 16-25, and >25.

RESULTS

Of 17,753 traumatic patients, 164 (0.92%) had injuries to the extremities that resulted in limb amputation. Of these, 143 (87.2%) were men. Mean age of the patients was 29.0 years ± 15.4 years (range from 2 to 73 years). The highest incidence was seen in the age group of 21 to 30 years (34.1%) followed by the age group of 11 to 20 (25%), Fig. 1. The median time from trauma to hospital admission was 1.1 hours (range from 3 minutes to 12 hours).

One hundred and four cases were occupational accidents (63.4%). Industrial workers were the most injured group with 28% of total amputations and also the first in the list of occupational injuries. The second place was simple workers (21.3% of total cases), which were also the second in the list of occupational accidents. In non-occupation related injuries, students were the first (16.7% of non-occupation related cases and 6.1% of total), followed by children (15.0% of non-occupation related cases and 5.5% of total). Totally, 96.9% (n=156) of subjects had education level of high school diploma and lower and 22% (n=36) of the patients were illiterate.

Seventy four cases were results of penetrating trauma (45.1%) and ninety cases were from blunt injuries (54.9%). The most common single reason for injury was stabbings (37.8%), followed by crush injuries closely (31.7%, Fig. 2). Of total of 26 patients underwent an amputation due to road traffic crash (RTC), car driver or passenger were the most common positions (42.3%, Fig. 3).

Amputation of hand fingers was the most frequent type of amputation (125 cases, 76.2%). Ankle and foot amputations went to the second place with a considerable disparity from the most common type (17 cases, 10.4%, Table 1).

Seven subjects had associated vascular injuries and respectively 105 (64.02%), 26 (15.85%), and 6 (3.65%) cases had ISS ranks of 1, 2, and 3. Other associated injuries have been shown in Figs. 4 and 5. Median of hospital stay was 3 days, ranging from 1 to 54 days. Ninety patients (54.9%) left the center with permanent disability. Transient disabilities, departure with informed consent, refer to another center and complete recoveries were in next order as the primary center outcome. Just one out of 164 patients died (0.6%), due to severity of injuries to other organs.
DISCUSSION

Our results showed amputation rate of about 1% in traumatic patients. Occupational injuries were the most common causes of these injuries. It has been shown that hand and fingers are the most frequent parts of body affected in these injuries\textsuperscript{11,12} and it is consistent with our results that showed high rate of finger amputation. Regarding the age and sex of victims, our results are consistent with previous reports which show most of the traumatic limb amputations occur in young males.\textsuperscript{13-16}

Regarding the level of amputation in upper extremity, our results are similar to the study conducted by Liang et al\textsuperscript{17} that shows most of the amputations occur at finger level. In our series, amputation at the level of ankle and foot was the most frequent in lower extremity traumas, which was not similar to the study conducted by Abbas and Musa\textsuperscript{18} which showed below knee amputation was the most frequent procedure. The difference may be explained by different patterns of traumas in two countries.

Regarding the mechanism of injury, our results showed stabbing was more frequent than RTC that was in contrast with the report from Nigeria.\textsuperscript{3} Moreover, our study showed that blunt traumas-resulted in amputation were more common than penetrating ones. It may confirm that blunt traumas carry worse prognosis than penetrating injuries as previously described\textsuperscript{19,20} and are more likely resulted in amputation. Because most blunt trauma results from falls and motor vehicle accidents and higher energy injuries are more likely to result in vascular injury.

Limitations of this study are those related to retrospective studies. Moreover, as Iranian National Trauma Project focused mainly on epidemiologic aspects of trauma in Iran, we have not the details of preoperative measures and causes of amputations (necrosis, ischemia, infection). Lack of long term follow-up of the patients is another limitation of this study.

In conclusion, this study shows the epidemiology of extremity traumas leading to limb loss in Iran, a developing Middle East country. Results of this study may be used for preventive strategic planning of these injuries.

**REFERENCES**


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