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Education in Traffic
Preliminary Communication
U. D. C.: 614.883:618.2:656.08
Accepted: Sep. 2, 2003
Approved: Apr. 6, 2004

SIGNIFICANCE OF TRANSPORT IMMOBILISATION OF TIBIA AND ANKLE FRACTURE IN CASE OF PREGNANT WOMEN AND OTHER INJURED PERSONS

ABSTRACT

The analysis of the data from the case history of patients with tibia and ankle fractures was carried out to show the significance of identifying such conditions and the consequent implementation of transport immobilisation as the first step in treating the injured persons. The implementation of transport immobilisation in indicative conditions should be imperative in providing first aid regardless of who is providing it (a layman or a medically educated person). The tibia and ankle fractures are easily identifiable and it is not difficult to diagnose them.

The data that have been gathered lead to considering the level of education or negligence of the participants included in the first aid chain. Taking into consideration the facts that the number of traffic accidents is increasing in the world, that Croatia is at the very top of the list regarding the number of fatalities per capita, that the timely and properly provided first aid reduces the frequency of complications of the injury itself, thus causing the reduction of the treatment costs, in our opinion immobilisation as one of the aspects of providing first aid did not lose its actual significance, but acquired additional significance within the framework of increased and higher-quality possibilities of providing first aid.

KEY WORDS

transport, immobilisation, pregnant women, tibia and ankle fractures

1. INTRODUCTION

The notion of immobilisation means the procedure of rendering the injured part of the body immovable.

As part of first aid, the temporary so-called transport immobilisation is carried out, in the attempt to prevent deterioration of the existing injury for which it is known or assumed that it exists based on the clinical

signs, i. e. to prevent a closed fracture from becoming an open fracture or to prevent secondary damage of soft tissues (muscles, nerves, blood vessels), and to reduce at the same time the pain during the transport of the injured person to hospital.

Immobilisation should be the first step in providing first aid, and it should be a procedure used in traffic accidents in the following cases: bone fracture or suspicion of a fracture, dislocation of joints, extensive injuries, burns, crushed extremities, and in case of open injuries especially those combined with haemorrhage which require application of Esmarch's bandage.

If immobilisation is applied as form of treatment then we speak of the therapeutic immobilisation.

Analysing the data from the case histories of patients with tibia and ankle fractures, it is necessary to indicate the importance of identifying such conditions and of consequent implementation of the transport immobilisation as the first step in the medical treatment. The application of transport immobilisation in indicative cases should be the imperative in first aid regardless who administers it (a layperson or a medically trained person). The tibia fractures are more easily identified than the fractures in the region of ankle, where dislocations (subluxations and luxations), and sprains (distortion) of the joints (Figures 1, 2) are more frequent, very often with similar or equal clinical picture. In all the mentioned cases the immobilisation has to become the basic form of first aid administered by the laymen. The data gathered make us consider the level of education and negligence of the participants included in the first aid chain (2, 7, 8).

The medically untrained persons (laypersons) that have attended driving schools, and are now actively participating in traffic, had to attend the course and sit



Figure 1 - Fracture of both lower-leg bones

for the exam in first aid. The curriculum provides also the training in the basic principles of administering first aid in the form of immobilisation of the injured part of the body. The analysis of the gathered data has resulted in a disappointing fact about the poor quality of administering first aid by the laypersons, including the ignorance and failure of engagement in cases when the transport immobilisation is of extreme importance.



Figure 2 - Fracture of the external part of the tibia and the ankle joint

The level of quality of the first aid administered to the victim by a medically trained person, of secondary, post-secondary and university qualifications, represents a new and more significant problem in the first aid concept. In medically non-trained persons the lack of knowledge and failure of involvement can be partly understood and justified for the simple reason such as fear of making a mistake, but it cannot be acceptable when medical personnel has lack of knowledge or does not apply immobilisation in cases when clear medical indications for it exist, and this leads to the issue of the level of qualification and of moral-ethical correctness of their handling and eventually of their responsibility.

Taking into consideration the facts that the incidence of traffic accidents in the world is increasing, that Croatia is at the very top regarding the number of fatalities per capita, immobilisation as a form of first aid has not lost its significance but has acquired new, additional significance in the framework of increased and higher-quality possibilities of administering first aid.

2. TREATMENT

The analysis of data of patients admitted because of the tibia and ankle fracture at the Klinika za kirurgiju (Accident Surgery Clinic), KBC - Zagreb in the period from 1 January 2001 to 31 December 2002, showed the total number of 134 examined and subsequently treated patients. The medical treatment included 70 female persons and 64 male persons, which

does not represent any significant difference in the share per gender (Table 1). Out of the total number of female persons, 4 were pregnant.

Table 1 - Distribution of patients treated acc. to the stated diagnosis per gender

gender	females	males	total
number	70	64	134
percentage	52.23%	47.76%	100%

The admitted patients were on the average middle-aged persons, 50.01 years, and the injuries were results of falls or traffic accidents. The youngest patient was 17 and the oldest one was 90 (Table 2).

Table 2 - Distribution of patients treated acc. to the stated diagnosis per age

average age	the youngest person	the oldest person
50.01	17	91

During the gathering of data, and later during their analysis, special attention was paid to the data that referred to the transportation method of the injured persons to the Klinika za kirurgiju (Accident Surgery Clinic), i. e. whether the injured person arrived by ambulance, passenger car or on foot, and who accompanied the person (physician, some other medically trained person, medically untrained person or unaccompanied). The attention was paid also to data about the first aid i. e. whether it was administered and if yes, who administered it, what was the quality i. e. adequacy of the administered first aid. The data on the adequacy of first aid referred to the fact whether immobilisation was applied in the situation when there were indications for it, and the data on quality re-

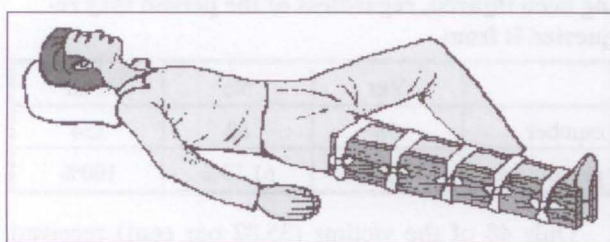


Figure 3 - Immobilisation using improvised immobilisation means

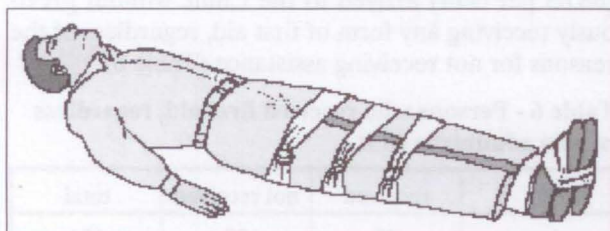


Figure 4 - Immobilisation using improvised immobilisation means

ferred to the type of immobilisation means that were applied: means of standard immobilisation (Cramer's, pneumatic splint, etc.) or means of improvised immobilisation (leg to leg, board, etc.) (Figures 3, 4).

One of the aspects of gathering data was also a questionnaire which contained, among others, the following question: Before coming to hospital, did you report to any physician of general medicine or any other person of medical or non-medical training for first aid?

3. RESULTS

During the twenty-four-month period from the beginning of 2001 till the end of 2002 a total of 1480 patients were admitted at the Klinika za traumatologiju (Accident Surgery Clinic) KBC – Zagreb, out of which 134 patients were admitted because of the tibia and ankle fracture which accounts for 9.05% of all the admitted persons. (Table 3)

Table 3 - Patients admitted with the diagnosis of tibia and ankle fracture in relation to the total number of patients admitted at the department of accident surgery

	total number of admissions	fractures of tibia and ankle
number of the admitted	1480	134
average	100%	9.05%

The clinical picture of the fractures of bone structure of tibia and ankles is easily identified: the pain and loss of the function of the injured extremity, deformity above the injured bone and swelling, open wound, and it is impossible to understand the uncertainty of the person administering the first aid about whether the case requires immobilisation or not.

The clinical report of pregnant women should certainly mention that apart from the increased pain as result of injury, the psychical assistance is important because of the fear for the result of her pregnancy. It is very important to know the month of pregnancy, and whether during the injury the abdomen of the pregnant woman was subjected to any impact. In any case, for a detailed surgical treatment the pregnant woman must identify the pregnant condition (X-ray, surgical treatment) and the gynaecologist has to be included in the treatment through gynaecological examination and by the ultrasonic scanning. During pregnancy, all the organs are exposed to changes so that the pregnant woman and child-bearing women often react differently to the injury. During the pregnancy the plasma volume increases by 40 – 50 per cent until the end of the first quarter, and the maximum in-

crease of the volume occurs between the 28th and 32nd month of pregnancy. The mass of erythrocytes is also increased in the process, but at a lower rate than in case of the plasma volume. The consequence is that during pregnancy dilution anaemia often occurs, with respective low reduction of hematocrits. The pregnancy thus insures natural protection against the loss of blood expected during birth, and the moderate loss of blood in pregnancy does not present a major problem. In case of the pregnant women suffering trauma, a prolonged haemorrhage may be masked by the described changed hemodynamic condition. The clinical loss of blood of up to 2000 ml (30%) is difficult to identify in case of pregnant women suffering trauma. The assessment of the condition and method of treating the pregnant women with trauma can also be affected by other cardiovascular changes during pregnancy. Blood pressure in pregnancy falls by approximately 15 – 20 per cent reaching the lowest point in the 28th week of pregnancy. Another important hemodynamic effect that needs to be taken into consideration in treating the pregnant victim of trauma is hypotensive action while lying on the back. In the late phase of normal pregnancy, a significantly increased gravid uterus can cause aorto-caval compression, resulting in 25 per cent reduction of the heart operation. In case of trauma-caused haemorrhage, hemodynamic instability in case of aorto-caval compression may become acute. The application of the lumbar support, manual lateral moving of the uterus, or lateral inclination of the patient may help in reducing the uterine aorto-caval compression. The cardio-respiratory changes are also manifested during the normal pregnancy. Ventilation increases within a minute by 50 per cent, primarily because of the increase of the volume of breathing in and out. Thus, a pregnant woman is less tolerant to apnea, and hypoxemia occurs much faster than in non-pregnant women. Blunt impact-generated trauma can be caused by traffic accident, accidental fall or violence. Traffic accidents often result in traumas caused by blunt impact and the most common cause of the death of the fetus in the mentioned situation is the death of the mother. Falling out of the vehicle combined with the head trauma is related to poorer chances for the fetus. The abruptio placentae is related to the trauma caused by blunt impact. The main aim of treating the pregnant woman must be the identification and stabilisation of vital signs of the mother. Although specific fetal interventions are important, the initial attempts at stabilisation have to be as a rule directed towards the mother, rather than the condition of the fetus. The majority of circumstances that cause the instability of mother are also fatal for the unborn child. At the beginning of the treatment one should not underestimate the assessment and attention of the potentially life-endangering

injuries of the mother by extensive evaluation of the fetus.

Immobilisation, especially, therapeutic one, in pregnant women and also in persons with the diagnosed venous problems and /or family inclination related to the risk of deep venous thrombosis. In the mentioned groups of people it is essential, simultaneously with applying the immobilisation, to place the injured extremity in a higher position, and possibly administer some anticoagulant (Andol).

The analysis of the gathered data showed that 36 of the victims (23.37 per cent) arrived to hospital unaccompanied, and the remaining 98 were accompanied. In 56 cases (41.79 per cent) these were medically trained persons who were not necessarily part of the first aid team, 42 persons (31.34 per cent) were accompanied by the medically non-trained persons, mainly relatives or friends (Table 4).

Table 4 - Accompanying persons, i.e. method of arrival of the injured person to the clinic

	unaccompanied	accompanied by: emergency medical team, MOO	MNOO
number	36	56	42
average	23.37%	41.79%	31.34%

MOO-medically trained persons, secondary, post secondary and university qualifications
MNOO- medically non-trained persons, laypersons

Out of 134 victims, 58 (43.28 per cent) requested first aid assistance of persons of medical or non-medical profession, whereas the remaining 82 (61.19 per cent) arrived to hospital without previously asking for advice or assistance (Table 5).

Table 5 - Patients who requested first aid after having been injured, regardless of the person they requested it from

	Yes	No	total
number	58	82	134
percentage	43.28%	61.19%	100%

Only 48 of the victims (35.82 per cent) received some form of first aid, ten were not admitted although requiring assistance. Thus, 92 of the injured persons (68.65 per cent) arrived to the Clinic without previously receiving any form of first aid, regardless of the reasons for not receiving assistance (Table 6).

Table 6 - Persons who received first aid, regardless of who administered it

	received	not received	total
number	48	92	134
percentage	35.82%	68.65%	100%

Although all the patients showed signs indicating fracture, only in 44 of the injured (91.66 per cent) immobilisation was applied, whereas the remaining 4 persons (8.33 per cent) were sent to the Clinic for immobilisation receiving some other form of first aid (infusion, analgetics, etc.) (Table 7).

Table 7 - Relation between application of immobilisation i.e. non-application as part of the first aid

	no immobilisation	with immobilisation	total
number	4	44	48
average	8.33%	91.66%	100%

Out of 48 victims who received first aid, 34 (70.83 per cent) were attended by medically trained persons (secondary, post-secondary and university qualifications), and the remaining 14 (29.16 per cent) received assistance by medically non-trained persons (Table 8).

Table 8 - Persons administering first aid

	MOO	MNOO	total
number	34	14	48
average	70.83%	29.16%	100%

MOO-medically trained persons, secondary, post-secondary and university qualifications
MNOO- medically non-trained persons, laypersons

Improvised immobilisation means were applied in 40 cases: in 36 cases (62.50 per cent) Cramer's splint was used, and in 4 cases (8.33 per cent) the pneumatic splint (Table 9).

Table 9 - Type of applied immobilisation

	Cramer's splint	Pneumatic splint	improvised means	total
number	30	4	14	48
average	62.50%	8.33%	29.16%	100%

Cramer's splint and pneumatic splint – standard means of immobilisation

4. DISCUSSION

As one of the basic principles of administering first aid, immobilisation was first mentioned during the First World War when it was the obligatory first aid method for all the injured persons in the region of the Alliance forces. Medically trained persons as well as soldiers had the obligation to administer such first aid, since they had passed the basic training in first aid provision. (6)

Because of the road traffic development, easy availability of the transport means and increased incidence of traffic accidents, it is necessary for all the ac-

tive and passive traffic participants to have the knowledge of the basic principles of administering first aid. In Croatia, the mentioned first aid rules are taught within the curricula at: driving schools, Faculty of Transport and Traffic Engineering, Traffic Department, Police Schools, Fire-brigade schools and within the activities of the Red Cross.

Since the education level of the medically non-trained persons is limited, it cannot be expected that they will comply with all the rules of proper immobilisation (immobilisation of two adjacent joints, taking physiological position of the injured extremity). However, the fact is that all the active traffic participants have the obligation to get maximally engaged in administering first aid in accordance with their knowledge and the given possibilities.

The transport immobilisation of the injured extremity can be done by improvised or standard means of immobilisation. The improvised means of immobilisation are used in the situation when the injured leg is immobilised by means of the healthy leg (e. g. shirt used to bind the extremities together), and there are no standard immobilisation means available. Standard immobilisation means include Cramer's and pneumatic splint. The mentioned splints can be usually found in the ambulance and in the emergency surgical clinic. Cramer's splint has been used for a hundred years and in the last thirty years in the western countries it is being replaced by the pneumatic splint. The pneumatic splint, which is rarely used in Croatia, should be preferred over the Cramer's splint in case of immobilising the injured extremity. It is easier to apply, it enables optimal positioning of the injured part of the body, the patients feel less pain, and it simultaneously performs the amortisation of movements during transport. (1, 2, 4, 5, 6)

The analysis of data that were included in our work, attempts to indicate the worrying fact which says that the active as well as the passive traffic participants, whose first aid administered to a person injured in the traffic accident should be absolute imperative, are non-trained (insufficient and inadequate information and poor skills) in the mentioned area of administering first aid.

The persons who should provide first aid have been divided into two groups: medically non-trained and medically trained persons.

In our opinion the inadequately administered first aid in these two groups does not represent the same problem.

The first problem is the issue of the reason why a layperson only reluctantly decides to administer first aid, whether the problem lies in insufficient and inadequate education or in the fear from blood and injuries. The second problem refers to the fact that only one fourth of the injured persons report to their physician

before going to the emergency clinic, and that the form of first requested and then received first aid was inadequate. This fact is of significantly greater importance over the non-administered first aid by the layperson since the physicians are educated during their study and prepared to administer proper first aid, and besides they have the obligation, as all medical personnel, for constant education in this field of medicine.

The results of our research are worrying since they indicate the fact that as many as 67.17 per cent of the injured persons arrive to the emergency surgical clinic without any immobilisation in the situation in which it had been indicated and necessary. The failure to administer first aid means that the injured person suffers additional pain during transport, increasing also the danger of additional injury.

It is necessary to indicate the utmost need for permanent education and training in case of medical workers, as well as in case of medically non-trained persons, the laypersons. (5,7,8) Permanent education means teaching persons about the first aid principles, with the education starting at the earliest possible age (kindergartens, schools) all the way to old age, with the syllabus adapted to the age and level of education. The project costs should be shared and financed by the responsible Ministries (Ministry of Education and Culture, Ministry of Maritime Affairs, Traffic and Communications, Ministry of Health, etc.).

5. CONCLUSION

The analysed data during the two years indicate that the tibia and ankle fractures account for 9.05 per cent of all the admittances at the Accident Surgery Clinic - KBC - Zagreb. The majority of the injured persons admitted to the ward due to the mentioned indications had to be surgically treated. The surgical treatment was not done on patients whose fractures did not require hospitalisation so that they were treated at the clinic - as outpatients.

The average age of the injured persons was 50. The female persons (52.23 per cent) indicate a somewhat greater frequency of the mentioned fractures compared to the male persons (47.76 per cent) but without any major significance.

Only 58 injured persons (43.28 per cent) requested first aid, and only 48 (35.82 per cent) received it. In 44 persons (91.66 per cent) the transport immobilisation was applied, so that it may be said that the injuries in these cases were properly treated. Assistance to these persons in 34 cases (70.83 per cent) was performed by the medically trained persons and in the remaining 14 cases (29.16 per cent) by the medically non-trained persons.

The dominant immobilisation means in Croatia is still the Cramer's splint. The pneumatic splint is rarely used although in our opinion it has the priority over other immobilisation means because of easier application, better immobilisation of the fractured bone fragments and for the patient - a less painful immobilisation method. The improvised immobilisation means are applied rather rarely.

The especially worrying fact is related to the data that 92 of the injured persons (68.65 per cent) arrived to the Clinic without previously receiving any form of first aid. In spite of the fact that there were signs of fracture, these persons were not immobilised.

It may be concluded that the awareness of the population (medical and non-medical persons) about the significance of the transport immobilisation is insufficient and that there is need to improve the quality of education of the persons in administering first aid.

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SAŽETAK

ZNAČENJE PRIJEVOZNE IMOBILIZACIJE KOD PRIJELOMA POTKOLJENICE I GLEŽNJA KOD TRUDNICA I OSTALIH POVRIJEĐENIH OSOBA

Analizirajući podatke povijesti bolesti bolesnika s prijelomima potkoljenice i gležnja željeli smo ukazati na važnost prepoznavanja takvih stanja i posljedичnu primjenu prijevozne imobilizacije kao prvog koraka u zbrinjavanju i liječenju povrijeđene osobe.

Primjena prijevozne imobilizacije kod indikativnih stanja morala bi biti imperativ u pružanju prve pomoći bez obzira tko je pruža (laik ili medicinski obrazovana osoba).

Prijelomi potkoljenice i gležnja su lako prepoznatljivi i u njih nije teško posumnjati.

Podaci koje smo prikupili potiču nas na razmišljanje o educiranosti ili nemaru sudionika koji su uključeni u lanac pružanja prve pomoći.

Uzevši u obzir činjenice da je incidencija prometnih nesreća u porastu u svijetu, da se Hrvatska nalazi na samome vrhu po broju unesrećenih po glavi stanovnika, da se pravodobnom i pravilno pruženom prvom pomoći smanjuje učestalost komplikacija same povrede čime se utječe i na smanjenje troškova liječenja, smatramo da imobilizacija kao jedan od vidova pružanja prve pomoći ne samo da nije izgubila na aktualnosti već je i dobila novo značenje u okvirima povećanih i kvalitetnijih mogućnosti pružanja prve pomoći.

KLJUČNE RIJEČI

prijevoz, imobilizacija, trudnica, prijelomi potkoljenice i gležnja

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