DURING THE FIRST WORLD WAR AND THE SECOND WORLD WAR MORE THAN 80 % OF WOUNDED PERSONS HAD INJURIES OF UPPER OR LOWER LIMBS. IN THE RECENT WAR IN THE FORMER YUGOSLAVIA THE PERCENTAGE OF PERSONS WITH THESE INJURIES WAS ABOVE 80%. EACH WAR IS ALSO CHARACTERIZED BY THE HIGH PERCENTAGE OF WOUNDED PERSONS WITH AMPUTATIONS OF UPPER OR LOWER EXTREMITIES. THESE AMPUTATIONS OCCURRED MOSTLY IN THE CASES OF POLYTRAUMA. IN OTHER CASES WE FACED WITH SEVERELY WOUNDED EXTREMITIES WITH AN EXTENSIVE DESTRUCTION OF SOFT TISSUES, BONES, BLOOD VESSELS AND JOINTS, WHERE THE AMPUTATION IS THE ONLY POSSIBLE INTERVENTION TO SAVE THE PATIENT. IN THE PREVIOUS WORLD WARS, THE SURGEONS HAVE TRIED TO SHORTEN THE TIME OF TREATMENT AND TO ACCEPT THE SURGICAL TECHNIQUE, BY THE APPLICATION OF PRIMARY SUTURE OF THE WOUND. DURING THE AGGRESSION ON BOSNIA AND HERZEGOVINA WE WERE FACED WITH A LARGE NUMBER OF WOUNDED PERSONS WITH AMPUTATIONS I.E. CASES WHERE WE APPLIED THE PRIMARY SUTURE. THE RESULTS WERE STILL SURPRISING AND IN MANY CASES THE WOUNDS HAD PRIMARILY HEALED. THE RESULTS WERE BETTER WHEN THEY WERE USING PRIMARY SUTURE ON THE UPPER EXTREMITIES, MEASURED AT 61.9 % WHILE THE PERCENTAGE OF USING THE SAME SUTURE ON THE LOWER LIMBS WAS OF 48.8 %. THE RESULTS OF THE WAR YEAR 1995 WERE IMPROVED IN COMPARISON TO THE PERCENTAGES LISTED ABOVE. THE STATISTICAL ANALYSIS INDICATED THAT EARLY APPLICATION OF THE PRIMARY SUTURE TO THE AMPUTATION WOUND WAS POSSIBLE AND LARGELY SUCCESSFUL, BUT, ONLY WHEN PERFORMED UNDER CERTAIN CONDITIONS. KEY WORDS: WAR AMPUTATION WOUND, PRIMARY SUTURE, CONDITIONS FOR PRIMARY SUTURE.

1. INTRODUCTION
Experience from the World War the Second, where German surgeons applied the primary repair of war wounds by amputation and the high number of infections and the disastrous results were the reasons why they were quickly abandon their primary suture(s). Vietnam War doctrine and the Red Cross rules eliminate primary suture of an amputation wound and they recommended the secondary wound closure. In the period after the Second World War and Vietnam War surgical approach was improved, operative technique improved as well as pharmaceutical industry gave a wide range of broad-spectrum antibiotics with the effective actions (1, 2, 3, 4).

2. METHODOLOGY
In overview of the short history of wound treatment we need to mention some important events: a) beginning of the 16th century, Italian surgeon, Giovanni Da Vigo (1514.) was pointing on the war wound contamination and he suggested the wound treatment with a glowing item or with boiling oil, b) dr. Ambroise Pare (1500–1510) did introduce the artery ligation, c) King’s Louis XV surgeon, Dr. Henry Francois Ledran was a first who was performing a wound debridement after treatment in 1865, d) in 1876, Dr. Morell in France, followed by Dr. Esmarch in Germany did introduce an extremity supporter, which was preventing a blood loss, e) Dr. Antonius Mathijens was a first who inaugurated the gypsum bandages, e) Dr. Nikolai Ivanović Pirogoff (1830–1881) and Dr. Louis Oliver (1825–1900) did introduce the immobilization as a method of the wound treatment (5, 6).

A broad spectrum of war injuries was result of the development of the modern, sophisticated and highly effective war technology and war weapons. Amputations were always present in a big number and in all wars. The percentage of wounded people with extremities wounds was usually higher than 80 % (1, 2, 3). In the past, these wounds directly or indirectly contributed to a high mortality percentages. Special problem for negative development were the wound infections (1, 2, 4, 7).

This work represents the retrospective study of the orthopedic-surgery department during the Bosnian War, from 1992 to 1995. We observed the surgically treated patients in the Cantonal Hospital Zenica and these patients were also studied in the course of further treatment and rehabilitation.

With the development and implementation of anesthesia, and with pharmaceutical industry developing more
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effective wound healing medications the wound treatment became more and more successful and mortality percentages started to decrease.

3. RESULTS

Primary wound suture was applied and used during the war in Bosnia and Herzegovina (1992-1995), due to the lack of experience and knowledge of the war doctrine. The fairly high percentage success of primary suture of the amputation wound was showing that it can be used like a method of treatment. We analyzed total of 528 patients treated in our hospital. This method had a success in a 61.9 % of treated upper extremities cases and in 28.8% patients with the wounded lower extremities. These percentages represent the averages for almost 4 years long war. If we were looking just at year 1995, the last year of the war, the success of applying primary suture on war amputation wound was much higher. (Figure 1, 2 and 3).

Due to our results we concluded that the primary suture of war amputation wound can be successfully used, but only under certain conditions: a) operations should be performed in a civil or war hospital, b) educated teams and equipment are crucial, c) transportation of the wounded should last up to maximum of 6 hours, d) shock prevention should be done by utilizing the appropriate immobilization, supporter, rehydration, analgesic treatment, according to current guidelines for this type of trauma (3, 8) (Figure 4 and 5).

4. DISCUSSION

During the war in Bosnia and Herzegovina, the war doctrine (e.g. from the Vietnam War experience) it was considered that use of the primary suture to the amputation wound is “vitium artis” - and the suggestions were to use the following treatment elements: a) correct wound debridement, b) antibiotics application, c) wound bandaging and gradual removal of the death tissue (i.e. necrectomy), d) when the infection is solved out, to make a definite, secondary suture, e) delays in the application of the primary suture can be used, just in cases where the infection did not develop (7, 8, 9, 10).

The armies of the highly developed countries, with their highly modern equipment, mobile and trained military hospitals and staff can perform these tasks in a fairly easy manner. These armies have sufficient quality stuff, rich and adequate equipment, properly organized military hospitals and accurate transportation.

Unfortunately, the underdeveloped countries lacked many crucial factors (i.e. educated staff, equipment, medical supplies, means of transportation,
and this all could be seen during the war in Bosnia and Herzegovina. Founding of the fast and successful treatment was dictated in these situations by a big number of wounded. Treatment recommended by the Red Cross was impossible to apply due to lack of hospitals, small number of hospital beds, lack of medical supplies, etc. It was impossible to carry out a series of anesthesia, series of wound treatments (e.g. partially progressive necrectomy), series wound bandaging until the applying of secondary wound suture (10, 11, 12, 13, 14).

The primary wound suture produced a good results and it was recognized as a correct and possible solution. The success of this suture was much more important in conditions, which, the highly developed countries “enjoyed” during the war (3, 8).

5. CONCLUSION

The primary suture of the war amputation wound can be successfully applied in many scenarios. Surgeons’ experiences from the war in Bosnia and Herzegovina was showing that it was possible to perform this method, provided that the right conditions were met, such as: a) good equipped military or civilian hospital, b) educated teams who mastered the latest surgery techniques, c) transport must be completed within a 6 hours, preferably less, d) therapy and prevention of shock from the moment of injury, during the transportation, until the final treatment (e.g. mobilization, support, rehydration, analgesics, and tetanus protection) has to be done (3, 8).

REFERENCES