Microsurgery in War Wounds

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Introduction

As Sergeant Surgeon to King Charles II, Richard Wiseman (1622-1676) described the war wounds: "Wounds made by gun-shot are the most complicate sort of wounds that can be inflicted: For they are not only solution of continuity, but have joined with them contusion, attrition and dilacerations, in a high vehement kind. To this we may add all sorts of fractures and accidents, as haemorrhagia, inflammation, erysipelas, gangrene, and sphacelus; besides the extraneous bodies which are violently carried into the wound, and multiply indications...."(1).

Against our initial thoughts, when we compare the water colors of patients from the First World War with the pictures of patients that we currently deal with at the Military Hospital today, the characteristics of the wounds are amazingly similar.

However some of the current war wounds are worst, especially those caused by the non-conventional arms like the antipersonnel mines. Those arms were not used during the First World War and some of them are sadly our own patrimony. The non-conventional arms we are dealing with more extensive injuries and harder to treat, recently I have to see one patient who had lost the legs, the eyes and one hand.

The treatment of the war wounds has been a challenge, in the First World War the tube flaps were the cornerstone of the plastic Surgery in the treatment of complex injuries, with impressive results; but with the disadvantage of the need of several surgical procedures and some bizarre uncomfortable positions. Today microsurgery is the ideal method to transfer - in one surgery- great amounts and kind of tissues, providing the necessary elements to reconstruct the complex war wounds.

Figure 1: Water Color of patient injured during the First World War (1918).From the Gillies Archives of the Queen Mary's Hospital, Sidecup, UK. Figure 2: Digital picture of patient of the Military Hospital in Bogotá, Colombia (2002).

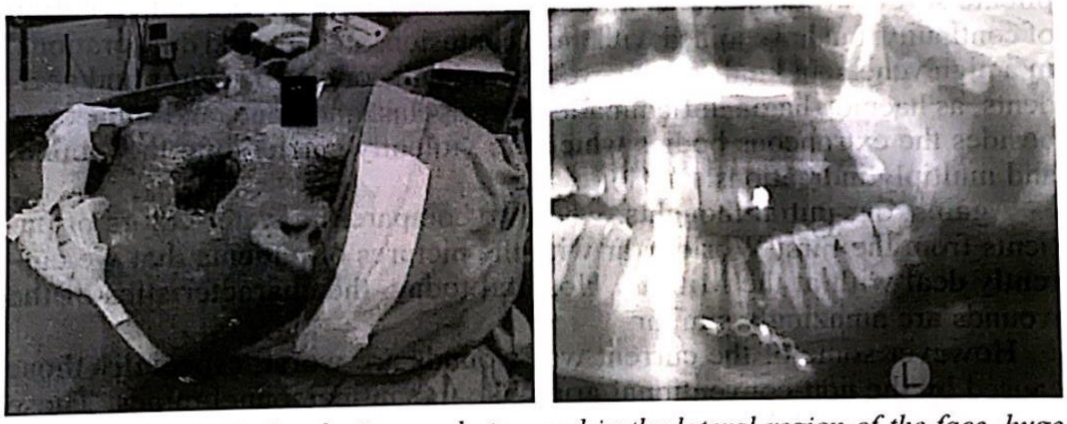

Figure 3 and 4: High velocity gunshot wound in the lateral region of the face, huge salivary fistulae, complete lesion of facial nerve, severe lesion of the parotid gland, complete loss of mandible angle, ascending ramus and condyle.

Material and Methods

During 6 years the senior author performed 161 free flaps in 158 patients, 61 free flaps were used for war wound (WW) reconstruction and the other 100 for pathologies non war wound (NWW) related.

Against Dr. Godina recommendations (2) about timing in the reconstruction of severe wounds, the microsurgical reconstruction of the WW was done after 72 hours. In our Hospital the timing of reconstruction of WW is almost impossible to modify, because the casualties happen faraway in the countryside, the patient has to be evacuated from the "battlefield", treated in lo-

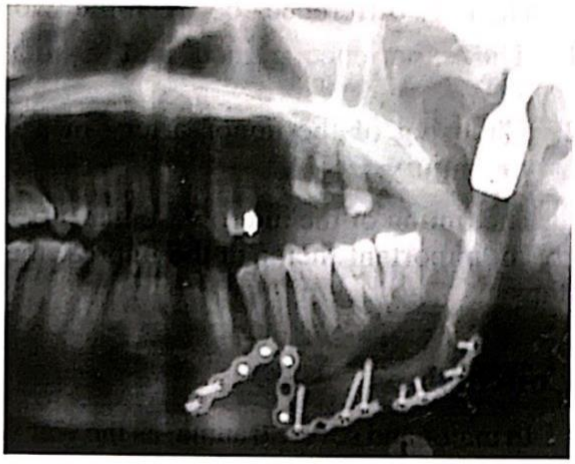

Figure 5 and 6: postoperative pictures the surgical treatment. The mandible was reconstructed with a fibula free flap with one osteotomy, condyle prosthesis was placed at the end of the fibula. Because the facial nerve was broken at the stylomastoid foramen the ENT got the facial nerve into the temporal bone and a sural nerve graft was used to bridge it with the zygomatic branch of the facial nerve.

cal hospitals and just the very complex cases are sent to the Military Hospital after some days. Even if the patient arrived to the hospital into the first 3 days of injury we would not be able to reconstruct this patient into the first 72 hours, due to administrative issues.

Our hypothesis was "The time elapsed from the injury and the free flap is not an important factor in the success rate of those free flaps performed in acute wounded patients".

To evaluate the final success rate of the free flaps, they were divided in two groups for the purpose of review. Group 1 free flaps performed between August 1996 and July 1999. Group 2 free flaps performed between August 1999 and august 2002. The NWW free flaps were used as control in both groups. The time elapsed from the injury to the final surgery, the age, the free flap; the recipient vessels and the success rate were recorded in each patient. The results were compared.

Results

Group 1 (1996-1999). 35 free flaps for WW reconstruction. Control group of 51 free flaps for NWW reconstruction. Average of time elapsed from the injury to the final surgery 15.9 days. Failure rate in war wound free flaps 11.4%. Failure rate in non war wound control group 0%.

Group 2 (1999-2002). 26 free flaps for WW reconstruction. Control group

of 49 free flaps for NWW reconstruction. Average of time elapsed from the injury to the final surgery 23.2 days. Failure rate in WW free flaps 3.8%. Failure rate in NWW control group 2%.

The only differences between the two groups were:

1. The experience gained in the microsurgical reconstruction of the WW.
2. Choosing of the donor artery in a different muscle compartment of the injury.

The timing of the micro vascular procedure in relation to the injury was not an important factor in the improvement of the survival rate of the free flaps.

Conclusions

In major and severe trauma, as the war wounds, the free flap reconstruction is a powerful tool. There is a tendency to have a higher failure rate in free flaps performed to patients with war wounds than to patients with other pathologies (congenital, cancer, accidents), but it is important to understand that these patients have limited or not other options of treatment, as shown in the clinical cases.

We have had an improvement in the success rate in free flaps for war wounds as we gained more experience and when we used the compartment concept to choose the recipient vessels, in our series the time elapsed from the injury and the final surgical treatment was not an important factor in this improvement.

Compartment concept: The extension of the fibrosis occurs along the same compartment of the injury surrounding the vessels, but if we use vessels of different compartment they are free of fibrosis and the risk of failure is lower. For several micro surgeons the posterior tibial artery is safer as recipient than the anterior tibial artery, the physiological explanation is that most of the injuries treated with free flaps in the leg are in the anterior compartment.

The Real Surgery Needed

The final results are still far from the normality, and the suffering of our patients is not measurable but it is huge. The prevention is the answer in every disease, but what we as physicians could do to prevent the war? What have we done to prevent war? Is it possible to prevent war a disease? The ironic issue is how the human being has been able to control diseases that killed our forebears in millions –plague, cholera and typhus-, but not war. The etiology of war is the human being by itself, and should be easier to cure it. The war as disease has mutated faster than the efforts to control it, as a matter of fact has been "improved". The only option is the education of our children in a non-violent culture, respecting the others and thinking in their needs.

The origin of war, ten thousand years ago, was the difference of opportunities between agricultural communities in the river valleys with the hunting societies (3), and it is the difference of opportunities the etiology of most the today's conflicts.

Just as war begins in the minds of men, peace also begins in our minds. The answer is the *Microsurgery of Our Mind*. The same specie who invented war is capable of inventing peace. The responsibility lies with each of us, as we direct to our children into a culture of non-violence, were the respect and solution of the others needs is our goal.

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