

Combat Wound Induced Prosthetics

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Abstract— This paper will attempt to briefly cover the extremely broad topic of prosthetics. It will mainly focus on the causes of modern day amputees, and in this case we will focus on veterans who received their wounds from IEDs in either Iraq or Afghanistan. It will also briefly discuss the main types of prosthetics and power sources and what researchers are hoping to see sometime in the future. As well as explain the importance of inculcating the amputee soldier back into a normal every day routine after dealing with such hardship.

I. INTRODUCTION

Modern technological advances afford today's soldier many opportunities and chances at leading a normal life after having an extremity amputated due to combat related injuries/wounds. Unlike amputees in the civil war, the chance for a double leg amputee to walk is not only possible, but it is likely. These modern day prosthetics can emulate the actions and movements of able-bodied human extremities with great accuracy.

From my limited experience in the Army I received insight into the truly brutal nature of IEDs (improvised explosive devices) and their effect on U.S. Soldiers who have experienced an IED attack. In severe cases, soldiers must undergo an amputation of either an upper or lower extremity in order to save their life. Although both the wars in Iraq and Afghanistan have lower casualty rates than previous engagements in US history, the use of IEDs is rapidly increasing, causing a growth in amputee veterans.

These amputee veterans rely on modern biomechanics to produce aforementioned prosthetic limbs that will allow them manipulate the world around them as if they had never lost a limb. Inculcation of these amputees into a normal routine is imperative for the well-being of our nations veterans, and should be of the utmost importance in biomechanical/medical research.

II. TYPES OF PROSTHETICS

If we look at prosthetics in a general sense we can see that there are 4 main types of prosthetics that are commonly seen in veterans of today's wars. The first, transradial prosthesis, is an artificial limb that does not involve the creation of an elbow joint. Or in other words the arm was amputated below the elbow. Next we have transhumeral prosthesis, which similar to transradial prosthesis involves an artificial upper extremity, but this time the arm has been amputated above the elbow. Due to the complex nature of the elbow, this makes mimicking the movement of an able-bodied elbow very

difficult which calls for more advanced technological mechanics to be emplaced. The last two types of prosthesis that will be covered in this paper involve the lower limbs. Transtibial prosthesis are used in patients who have had a leg (or both) amputated below the knee. The last type of prosthesis, considered by many to be the most complex, is transfemoral. Transfemoral prosthetics have to in a sense recreate the motions of the knee joint, and must also be able to provide balance and support for the rest of the patients body.

III. FUTURE ADVANCEMENTS

TODAY THE MOST COMMON WAY TO POWER AN ARTIFICIAL LIMB IS THROUGH THE USE OF BATTERIES. THE LIMB WILL HAVE SOME TYPE OF EXTERNAL BATTERY SOURCE ATTACHED TO IT WHETHER IT IS RECHARGEABLE OR NOT IN ORDER TO POWER THE MECHANICS BEHIND THE LIMB. BATTERIES MAY NOT BE THE END ALL BE ALL SOLUTION TO POWERING THESE PROSTHETICS. A TEAM OF RESEARCHERS FROM MIT WORKING WITH FUNDING FROM THE PENTAGON ARE ATTEMPTING TO HARVEST THE BODY'S NATURAL SOURCE OF ENERGY IN ORDER TO PROVIDE POWER TO ARTIFICIAL LIMBS. IT IS THE RESEARCHERS HOPES THAT THEY CAN USE GLUCOSE FROM SPINAL FLUID FOUND IN THE BODY, COMBINED WITH A NEURAL IMPLANT THAT WILL USE THE ENERGY FOUND IN THE GLUCOSE RICH SPINAL FLUID TO SEND SIGNALS TO THE ARTIFICIAL LIMB.

IV. CONCLUSION

SOLDIERS COME UNDER FIRE EVERY DAY IN AFGHANISTAN, AND EACH TIME THEY COME UNDER FIRE THEY RISK SUSTAINING AN INJURY THAT WILL LIKELY BE CAUSE FOR AN AMPUTATION OF AN UPPER OR LOWER EXTREMITY. THROUGH THE USE OF THE DIFFERENT TYPES OF PROSTHETICS MENTIONED IN THIS PAPER, SOLDIERS WHO NEVER THOUGHT THEY WOULD BE HAVE BEEN ABLE TO WALK AGAIN, ARE NOT ONLY TAKING THEIR FIRST STEPS IN A NEW LIFE, BUT THEY ARE TAKING STRIDES. NO ONE CAN UNDERSTAND WHAT THESE VETERANS HAVE GONE THROUGH UNLESS YOU YOURSELF HAVE BEEN THROUGH THE SAME EXACT SITUATIONS. IT IS EXTREMELY IMPORTANT FOR THE GOVERNMENT AND PRIVATE FIRMS TO CONTINUE THEIR RESEARCH INTO PROSTHETICS IN ORDER TO PROVIDE OPPURTUNITIES FOR THESE WOUNDED HEROE TO HAVE A SHOT AT A NORMAL LIFE AGAIN.

References

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