Artificial limbs essay sample

The invention of the artificial limbs was a major milestone in the medical world. Artificial limbs work so effectively and look so convincing, people might not even notice someone wearing one. Prosthesis is a device used to replace a lost limb. In addition to this, prosthesis can result in cosmetic improvements for the patient and build self-confidence. After years of research, science and technology have combined to make prosthetic limbs more efficient, comfortable, and lifelike than ever before. “ The first artificial limbs were stiff and did not have joints that bent like real arms, hands, or legs” (Woods 40).

The limbs were also heavy and uncomfortable. This made people only able to wear them for a short period of time. They usually were just a leather cup attached to a wooden peg. “ The cup would be fitted over the stump, and attached by straps. The straps could easily come undone, and the limb would fall off” (Woods 40) . Artificial limbs since this time have improved greatly. In medieval times, “ leg prosthesis was simply a bend at the knee with an artificial foot to fit in the stirrup”(Murphy 11). This was so the knight could sit comfortably in his saddle.

It was useless in battle though, so the knight had to detach it before fighting. For amputated arms and hands, a crude hook was used. It did not have any movement skills, but it gave the wearer more freedom. In 1508, the German knight, Gotz von Berlicichingen, had his right arm amputated. His prosthetic arm was considered a miracle in his time. It looked like an iron glove and was strapped to the stump of the forearm with leather straps. With the help of gearwheels, the fingers could be revolved and fixed at a certain position. This allowed the knight to hold his sword and carry out his profession.

In 1529, Ambroise Pare introduced amputation to the medical community. Pare was born in an era where life around him was a never-ending series of small battles. Those wars were being waged with a new weapon: firearms. Firearms caused the death of many soldiers, which is what inspired Pare to become a barber-surgeon. It was during the siege of Turin (1536-1537) that Pare made his first medical discovery. Gunshot wounds, a new medical condition that was thought to be poisonous, could be improved with a simple dressing and soothing ointment. This was done instead of the usual routine treatment of cauterization with boiling water.

His next contribution to medicine was the idea of tying off blood vessels to prevent uncontrollable bleeding in amputations. He then designed a number of artificial limbs as well as an artificial eye. Pare's ideas paved the way for many other improvements in surgery. For example, in 1696, inspired by Pare's ideas, " Peiter Andriannszoon developed the first non-locking prosthetic limb for below the knee. This is the basis for the current joint and corset prosthesis"(The History of Prosthetic Devices 2). Britain's Marquis of Anglesea lost a leg in the battle of Waterloo, and he wanted something better than a peg leg.

He approached James Potts, a skilled London craftsman with a reputation for making better than average wooden legs. This caused James Potts to invent the first truly flexible artificial leg. He did this by making a hinged steel knee, an ankle joint, and a " toe lift" mechanism. " As the knee bent to walk, artificial tendons running down the hollow center of the lower leg, contracted to lift the front of the wooden foot" (Murphy 25). In 1839, William Selpho,

one of James Potts’s apprentices, inserted a rubber plate to soften the impact of walking.

He also added a rubber sole to improve traction on wet surfaces. One of Selpho’s early clients was Dr. Benjamin Palmer of Philadelphia. After wearing Potts’s leg for sometime, he decided to make some improvements of his own. He came up with a wooden leg that had Potts’s “ toe lift” and Selpho’s shock absorbers. It had a greater springiness in its step. It also had a remarkable realistic appearance, down to its shape and skin color. Up to World War II, amputees had to wear suspenders for stability. Then British doctor Douglas Bly discovered the idea of attaching the prosthetic limb by suction to the wearer.

This newer leg prosthesis was redesigned to provide greater stability and mobility for different kinds of wearers. “ The above-the-knee amputates had an adjustable brake that made it possible to tune the swing of the lower leg to an almost consistent walking speed”(Murphy 91). This made these artificial legs well-suited for older patients because the leg was not too active. Younger, more active patients needed new improvements to fit their lifestyles. They found their improvements in knee systems that had hydraulic shock absorbers. This allowed them to run.

New foot designs offered better cushioning, shock absorption, and flexibility on rough land. “ Doctors responsible for wartime amputations were more likely than earlier generations of surgeons to have advanced training in bones, joints and muscle mechanics”(Murphy 49). It was not until 1948, when prosthetists had to have a college degree. They must have had

advanced training in orthotics and prosthetics, and on-the-job experience before gaining professional certification. No longer could an individual open a workshop in the back of a garage and post a sign claiming to know what he was doing.

Hospitals were staffed by hundreds of young women. Along with teaching the disabled how to move and maintain balance, they gave their patients short courses in how to care for their stumps and prosthesis. World War II veterans thought their current prosthetic limbs were unsatisfactory. Doctors realized the need for necessary advancements in the field. The “ United States government made a compromise with some companies to improve prosthetics rather than weapons”(History of Prosthetics 3). The government also increased awareness, so people began to learn more about prosthesis.

Wood and leather no longer seemed satisfactory when in the field of prosthetics. “ Wood requires individual carving and shaping, costly and time-consuming techniques that depend on the talent of a master craftsman. Leather while easier to work with, absorbs sweat and is hard to keep clean overtime”(Murphy 91). Both combine to make a heavy artificial limb that tires the wearer and discourages activity. “ To overcome difficulties with it, engineers at Northrop Aviation, which had been a leading designer and manufacturer of lightweight fighter planes in World War II, came up with new aterials that were lighter and more durable.

They also introduced thermosetting plastics” (Murphy 91). As the public became more used to seeing amputees, and as the internal mechanisms of artificial limbs became more complex, the outward appearance also

changed. They changed the wooden leg to a leg made of steel and aluminum pylon. “ The pylon could be adjusted in length to allow for a person’s continuing growth”(Murphy 92). In order to have a better appearance, wearers could still get a foam cover for their pylon. During World War II, the artificial arm was body-powered.

It was desirable for individuals who wanted to be able to perform simple gripping and lifting actions. There were many different variations on this idea in the late 1940’s. Using a concept based on puppetry, the body-powered arm relies on motion transferred from the opposite shoulder to the artificial hand by straps, cables, and pulleys. A shrug of the shoulder causes the artificial hand to open and its spring loaded fingers to pull apart. Another shrug causes the springs to release and the hand to close again. It takes a lot of concentration to master this device.

In the 1960’s, inventors learned how to make prosthetic limbs controlled by myoelectrity, the electricity produced inside human muscles. A myoelectric limb looks like a natural hand, arm, or leg. Inside are tiny electrical parts, motors, and a place for rechargeable batteries. It is controlled by the muscles left in the stump of the missing limb. “ Delicate sensors in the limb pick up electrical signals that are sent from the person’s muscles as they contract”(Rosaler 25). In addition, people must attend training to get a myoelectric limb to obey the commands of their muscles.

In 1981, a famous artificial limb, called the Utah Arm, was invented. It is made from parts that were powered by a rechargeable battery. The arm’s elbow, wrist, and fingers all move like natural body parts. “ With this arm, a

person can pick up a raw egg and hold it securely, but not so tightly that the egg cracks”(Woods 42). “ The 3C100 C-Leg System, built by Otto Block Orthopedic Industry, was made with computer technology to control how the leg responds and to provide a smooth, natural walk” (Cobb 20). This artificial limb is constructed of lightweight carbon fiber material, and the entire bionic leg weighs only 1. kilograms.

A rechargeable battery powers the microprocessor and hydraulic units. The battery will power the leg for twenty-five to thirty hours in one charge. In 2003, doctors at the Rehabilitation Institute of Chicago made another great advancement in artificial limbs. They developed a prosthetic arm that could be controlled by the patient’s thoughts. “ It works by using the electrical connections that already exist in the human nervous system”(Woods 43). When the patient thinks about bending the arm, the brain sends an electrical signal through the nerves to electrical devices in the arm.

People whose legs have been amputated below the knee can run, jump, and participate in sports such as skiing and basketball, thanks to the advances in artificial limbs. “ Each year 250, 000 Americans receive an artificial knee with the flexibility of a real one”(Rosaler 24). About 120, 000 babies (one in thirty-three) in the United States are born with birth defects that result in an artificial limb. The first Olympic-style game for disabled athletes, the Paralympics, was organized in Rome in 1960. “ It was limited to wheel-chair competitors with spinal-cord injuries.

The games have since been expanded to include competitive international games for the blind, amputees, and individuals with cerebral palsy”(Murphy

82). By 1996 when Atlanta, Georgia hosted the Paralympics, more than 3, 500 competitors from 120 countries participated in 17 different sports. The Paralympics provide inspiration to millions of people to do more with their lives. These events show what can be done with rehabilitation training, a “ can-do” attitude, and state-of-the-art prosthetics. Many amputees refuse to quit even though they have been disabled.

For example, sprinter Tony Volpentest, born without hands or feet, won both the 100-meter and 200-meter races at the 1996 Paralympics with the help of high performance prosthesis. Also, Ed Hommer’s dream was to climb Alaska’s Mount McKinley, the highest mountain in North America. After he had his two legs amputated, he doubted he would ever fulfill his dream, but with his two artificial legs, he was able to continue. In 2003, Aron Ralston amputated his own arm when it got stuck under a boulder during a wilderness hike alone. Ralston still refused to give up hiking, mountain climbing, and other outdoor sports because of his condition.

Engineers made him a special artificial arm with a mountain climbing pick in place of a new artificial hand. Artificial limbs make a difference to many amputees. Decades ago, amputees would have simply died, but because of the advancements in artificial limbs, many of them live normal lives. Artificial limbs not only now look real, but they move similarly. Prosthesis can be controlled by myoelectricity, straps and pulleys, and thoughts. Scientists are now working on the future of artificial limbs. They hope that they will eventually learn how to grow new body parts to replace those lost. Possibilities are endless in the field of prosthesis.