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Muscle atrophy, which is the wasting away or degeneration of muscle mass in an individual, has many causes. When a bone in the body is broken and set in a cast, the surrounding muscles are immobilized. Due to the lack of applied stress to these muscles, they begin to atrophy, which is evident in the clearly shrunken muscles seen after the cast is removed (Leibergall 2008). Recognizing this problem, engineers have developed a device that exercises target muscles even if they are encased by a cast.

StimuHeal, a company out of Israel, has recently developed a device called MyoSpare. This system is used during the period in which an injured patient, usually an adult or senior citizen, is inactive and healing from an injury. MyoSpare uses Neuromuscular Electrical Stimulation (NMES) in order to send impulses to the muscles. Since the brain and skeletal muscles of the body constantly communicate through electrical signals, NMES works by using electrodes to simulate the action of the brain by directing impulses to the muscle. Use of this device not only minimizes muscle atrophy, but also lessens occurrence of muscle spasms. It can be used in any instance where activity of the muscles is limited, but what makes it unique from similar designs is its ability to stimulate the muscles under splints, braces, and even casts (Kloosterman 2008).

The MyoSpare is able to be controlled by the patient who can choose the stimulation intensity that is comfortable for him or her. Its innovative design allows for the constant stimulation of muscles without causing them to fatigue. The battery-powered device works by implementing a cyclical pattern of stimulation so that the same areas of muscle are not being stimulated at the same instant all of the time (Leibergall 2008). Potentially, the patient can constantly have this device running and stimulating his or her muscles without worrying about hurting the muscles or tiring them out. This device also includes a built in monitor that works to record treatment over time, along with the intensities that the patient has applied throughout the period of treatment. This lets the patient's doctor ensure that sufficient stimulation was used throughout the healing time. While this device can be used in conjunction with traditional electrodes, StimuHeal has developed their own specialized electrodes called Duralect.

Duralect electrodes are designed to be used for long-term use. Traditional electrodes need to be replaced rather frequently, so they are not feasible for use under casts. These electrodes are as thin as traditional ones, and they contain a layer of biocompatible gel used to minimize negative reactions from sensitive skin. They can be used for up to several weeks without the risk of burning out. However, since they are slightly more expensive, patients are urged to consult their doctors to evaluate whether or not they are entirely necessary for their healing plans (Leibergall 2008).

The pros of this system center around the specialized electrodes. Since inserting traditional electrodes could prove problematic due to increased sweating of the confined skin, Duralect electrodes are designed to survive the added moisture without malfunctioning. Also, unlike older versions of the MyoSpare device, a microprocessor was developed and implemented to calculate a cycle of muscle stimulation/rest. Use of this system will cut down on physiotherapy costs, as well as minimize muscle atrophy in patients, allowing them to return to their lives immediately. It is the only system that can be used under casts. Also, since StimuHeal wants to stay competitive in the international biomedical market, the cost of this system should be around $300 after receiving FDA approval.

The cons of this system are the same as those of traditional electrode/muscular treatments. Since electrodes are in direct contact with the skin, the electrical impulse sent through them can possibly irritate the skin, or even cause slight burns. If the biocompatible gel on the electrodes is partially missing, the electrical impulse can cause tissue damage to the area of skin in direct contact. However, a clinical study performed at the Hadassah Medical Center in Jerusalem, Israel looked at the safety and effectiveness of this system on patients who had undergone surgical fixation after fracturing their ankles. This study proved that use of the MyoSpare in conjunction with Duralect electrodes worked well for these patients, and there were no serious adverse effects reported. In fact, these patients demonstrated less muscle atrophy, improved mobility, less pain, and shorter healing time (Kloosterman 2008).

Works Cited

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