

Esteem Hearing Implant

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Sensorineural hearing loss, also known as nerve deafness, is hearing loss resulting from problems in the inner ear, in the nerve from the inner ear to the brain, or in the brain. This is the most common form of deafness and can usually be improved with an ordinary hearing aid.

The Esteem hearing system from Envoy Medical is a totally implantable middle ear device for moderate and severe sensorineural hearing loss. What makes this device unique is the lack of a microphone. Instead it uses the functioning eardrum to pick up vibrations and adjusts these vibrations to the individual needs of the patient. This method of hearing minimizes background noises which are common in normal hearing aids and allows for the device to be completely implantable. In addition to this, the device has a pacemaker like battery which lasts 4.5 to 9 years of continuous use and can be replaced with a minor outpatient surgical operation.

The Esteem can be broken down into three major parts. The first is the Sensor which is the first of two piezoelectric transducers. This is cemented to the incus within the middle ear. When the ear drum picks up vibrations and they are propagated down the ossicular chain, the sensor picks up the vibrations and converts them into electrical signals. These electrical signals then pass to the next part known as the sound processor. This section is a small round device which is implanted behind the ear under the skin. This processor converts the incoming signal into modified electrical signals based on the patient's particular hearing needs. This new signal is sent out to the second transducer, the Driver, which is surgically attached to the stapes. This transducer converts the new electrical signals into mechanical vibrations that transmit to the stapes and the cochlea. It is important to note that this method requires the interruption of the ossicular chain which causes

further hearing loss when the Esteem system is not in use.

In a 2007 study, six patients were implanted with the hearing aid. The average duration of the surgical procedure was 5 hours 45 minutes with the first procedure taking 8 hours and 10 minutes and the final procedure taking only 3 hours and 50 minutes. The Esteem was implanted in 3 of the 6 patients 2 months after surgery.

All three of these patients experienced an increase in hearing ability. The mean actual hearing gain in comparison to preoperative hearing threshold was 26 dB for patient one, 9 dB for patient two and 11 dB for patient three. The mean actual hearing gain compared to the post operative threshold for patients one, two and three was 65dB, 41dB and 61dB respectively. As expected, after the surgery and before the activation of the device, all of the patients hearing loss increased due to the interruption in the ossicular chain.

The Esteem hearing system has all the benefits of an ordinary hearing aid. In addition to this, patients no longer have to worry about the appearance of the device or constant maintenance. In some interviews, patients claim they have higher confidence. They also do not have to worry about getting the device wet or constantly changing the batteries.

This device has earned the CE mark of approval a few years back and recently received FDA approval on March 17, 2010. Direct cost to the recipient for the device and implant surgery is approximately \$30,000. Financing options are available as well.

References:

Barbara, M, Manni, V, & Monini, S. (2009). Totally Implantable Middle Ear Device for Rehabilitation of Sensorineural Hearing Loss: Preliminary Experience With the Esteem®, Envoy. *Acta Oto-laryngologica*, 129(4), 429-432.

<http://www.envoymedical.com/get-informed>

