Abstract — Bone Anchored Hearing Aids (BAHA), are surgically implanted hearing devices designed for patients with conductive hearing loss, mixed hearing loss, or single-sided deafness. Unlike conventional hearing aids whose sound is transmitted through the medium of air conduction, BAHA uses the bones in the skull to transmit sound waves.

I. INTRODUCTION

Hearing loss is a major public health problem and is currently the third most common physical condition after arthritis and heart disease. There are many different causes to hearing loss, and several of them include exposure to loud noises, infections, birth defects, and reactions to drugs, especially chemotherapy. There are many hearing devices currently available including the most common- Conventional Hearing Aids (CHA). However, many patients who have chronic middle ear conditions or congenital defects are not candidates for CHA, but instead are suitable for Bone Anchored Hearing Aids. BAHA are designed for patients who have conductive hearing loss, mixed hearing loss, or single sided deafness. The device works to bypass the conductive roadblock and transmit the sound directly to the cochlea through direct bone conduction. For single sided deafness (SSD) patients, the device can also directly transfer the sound to the hearing ear’s cochlea.

II. METHODS

The Baha system is based on bone conduction and the process includes placing a titanium implant behind the non-hearing ear, inside the mastoid skull bone. The sound processor is connected to the implant with an abutment behind the ear, creating direct bone conduction. The sound waves go through the middle ear and are received directly to both working cochlea. For SSD patients, who have relatively normal hearing in the opposite ear, the sound waves are transmitted through the skull bone and to the functioning cochlea on the opposite side. After two months, the sound processor can then be attached to the abutment by a plastic snap that holds it in place.

III. RESULTS

A retrospective study was conducted of 24 patients with BAHA in the United States between 1984 and 1987 by The Department of Otolaryngology/Head and Neck Surgery at Columbia University. The purpose was to determine the long term effects of the BAHA on these patients. 78% of the patients who used the hearing aid on average 15.6 hours per day, were still using it 10-13 years post operation. The overall satisfaction had a score of 4.5/5, and the average speech reception threshold improved from 52 db to 27 db (p < 0.05).

IV. DISCUSSION

Based on these results BAHA have shown to be very beneficial for patients with mixed hearing loss, conductive hearing loss, and SSD who are not suitable for CHA. An issue with BAHA is the expensive cost, which on average is about $10,000 for both the abutment and the sound processor. Future directions could be extending the life of the sound processor, because it typically needs to be changed every 5 years, and they go for about $3,500. The importance of Bone Anchored Hearing Aids are so relevant globally today because they impact an individuals life in a tremendous way, and with further studying and technology will continue to increase the quality of life.

REFERENCES