A case series of a magnetic bone conduction hearing implant

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ABSTRACT

The objective of the study was to retrospectively review the postoperative outcomes of patients from a single centre who were implanted with a magnetic bone conduction hearing implant system. The medical and audiological case notes of all patients ($n = 34$) in a tertiary referral centre ENT department who had been implanted with a Baha® 4 Attract System between October 2013 and April 2015 were reviewed retrospectively.

The main outcome measures were use of the aid and complications from implantation or use of the aid. Results indicated that 23 patients had no significant postoperative problems; 5 required an alteration in magnet strength; 1 reported troublesome tinnitus; 1 had the implant changed to an abutment system; 1 had the magnet removed; 1 has ongoing skin problems; 2 have been changed to a newer, lighter sound processor. The majority of patients had good outcomes from the magnetic bone conduction aid. A proportion of patients had significant problems requiring medical attention.

KEYWORD

Hearing aids

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Background

Magnetic bone conduction hearing implants have been designed to provide an alternative to the existing aids which couple to a skin piercing abutments. The system comprises an osseointegrated titanium implant on to which an implanted magnet attaches with a screw. Externally, the sound processor is coupled to another magnet, which is covered by a soft pad (Fig 1). The surgical technique is similar to that for inserting the established abutment-based bone conducting systems, other than additional steps required to place the magnet.¹ Six strengths of external magnet are available to allow good coupling for different patient skin thicknesses. The potential advantages in such a non-skin-penetrating system are fewer problems with infection or inflammation, which can be related to abutments. In addition, less time is spent cleaning and hair trimming by the patient and there are cosmetic advantages. Two recent studies^{2,5} report good hearing outcome with minimal skin problems with this system.

This study describes the postoperative outcomes of all patients implanted with the magnetic bone conduction hearing implant, from when the department first introduced the system in October 2013 to April 2015. The review focuses on patient's use of the aid, problems with the surgical site and how these issues were managed.

Materials and Methods

This is a retrospective review of the medical and audiological notes of all patients implanted with a Cochlear Baha® 4 Attract System (Cochlear Bone Anchored Solutions AB, Mölnlycke, Sweden) between October 2013 and April 2015 in a tertiary referral centre where three trained surgeons implanted the device.

Results

Thirty-four patients were implanted in the period studied; ten of these were for single-sided deafness. The age of patients ranged from 8 to 64 years. At the time of writing, the follow-up period ranges from 3 to 20 months.

The majority ($n=23$) patients had no problems with their skin or with the sound processor; 6 patients reported tenderness at the site of the implant. These were resolved by changing the external magnet to one of lower strength. One of these patients has also had their sound processor changed to the new lighter sound processor. One patient developed a painful skin lump at the site of the implant. This prevented use of the sound processor. The area was due to be surgically explored, although it was resolved by the day of surgery. This patient changed sound processor to the new

Figure 1 Baha® Attract System: sound processor (1); magnetic connection (2); implant (3)

lighter processor (Cochlear™ Baha 5) with no reported problems.

One patient suffered from psoriasis affecting the scalp and there was an area of partial thickness breakdown of the skin. This condition was treated with antibiotics and by avoiding the use of the sound processor. At the time of writing, the area remains tender and the sound processor is not being used.

One patient suffered trauma to the implant site 5 months after implantation. Following the injury, the patient reported that the aid was not working. The implant site was explored and both the implanted magnet and the implant itself were found to be secure. The magnet has been removed and the implant protected with a cover screw. The senior author (AHM) plans to discuss with the patient the possibility of retrialling the magnetic system or changing to an abutment.

One patient developed an infection at the implant site 1 month after implantation. This was treated unsuccessfully with intravenous antibiotics. The magnet was removed 2 months post-implantation and the infection settled. The patient had an abutment placed on to the implant 11 months after initial implantation and receives good hearing from this.

One patient suffers from distressing tinnitus. This patient has been followed up for 2 months thus far and continues to be treated conservatively. This patient is not currently using the sound processor.

Discussion

Within the authors' department, over 50% of patients being implanted with bone conduction aids are within audiological criteria and opt for a magnet- rather than abutment-based system. The advantages to the patient are that less care is needed of the hair around the site, potentially fewer problems from the wound and avoiding having a skin-penetrating abutment. The extended incision recommended by the manufacturers¹ can lead to an extended visible scar in the patient's scalp. The authors have performed 20 cases with a 5-cm linear incision, similar to that made when using abutments, without any complications.⁴

This series showed that 11 of 34 patients had problems following implantation. Five of these were resolved by simply changing the magnet and two by using the new, lighter, sound processor (Cochlear™ Baha 5). This processor weighs 9.8g compared with the older processor, which weighs 11.6 g. This new processor was only available for use within the department towards the end of the study period. All future patients are to be fitted with this processor and its lightness may result in fewer problems of skin tenderness.

Four patients have been unable to use their sound processor; three of these may return to using the processor, and one has been changed to an abutment.

Conclusion

In this series, 30 of 34 patients had a successful outcome from the this magnetic system. The remaining four had problems relating to trauma, infection, psoriasis and tinnitus. The potential to change from the attract magnet system to the abutment system offers both the surgeon and patient an alternative option should there be problems related to aiding through a magnet. Problems such as tinnitus may, however, remain, and these are difficult to address with any aiding system. Surgeons should be clear in explaining the success rate and these potential problems and solutions when offering this system.

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