Comparison Study of Bone-Anchored Hearing Aid Complications Using the 9mm Abutment versus 6mm Abutment at Initial Implantation

Sean R. Wise, MD1,2, Jacqueline S. LaRouere, BS2, Dennis I. Bojarb, MD1,2
1Michigan Ear Institute, Farmington Hills, MI
2St John Providence Hospital, Southfield, MI

Abstract

Objectives: To assess differences in the incidence, type and management of complications encountered with implantation of the bone-anchored hearing aid (BAHA) when using the 9 mm abutment versus the 6 mm abutment at initial implantation.

Study Design: Retrospective cohort study.

Methods: One hundred thirty consecutive patients between January 2010 and December 2011 underwent single-stage BAHA implantation using either the 9 mm or 6 mm abutment at initial surgery. Clinical outcomes assessed for the two groups included the incidence, type and management of postoperative complications. Abutment size, age, gender, indication for surgery, BAHA type, duration of follow-up and patient co-morbidities were evaluated as potential factors affecting outcomes.

Results: Average duration of follow-up was 16 months. Postoperative complications occurred in 38 (29.2%) patients. Twenty-four (18.4%) patients experienced minor complications requiring simple, local care; eight (6.1%) patients required in-office procedural intervention; and six (4.6%) patients required revision surgery in the operating room. Implant extrusion occurred in 3 (2.3%) patients. Eleven (8.5%) patients required placement of a longer abutment. Patients receiving the 6 mm abutment at initial surgery were significantly more likely to encounter a complication requiring in-office procedural intervention or revision surgery (p=0.001).

Conclusion: Minor complications following bone-anchored hearing aid implantation are common. The vast majority of these complications are due to localized skin reactions, most of which are readily addressed through local care. Patients receiving the 9 mm abutment during initial implantation are significantly less likely to require in-office procedural intervention or revision surgery postoperatively as compared to those receiving the shorter, 6 mm implant at initial surgery.

Introduction

- Since its introduction in 1977, the BAHA has become a well-established method for auditory rehabilitation.1-3
- Despite various modifications in surgical technique, minor postoperative complications following implantation are common.
- Complications most frequently involve soft tissue reactions around the skin-penetrating titanium abutment.1-3,4,7
- Generally, these skin reactions are easily treated through local wound care measures.1-3,6,10
- More serious reactions may lead to skin overgrowth of the abutment, hypertrophic scarring, infection, or implant loss.1,3,7
- Changing to a longer abutment after surgery has shown potential to avert more serious postoperative problems.4,7,10
- The purpose of this study was to assess differences in the incidence, type and management of complications encountered following BAHA placement when using a 9 mm abutment versus 6 mm abutment at initial implantation.

Methods and Materials

- Retrospective review of 130 cases undergoing BAHA surgery between January 2010 and December 2011.
- 65 patients consecutive patients receiving a 9 mm abutment at initial surgery assessed against 65 consecutive patients who initially received a 6 mm abutment.
- All 130 cases performed as a single stage procedure using a linear incision technique with wide subcutaneous tissue reduction.
- Two different model implants utilized (Cochlearâ® Baha® Centennial, CO and Oticon Medical Ponto® Somerset, NJ).
- Data collected included demographics, indication for surgery, abutment size, BAHA manufacturer, date of surgery, surgeon, any variation in surgical technique, anesthetic and follow-up duration.
- Smokers, diabetics, and patient body mass index (BMI) recorded.
- Outcomes assessed included incidence, type, time to occurrence, and management of postoperative complications.

Results

- Mean age 54 yrs (12-84); 52 (40%) male; 78 (60%) female.
- S5 (42%) Cochlearâ® Baha®; 75 (58%) Oticon Ponto®.
- Seventeen (13%) diabetics; 13 (10%) smokers.
- 54 (42%) normal weight (BMI 18.5-24.9 lb/in²), 32 (25%) overweight (BMI 25-29.9), and 44 (33%) obese (BMI ≥ 30).
- Patients more likely to have received 9mm abutment if male (p=0.004), diabetic (p=0.019), or overweight/obese(p=0.000).
- Average duration of follow-up 16.4 months (range 5-29 months).
- Postoperative complications observed in 38 (29%) patients.
- Soft tissue reactions around abutment in 32 (24%) patients.
- Twenty-four (18.4%) patients with minor complications requiring simple, local care; Eight (6.1%) patients with complications requiring procedural intervention in the office; Six (4.6%) patients required revision surgery in the OR (Table 1).
- Overall revision rate 10.7%. Implant extrusion rate 2.3%.
- Eleven (8.5%) patients required placement of longer abutment.
- Patients receiving the 9 mm abutment at initial surgery were significantly less likely to require procedural intervention in office or revision surgery in OR (p=0.001) (Figure 1).

Table 1. Incidence and types of complications by abutment size.

<table>
<thead>
<tr>
<th>Complications</th>
<th>9mm</th>
<th>6mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>53</td>
<td>39</td>
</tr>
<tr>
<td>Requiring local care only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localized dermatitis / skin reaction</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Localized cellulitis / granulation</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Abutment loose from fixture</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Requiring office procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin overgrowth requiring excision</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Incision and drainage abscesses</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Keloid requiring repeat injections</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Processor feedback issues / thick skin</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Requiring revision in OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extensive skin overgrowth</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Extrusion / loss osseointegration</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

Discussion

- Patients receiving the 9 mm or 6 mm abutment at initial surgery exhibited an equal risk for experiencing minor soft tissue reactions requiring local care only.
- Such reactions may be expected as any skin penetrating implant may evoke a foreign body inflammatory response.
- Patients implanted with the 9 mm abutment were significantly less likely to experience more serious problems requiring procedural intervention or revision surgery.
- The longer abutment likely reduces the chances of skin overgrowth with these expected reactions, precluding the entrapment of debris and bacteria that can lead to more serious complications and need for revision.
- Males, diabetics, and those with elevated BMI may have an increased risk for postoperative complications.4-7 In our study, these groups were significantly more likely to have received the 9 mm implant. Despite this potential for higher risk, all patients requiring revision or experiencing implant extrusion were those who received the 6 mm implant.

Conclusions

- Majority of complications are due to minor, localized skin reactions which are easily treated by topical therapies.
- Patients receiving either the 9 mm or 6 mm abutment at initial surgery appear to be at equivalent risk for minor reactions.
- However, patients receiving the 9 mm abutment are significantly less likely to experience complications requiring procedural intervention or revision surgery as compared to those patients initially receiving the shorter, 6 mm abutment.
- This may be especially true for male patients, diabetics, and those patients who are overweight or obese.
- Regardless of whether patients are considered to be at higher risk or not preoperatively, we would recommend strong consideration be given to placement of a longer abutment for all patients at initial implantation.
- We think this will significantly diminish the risk of severe soft tissue reactions postoperatively, and will likely reduce the chances of needing revision.

References

7. Conclusions of a longer abutment for all patients at initial implantation.