Early Activation of Cochlear Implants: A Systematic Review and Narrative Synthesis
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Background
Cochlear implant device activation typically occurs four weeks post cochlear implant surgery.
Emerging evidence suggests earlier activation is feasible and beneficial, giving patients quicker access to sound and rehabilitation.

Objectives
In this review, we aimed to observe cochlear implant (CI) outcomes following early sound processor activation.

Methods
Electronic searches of Medline/PubMed, AMED, EMBASE, CINAHL and the Cochrane Library following PRISMA guidelines.
The PICO strategy was used to identify population (P), intervention (I), comparison (C) and outcomes (O) as below:
P: Children or adults receiving cochlear implantation
I: Early sound processor activation as per clinical practise
C: Conventional switch on as per routine clinical practise
O: Audiometric outcomes, patient outcomes, complications

Results
• Thirteen full texts and one abstract met the inclusion criteria.
• Due to heterogeneity of methods and reported data meta-analysis was not possible. Results are presented as a narrative synthesis.
• Pooling of results was used to give an overview of the population demographics and study characteristics.
• Formal statistical meta-analysis was not possible due to the heterogeneity of outcomes and reporting amongst identified studies.

Patient Demographics
• Mean ages for each group were not available due to this level of detail being omitted from some of the studies included for review.
• Adult and child recipients were not routinely described in the published literature.

The necessity of using an ‘off ear’ wearing approach
Overall impedance levels were consistently observed in 251 undefined cases.

Subjective Outcomes
• Notably reduced anxiety for patients and families due to early activation.
• Sooner access to sound and rehabilitation due to early activation.
• No significant difference in speech recognition beyond 4 weeks post-operatively.
• No long-term hearing outcomes followed up past 9 months.

Discussion
Lack of longitudinal evidence limits the conclusions for long term effects of early activation of CI.
Overlap between activation time of CG & EF groups.
Studies included were of modest methodological quality, commonly retrospective and non-randomised.
Identifying suitable patients for early activation should consider:
• Co-morbidities
• Wound healing & post-surgical factors
• Infection, pain or swelling
• Device used (e.g. off the ear processors)

Conclusions
• Early activation of CI is feasible with low complication rates.
• Early activation improves patient satisfaction and reduces anxiety.
• Patients have sooner access to sound and rehabilitation.
• Early activation of CI has the potential to reduce hospital footfall and visits; an important consideration post COVID-19.

Materials
• Studies used populations from the following countries: Taiwan, China, Japan, Turkey, Saudi Arabia, France, Germany, Italy and Austria.
• Cochlear™ and MED-EL implant devices and electrode arrays were widely represented across the available literature. Advanced-Bionics or Oticon Medical devices were limited.

Surgical Technique
All studies used a minimally invasive approach for implantation with mastoidectomy and posterior tympanotomy approach:
• 259 cases round window approach
• 34 cochleostomy approach
• 251 undefined cases
For successful early activation a minimally invasive surgical technique needs to be adopted.

Impedance Levels
Impedance behaved consistently with surgical recovery for both EF and CG patients across all studies.
Overall impedance levels were consistently observed to reduce sooner within the EF group.

Magnet Strength
The published literature has varied recommendations for magnet strength.
In early fit cases extra care and monitoring may be required and magnet strength adjusted as necessary.
The necessity of using an ‘off ear’ wearing approach was not indicated from the literature.

Complication Rates
No significant differences were noted between the early activation and the control groups for complication rates.
Pain and mild swelling associated with the surgical procedure were the only reported complications.
A 0.2% early activation drop out rate was noted in one study7.

The table below shows the main demographics of the combined study population:

<table>
<thead>
<tr>
<th>Control Group (CG)</th>
<th>Total Subjects</th>
<th>Bilateral Implants</th>
<th>Unilateral Implants</th>
<th>Range time surgery to activation (days)</th>
<th>Age Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Fit (EF)</td>
<td>596</td>
<td>4</td>
<td>592</td>
<td>0-14</td>
<td>9 months - 88 years</td>
</tr>
</tbody>
</table>

References

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