BACKGROUND READING REPORT

ADVANCE COMPUTER INTEGRATED SURGERY

Systematic review: Radiological and histological evidence of cochlear implant insertion trauma in adult patients

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- The paper derived histological and radiological methods to assess for trauma evidence in patients after cochlear implant surgeries. The "**main**" reason to opt this paper is to develop a method to reduce the patient's trauma and post surgical complications as authors have mentioned in the paper.

  This paper assess the necessity of the new method to look for reason behind the patient's trauma and try to mitigate as it has been observed nearly around 17.6% [1] of the patients.

  My project, "Force Sensing forceps for Cochlear Implant Surgeries" is about design and development of force sensing forceps which calculates the forces during cochlear insertion procedure. This will lead to developing a calibration method to calculate the forces for the force sensor.

  This paper has concluded that 17.6% trauma rate for the cochlear insdertion can be improved with more accurate and consistent electrode insertion and robotics guidance which is the future work of my project.

- **Technical Summary:**

Methods:
A systematic study of literature has been performed using several medical databases listed as follows:

- PubMed, Medline, Cochrane, Allied and Complimentary Medicine Database, EMBASE, CINAHL

Study Selection:
A grading system described by Eshraghi was used to classify cochlear trauma based on *Participants, Interventions, Outcomes and Study Design*.
Medicine search strategy was depending on the a few criterias such as: Cochlear implants,[MeSH], [ti.ab], Expected electrode insertion trauma, hearing preservation etc.

Data Extraction and Quality Assessment:
The standard for mof data extraction was used for the patients based on the grade of trauma. Each study was supervised and reviewed as per the Center for Evidence Based Medicine(University of Oxford).

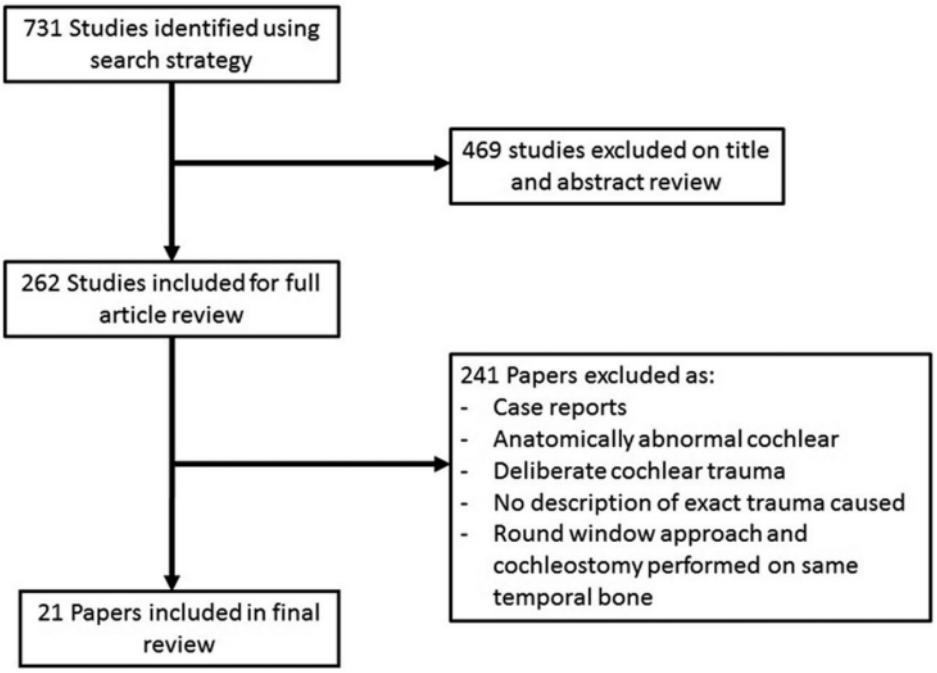

Fig: Flow diagram of the search results [1]

Data Synthesis and Result:

A structured systematic review was performed with the results described and tabulated. Different methods used to assess the cochlear trauma including Histology, CT, X-Ray etc. The results shows that histological studies and radiological studies can both be used to

measure the degree of cochlea trauma using humans models post operatively or cadaveric studies using temporal bones.

To move a step further, authors aslo determined the frequency vs trauma rate with different types of electrode array categories. This helps use to determine which is the most effective electrode array having the least percentage of trauma in the patients.

- **Analysis:**

The paper summerised the overall cochlear implant insertion trauma rate (17.6%) which can possibly be mitigated using the various methods.

Pros:

- The paper best describes which surgical approach is safe using the percentage and the grade of trauma.
- The electrode array and its implications on the patients are also taken into consideration while the assessment.
- The grade of the cochlear trauma is determined to see actually which part is causing the issue with the surgical complications.

Cons:

- The paper is limited to 653 patients data wherea as number of patients were more than 217,000. [2]
- The data is only limited to adults but not other age categories.
- The age is not considered as a factor because of the less number of patients but they also take age factor into consideration.
- The study is immediately performed by the patient where as a longer follow up was needed in order to asses the data.

Referances:

1. *Emma Hoskison, Scott Mitchell & Chris Coulson (2017) Systematic review: Radiological and histological evidence of cochlear implant insertion trauma in adult patients, Cochlear Implants International, 18:4, 192-197, DOI: 10.1080/14670100.2017.1330735*
2. *https://www.acialliance.org/page/CochlearImplant#:~:text=https%3A%2F%2Fwww.nidcd.nih,gov%2Fhealth%2Fcochlear%2Dimplants&text=Using%20a%209%25%20annual%20growth,through%20the%20end%20of%202019.*