

INTRODUCTION AND OBJECTIVES

- Meningitis is a rare but possible complication following otologic surgical procedures, given the proximity of the middle and inner ear structures, vessels, and the brain¹⁻⁵.
- The review aimed to examine the incidence, etiology, and time course of meningitis as a postoperative sequelae of otologic surgeries.

METHODS

- IRB-exempt.
- Databases: PubMed, Cochrane, and Web of Science
- Studies published between 1960-2022.
- MESH terms: “meningitis”, “postoperative complications” and subcategories of otologic surgeries “auditory brain stem implantation”, “cochlear implantation”, “endolymphatic shunt”, “labyrinth fenestration”, “mastoidectomy”, “middle ear ventilation”, “myringoplasty”, “ossicular replacement”, “stapes surgery”, “tympanoplasty”.
- Exclusion criteria: non-English, non-human, did not provide number of patients.
- Inclusion criteria: specified the presence/absence of meningitis.
- Time data converted to months.
- Date ranges averaged.
- First meningitis data used for patients with multiple occurrences.
- Descriptive data analysis performed in Microsoft Excel.

RESULTS

- 140 studies reviewed
- 57,108 patients, 49.0% male, 57.5% pediatric, age range of 3.6 months – 94.9 years.
- 215 patients with post-op meningitis, most commonly following cochlear implantation (72.1% of total cases).
- Incidence of meningitis following otologic surgeries: 0.38%
 - Following cochlear implantation: 0.32%
 - Following stapes surgery: 0.55%
 - Following auditory brain stem implantation: 3.0%
 - Following mastoid surgery: 1.1%
 - Following endolymphatic surgery: 0.41%
- Incidence of meningitis between 1951-1999: 0.35%; 2000-2020: 0.39%
- Inner ear malformations were present in:
 - 38.3% of patients with meningitis following otologic surgeries.
 - 49.1% of pediatric cochlear implantation patients.
- Vaccination data were only provided for 34.7% of cochlear implant and 14.3% of auditory brainstem implantation studies.

REFERENCES

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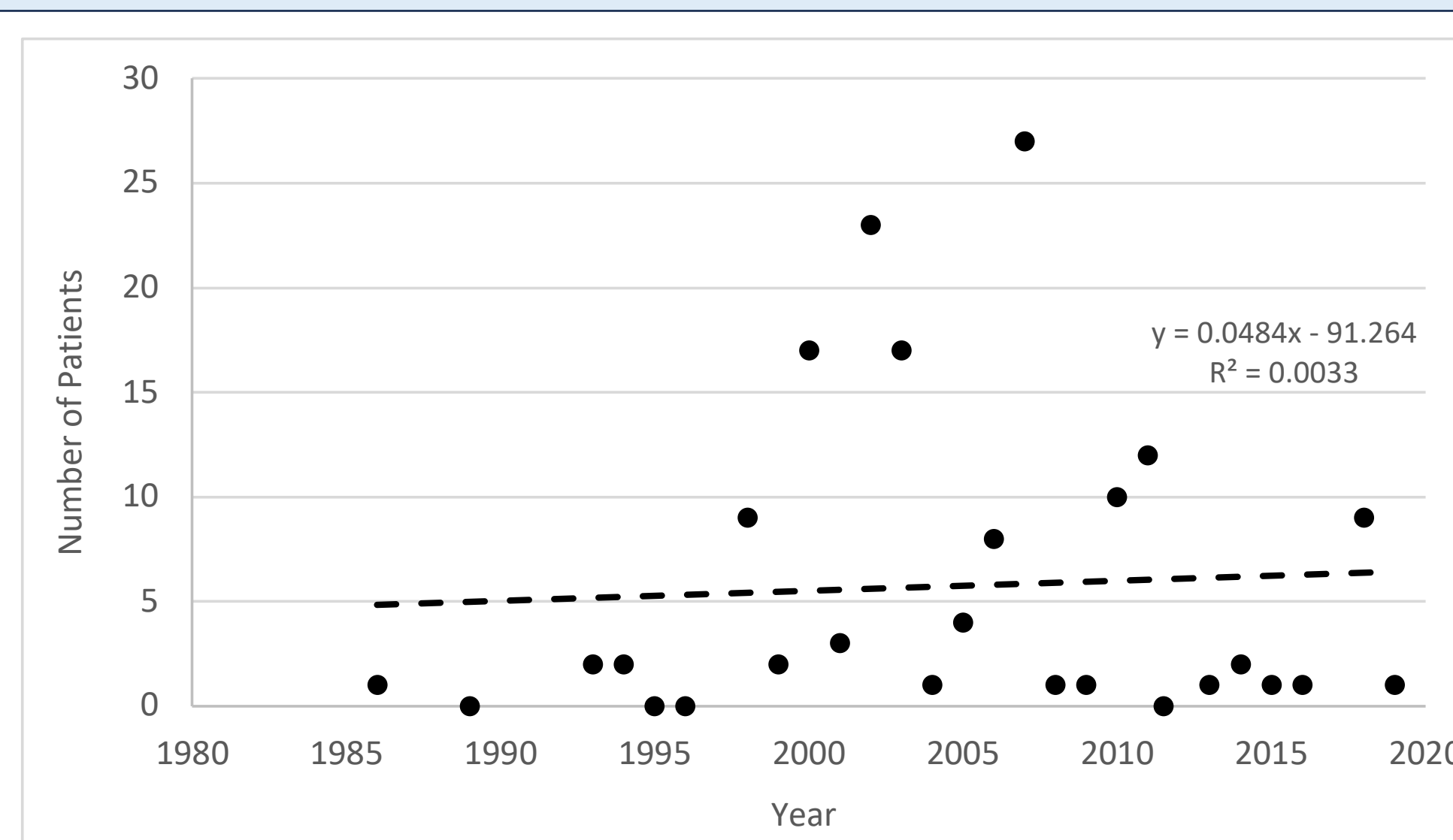


Fig. 1 Number of patients with meningitis by year for cochlear implantation (CI).

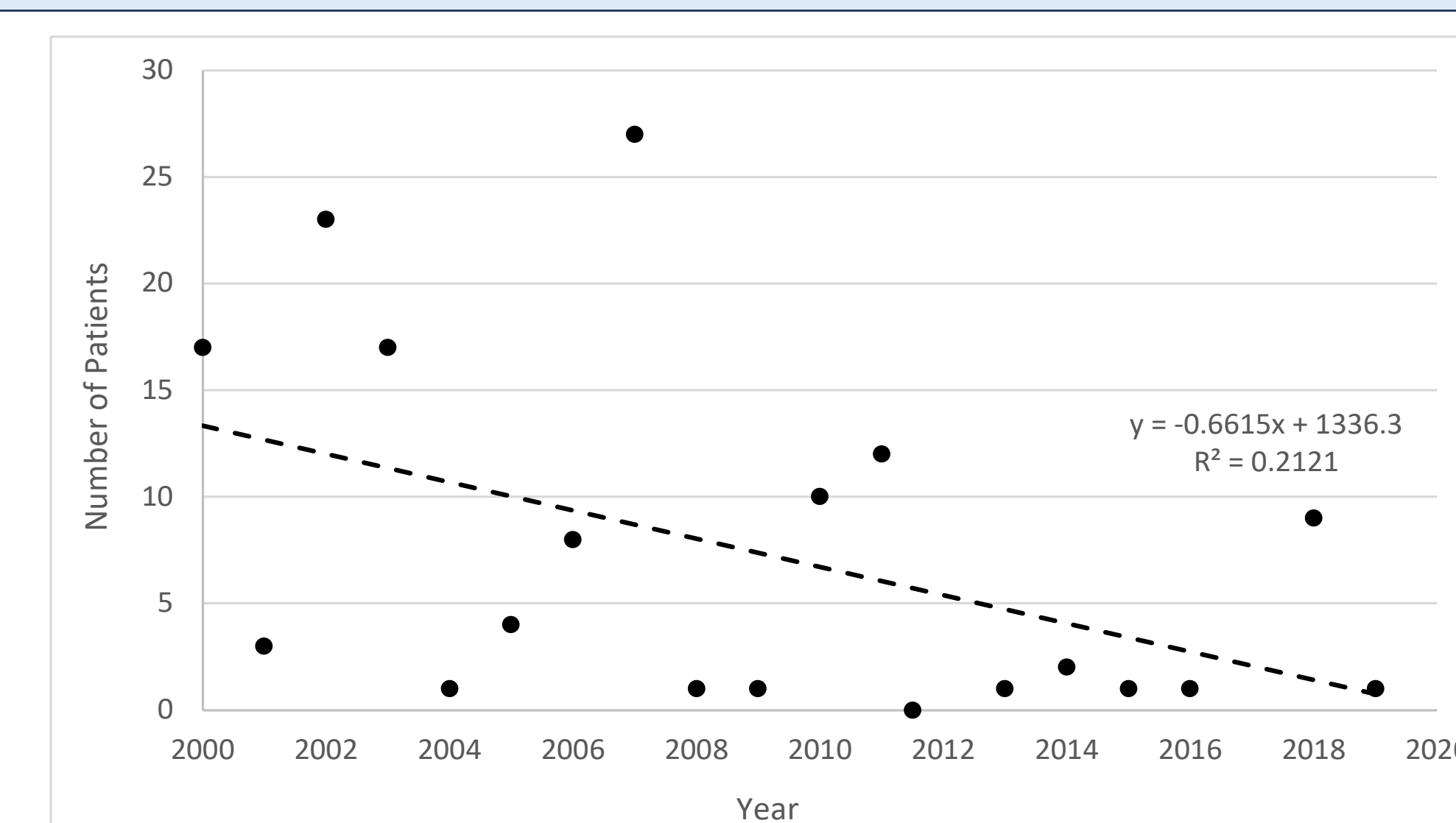


Fig. 2 Number of patients with meningitis by year since 2000 for CI.

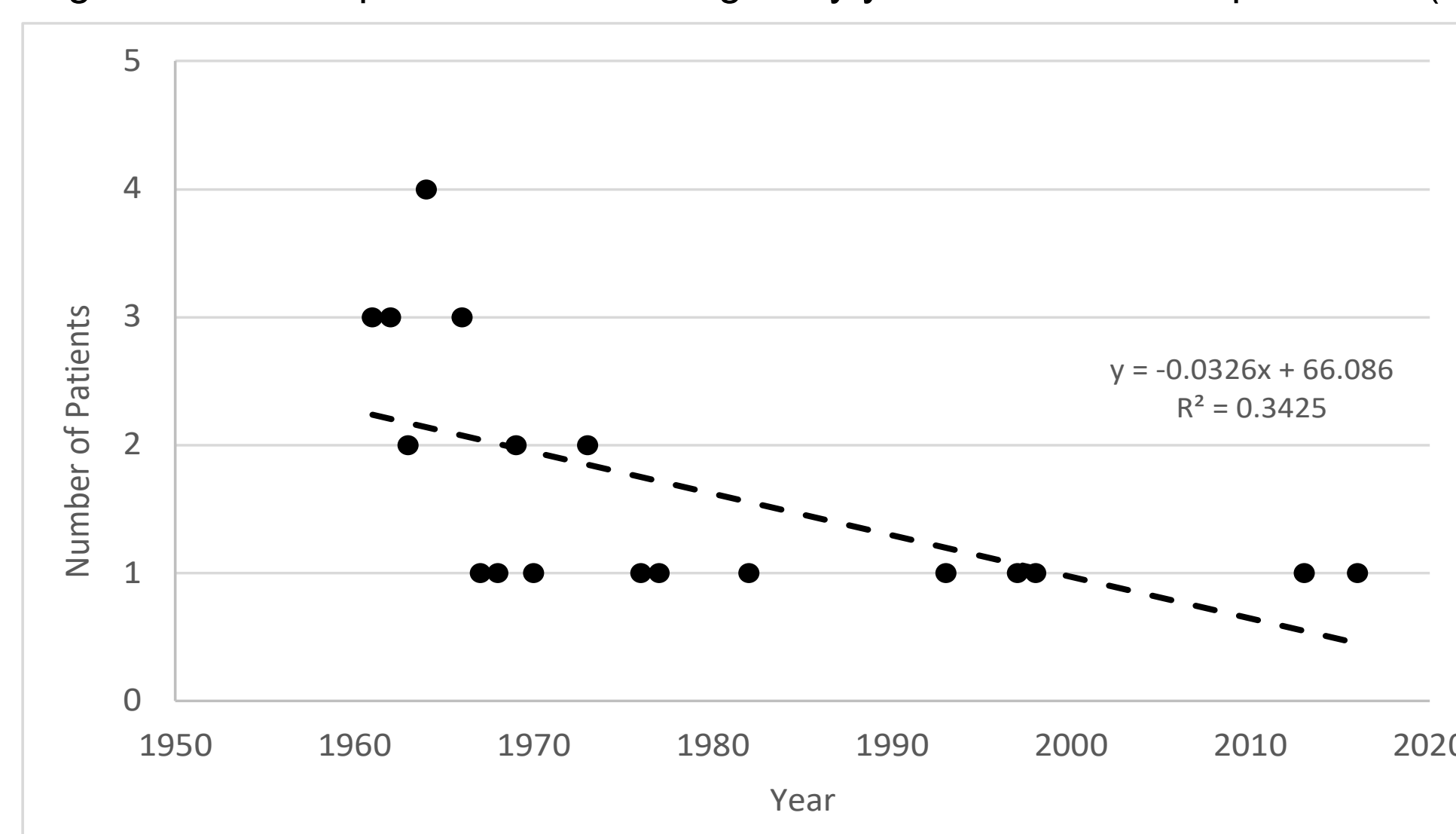


Fig. 3 Number of patients with meningitis by year for stapes surgery.

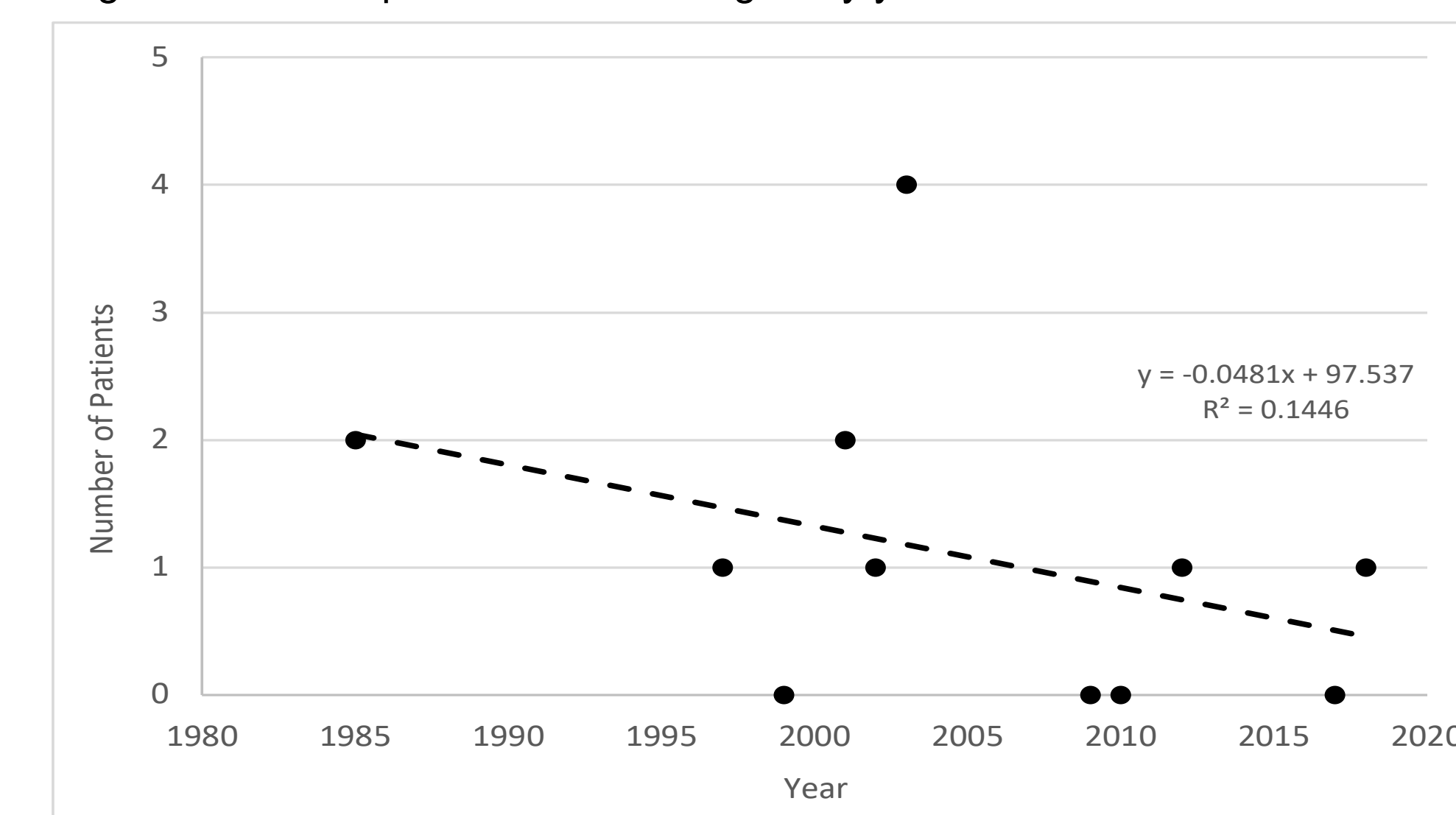


Fig. 4 Number of patients with meningitis by year for auditory brainstem implant.

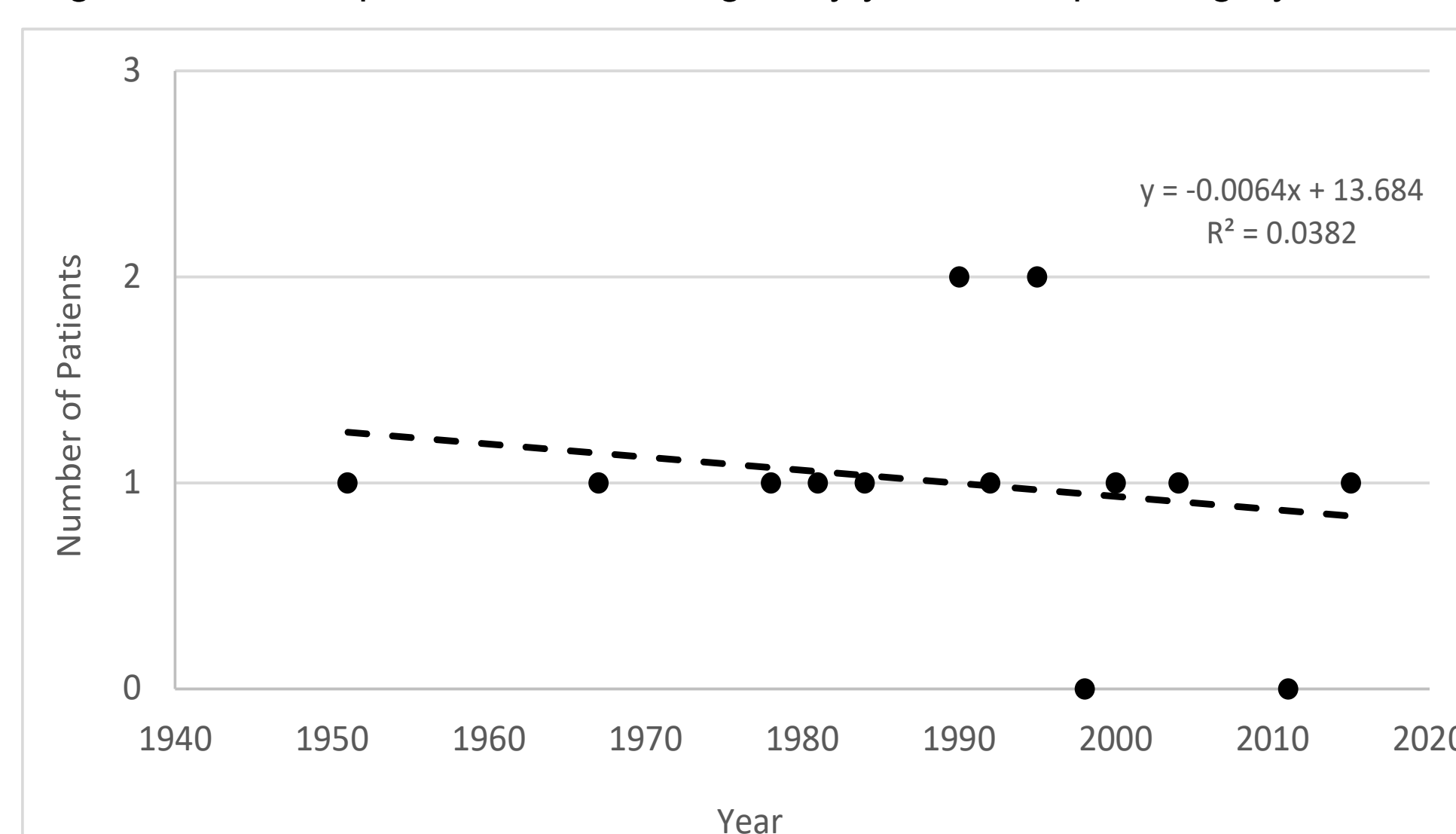


Fig. 5 Number of patients with meningitis by year for mastoid surgery.

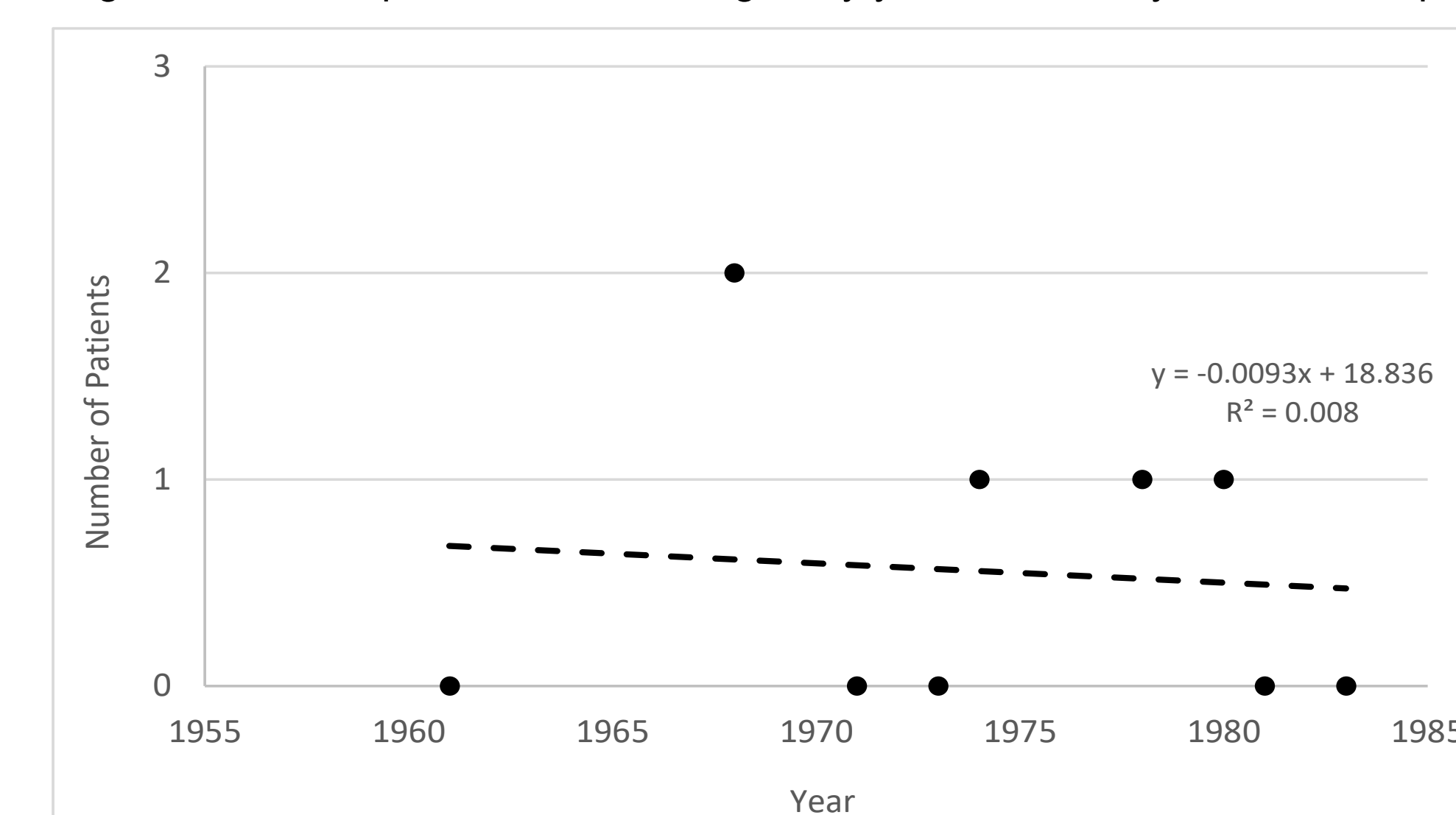


Fig. 6 Number of patients with meningitis by year for endolymphatic surgery.

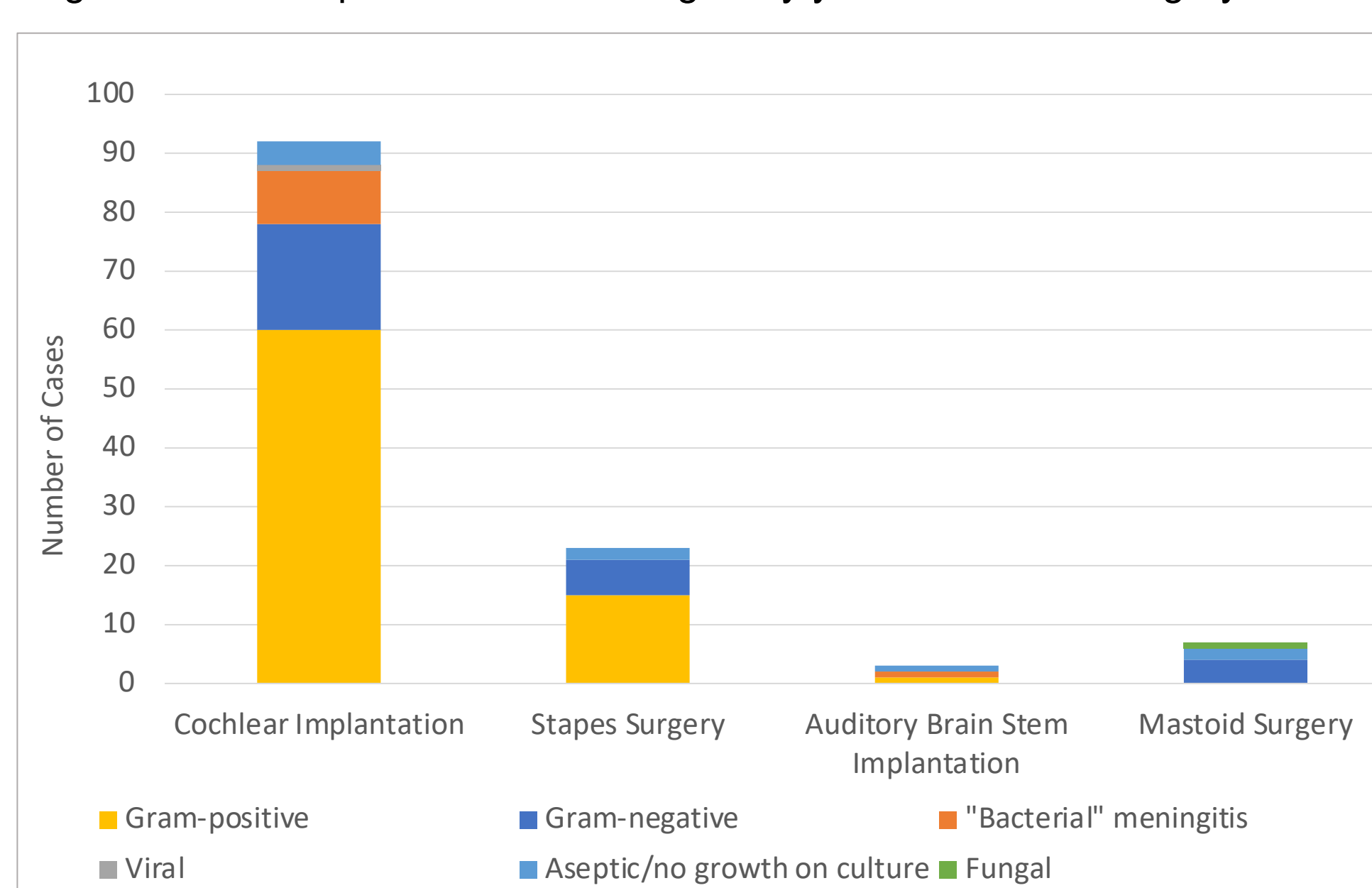


Fig. 7 Etiology of postoperative meningitis.

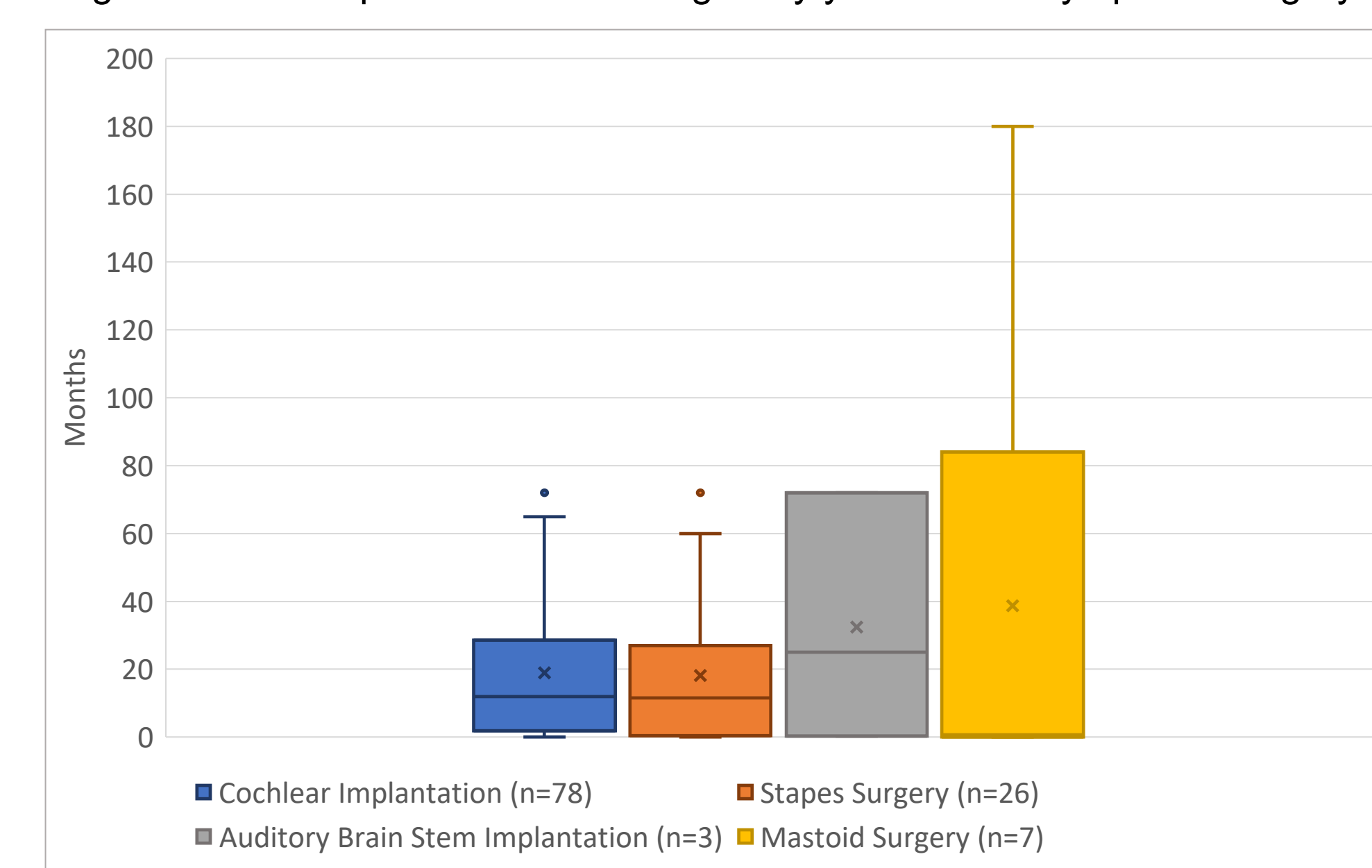


Fig. 8 Timing of postoperative meningitis.

CONCLUSION

- Postoperative meningitis continues to have an impact on patients.
- Inner ear malformations increase susceptibility to postoperative meningitis.
- Meningitis can occur immediately or after years, requiring continual monitoring.
- *S. pneumoniae* remains the leading cause of postoperative meningitis.
- While vaccinations, soft surgical techniques, and technological advances likely have had an impact on decreasing the rate of meningitis, the data is complex.
- Limitations included heterogeneity of reported data, low number of studies for certain procedures, methodology of averaging time data, and variations among the types of studies for each procedures.
- Future studies are needed to investigate the incidence, etiology and time frame of postoperative meningitis.