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Title

The Impact of Recurrence or Presence of a New Malignancy on Tracheoesophageal Puncture Device Failure

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Introduction

- In the United States there are approximately 67,000 cases of Head and Neck Cancer annually and 15,400 deaths.
- The NIH estimates that in 2023 approximately 12,380 new cases of laryngeal cancer, were diagnosed which has a 61.6% 5-year relative survival rate.
- The total laryngectomy is a surgical procedure that removes all of the laryngeal structures and sections of the upper trachea.
- Tracheoesophageal speech is considered the gold standard for voice rehabilitation following total laryngectomy.
- Tracheoesophageal speech utilizes a voice prosthesis (VP) that is inserted through a puncture in the common wall separating the trachea from the esophagus.
- The current literature has established that many factors that can impact a VP lifespan.
- In patients with advanced laryngeal cancer (T4a), up to 10% of patients can develop a recurrence, while less severe cases can result in up to 25% of recurrence.
- However, there is limited information on how the development of a secondary malignancy or recurrence can impact VP device failures or their lifespan.
- Therefore, understanding the factors that may influence TEP device failures particularly in the context of cancer recurrence or new malignancies is essential in the management of patients.

Methods and Materials

Data Collection:

- Institutional review board approval and a waiver of informed consent was obtained to perform Retrospective Chart review of patients who at VP management at UC Davis Center for Voice and Swallowing - Department of Otolaryngology.
- Data sources included the UC Davis Electronic Medical Records (EMR).
- Data tracked on Microsoft Excel

Inclusion Criteria:

- Patient must have VP prosthesis management at the UC Davis Center for Voice and Swallowing Clinic and developed a recurrence or new malignancy.
- Must have at least 3 consecutive VP prosthesis exchanges at UC Davis Center for Voice and Swallowing

Variables:

- Patient Demographic: DOB, Sex, Age at time of Laryngectomy, Disease characteristics, Surgical and Medical Management of original Head and Neck Cancer, Date of secondary malignancy or recurrence.
- VP variables: date of prosthesis exchange, associated device complication, lifespan of prosthesis device, type of prosthesis device.

Demographics and Clinical Data

Biological Sex, No. (%)

Male	20 (83%)
Female	4 (17%)
Age at TL, Mean (SD), y	63.6 (11.8)

Tumor Site No. (%)

Supraglottic	2 (8%)
Glottic	9 (38%)
Subglottic	1 (4%)
Oropharynx	7 (29%)
Hypopharynx	2 (8%)
Other	3 (13%)

Second Malignancy No. (%)

Recurrence of Head and Neck Cancer	8 (33%)
Second Primary	9 (38%)
Metastatic (unknown primary disease)	7 (29%)

Closure Technique, No. (%)

Primary Closure	9 (37.5%)
Pectoralis major rotational flap (PMC)	7 (29.2%)
Anterolateral thigh free flap (ALT)	4 (16.7%)
Radial forearm free flap (RFFF)	1 (4.2%)
Unknown	3 (12.5%)

Radiotherapy, No. (%)

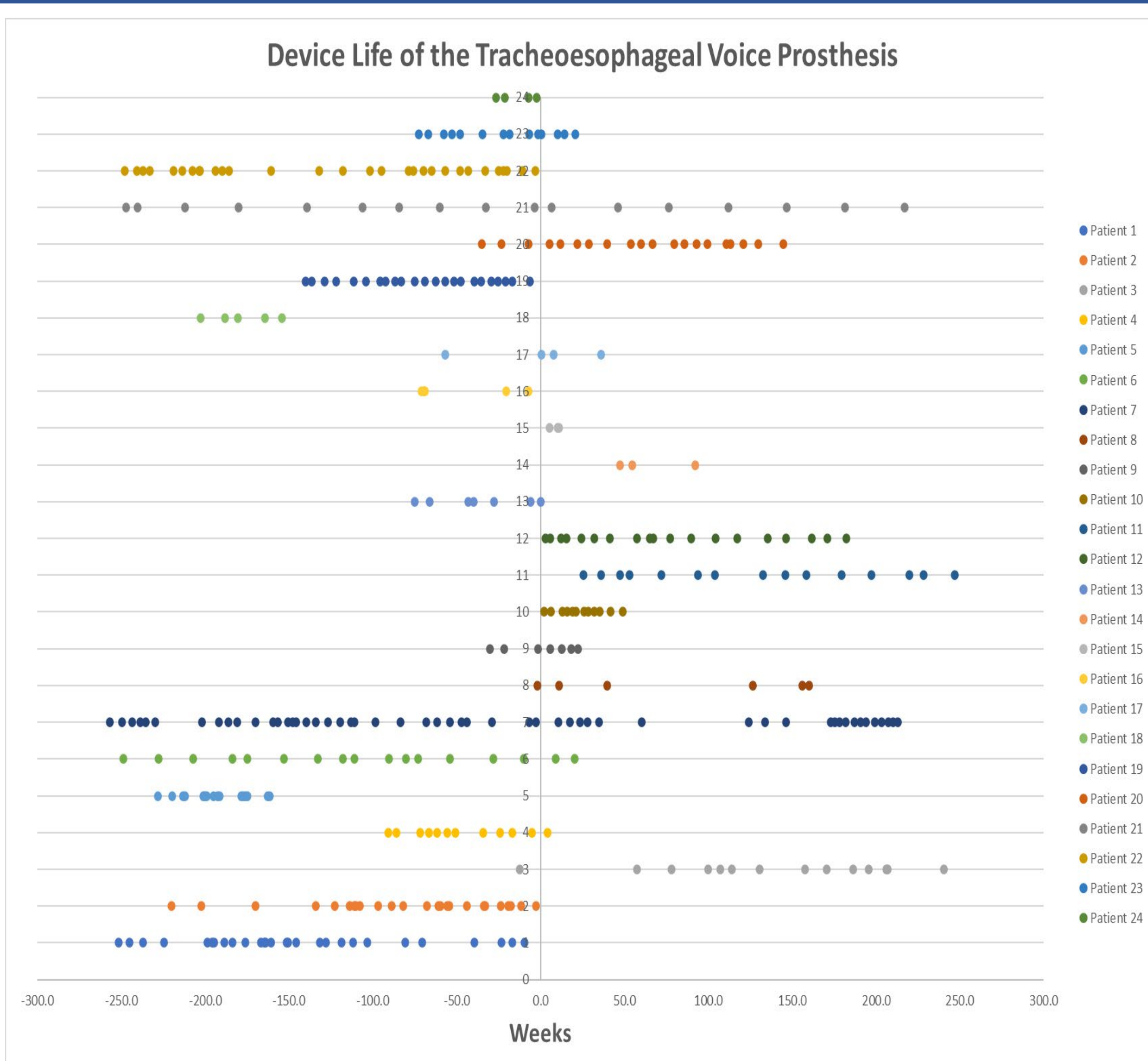
Before Surgery	6 (25%)
Adjuvant	13 (54%)
Both	3 (13%)
No treatment	1 (4%)
Unknown	1 (4%)

T Stage, No. (%)

T0-T2	6 (25%)
T3	4 (17%)
T4	11 (46%)
Unknown	3 (13%)

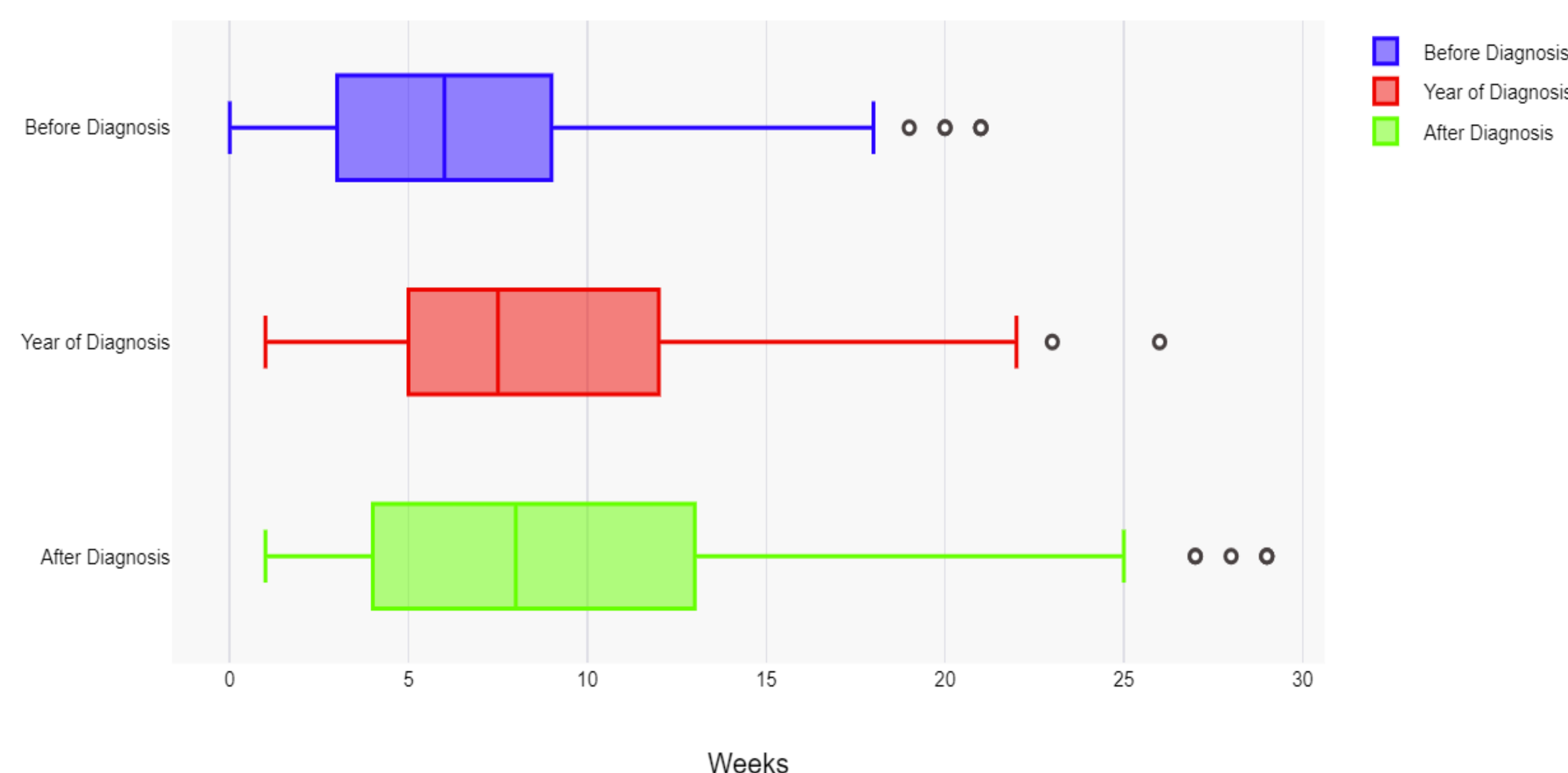
N Stage, No. (%)

N0	10 (42%)
N+	11 (46%)
Unknown	3 (13%)



Graph 1. Frequency of VP changes per patient was plotted. The X-axis represents the date when the TEP change occurred. The origin represents the diagnosis date of second malignancy or recurrence.

Tracheoesophageal Voice Prosthesis Lifespan



Graph 2. Box and whisker plot of frequency of TEP changes. The horizontal line in the middle of each box indicates the median, the top and bottom borders of the box mark the 75th and 25th percentiles, the whiskers above and below the box indicate the 90th and 10th percentiles, and the points beyond the whiskers are outliers beyond the 90th or 10th percentiles.

Results

VP Device Life Span:

A one-way ANOVA revealed that there is a statistically significant difference in the mean lifespan of a tracheoesophageal VP between at least two groups ($F(2, 356) = [4.443], p = 0.01$). Tukey's HSD Test for multiple comparisons found that the difference in average lifespan of a VP device before a second diagnosis (6.9 weeks), and after a diagnosis (9.6 weeks), was statistically significant ($p = 0.008, 95\% \text{ C.I.} = [0.763, 6.62]$). However, there was no difference in VP device lifespan the year the patient was diagnosed (8.83 weeks) and the years before ($p=0.7$). Or between the year the patient was diagnosed and the years after diagnosis ($p=0.263$)

Conclusions and Next step

- The hypothesis was that a second malignancy would induce an inflammatory state in patients that would lead to a shorter VP device lifespan. However, the results paradoxically show the opposite. In the years leading up to the second malignancy, the VP device fails more often than the year a second malignancy was diagnosed or the years after.
- Look at quantitative inflammatory markers such as the Systemic Immune-Inflammatory Index (SII) in relation to frequency of VP change