INTRODUCTION

- Vocal fold motion impairment (VFMI) can be seen in symptomatic patients with airway and swallowing disturbance
- Superior laryngeal nerve (SLN), recurrent laryngeal nerve (RLN), and vagal neuropathies can all result in VFMI, as can ankylosis and bowing atrophy
- Vocal fold paresis (VFP) has been well documented in patients with normal motion with abnormal laryngeal EMG (LEMG)
- Laryngologists commonly use clinical information to diagnose VFP, including bowing, incomplete closure, and increased vibratory amplitude. Physicians are historically poor at selecting clinical site of paresis on exam alone
- LEMG may show new, ongoing, or stable injury and prognosticate return of function
- We hypothesize that most symptomatic laryngeal motion asymmetry is associated with old healed nerve injury, and that LEMG testing will show multiple electrical signal abnormalities which can secure the diagnosis of paresis and assist in management; a series of symptomatic patients with asymmetric VFMI were evaluated by LEMG to help better define the incidence of paresis, and the electrical signal characteristics associated with it

METHODS AND MATERIALS

- 25 consecutive patients with dysphonia and vocal fold motion asymmetry were studied with LEMG
- Studies were performed by a Laryngologist and Neurologist, with analysis done by the Neurologist
- 4 muscles were analyzed for each of the 25 patients for a total of 100 muscles - right and left thyroarytenoid, right and left cricothyroid
- Signals were classified into three broad categories: acute denervation, chronic denervation with abnormal motor unit recruitment pattern, and chronic denervation with abnormal motor unit morphology
- Findings were analyzed using McNemar's test

RESULTS

- 25 patients were recruited; 13 male and 12 female. Average duration of symptoms was 27.5 weeks (range 2-204 weeks)
- Clinical criteria to diagnose paresis included asymmetric VFMI, reduced diadochokinesis, unilateral bowing, and asymmetric mucosal wave propagation, amongst other findings. (See figures 1 and 2)
- Abnormal EMG findings were documented in 22/25 patients (Table 1)
- Diagnoses based on LEMG included
  - 9 RLN paresis
  - 9 Vagal paresis
  - 4 Bilateral paresis
  - 3 normal studies
- Chronic denervation and reinnervation signals were seen most often, indicating old healed neuropathy. This included motor units firing fast, decreased units, failure to recruit larger units, and reduced full interference patterns. Polyphasic units were also seen (Table 1)
- McNemar's test showed significant p-values (<0.05) comparing acute denervation potentials to units firing fast, decreased units, decreased recruitment, and polyphasic fast units (Tables 2 and 3)
- Management included injection laryngoplasty with hyaluronic acid in 10 patients, voice therapy in 6, and observation or spontaneous recovery in the remainder

RESULTS (cont’d)

- LEMG in patients with vocal fold motion disturbance shows a high incidence of VFP
- LEMG shows that paresis may be due to unilateral, bilateral, and vagal paresis
- Most patients with VFP have an old injury with denervation followed by reinnervation
- The high incidence of vagal paresis (9/25) may explain why injection laryngoplasty alone is not often sufficient for full functional restoration. It is a diagnosis that is not necessarily considered in VFMI
- The high incidence if bilateral findings (4/25) highlights the discrepancy between clinical impression and LEMG findings
- LEMG in patients with vocal fold motion impairment should look for abnormalities in motor unit morphology, recruitment sequence, unit firing rate and size principle of motor unit recruitment rather than acute denervation findings.
- Limitations:
  - Small study size
  - Subjective LEMG interpretation
  - Inherent bias of paresis diagnosis made based on LEMG findings
  - No uniform way to report LEMG findings

CONCLUSIONS

- LEMG in patients with VFMI is often associated with bilateral or unilateral VFP, as well as vagal paresis
- Chronic denervation and polyphasic units are commonly seen as opposed to signs of acute denervation
- Clinical exam criteria alone make the diagnosis difficult
- Addition of LEMG augments the diagnosis of VFP
- A multidisciplinary team approach to LEMG can guide care for these patients

SELECTED REFERENCES