**Introduction**

- Stress Urinary Incontinence (SUI) is the leakage of urine due to an increase in abdominal pressure that affects approximately 30% of women.
- During childbirth the pudendal nerve (PN) and the muscle it innervates, the external urethral sphincter (EUS), are injured.
- After childbirth women develop post-partum SUI associated with increased motor latency.
- While most women recover within one year, many will redevelop symptoms within 5 years, suggesting the PN does not regenerate properly after vaginal childbirth.
- Current treatments do not address the underlying pathophysiology.

**Methods**

- Sprague-Dawley rats received a PN crush (PNC) and vaginal distension (VD) or a sham injury with or without electrode implantation with ES or with sham ES.
- 1 hour after the procedure, animals received 1 hour of ES (0.3mAmp, 20 Hz, 0.1ms) followed by either daily or 4 times a week a stimulation under isoflurane anesthesia. Sham ES consisted of 1 hour of isoflurane anesthesia.
- Animals were stimulated for 2 weeks.

**Histological Outcomes**

- Masson's and Neuromuscular Junction (NMJ) staining of the EUS showed:
  - Increase in BDNF after nerve injury alone
  - Decrease in BDNF after muscle injury alone
  - Dysregulation of BDNF after the dual injury
  - BDNF is not upregulated after a dual injury, suggesting its involvement in impaired regeneration of the PN following vaginal childbirth.

**Results**

- While ES accelerated LPP recovery, 4 times a week improved recovery better than daily stimulation, supported by the improvement in EMG amplitude and frequency.
- Electrode implantation decreased sensory nerve amplitude and frequency, supported by the reduction in innervated NMJs.
- Daily stimulation may have been too frequent, causing some damage to the PN and reduced accelerated regeneration.
- ES is a possible treatment for SUI, but electrode implantation is not advisable clinically after childbirth.
- Future work will investigate clinically feasible stimulation routes.

**Conclusion**

- 4 times a week stimulation preserved the EUS compared to sham stim and daily stim. Implantation did not affect EUS morphology.
- Implantation affected NMJ in all groups. While Sham stim after PNC+VD did not improve NMJ innervation or morphology, daily stim showed some improvement and 4/wk stim showed greater improvement of NMJ.

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