

## QUANTITATIVE MULTI MOTOR UNIT POTENTIAL (MULTI-MUP) ANALYSIS OF EXTERNAL ANAL SPHINCTER MUSCLES SHOWS NERVE DAMAGE FOLLOWING VAGINAL BIRTH

### Aims of Study

Fecal incontinence in women is thought to be associated with sphincter laceration or pudendal nerve damage.[1, 2] A prolonged pudendal nerve terminal motor latency (PNTML) is evidence of profound nerve damage but PNTML can be normal even when nerve injury has been sustained.[3] Recently, quantitative EMG of the pelvic floor muscles has been made possible by multiple motor unit potential analytic techniques.[4, 5] Previous investigators have shown no change in quantitative EMG parameters after childbirth, but these examinations took place remote from delivery.[6] To show subtle neuropathic changes to the external anal sphincter (EAS) immediately following vaginal childbirth, we performed neurophysiologic tests, including quantitative EMG in nulliparous (Nullip) women and recently postpartum (PP) women.

### Methods

Standardized examinations were performed on 28 nulliparous women and 12 asymptomatic women who were postpartum following vaginal delivery of their first child. The examinations included POPQ measurements, endoanal ultrasounds, PNTML and concentric needle EMG for motor unit potential (MUP) analysis. Quantitative EMG (QEMG) was performed from a digitally recorded signal on a Medtronic Keypoint EMG machine equipped with multi-MUP software. From each subject approximately 40 discrete motor units were sampled from the EAS at 3 and 9 o'clock. Means and standard deviations were calculated. Most data were not normally distributed and Mann-Whitney U tests were used to determine significance.

### Results

Mean age was similar between the groups: 27.0 ± 7.5 yrs in Nullips vs. 25.2 ± 4.7 yrs in PP (p=0.5, t-test). A mean of 11.6 ± 0.7 weeks had elapsed since unassisted vaginal deliveries in the PP group. PNTML was not increased. From 859 distinct MUPs in the Nullip group and 540 distinct MUPs in the PP group, the following objective MUP parameters were all shown to be significantly increased.

		Nulliparous	Postpartum	<i>p</i>
<b>MUP Parameters:</b>	Duration (ms)	5.5 (3.0)	6.3 (3.7)	.02
	Amplitude (µV)	275 (184)	301 (194)	.006
	Area (µVms)	229 (194)	261 (230)	.003
	Turns	2.4 (1.4)	2.7 (3.0)	.001
	Phases	2.8 (1.1)	3.0 (1.2)	.004
<b>Motor Latency:</b>	PNTML (ms)	2.2 (0.8)	2.8 (2.1)	0.5

### Conclusions

In primiparous women who are 12 weeks postpartum from a vaginal delivery, motor units are larger and more complex than in similarly aged women who have never had childbirth. QEMG using multi-MUP analysis detects the presence of subtle nerve injury following vaginal childbirth that is not demonstrated by nerve conduction studies alone. One utility for this tool may be to identify women with subclinical injury so that postpartum rehabilitation can begin prior to the onset of symptoms such as fecal incontinence.

### References

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