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Improvement Of Force Control After Platelets-Rich Plasma Injections Among Patients With Lateral Epicondylitis

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Disclosures:

The author declares that there is no relevant or material financial interests that relate to the research described in this paper

Introduction

- Platelet-rich plasma (PRP) injection has been proved to significantly improve pain associated with lateral epicondylitis (LE), commonly scaled with patient-reported outcome questionnaires.

- However, little is known about force precision control for the patients with LE who receive PRP injections.

- The aim of this study was to investigate the effect of PRP injections on precision control for force generation at the three-month follow-up.

Methods

- 15 age-matched healthy participants (male: female= 9:6, 26-52 yrs) and15 patient participants (male: female= 9:6, 27-51 yrs) with LE who received a single PRP injection (ACP, Arthrex Inc., Naples, FL) enrolled in this study.

- In the pre-test and post-test when the PRP group received injection for 3 months, they completed 3 maximal voluntary contraction (MVC) trials of the wrist extension followed by a visually-guided trapezoidal force task of wrist extension (8-sec ramp-up phase up to 75 % MVC followed by 2-sec holding phase and 8-sec ramp-down phase) with the injured hand.
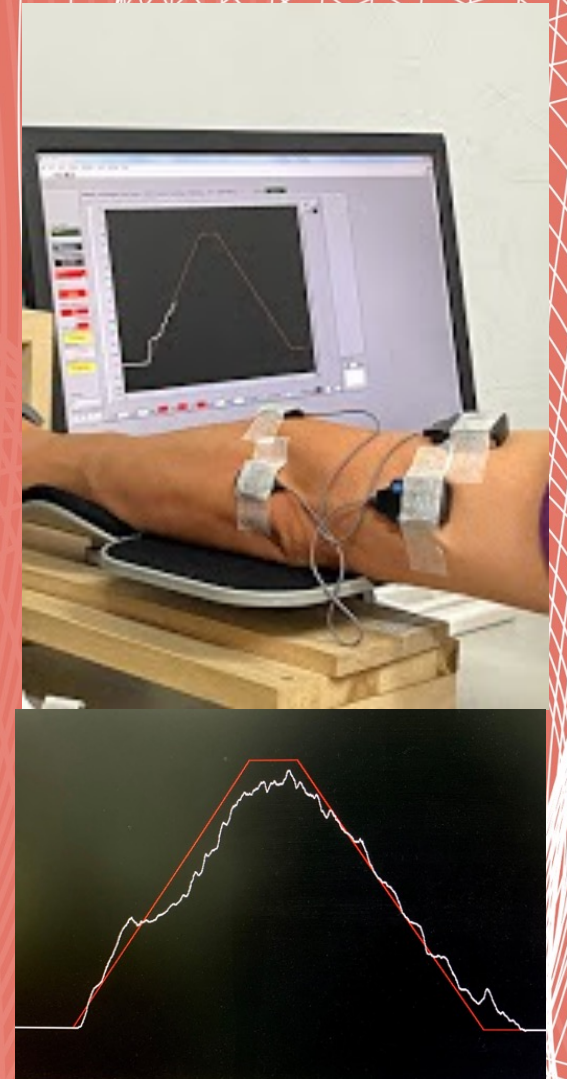
Methods

- The same force tasks, separated by 3 months, were repeated for the control group with the matched hands.

- Task errors and force fluctuation dynamics during force increase of the isometric trapezoidal contraction were characterized.

- The differences force fluctuation characteristics during the ramp-up phase was contrasted between the pre-test and post-test for the PRP and control groups.

Results

	ERR_U	U_RMS	MF_U	EN_U	MVC	GRIP POWER	VAS
GLOCOSE PRE-TEST(N=7)	4.11±1.90	1.81±0.38	0.54±0.13	0.16±0.27	2.71±1.56	36.57±11.08	**7.66±1.50**
GLUCOSE POST TEST (N=8)	3.71±1.71	1.94±0.62	0.43±0.34	0.14±0.14	2.61±1.46	31.51±8.26	**3.75±3.31**
T VALUE	1.250	-0.446	2.082	2.115	0.442	0.938	**3.302**
P VALUE	0.258	0.671	0.082	0.079	0.688	0.384	**0.021**
PRP PR-TEST (N=7)	**4.16±1.67**	2.16±0.53	0.51±0.22	0.15±0.67	**2.20±1.38**	28.38±11.79	**6.5±1.92**
PRP POST TEST (N=8)	**2.41±1.34**	1.65±0.89	0.62±0.23	0.20±0.79	**2.73±1.30**	28.60±9.86	**3.12±2.10**
T VALUE	**2.633**	1.837	-1.022	-1.578	**-0.593**	-0.103	**3.813**
P VALUE	**0.034**	0.109	0.341	0.159	**0.001**	0.921	**0.007**
PRE-TEST	t=-0.054 p=0.958	t=-0.146 p=0.167	t=0.296 p=0.772	t=0.356 p=0.716	t=0.678 p=0.510	t=1.378 p=0.191	t=1.383 p=0.190
POST-TEST	t=-1.653 p=0.122	t=-0.713 p=0.488	t=0.-2.113 p=0.055	t=0.-2.029 p=0.064	t=-0.174 p=0.0.865	t=0.615 p=0.0.549	t=0.805 p=0.0.435

Results

- For the PRP group, root mean square (RMS) of task errors and force fluctuations were smaller in the post-test than those in the pre-test (task errors: 5.11±2.12 % MVC to 3.54±1.91 %MVC, p=0.025, force fluctuations :2.29±0.31 % MVC to 1.51±0.36 % MVC, p < 0.001).

- In terms of sample entropy (SampEn) and mean frequency (MF), complexity (0.13±0.04 to 0.18±0.08 p=0.014) and spectral level (0.43±0.16 to 0.59±0.22, p = 0.053) showed increasing trend after PRP injections.

Results

- Compare with control group, pre-test extremities showed higher task errors and fluctuations in all aspect(task error RMS: $p=0.025$; force fluctuation RMS $p=0.002$; MF of force fluctuations: $p=0.007$; SampEn of force fluctuations: $p=0.006$).

- In contrast, there were no differences in all aspects of force fluctuations between the post-test for the and group (task error RMS: $p=0.405$; force fluctuation RMS $p=0.149$; MF of force fluctuations: $p=0.476$; SampEn of force fluctuations: $p=0.853$).

- MVC of injured extremity is significantly higher in post-test at 3 months follow up (154.15±120.18 NT to 196.77±110.89 NT, $p=0.002$).

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Conclusion

- PRP injection significantly improves precision control of wrist extension during force increase.

- In addition to force precision, PRP injections add to richness of force regulation and error correction attempts for the patient group.

- Our study clearly demonstrates that PRP injections are able to satisfactorily restore all aspects of force generation capacity at the 3 months follow-up.