Okay to Play! Do Activity Restrictions Matter During Treatment of Pediatric Distal Radius Buckle Fractures? A Prospective Study

Dustin Adam Greenhill, Neil Jain, Robert Gomez, Kylie Coffield, Nicholas Grimm

INTRODUCTION:

Pediatric distal radius buckle fractures are inherently stable. Widely accepted evidence that currently direct treatment protocols prescribes formal activity restrictions for several weeks. These restrictions often manifest as a school note preventing the child from participating in supervised physical activity. The clinical necessity of strict restrictions has not been questioned. This study examines the role of activity restrictions on clinical, radiographic, and patient reported outcomes in pediatric patients with an isolated distal radius buckle fracture.

METHODS:

Patients ≤16 years old presenting with an acute dorsal distal radius buckle fracture were prospectively enrolled into one of three treatment cohorts: 1) standard Velcro wrist splint with prescribed restrictions (control), 2) standard Velcro wrist splint with no restrictions (Spl-noR), or 3) a removable custom 3D-printed rigid orthosis with no restrictions (3D-noR). Patients with insufficient follow-up, bilateral buckle fractures, abnormality of the volar cortex, or an additional injury were excluded. Four-week radiographs and patient reported outcomes (activity levels, treatment satisfaction, and QuickDASH disability and sport modules) were obtained.

RESULTS:

Among 133 included patients (48 control, 57 Spl-noR, 28 3D-noR) averaging 8.2±3.6 years old, there were no differences in age, sex, or laterality between cohorts. Reported activity levels decreased during treatment in the restricted control group but not in unrestricted patients ($p < 0.001$) (Table 1). The control group also expressed more activity avoidance ($p < 0.001$) and problems participating in sports (QuickDASH sports 39.6 versus 8.7/10.7, $p<0.001$) than the unrestricted experimental groups (Spl-noR and 3D-noR, respectively). However, all patients demonstrated uncomplicated radiographic and clinical healing by four-weeks. Patient satisfaction did not differ across treatment cohorts ($p = 0.221$).

DISCUSSION AND CONCLUSION:

In refinement of previously studied protocols on this topic, formally prescribed activity restrictions may not be required during the predictably uncomplicated healing of pediatric distal radius buckle fractures. Removable but rigid 3D-printed immobilization also does not demonstrate any clear benefit during unrestricted activity. Patients and parents can self-limit physical activities in a removable Velcro splint without compromising successful outcomes.

Table 1: Patient Reported Outcomes Among Treatment Cohorts

	Soft Splint Restrictions (Control)	Soft Splint No Restrictions (Spl-noR)	Rigid 3D-cast No Restrictions (3D-noR)	p-value
Cohort size (n)	48	57	28	
Age (years)	8.3±4.0	7.7±3.5	8.9±2.8	0.333
Laterality	27 L, 21 R	33 L, 24 R	19 L, 9 R	0.582
Mean Patient/Parent Survey Scores (1-5)*				
Perceived impact on overall activity	2.2	1.9	1.9	0.295
Frequency of activity avoidance	2.6	1.7	1.8	<0.001
Satisfaction with splint or cast	4.4	4.5	4.7	0.221
Child's activity level pre-injury	4.6	4.4	4.6	0.314
Child's activity level since the injury	3.4	4.1	4.3	<0.001
Difference in activity levels during treatment	1.2	0.3	0.3	<0.001
QuickDASH**	20.4	8.7	10.7	<0.001
QuickDASH Sports**	39.6	14.9	19.0	0.004

*1 = lowest, 5 = highest

**1 = no difficulty, 5 = severe difficulty