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Children with a unilateral congenital below elbow deficiency (UCBED) have one typical upper limb, and one that ends below the elbow, at the proximal level or mid forearm (i.e., lacking a hand). Unlike the majority of adults who usually acquired their limb loss, children with UCBED were born with their limb difference; their affected muscles have never actuated an intact limb. Due to this lack of experience, it has been assumed that their abilities to purposefully modulate muscle activity are limited, subsequently influencing prosthetics designed for this population. Here, we used ultrasound imaging coupled with machine learning to quantify this limitation in 8 children with UCBED (ages 8-20). We measured the extent children could volitionally and reliably activate residual muscles to represent distinct hand grasps, as well as proportionally modulate their muscles to achieve intermediate states, representing graded positional control of grasp closure. We demonstrate that all subjects could enact up to 9 distinct muscle patterns representing different grasp patterns (e.g., power grasp) and could perform these intended movements consistently. We compared these motor abilities to their unaffected limb and found similar performance across limbs. Furthermore, we show that all subjects can proportionally modulate their residual muscles and achieve up to 5 distinct proportional levels and maintain those levels for up to 10 seconds. These results suggest that although participants had never actuated the missing hand they can still distinctively and consistently activate the residual muscles that would perform the intended motor act. This provides insight into how motor control develops in the absence of the normal effector and