Ultrasound analysis of tongue movement in childhood apraxia of speech
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Childhood apraxia of speech (CAS) is a neurological motor speech disorder affecting spatiotemporal planning of speech movements. Speech characteristics of CAS are still not well defined, presenting difficulties in recognising the impairment and, consequently, in selecting the correct therapy methods. The main aim of the study was to reveal speech characteristics of CAS by applying joint acoustic and articulatory analysis. This was achieved by ultrasound imaging of the tongue during the articulation of syllables with different onset structure (number and type of syllable onset segments). The synchronised acoustic and ultrasound recordings provided the following temporal and articulatory measurements: duration of syllables, amount and rate of tongue movement over the syllables and observation of the patterns of tongue movement. In order to reveal unique information about speech in CAS, performance of teenagers with CAS was compared to a control group of adults and a control group of typically developing children.

Results showed that, as a group, speakers with CAS differed from the adults but not from the typically developing children in syllable duration and in rate of tongue movement. They did not differ from either of the control groups in amount of tongue movement. Observing patterns of tongue movement showed that speakers with CAS produced different patterns than speakers in the control groups. However, like adult speakers, speakers with CAS showed very stable patterns of tongue movement across five repetitions of the same syllable. The same was not observed in the typically developing children. Also, the ultrasound recordings suggest that speakers with CAS may move their tongues less in the oral space than speakers in the control groups. The differences between the control groups were similar to those previously reported.

The results additionally provide support for the usage of ultrasound tongue imaging both with adults and children and as a diagnostic tool in clinical practice.