Acoustic analysis of vowels before and after orthognatic surgery. Juha-Pertti Laaksonen, Matti Niemi, Risto-Pekka Happonen & Olli Aaltonen. 1 Dept. of Phonetics, University of Turku, 2Dept. of Oral and Maxillofacial Surgery, University of Turku, Turku, Finland. [Full Paper Available on CD]

The effects of orthognatic surgery on the phonetic quality of speech were studied by analyzing acoustic features of vowels. Five men with dentofacial deformities (Class II skeletal deformity) undergoing surgical operation were enrolled in the study. The speech material consisted of 8 vowels (/i/, /y/, /e/, /ø/, /æ/, /a/, /o/, /u/) in sentence context. Every utterance was repeated 10 times in 3 different sessions: before the operation, 1 month to 3 months after the operation, and 6 to 9 months after the operation. The acoustic features (F1, F2, F0, duration) were measured and analyzed. At the group level, no significant acoustic changes were found between the 3 different sessions in any parameter measured (p>.01). However, the results show that the operations had individual and variable effects on vowel quality, ranging from slightly affected to completely unaffected. Two subjects showed changes in vocal tract resonances, and 1 subject had short-term changes, that eventually returned to the presurgical level. Significant changes of F0 were observed in 1 subject, and 3 subjects had short-term changes. No significant changes were found in duration. One subject had no significant changes in any parameter measured. Different orthognatic surgeries performed had some effects on speech output. However, these changes were highly individual, and mostly short-term. Usually the changes applied to single vowels, not to the entire vowel system. Orthognatic surgery seems to have no potential to change vowel quality permanently. Thus, even profound anatomical changes in the vocal-tract have no significant effect on speech production.