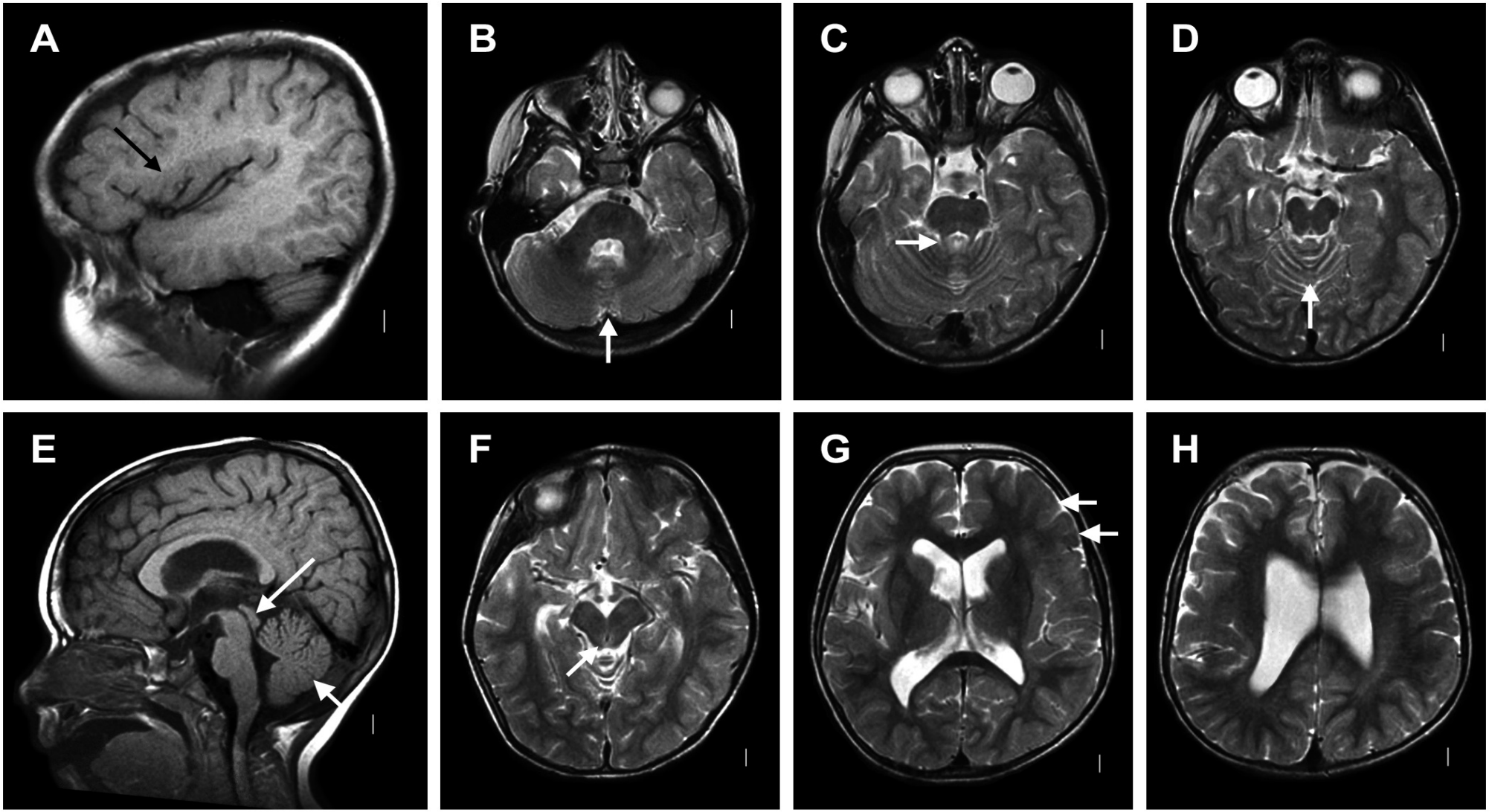

Figure S1. Normal brain MRI images comparable to Figures 2A-H demonstrate a normal Sylvian fissure (arrow in A), normal cerebellar vermis (arrows in B and D, and bottom arrow in E), normal superior cerebellar peduncles (arrow in C), normal midbrain tectum (top arrow in E and arrow in F), and normal cortex (arrows in G).

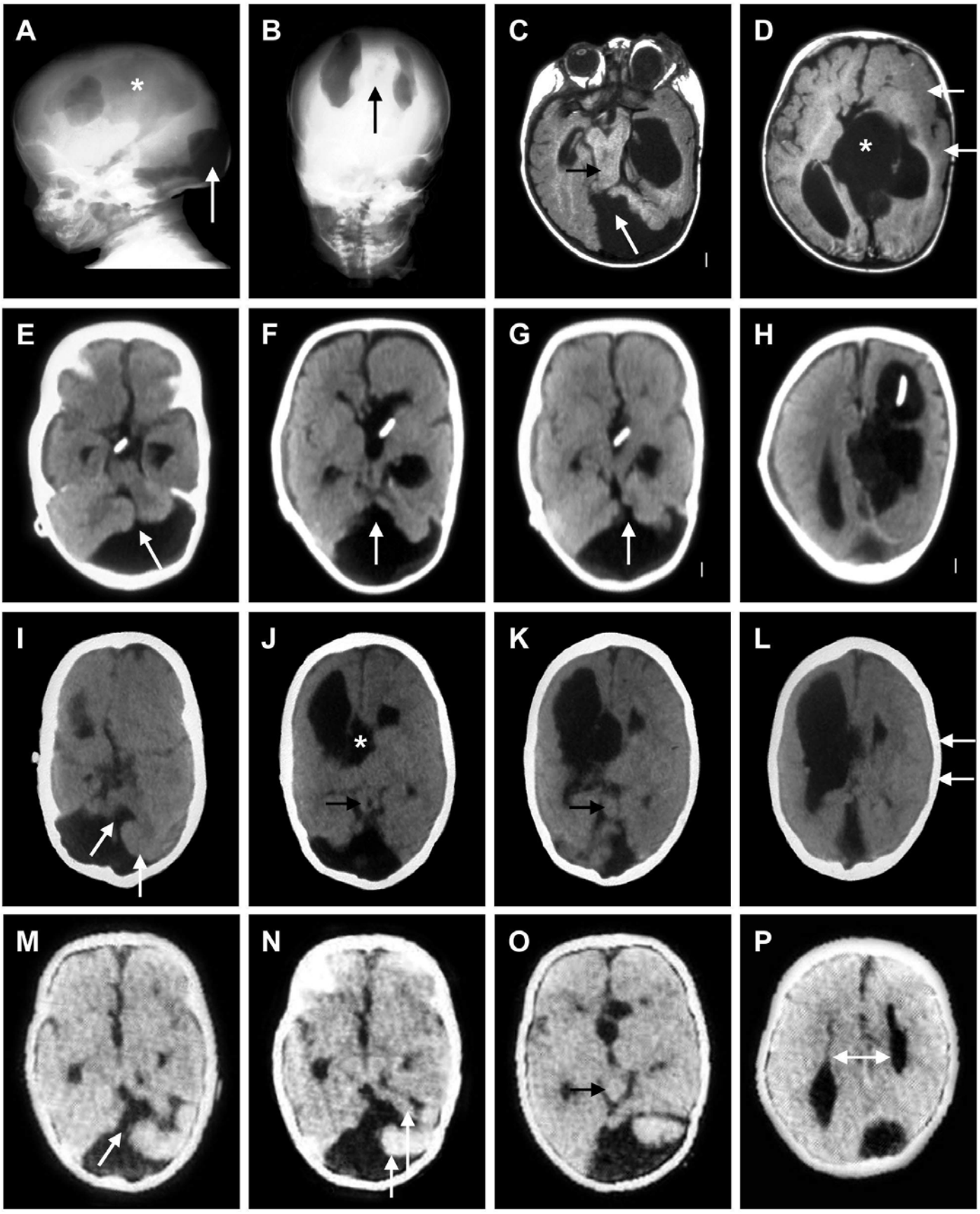

Figure S2. The classical OCCS brain malformation. Lower resolution brain imaging studies in four other patients showed similar changes. These consisted of a pneumoencephalogram in patient 8 (A-B), two images from an MRI in patient 5 (C-D), and cranial CT scans in patients 5 (E-H), 6 (I-L) and 7 (M-P). Images through the cerebral hemispheres in patients 5 and 6 show loss of the normal gyral pattern and moderately thick cortex (white arrows in D and L) that

probably represent polymicrogyria. The resolution is too low to assess the cortex in patient 7 (M-P). The lateral ventricles are mildly enlarged and widely separated in all four patients (asterisk in A, arrows in B and P; also seen in F-H and J-L) indicating agenesis of the corpus callosum, with large interhemispheric cysts in patients 5 and 6 (asterisks in D and J). Images through the posterior fossa in patients 5-7 show a large and dysplastic midbrain tectum (black arrows in C, J-K and O), absent vermis (angled arrows in C, E, I, M and vertical arrows in F-G), and small, asymmetric cerebellar hemispheres (C, E-G, I-K, M-O with vertical arrows in I and N). All four patients have large posterior fossa fluid collections (A-I and L).

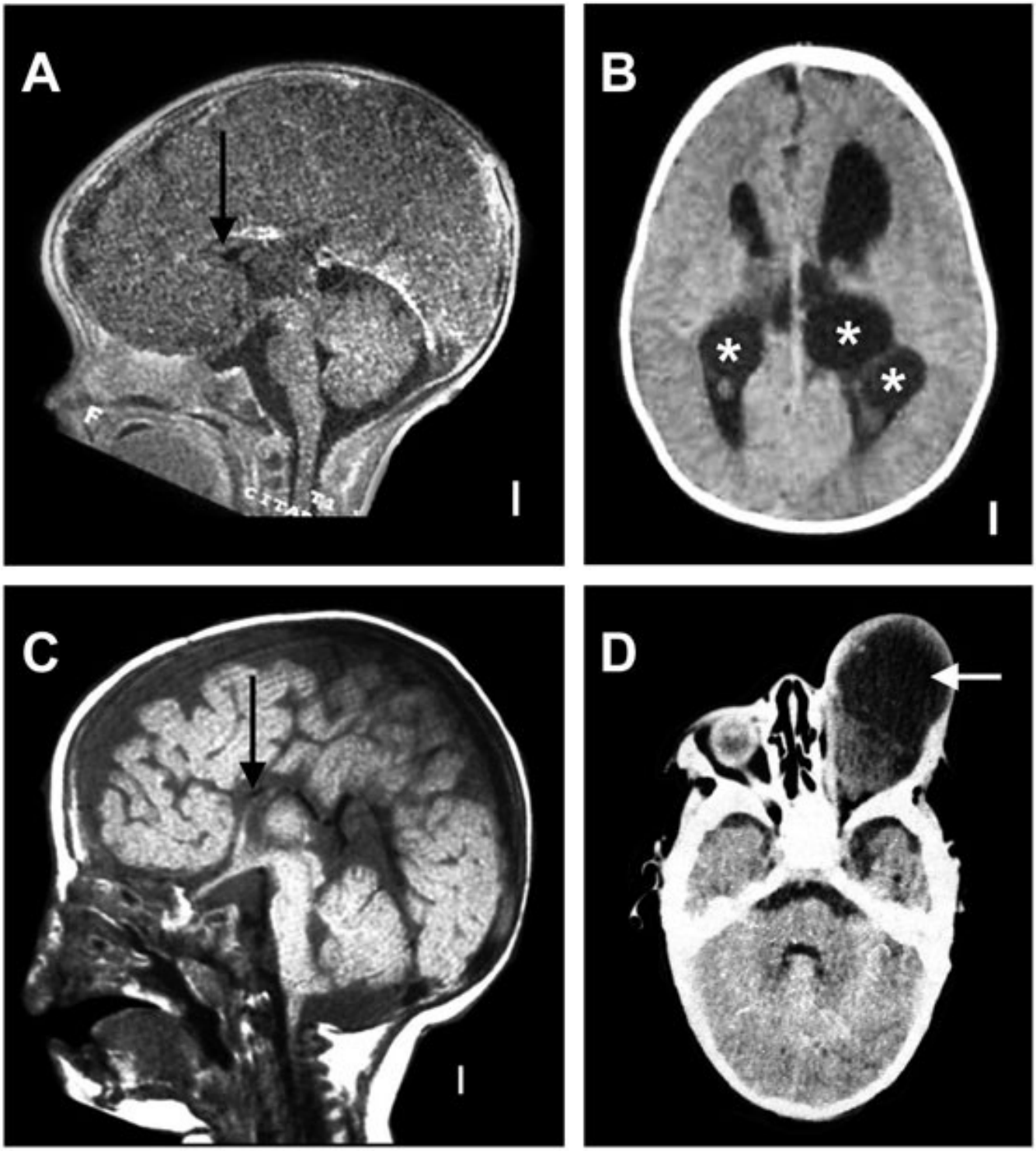

Figure S3. Incomplete OCCS brain malformation. In contrast, brain imaging studies in three OCCS patients were also suboptimal and incomplete, but showed less severe malformations. These consisted of an old MRI in patient 9 (A-B), a single MRI mid-sagital image in patient 10 (C), and a few CT images through the posterior fossa (D) in patient 11. The gyral pattern appears normal on limited views in patients 9 and 10 (B and C). The lateral ventricles are mildly enlarged and separated with several intraventricular cysts in patient 9 (asterisks in B), but cannot be assessed in patients 10 or 11. The corpus callosum is absent save for a small anterior remnant in patient 9 and completely absent in patient 10 (black arrows in A and C). The brainstem including the tectum, and the cerebellum appear normal in all three patients (A, C and D). The left eye is cystically enlarged in patient 11 (D).