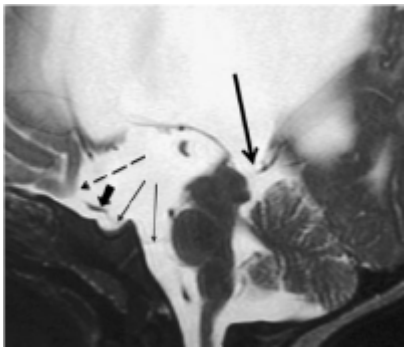
Third ventricle deformation



Structural changes of the brain's third ventricle have been acknowledged as an indicative measure of the brain atrophy progression in neurodegenerative and endocrinal diseases.

Kim et al. demonstrated that there approach is suitable to morphometrical analyses of the third ventricle, providing high accuracy and inter-subject consistency in the shape quantification. This shape modeling method with geometric constraints based on anatomical landmarks could be extended to other brain structures which require a consistent measurement basis in the morphometry [1].

Preoperative third ventricle deformation (known as 'bowing') is associated with higher endoscopic third ventriculostomy (ETV) success [2].

In children, the effect of bowing has not to date been systematically studied. Aim of a study of Krejčí et al. was to determine the effect of bowing on ETV success in adult and child patients.

In this retrospective, monocentric study were included 135 (70 adults and 65 children) of 157 patients who underwent ETV between 2008-2016, with mean follow-up 4.3 years. Presence and extent of bowing and its impact on ETV outcome were evaluated. Third ventricular anatomy was assessed on pre- and postoperative MR imaging.

In patients > 6 months old, the ETV success rate was 91 % in bowing-positive cases and 47.6% in bowing-negative cases. Among patients < 6 months old, ETV was successful in 37% of those with bowing and 36.4% of those without. Presence of bowing strongly indicates ETV success in patients older than 6 months ($p < 0.000\ 5$), including children of 7 months and older (p 0.001). This relationship was not confirmed in pediatric patients up to 6 months old (p 1.000). The extent of bowing does not influence ETV success (p 0.559). Bowing correction strongly correlates with ETV success ($p < 0.000\ 5$).

They confirmed significant correlation between bowing and ETV success in patients over 6 months old. This relationship was not determined in those younger than 6 months and therefore we do not recommend bowing in ETV indication criteria for this patient cohort [3].

References

1)

Kim J, Valdés Hernández Mdel C, Royle NA, Maniega SM, Aribisala BS, Gow AJ, Bastin ME, Deary IJ, Wardlaw JM, Park J. 3D shape analysis of the brain's third ventricle using a midplane encoded symmetric template model. Comput Methods Programs Biomed. 2016 Jun;129:51-62. doi: 10.1016/j.cmpb.2016.02.014. Epub 2016 Feb 28. PubMed PMID: 27084320; PubMed Central PMCID: PMC4841787.

2)

Dlouhy BJ, Capuano AW, Madhavan K, Torner JC, Greenlee JD. Preoperative third ventricular bowing as a predictor of endoscopic third ventriculostomy success. J Neurosurg Pediatr. 2012 Feb;9(2):182-90. doi: 10.3171/2011.11.PEDS11495. PubMed PMID: 22295925.

3)

Krejčí T, Krejčí O, Večeřa Z, Chlachula M, Šalounová D, Lipina R. The role of third ventricle bowing in the success of endoscopic third ventriculostomy in pediatric and adult patients. Clin Neurol Neurosurg. 2019 Oct 10;187:105554. doi: 10.1016/j.clineuro.2019.105554. [Epub ahead of print] PubMed PMID: 31639633.