IDENTIFICATION OF CHARACTERISTIC NEUROLOGICAL COMPLICATIONS IN INFANTS WITH ACHONDROPLASIA BY ROUTINE MRI SCREENING

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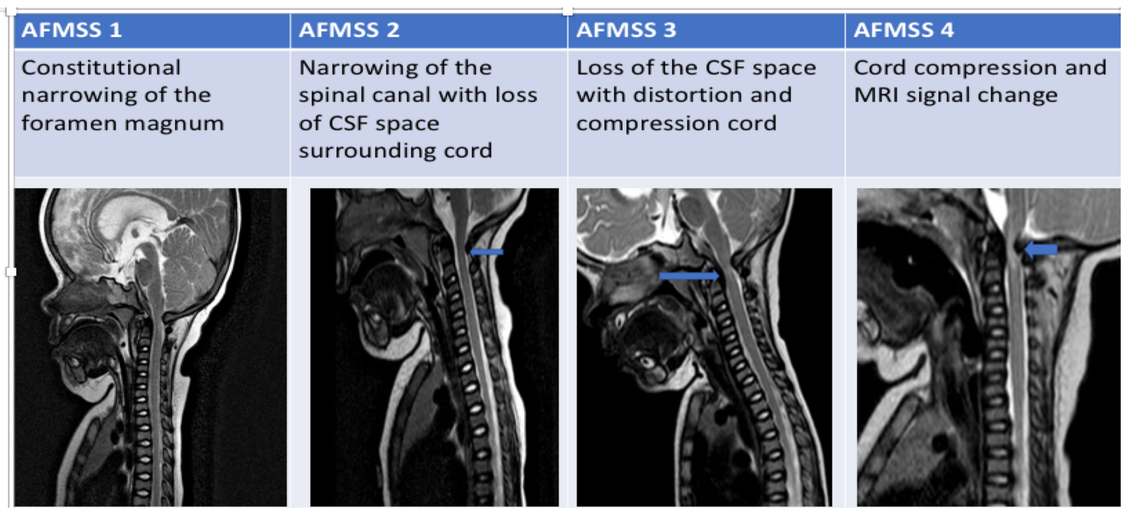
BACKGROUND

Achondroplasia is the commonest type of skeletal dysplasia with an incidence of 1 in 20, 000 and is due to recurrent and dominantly transmitted, activating mutations in Fibroblast Growth Factor Receptor 3 (FGFR3). Complications during infancy include foramen magnum stenosis and hydrocephalus, which may lead to neurological morbidity and sudden unexplained mortality. Early detection and appropriate neurosurgical management can prevent these complications. However, consensus around routine screening has not been reached and imaging practices between centres in the United Kingdom are inconsistent.

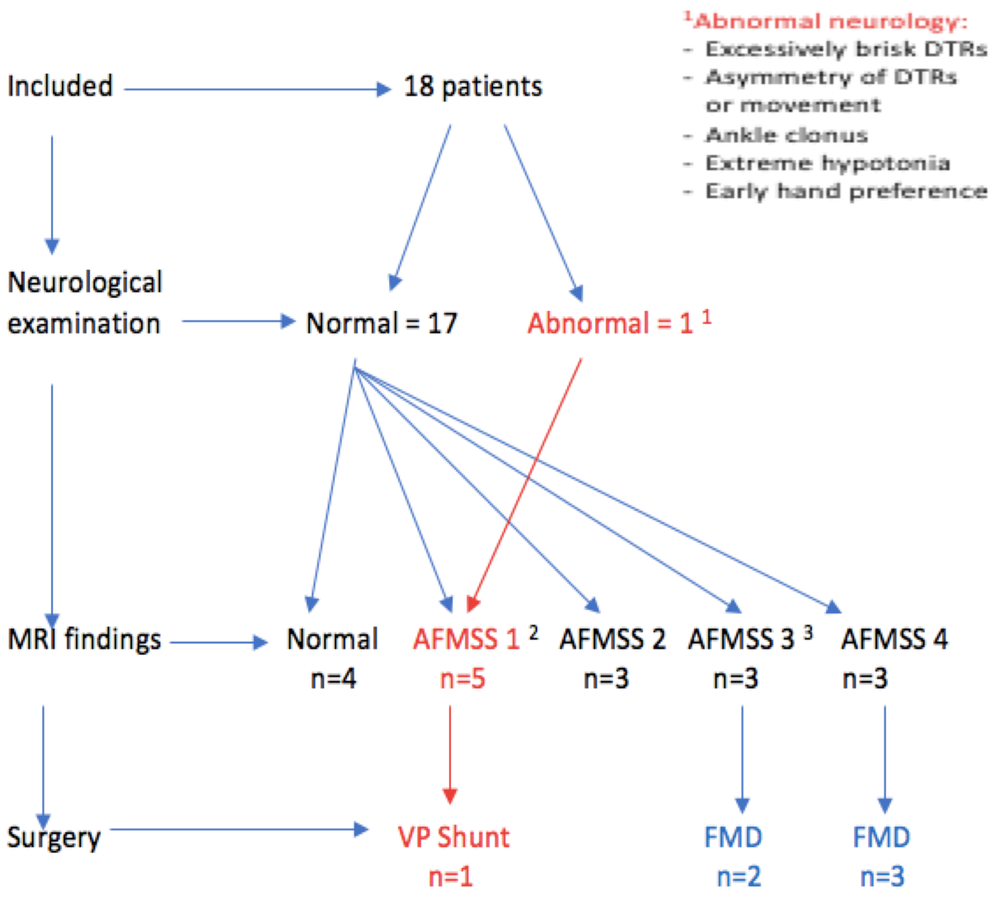
AIMS

The Achondroplasia Multi-disciplinary Service at the Evelina Children's Hospital provides regular surveillance for over 140 affected children. Since 2016, all infants under one year have undergone routine MRI brain imaging, aiming to identify early changes and document natural history of pathology, with a view to informing recommendations for management.



RESULTS

Figure 1: Prevalence of neuraxis changes on MRI and surgical outcomes vs neurological findings



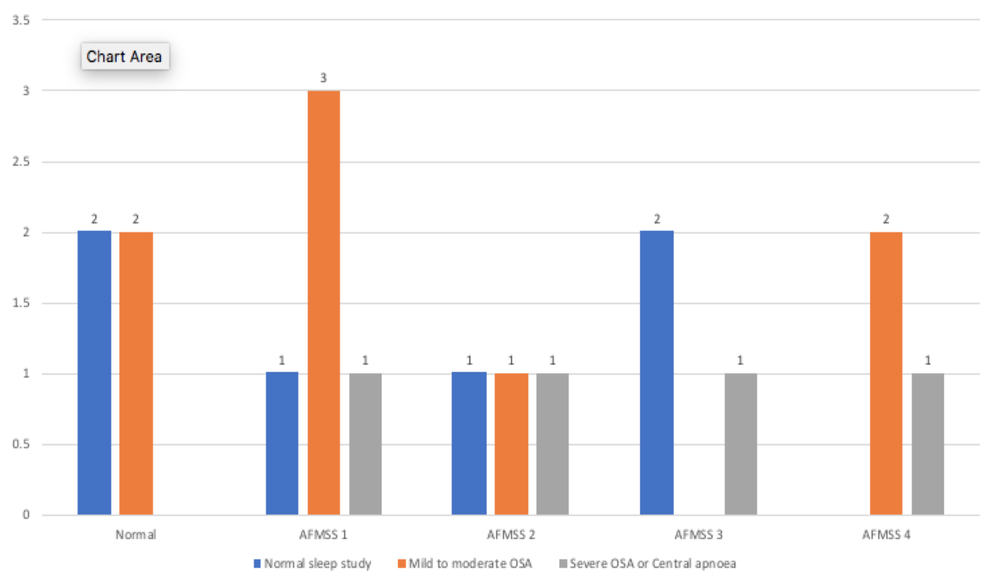
[2,]1 with AFMSS 1 and hydrocephalus who underwent VP shunt insertion.
[3] 1 with AFMSS 3 with hydrocephalus who did not undergo surgery.

Baseline characteristic	Number (n = 18)
Male	8
Female	10
Antenatal Δ	9
Postnatal Δ	8
Unknown timing of Δ	1
Diagnostic investigations	
Genetic testing *(FGFR3)*	16
Skeletal survey	5
Positive family history	2

STUDY DESIGN

This retrospective cohort study investigated all children under one year with a confirmed diagnosis of Achondroplasia from January 2016 to January 2018. Details were collected of the clinical evaluation, which included a detailed neurological examination and MRI scans. The presence of hydrocephalus or craniovertebral junction (CVJ) changes were evaluated by a Paediatric Neuroradiologist. In order to provide a more objective assessment of foramen magnum stenosis, a novel scoring system was developed, the Achondroplasia Foramen Magnum Severity Score (AFMSS).

Figure 2: MRI staging versus sleep study findings for 18 patients



- ✓ Only 1 patient had an abnormal neurological examination.
- ✓ However 14 patients had MRI changes.
- ✓ Of those, 6 required neurosurgery, either VP shunt insertion of foramen magnum decompression (FMD).
- ✓ The AFMSS stage was positively correlated with likelihood of FMD.
- ✓ Clinical neurological examination, as an indicator of structural abnormality, had a low sensitivity of 6% but a high specificity of 100% in this age group.

CONCLUSION

This data demonstrates a high prevalence of pathological neuraxis changes in infants with Achondroplasia detected on routine MRI screening without clinical signs of symptoms. Further studies are needed to explore the evolution of foramen magnum changes in children over 12 months of age. The results of this study indicate that all infants with Achondroplasia should undergo routine neuroimaging screening, given the high incidence of significant complications in this unselected population.

REFERENCES

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