Short report

MRI measurement of syrinx size before and after operation

R GRANT,* D M HADLEY,* D LANG,† B CONDON,* R JOHNSTON,† I BONE,‡
G M TEASDALE†

From the Magnetic Resonance Unit,* Department of Neurosurgery,† Department of Neurology,‡ Institute of Neurological Sciences, Southern General Hospital, Glasgow, UK

SUMMARY When patients with syringomyelia fail to improve after operation, factors such as incomplete cyst decompression or type of operation are often implicated. MRI has been used to confirm adequate syrinx decompression post-operatively and to compare the degree of collapse with the type of operation. Foramen magnum decompression was at least as effective in reducing cyst size as syringo-subarachnoid shunting. MRI may also provide a better classification of syringomyelia.

The merits of operations for syringomyelia are controversial and the benefits of different methods are uncertain.¹⁻³ Magnetic resonance imaging (MRI) has, for the first time, made it possible to measure directly and non invasively the size of a syrinx, without interfering with spinal hydrodynamics, and can be repeated relatively readily. We have used MRI to measure the size of syringes before and after operation, following either posterior fossa decompression or direct drainage of the cyst.

Address for reprint requests: Dr R Grant, Magnetic Resonance Unit, Institute of Neurological Sciences, Southern General Hospital, Glasgow, G51 4TF, UK.

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Patients and methods

We studied nine patients with syringomyelia: eight patients did not have a predisposing cause but in one patient the syrinx was secondary to a spinal injury. The types of operation performed are listed in the table. Patients were imaged before operation and at 1-6 months (mean 2.9 months) post-operatively.

Sagittal and axial magnetic resonance images were obtained with a 0.15T resistive system: Spin Echo (SE 500/40) and Inverse Recovery (IR 780/400/40) sequences were used, giving high definition contiguous 8 mm slices. Tonsillar herniation was measured by reference to a line between the fat pad at the lower end of the clivus and the posterior lip of the foramen magnum. The maximum diameters of the syrinx in cervical and thoracic regions were measured using the image display system's electronic cursor and a profile of the MR

Table Pre- and postoperative measurements of syrinx diameter

Operation	Diameter of the Syrinx (mm)			
	Cervical region		Thoracic region	
	Preoperative	Postoperative	Preoperative	Postoperative
Foramen magnum decompression	8	1	8	0*
Foramen magnum decompression	12	4	9	6
Foramen magnum decompression	11	2	8	5
Foramen magnum decompression	5	1	0	0
Foramen magnum decompression + cysto-subarachnoid shunt	3	0	6	0
Foramen magnum decompression + syringo-subarachnoid shunt	8	1	8	0
Syringo-subarachnoid shunt	6	2	10	1
Syringo-subarachnoid shunt	9	4	9	4
Myelotomy	2	1	0	0

*0 = No cavity seen.

Fig SE500/40 Sagittal image using a local neck coil. (a) pre-operative syrinx with tonsillar herniation, (b) post-operative partial collapse following foramen magnum decompression.

signal intensity across the cord and syrinx. The edges of the cord were identified on the image and on the intensity profile as the points at which the high signal from the cord started to decrease rapidly towards the low signal characterising the CSF. The resolution of the system and uncertainties in placing the cursor gave rise to likely errors of the order of 1 mm in the diameters.

Results

Seven patients were shown to have a Chiari type I malformation with tonsillar herniation ranging from 5–16 mm. One had a posterior fossa arachnoid cyst at the foramen magnum without cerebellar tonsillar herniation. The patient with post-traumatic syringomyelia had a normal posterior fossa. Two syrinxes were confined to the cervical region, six extended to the 10th thoracic vertebral level and one reached the conus. After operation the syrinx became narrower in both cervical and thoracic regions in all patients (table) (fig), irrespective of the type of operation performed. The only difference related to the operation was that following foramen magnum decompression the 4th ventricle was larger.

Discussion

In patients with syringomyelia and a posterior fossa abnormality, the syrinx became smaller after foramen magnum decompression alone, without plugging of the obex. Syringo-subarachnoid shunting, recently in vogue, was also effective but did not confer obvious additional benefits. Our observations, and the recognised frequent association with tonsillar herniation, support the view that foramen magnum obstruction is important in the pathogenesis of syringomyelia⁴ and an appropriate target for treatment.

Neither before nor after operation did we observe a communication between the 4th ventricle and the syrinx; often these communications can be difficult to identify even by histological examination.^{5,6} During life patients are therefore better classified on MRI by the presence or absence of an abnormality of the posterior fossa structures rather than as “communicating” or “non communicating” syringomyelia. A syrinx in a patient with a normal posterior fossa is likely to be a consequence of trauma or tumour and may require different treatment.⁷

We have previously shown that the pre-operative

size of the syrinx is not related to the distribution of signs or clinical severity.⁸ Further studies are required to confirm our initial findings that in patients with a posterior fossa anomaly the reduction in syrinx size is independent of the type of operation. It will also be important to discover if the change in the size of the syrinx is related to the extent and duration of post-operative clinical benefit.

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