Arterial spin labeling in evaluation of venous drainage pattern in brain arteriovenous malformations

TO THE EDITOR: I read with interest the article by Blauwblomme et al. (Blauwblomme T, Naggara O, Brunelle F, et al: Arterial spin labeling magnetic resonance imaging: toward noninvasive diagnosis and follow-up of pediatric brain arteriovenous malformations. J Neurosurg Pediatr 15:451–458, April 2015). In this article, the authors used arterial spin labeling (ASL) in 21 patients with brain arteriovenous malformations (AVMs) and used cerebral blood flow (CBF) values to determine the nidus location and patency of AVMs after treatment. They also recommended that absolute quantification of CBF values could be relevant in the follow-up of pediatric brain AVMs after partial treatment.

One of the most important factors in the appearance of the ASL perfusion map is the use of additional crusher gradients, which can be used prior to image acquisition to null the signal from intravascular spins. By nulling the residual intravascular tagged signal, the blood-flow maps will be reflective of the protons deposited in the tissues, which allows more accurate quantification of CBF; however image acquisition without crusher gradients allows direct visualization of arteriovenous (AV) shunting and the draining veins, which can be very helpful in the diagnosis of new or residual/recurrent AVMs (Fig. 1). Le et al. demonstrated

![Image](https://example.com/image1.png)

**FIG. 1.** A: Axial T2-weighted image obtained in an 11-year-old patient demonstrating hemorrhage in the medial right temporal lobe associated with multiple tiny flow voids (arrow). B and C: Contrast-enhanced T1-weighted MR image (B) and source image of time-of-flight MR angiography (C) demonstrating early subacute blood products and tiny foci of flow-related enhancement (B and C, arrow). D and E: ASL images demonstrating increased CBF at the AVM (D, arrow) and a linear hyperintense structure coursing posteriorly from the AVM to the sinus confluence and right transverse sinus (E, arrows) indicative of AV shunting with deep venous drainage. F: Conventional angiogram confirming the ASL findings of an AVM (F, black arrow) with deep venous drainage via a prominent posterior mesencephalic vein (F, white arrow).
that identifying venous ASL signal intensity improved detection of dural arteriovenous fistulas and small AVMs. Our group also evaluated 19 patients with AV shunting and demonstrated the added value of ASL imaging without crusher gradients when compared to conventional sequences for detection of AV shunting. Some studies even used ASL imaging without crusher gradients to quantify the AV shunting. In conclusion, ASL imaging without crusher gradients can provide direct evidence of AV shunting and venous drainage, which can have an important role in the initial diagnosis and follow-up of AVMs.

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References

Disclosures
The author reports no conflict of interest.

Response
No response was received from the authors of the original article.

Intrathecal baclofen trials: complications and positive yield in a pediatric cohort

TO THE EDITOR: We read with interest the article by Sayer and colleagues (Sayer C, Lumsden DE, Perides S, et al: Intrathecal baclofen trials: complications and positive yield in a pediatric cohort. J Neurosurg Pediatr 17:240–245, February 2016). The authors performed a retrospective case review to examine the outcomes and complications in intrathecal baclofen (ITB) trials for childhood dystonia. They found that the rate of positive trials in this study was 98%, of which 21% did not progress to pump implantation. Although still advocating for ITB trials prior to ITB pump insertion to aid parental decision making, Sayer et al. believe that this response rate suggests that with good patient selection, ITB pumps could be placed without a preceding trial.

However, there was no mention of the pre-trial oral baclofen doses in the patients prior to the initiation of ITB trials. In general, ITB infusion is considered only when oral baclofen causes intolerable side effects or systemic toxicity at the dose level required to achieve therapeutic response. We believe that the pre-trial oral baclofen dosage information is critical, especially when considering a very high positive trial rate. We wonder if the reported positive response rate of 98% was partially contributed to by prior systemic baclofen doses that had not yet been excrated.

Furthermore, in patients who were taking high doses of baclofen for severe spasticity, completely tapering off oral baclofen could be extremely difficult to achieve. In some cases, weaning off their oral baclofen could predispose them to complications such as skin breakdown and serious withdrawal effects. We wonder if any of those patients who went through tapering off of oral baclofen encountered any significant clinical problems. In our practice, we have encountered a case of severe spasticity due to multiple sclerosis, that was minimally responsive to baclofen (60 mg 3 times daily) and tizanidine (4 mg 3 times daily), in which completely tapering off oral baclofen was deemed unfeasible. The patient had previously experienced severe spinal headache following lumbar puncture and therefore firmly refused an ITB trial. We performed an outpatient epidural infusion trial that lasted 12 days, in which her oral baclofen was slowly tapered off while the epidural baclofen rate was gradually titrated up to efficacy.

Another point we would like to comment on is the trial protocol (i.e., “Patients were encouraged to lie flat in bed for a minimum of 12 hours after LP [lumbar puncture] and following catheter removal, as well as with the catheter in situ.”). We believe a strong focus during the trial should be placed on evaluating how patients are doing during their usual activities of daily living. There were reported cases of worsening ambulation or transfers following permanent ITB pump placement following ITB bolus trial, because some of the tone could be used by patients to perform pivot transfer or assist ambulation, and when their lower extremities became totally flaccid with ITB infusion, they lost their ambulating abilities.

This underscores the importance of performing a thorough evaluation, including functional improvement during a patient’s activities of daily living, rather than a mere reduction of Modified Ashworth Scale scores. In this regard, we believe that the conclusion of the study by Sayer et al., that ITB pumps could be placed without a preceding trial, is not advisable.