



## Degree and Duration of Functional Improvement on Long-Term Follow-Up of Spinal Dural Arteriovenous Fistulae Occluded by Endovascular and Surgical Treatment

Andrew J. Durnford<sup>1</sup>, Jonathan Hempenstall<sup>1</sup>, Ahmed R. Sadek<sup>1</sup>, Jonathan Duffill<sup>1</sup>, Nijaguna Mathad<sup>1</sup>, John Millar<sup>2</sup>, Owen C. Sparrow<sup>1</sup>, Diederik O. Bulters<sup>1</sup>

■ **BACKGROUND:** Long-term outcomes following occlusion of spinal dural arteriovenous fistula (SDAVF) are poorly understood and are based on small series reporting predominantly short-term outcomes. The degree and duration of improvement remain unclear. In this study, we analyzed long-term outcomes following occlusion in a cohort of patients with SDAVF.

■ **METHODS:** This was a single-center cohort study of patients with SDAVF identified from a prospective database. Outcomes were assessed using a modified Aminoff and Logue Disability (ALD) Scale, the modified Rankin Scale (mRS), and patient-reported outcomes at presentation and long-term follow-up. Both angiographic recanalization and idiopathic functional recurrence rates were calculated.

■ **RESULTS:** Of the total of 67 patients with SDAVF identified, 59 were eligible for inclusion in this study. Fifty-seven of these 59 (97%) underwent occlusion. Twenty-two patients underwent initial embolization; 12 were occluded. Two patients recanalized. Eleven patients underwent surgery after attempted embolization; 10 were occluded. Thirty-seven patients treated by surgery only were occluded. The median duration of follow-up was 63 months (range, 12–240 months). After occlusion, the ALD gait and urinary scores improved by a median of 1 point. Although the median mRS score was unchanged, 49% of the patients experienced improvement, most by 1 point. There was no difference between the patients occluded by embolization

or surgery, but those requiring both approaches had worse gait and urinary scores ( $P = 0.005$  and  $0.03$ , respectively). The duration of symptoms by itself had no effect on outcomes ( $P = 0.61$ ). Following occlusion, 5 patients experienced an idiopathic late functional deterioration. Of 16 patients presenting with paraplegia, 13 (81%) improved, with a median mRS improvement of 1 point.

■ **CONCLUSIONS:** Following occlusion, patients with SDAVF experienced a modest improvement in symptoms, most commonly by 1 point on the ALD scale. Idiopathic late deterioration was seen in 9.1% of patients.

### INTRODUCTION

Since the first report of the aggressive natural history of spinal dural arteriovenous fistulae (SDAVF) by Aminoff and Logue in 1974,<sup>1</sup> there have been numerous reports describing the management of these lesions. Unfortunately, owing to SDAVF's low incidence, the series are invariably small, and it remains difficult to gather extensive experience, particularly data on long-term outcomes.

Among the main areas still needing clarification is the degree to which patient symptoms improve after successful occlusion, with the different reported rates measured on different scales making meaningful interpretation difficult. The greatest disagreement exists among patients presenting with paraplegia, in whom reported rates of return to walking have ranged from 0 to 100%.<sup>2,3</sup> It also remains to be established whether improvement is

#### Key words

- Dural arteriovenous fistula
- Embolization
- Endovascular
- Outcome
- Paraplegia
- Spine
- Surgery

#### Abbreviations and acronyms

**ALD:** Aminoff and Logue Disability  
**MRI:** Magnetic resonance imaging  
**mRS:** modified Rankin Scale  
**SDAVF:** Spinal dural arteriovenous fistula

From the Departments of <sup>1</sup>Neurosurgery and <sup>2</sup>Neuroradiology, Wessex Neurological Centre, University Hospital Southampton, Southampton, United Kingdom

To whom correspondence should be addressed: Andrew J. Durnford, M.Sc.  
 [E-mail: [adurnford@gmail.com](mailto:adurnford@gmail.com)]

Andrew J. Durnford and Jonathan Hempenstall contributed equally to this study and should be considered co-first authors.

Citation: *World Neurosurg.* (2017) 107:488-494.

<http://dx.doi.org/10.1016/j.wneu.2017.07.140>

Journal homepage: [www.WORLDNEUROSURGERY.org](http://www.WORLDNEUROSURGERY.org)

Available online: [www.sciencedirect.com](http://www.sciencedirect.com)

1878-8750/\$ - see front matter © 2017 Elsevier Inc. All rights reserved.

determined based primarily on the duration of symptoms or on the severity of symptoms at the time of treatment. Furthermore, although it is accepted that when occlusion is achieved, there is little difference in outcomes between surgical and endovascular modalities, whether repeat procedures or combined modalities have poorer outcomes, owing to either the treatment or the delay to occlusion, is less clear. Finally, we also have observed that many of these patients report subjective changes in their symptoms years after occlusion that necessitate reinvestigation. This deterioration is akin to the late deterioration observed in patients previously treated for cervical spondylotic myelopathy.<sup>4</sup> This phenomenon has been poorly described, and the durability of symptom improvement over time is unclear.

Therefore, we reviewed our unit's experience with patients with SDAVF over a 22-year period, to assess the impact of occlusion on the long-term functional outcomes and establish the rate of late deterioration.

## METHODS

### Case Selection

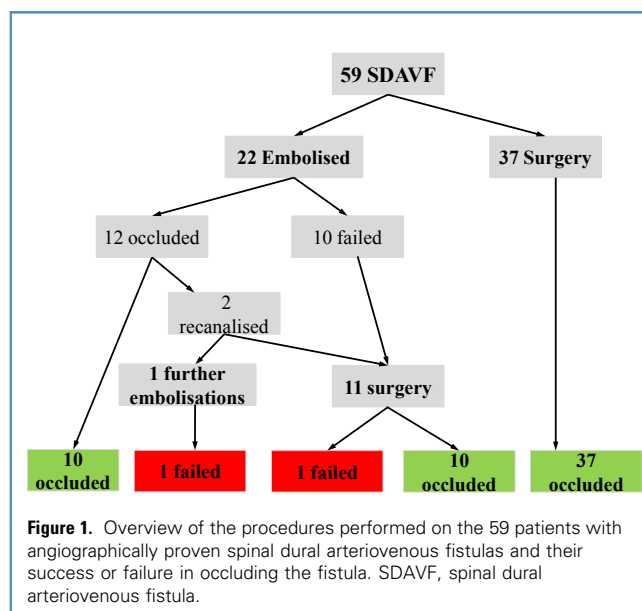
All patients presenting to the Wessex Neurological Centre, Southampton, with a new diagnosis of SDAVF have been recorded prospectively since 1992. From this database, we identified 67 cases of SDAVF presenting between 1992 and 2014. All patient notes and imaging were reviewed retrospectively. Local governance registration and approval was obtained.

Patients with angiographically proven SDAVF associated with spinal dysraphism ( $n = 3$ ) were excluded from this analysis, because they might be expected to have a different functional recovery, and are subject to a separate report. Five patients with SDAVF diagnosed based on typical findings on magnetic resonance imaging (MRI) were excluded as well. Reasons for not obtaining angiographic diagnosis in these cases were no arterial access in elderly patients ( $n = 2$ ), patient refusal of angiography for incidental asymptomatic SDAVF ( $n = 1$ ), and negative angiogram despite highly suspicious MRI findings ( $n = 2$ ). The remaining 59 patients with angiographically diagnosed SDAVF were included in our analysis (Figure 1).

All analyzed patients had a type 1 dural arteriovenous fistula<sup>5</sup> or dorsal spinal arteriovenous fistula as described more recently by Spetzler et al.<sup>6,7</sup> We also identified 4 patients with ventral spinal arteriovenous fistula, previously referred to as perimedullary fistula or type 4 fistula,<sup>8</sup> which we excluded from this series because they represent a distinct entity fed by the anterior spinal artery and is a much more technically challenging lesion to treat.

### Clinical Management

During the study period, it was our practice to first offer endovascular embolization in all cases with adequate access to the fistula with stable catheter position and absence of feeding vessels to the spinal cord. Embolization was routinely performed with n-butyl cyanoacrylate glue. Surgery was offered if this was not deemed possible or attempted embolization failed to occlude the fistula. In cases where the fistula could not be embolized, our practice was to place a detachable coil in the segmental arterial branch at the level of the fistula to act as a marker and aid surgical localization of the fistula. Surgery was performed using standard



microsurgical techniques including hemilaminectomy, durotomy, identification of the nerve root, and excision of a segment of the fistulous vessel. All patients were offered postoperative MRI and clinical review at 3 months to confirm occlusion of the fistula, and spinal angiography was performed only in those patients showing no improvement on MRI or clinical evaluation. This policy aimed to prevent unnecessary spinal angiography and its inherent risks while ensuring that no residual fistulae were missed.

A small number of patients early in this series underwent purely diagnostic spinal angiography to guide the choice of treatment modality. In this group, any second spinal angiography was considered an attempt at endovascular treatment, whereas in all others, an attempt at embolization was defined as injection of any embolic agent.

### Outcomes

The patients' clinical condition was assessed from clinical notes preoperatively, at the first clinic visit postoperatively, and at last clinic visit or telephone follow-up. Gait, urinary, and functional outcomes were scored on the modified Aminoff and Logue (ALD) scale<sup>9</sup> and modified Rankin Scale (mRS)<sup>10</sup> (Table 1).

### Statistics

The  $\chi^2$  or Fisher exact test was used to compare the number of patients with improved outcomes in different treatment groups. The level for significance was set at 5%.

## RESULTS

Fifty-nine patients with angiographically proven SDAVF (47 males [80%], 12 females [20%]) were analyzed. The mean patient age was 63 years (range, 30–88 years). Eleven patients (18%) reported a history of previous spinal trauma. The 59 cases of SDAVF included 3 cervical (5.0%), 37 thoracic (63%), 13 lumbar (22%),

Download English Version:

<https://daneshyari.com/en/article/5633910>

Download Persian Version:

<https://daneshyari.com/article/5633910>

[Daneshyari.com](https://daneshyari.com)