

First-in-Human Experience Using the Millipede 088 Aspiration Catheter in Stroke Thrombectomy

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Introduction

Larger lumen catheters are associated with improved reperfusion using aspiration thrombectomy for clot retrieval in stroke [1]. Significant scope remains to improve the rate of first pass effect (FPE), which has been associated with significantly improved clinical outcomes. Zaidat et al. reported that FPE patients had significantly better 90-day clinical outcomes than those in a non-FPE population (mRS \leq 2 61% versus 35%; $P=0.01$; OR 1.7) [2].

More recent studies have shown that closely matching the catheter size to the vessel size may improve the effectiveness of clot aspiration [3, 4]. A new category of “super-bore” aspiration catheters with 8Fr OD and 0.088in ID has recently been developed to further improve reperfusion success.

Perfuzo Ltd (Galway, Ireland) have been awarded a CE Mark for an aspiration catheter called Millipede 088 which has an 8F OD and 0.088” lumen. Millipede 088 incorporates a novel rib and recess design intended to improve flexibility and kink resistance, and to facilitate safe navigation in the intracranial vasculature. The device also includes a hydrophilic coating for improved lubricity.

It has been found that intracranial navigation of Millipede 088 in cadaver models is feasible, and that in-vitro the 088” lumen is associated with increased flow reversal during aspiration, improved revascularization and reduced distal emboli [5, 6].



Objective

The objective of this work is to report on early experience with Millipede 088 in Beaumont Hospital, Dublin, Ireland, and Royal London Hospital, London, UK.

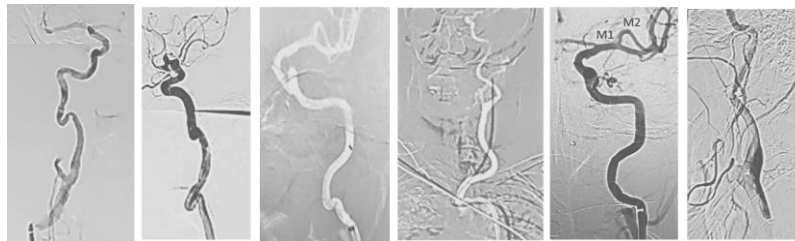
Methods

Clinical, procedural, and radiological data were reviewed for consecutive cases in which Millipede 088 was used. Millipede 088 was navigated to the target vessel over a 6F intermediate catheter with or without a microcatheter and microwire, at the discretion of the physician. Performance was evaluated in terms of intracranial navigation and reperfusion measured using the mTICI scale.

Results

Ten patients, aged 55-89 yrs, 50% male, with intracranial LVOs were treated (4 ICA and 6 M1). In two cases, the patients had concomitant tandem lesions requiring additional treatment. Millipede 088 was delivered intracranially in all cases (typical tortuosity shown below), and to the target vessel in eight cases. In two cases in which Millipede 088 could not be advanced to the target vessel, it was placed intracranially for distal flow control, and a 6F aspiration catheter was used for clot aspiration. In one case, following mTICI 2b reperfusion after aspiration, a stentriever was deployed via Millipede 088 to retrieve a distal M2 clot.

Navigation Success			
Metric	M1 (6)	ICA (4)	All (n)
Successfully navigated intracranially	100% (6)	100% (4)	100% (10)
Reached the target vessel	83% (5)	75% (3)	80% (8)
Did not require a microwire or microcatheter	67% (4)	50% (2)	60% (6)



Excellent reperfusion (mTICI 2c-3) at the end of the procedure, was achieved in all (100%) of patients. First-pass mTICI 2c-3 was achieved in 5 patients (50%). No sICH or other complications were reported.

Reperfusion Success			
Metric	ICA (4)	M1 (6)	All (10)
First Pass TICI 2c-3	0% (0)	83% (5)	50% (5)
Third Pass TICI 2c-3	100% (4)	100% (6)	100% (10)



Discussion

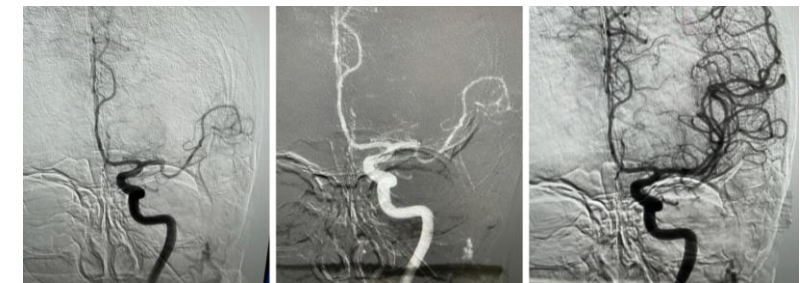
In this series the feasibility of thrombectomy using Perfuzo Millipede 088 aspiration catheter in combination with 6F aspiration catheters was established. Despite the 8F outer diameter and 0.088” super-bore lumen it was possible to navigate to the cavernous carotid in all cases irrespective of tortuosity, and to the target vessel in 80% of cases.

In cases where the tortuosity was too severe and Millipede 088 did not reach the target vessel, the 6F catheter was advanced to the clot for aspiration. In these cases, Millipede 088 provides distal support, reduces flow in the target vessel during clot retrieval potentially reducing distal emboli [6], and provides a shorter path for retrieval of the 6F catheter and clot to the larger 088 lumen catheter.

The rate of TICI 2c-3 within three passes was 100% which compares favorably with recent studies in which excellent reperfusion is typically achieved in approximately 49-59% of cases [7, 8]. First-pass TICI 2c-3 was achieved in 50% of cases comparing favorably to a recent meta-analysis which reported a rate of 29% [9].

Conclusion

In this series a super-bore aspiration catheter was navigated to the target vessel in 8 of 10 cases and aspiration thrombectomy using the Perfuzo Millipede 088 proved to be technically feasible and safe. Excellent reperfusion was achieved in all patients. The Millipede 088 represents a promising option for stroke thrombectomy.



References

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