



Available online at  
**ScienceDirect**  
www.sciencedirect.com

Elsevier Masson France  
**EM|consulte**  
www.em-consulte.com/en



## TECHNICAL NOTE

# Modified pressure cooker technique: An easier way to control onyx reflux



Daniel Giansante Abud<sup>a,\*</sup>, Luis Henrique de Castro-Afonso<sup>a</sup>,  
Guilherme Seizem Nakiri<sup>a</sup>, Lucas Moretti Monsignore<sup>a</sup>,  
Benedicto Oscar Colli<sup>b</sup>

<sup>a</sup> Division of interventional radiology and neuroradiology, medical school of Ribeirão Preto, university of São Paulo, 3900, avenida Bandeirantes, Monte Alegre, 14048-090 Ribeirão Preto, SP, Brazil

<sup>b</sup> Division of neurosurgery, medical school of Ribeirão Preto, university of São Paulo, Ribeirão Preto, SP, Brazil

Available online 2 March 2016

### KEYWORDS

Interventional neuroradiology;  
Arteriovenous malformation;  
Dural arteriovenous fistula;  
Embolization

**Summary** The use of onyx enabled the treatment of various intracranial vascular diseases more effectively than cyanoacrylate. The pressure cooker technique allowed definitive control of reflux and was made possible via detachable microcatheters. We present a variation of this technique called the modified pressure cooker to make reflux control easier and more reproducible and thus simplifying the procedure. We also extended the application of the technique to other diseases beyond arteriovenous malformations including dural arteriovenous fistulas and hypervascular tumors.

© 2016 Published by Elsevier Masson SAS.

## Introduction

The use of onyx (Medtronic-Covidien, Irvine, CA, USA) in the treatment of arteriovenous malformations (AVMs), dural arteriovenous fistulas (DAVFs) and hypervascular tumors of

the head and neck is increasing every day. Its non-adhesive properties allow more effective treatments compared to cyanoacrylate [1].

Perhaps the most important technical characteristic of the onyx injection is the control of reflux. After the plug formation and solidification along the microcatheter, the embolic agent penetrates the target region. The control of this reflux is essential throughout the entire procedure and may limit the final result [2].

Recently, Chapot et al. [3] described a technique for permanent control of reflux called the pressure cooker technique (PCT). Although this technique allowed definitive control of the reflux, it has some drawbacks. Obviously, it can be used for other diseases treated with onyx, but this has not been described until now.

*Abbreviations:* AVM, Arteriovenous malformation; CCA, Common carotid artery; DSA, Digital subtraction angiography; DAVF, Dural arteriovenous fistula; ECA, External carotid artery; ICA, Internal carotid artery; mPCT, Modified pressure cooker technique; OA, Occipital artery; PCT, Pressure cooker technique.

\* Corresponding author. Tel.: +55 16 36022640;  
fax: +55 16 36022648.

E-mail address: [dgabud@fmrp.usp.br](mailto:dgabud@fmrp.usp.br) (D.G. Abud).

<http://dx.doi.org/10.1016/j.neurad.2016.01.146>

0150-9861/© 2016 Published by Elsevier Masson SAS.

We describe a modification in the PCT to facilitate control of the plug formation. We also extended the technique to other diseases beyond AVMs and we called it the modified pressure cooker technique (mPCT).

## Technique

PCT as described originally positions a detachable microcatheter in the intranidal position. A second non-detachable microcatheter is then positioned between the distal mark and mark representing the detachable point of the first microcatheter. Microcoils are then positioned through the non-detachable microcatheter. Next, acrylic glue at 33% forms a permanent plug. In this way, the onyx that is injected through the detachable microcatheter finds a permanent barrier to prevent reflux. This creates a very favorable condition for onyx progression. This technique greatly facilitated control in the progression of onyx and was only possible after the introduction of detachable microcatheters [4].

In the mPCT, we also position two microcatheters. A detachable one (Apollo, Medtronic-Covidien) is in the intranidal position, and the other non-detachable one (Marathon, Medtronic-Covidien) is just proximal. But we reversed the order starting by onyx injection through the distal microcatheter. Once onyx begins to reflux, it obliterates the pedicle. At this moment, we can inject 33% glue, consisting of one part Glubran 2 (GEM Srl, Viareggio, Italy) and two parts lipiodol. This permanent glue plug is created between the column of onyx and the detachable mark of the microcatheter. The initial reflux of onyx arrests flow without

positioning the coils. Thus, onyx reflux and arterial flow blockage enable a much more controllable glue injection.

This technical modification, although simple, has great practical impact because, compared to the former PCT, this procedure is much more predictable and easier to perform. The mPCT does not require use of microcoils and can be indicated for a broad range of cases. We also extended this application beyond AVMs for DAVFs and hypervascular tumors.

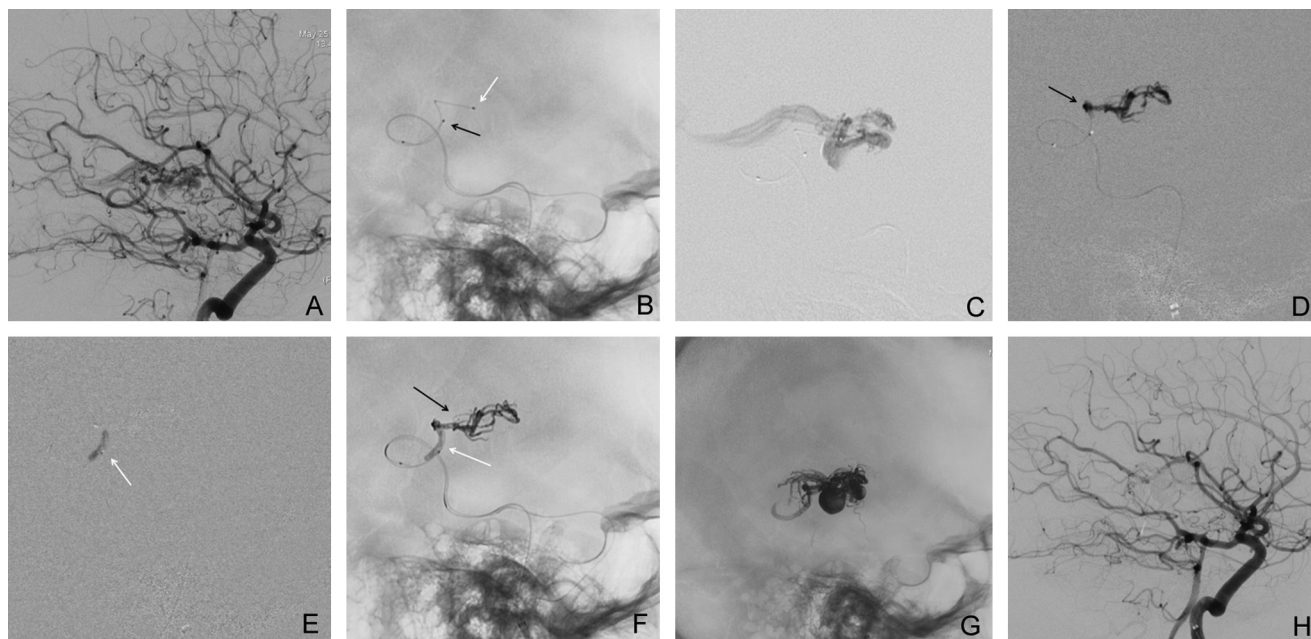
Our procedures using onyx are all performed under general anesthesia to prevent motion artifacts. We use two 6F femoral accesses or one 7F. After the puncture, 3000 IU of heparin is given intravenously. A complete angiography is performed and then, the 6F guiding-catheters or the 7F guiding-catheter with 2Y connectors are placed in the feeding artery to advance the microcatheters.

So far, 27 cases have been treated with this technique. No complications occurred. In four cases, although the technique has been applied according to the described steps, there was reflux of onyx through the glue plug. This may occur because the glue plug may not occupy the entire circumference of the artery. In this situation, the onyx can flow back through these spaces. To prevent this, it is very important to create a dense glue plug.

Examples of three diseases treated with the mPCT are presented below.

### Case 1 – AVM

A 32-year-old female presented with ventricular hemorrhage caused by thalamic AVM 2 years ago (Fig. 1).



**Figure 1** A. DSA, lateral view, right ICA injection, demonstrates a thalamic AVM fed by one dilated branch of the posterior cerebral artery (PCA). B. Plain radiography shows the position of the 2 microcatheters before the application of the mPCT. The white arrow designates the tip of the detachable microcatheter and the black arrow indicates the tip of the non-detachable microcatheter. C. DSA demonstrates the injection through the distal microcatheter in intranidal position. D. Road map shows initial injection of onyx until the beginning of reflux is obtained (black arrow). E. Road map shows the injection of glue to obtain the permanent plug. F. Plain radiography demonstrates the initial cast of onyx (black arrow) and the plug of glue (white arrow). G. Plain radiography shows the final cast of onyx. H. DSA, right ICA, demonstrates the complete exclusion of the AVM.

Download English Version:

<https://daneshyari.com/en/article/4233466>

Download Persian Version:

<https://daneshyari.com/article/4233466>

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