

Endosaccular Embolization of Cerebral Aneurysms using Japanese Immediately Electrically Detachable Coils - Contribution to Tight Embolization

Akiyo Sadato MD, PhD; Teppei Tanaka MD; Kazuhide Adachi MD; Motoharu Hayakawa MD; Yoko Kato MD; Yuichi Hirose

MD DSc

Department of Neurosurgery, Fujita Health University, Japan

Introduction

A Japanese immediately electrically detachable coil has unique size lineup, extreme softness, and unique shape. The coil may contribute to achieve dense packing of cerebral aneurysms.

Methods

The 0.010 inch ED coil is extremely soft and its lineup includes 1.5mm as the smallest diameter and unique 16mm filler coil (named "Infini"). These were mostly used as filler and finisher. The 0.014~0.016 inch ED coil has wide pitch coil that is expected to make 3 dimensional movement within an aneurysm sac.

ED coil structure and line-up

| ED coil line-up | Diameter of primary coil (inch) | Diameter of secondary coil (mm) | shape |
|-----------------|---------------------------------|---------------------------------|--------------------------------|
| 10 soft | 0.010 | 2*10, 16 (Infini [®]) | Helical, Infini [®] |
| 10 Extra-soft | 0.010 | 15*5, 16 (Infini [®]) | Helical, Infini [®] |
| Standard | 0.014~0.016 | 2*12 | Helical, α spiral [®] |

coils and generator

shapes of secondary coil

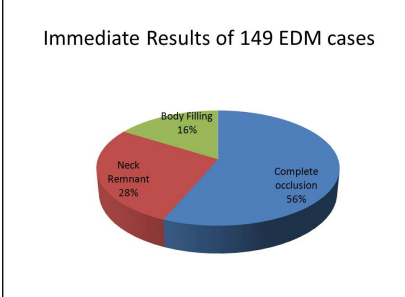
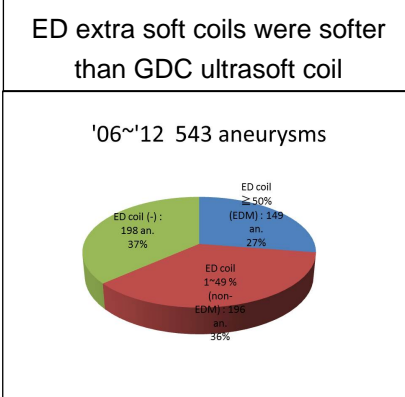
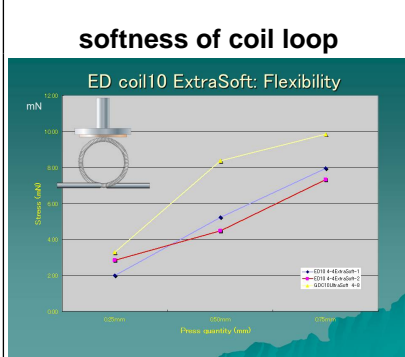
Infini : long coil as filler

- 16mm helix that can be easily folded and packed into as small as 4mm space
- Line-up
 - Infini soft : 16mm x 10, 20, 30 cm
 - Infini Extrasoft 16mm x 10, 15 cm

Diameter of primary platinum wire making primary coil.

| | Primary platinum wire (inch) | Diameter of primary coil (inch) |
|------------------|------------------------------|---------------------------------|
| ED coil 14 | 0.0024~39 | 0.014~16 |
| ED coil 10 Soft | 0.0018 | 0.010 |
| 10 Extra soft | 0.0014 | 0.010 |
| GDC 18 | 0.003 | 0.015 |
| GDC 18 soft | 0.00225 | 0.0135 |
| GDC 10 std / US | 0.002 | 0.010 |
| GDC 10 soft / SR | 0.00175 | 0.0095 |
| TruFill DCS | 0.002(fill), 0.003(basket) | 0.012 |

ED extrasoft coil is made of very fine primary platinum wire.



Representative case 1: 46F SAH grade III

Paraclinoid aneurysm with dumbbell shape : Completely occluded with 13 ED coils. VER=26.9%

Double catheter: Excelsior 1018 and SL10

Representative case 2: 56F SAH grade III

Tiny BA tip aneurysm: embolized with single ED coil (1.5mmx3cm)

Aneurysm size: 1.94 mm (D) x 1.88 (H)

Results

Since 2006 October to 2012 September, 543 cerebral aneurysms were treated by endosaccular embolization at our department and 345 (63.5%) were treated using ED coils alone or in combination with other kinds of coils. Among these, 149 were treated mostly with ED coils (EDM cases: the volume ratio of ED coils to all the deployed coils is more than 50%). The immediate embolization results of the EDM cases were complete occlusion in 84 aneurysms, neck remnant in 41, and body filling in 24. The average VER (volume embolization ratio) of EDM cases was 22.0 %. VER of nonEDM cases (ED coil is 1~49% in volume ratio) was 20.1 % and significantly lower than in EDM cases (P=0.0219, 2-sample t-test). During follow period, major recanalization that requires re-treatment was seen in 4 (2.7 %) aneurysms.

Representative case 3: 67F Unruptured Acom aneurysm

4 coils including 2 Infini were used to reach 20% of VER.

Matrix x 360 6x15 (VER=6.9%)
 Infini soft 16x20 (VER=13.3%)
 Infini ES 16x15 (VER=18.2%)
 EDES 3.5 x 6 (VER=20.1%)

Conclusions

Extreme softness and unique shape and movement of ED coil contributes to raise VER in endosaccular coil embolization of cerebral aneurysms.

Learning Objectives

To identify an effective treatment with very soft detachable coils.

References

Sadato et al. AJNR 16: 1459-1462, 1995

Sadato et al. Journal of Neurovascular Disease 2: 235-245, 1997

Sadato et al. Interventional Neuroradiology 17: 154-158, 2011