

Fibered versus non-fibered embolization coils

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Trerotola SO, Pressler GA, Premanandan C. Nylon fibered versus non-fibered embolization coils: comparison in a swine model. *J Vasc Interv Radiol*. 2019;30(6):949-955.

Purpose

Metallic coils, either with or without fibers, are a mainstay of embolotherapy. There are limited data comparing fibered versus bare metal embolization coils. The purpose of this study was to determine whether nylon fibers improve the performance of platinum embolization coils in porcine arteries.

Materials and Methods

Platinum 0.035" embolization coils, both with and without nylon fibers, were used to embolize a total of 24 hindlimb arteries in six swine: 12 with fibered coils and 12 with non-fibered coils. Apart from fibers, the coils were identical. Immediate and late results were studied, including number of coils needed to achieve vessel occlusion and durability of occlusion at 1 and 3 months. Arteriographic as well as histopathologic analysis was performed.

Results

The mean number of fibered coils (1.3, range 1–2) needed to achieve occlusion was significantly less than the number of non-fibered coils (3.2, range 2–4) needed to occlude similarly sized arteries ($P < 0.001$). At one month, the mean percent area of thrombus was significantly greater with fibered coils than with non-fibered coils ($63\% \pm 6\%$ (range 51–68%) vs $48\% \pm 15\%$ (range 32–75%); $P = 0.03$). At three months, the mean percent area of thrombus remained greater with fibered coils than with non-fibered coils, but the difference was not statistically significant ($61\% \pm 6\%$ (range 50–68%) vs $49\% \pm 15\%$ (range 23–66%); $P = 0.06$). The mean percent area of recanalization was lower with fibered coils than with non-fibered coils, but the difference was not statistically significant ($7\% \pm 6\%$ (range 1–18%) vs $16\% \pm 12\%$ (range 0–31%); $P = 0.07$ at one month and $6\% \pm 8\%$ (range 0–20%) vs $10\% \pm 9\%$ (range = 0–22%); $P = 0.22$ at three months).

From the Discussion Section

- The study was designed to limit variables as much as possible, so that the only variable would be the fiber. Further, blinding was used to eliminate any bias in the study on the part of the operator. The result confirms prior research, which showed that the addition of fibers to coils increases their immediate thrombogenicity and results in fewer embolic devices and presumably a faster time to occlusion. The actual time to occlusion could not be determined exactly in the study because of the nature of the study; in other words a set time was allowed to pass after deployment of each coil to check for occlusion.
- Using fewer coils obviously has cost savings but could conceivably also result in shorter procedure time with attendant decrease in radiation dosage, although this was not specifically measured in the study.
- Based on the results of the study, in the setting where acute occlusion is important, it would appear that fibers have an advantage over non-fibered coils.

Conclusion

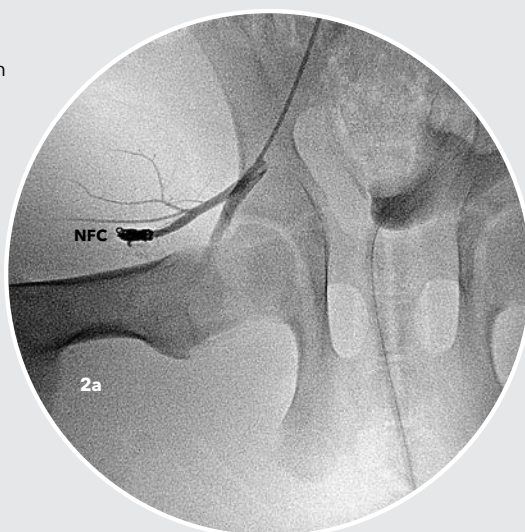
Nylon fibers allow significantly fewer embolization coils to achieve acute occlusion of arteries compared to bare metal coils. Both fibered and non-fibered coils showed recanalization at follow-up.



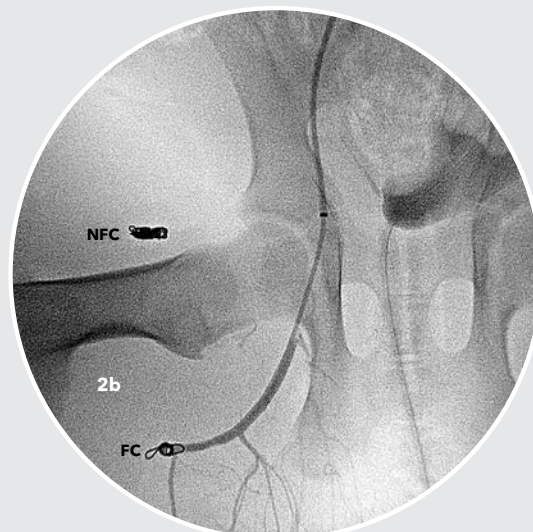
Figure 1. Photographs of the fibered (a) and non-fibered (b) embolization coils used in this study.

Figure 2.

Arteriograms of embolization coils implanted in porcine arteries.



Three non-fibered coils were required to occlude the circumflex femoral artery (2.6 mm diameter).



A single fibered coil successfully occluded the right deep femoral artery (2.8 mm diameter) in the same animal.

Table 1.

Vessel dimensions and numbers of coils required to achieve occlusion.

* These arteries were not completely occluded after deployment of the maximum 4 coils and were excluded from the statistical analysis

† $p < 0.001$ when compared to non-fibered coils.

Artery Diameter (mm)	Number of Non-Fibered Coils	Artery Diameter (mm)	Number of Fibered Coils
2.3	> 4*	2.3	1
2.4	2	2.3	2
2.5	2	2.4	1
2.6	3	2.6	2
2.9	4	2.8	1
3.0	4	2.9	1
3.0	4	3.0	1
3.1	3	3.1	1
3.1	3	3.1	1
3.1	3	3.1	2
3.1	> 4*	3.2	1
3.2	4	3.2	1
mean 2.9 ± 0.3	mean 3.2 ± 0.8	mean 2.8 ± 0.3	mean 1.3 ± 0.5†

* Text, images and captions are reproduced with permission. * The study was sponsored by Cook Medical.

* Scott Trerotola, MD, and Christopher Premanandan, DVM, are paid consultants of Cook Medical.

Customer Service

EU Website: cookmedical.eu
EDI: cookmedical.eu/edi
Distributors: +353 61239240, ssc.distributors@cookmedical.com
Austria: +43 179567121, oe.orders@cookmedical.com
Belgium: +32 27001702, be.orders@cookmedical.com
Denmark: +45 38487607, da.orders@cookmedical.com
Finland: +358 972519996, fi.orders@cookmedical.com
France: +33 171230269, fr.orders@cookmedical.com
Germany: +49 6950072804, de.orders@cookmedical.com
Hungary: +36 17779199, hu.orders@cookmedical.com
Iceland: +354 8007615, is.orders@cookmedical.com
Ireland: +353 61239252, ie.orders@cookmedical.com
Italy: +39 0269682853, it.orders@cookmedical.com
Netherlands: +31 202013367, nl.orders@cookmedical.com
Norway: +47 23162968, no.orders@cookmedical.com
Spain: +34 912702691, es.orders@cookmedical.com
Sweden: +46 858769468, se.orders@cookmedical.com
Switzerland - French: +41 448009609, fr.orders@cookmedical.com
Switzerland - Italian: +41 448009609, it.orders@cookmedical.com
Switzerland - German: +41 448009609, de.orders@cookmedical.com
United Kingdom: +44 2073654183, uk.orders@cookmedical.com

USA Website: cookmedical.com

EDI: cookmedical.com/edi.do

Americas:

Phone: +1 812.339.2235, 800.457.4500, Fax: 800.554.8335

E-mail: customersupport@cookmedical.com

Australia:

Phone: +61 734346000, 1800777222, Fax: +61 734346001, 1800077283

E-mail: cau.custserv@cookmedical.com



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