

Hard technical endpoints improve UAE outcomes

Embolic agents have been available for the treatment of uterine fibroids since the end of the 1990s, and spherical embolics since 2002, but there is as yet very little consensus or few standards within the industry. And few long-term studies have been conducted. However, this will change as physicians gain more experience of using embolics and as technology progresses. Preliminary results from a new German registry have already helped in the creation of new improved recommendations for the use of one particular embolic: Bead Block from Biocompatibles.

There are currently three spherical embolics on the market: Embospheres (Biosphere Medical), Contour SE Microspheres (Boston Scientific) and Bead Block. Embospheres are made of an acrylic co-polymer (trisacryl) cross-linked with gelatin, Contour SE Microspheres are made from liquid PVA (polyvinyl alcohol), while Bead Block are PVA with acrylamid group added. This gives the latter a unique structure, resulting in better rigidity and elasticity compared to traditional PVA products. These properties are important in relation to catheter deliverability and the ability of the user to perform a targeted superselective embolisation.

The Bead Block study is based at the University of Berlin under the leadership of Dr Thomas Kröncke. He told *Interventional News*: "I have been using different embolics since 2000. We are always looking for new developments in the field, so when Bead Block came onto the market I was interested to use it. Together with my colleague Dr Lohle from Tilburg, the Netherlands, we started in 2003/2004."

He continued: "There are guidelines [for UAE] in the terms of who should perform embolisation and the way it should be performed, but we're still learning about the indications. We know it works very well for fibroids, but we are still finding out which patients are not good candidates and what are the important factors that influence clinical outcomes. It is evolving rapidly, but it is still a new field and the standards are improving."

Seeing is believing

As with all interventional procedures, the right imaging technology is essential. "We have started to use contrast-enhanced MRI (CE-MRI) for observing patients after UAE," explained Kröncke. "We did some research and found that it is crucial to infarct as much of the fibroid tissue as possible. CE-MRI has helped us to show this. In the long run, this turns out to be the most important factor we



have found to date in order to monitor clinical and technical success."

From a radiological point of view, CE-MRI is nothing new. However, what is unusual is the use that Kröncke puts it to in UAE. "MRI is the best tool to image the uterus and the fibroids, and it gives you the opportunity to add contrast to give an overview of the blood supply of different areas of the uterus and the fibroids."

During embolisation, the arteries feeding the fibroids are occluded. Using angiography it is possible to see if the fibroids are still living and vital. "We have found that CE-MRI gives us a very nice overview of how technically successful we are. And one of the things that has turned out to be important for clinical success is infarction rate – effectively cutting off the blood supply," he commented.

This is in contrast to established methods of UAE where only size, number and location of fibroids are recorded using ultrasound. According to Kröncke: "There are some factors we know about before starting the intervention, such as size and number of fibroids, location and so on, but these factors do not really influence the outcome, even if there are many fibroids or they are very large."

Bead Block registry

Kröncke's registry of patients treated with Bead Block is a prospective study, with all patients undergoing CE-MRI. "We now have about 80 patients. This first group have done 3, 6 and 12 months follow-up with a high clinical success rate. The second group – around 43 patients – is where we have tried to improve the success of the procedure. These patients have been followed since December last year until now – three months."

In his study, Kröncke is particularly concerned about long-term results. Although the success rate for UAE is around 80–90% for the first year, many patients will return after 2–3 years. "Our goal in offering a new and minimally invasive treatment is to find out why... We see the failures and ask 'why did they fail?'" To help resolve the issue, Kröncke differentiates between clinical and technical success. To measure clinical success he



Thomas Kröncke

has employed quality of life measurements using a standardised and validated questionnaire.

"With our improvements in the second group we have now achieved a clinical success rate – where patients are satisfied (their complaints/problems are resolved/improved) – of 83%," he revealed. "The important thing that we wanted to stress is that we have been able to obtain 90–99% infarction of targeted fibroids in 94% of patients using Bead Block, which is very high compared to other embolic agents."

Bead size

Given that the level of infarction is one of the crucial aspects of UAE, the size of the embolic becomes very important. Kröncke explains: "In the past it was thought that everybody should use a typical size of 500–700 microns. While this is true for some agents it doesn't mean that they should all be used in the same way. While the success rate with 500–700 microns is OK, we can improve this by using larger particles and changing the endpoint of the procedure." According to the registry, Kröncke managed to improve results by upsizing the beads. "We recommend that to get the best results [from Bead Block] we need to use larger beads of 700–900 microns and use stasis as an endpoint so that we ensure we cut off the blood supply in the vessel." Using this technique the researchers managed a 20% increase in the infarction rate with Bead Block, from about 76% to 94%, he claimed.

In conclusion, Kröncke said: "People need to be aware there are different embolics and this necessarily implies that they should be used differently. If something is spherical it doesn't mean it should be used in a certain way. From the registry data we have where we apply objective measurements such as CE-MRI, a 700–900 micron size for Bead Block ensures a good technical success in terms of infarction and a good clinical result." UAE is an evolving field, and things that are today's common knowledge were unknown two years ago. And only by using the embolics and conducting thorough investigations such as this one can we push the field even further forwards.



Uterine Fibroid Embolisation

Uterine fibroid embolisation (UFE) is a uterus sparing, non-surgical technique for the relief of symptomatic uterine fibroids. The procedure involves blocking the blood flow to uterine fibroids by using an "embolic agent." The embolic agent is delivered via a catheter that is placed in the uterine artery under fluoroscopic guidance.

In 1995 Ravina et al.¹ reported the first series of bilateral uterine artery embolisation for fibroids and in the last decade UFE has become an established procedure with long-term data has showing that the procedure has a 73 percent success rate at five years.²

As the technique of UFE has developed so too has the understanding of the mechanisms of action of embolisation. Initial clinical studies relied on measurements of uterine and/or fibroid volume to establish success along with patient satisfaction and symptom control but with the advent of routine use of MRI and then contrast enhanced MRI (CE-MRI) it has become possible to look in even greater detail at fibroids and their response to embolisation. Pelage et al.³ looked at the long-term imaging outcomes of UFE using CE-MRI and linked clinical success to the degree of tumour infarction. This has been supported by research of Kroencke et al.³ who showed that the infarction rate of fibroids (percentage of infarcted fibroid tissue) has a profound influence on clinical outcome.

With the introduction of new spherical agents such as Bead Block, further research was needed to optimise their use in UAE.

Dr Thomas Kroencke (Charité Hospital, Berlin, Germany) and Dr Paul Lohle (St. Elisabeth's Hospital, Tilburg, Netherlands) have recently conducted a registry of patients

treated with Bead Block the embolic agent marketed since 2003 by Terumo.

Bilateral uterine artery embolisation was performed in 36 patients using 700-900µm size Bead Block, using a near stasis endpoint. CE-MRI was performed 24-72 hours following UFE to determine the percentage of fibroid devascularisation.

The authors reported 90-99% infarction of targeted fibroids in 94% patients using Bead Block which is very high compared with other embolics.

Good improvements in quality of life and patient satisfaction levels of 85% were also reported in the study.

1. Ravina JH, Herbreteau D, Ciraru-Vigneron N, et al. Arterial embolisation to treat uterine myomata. *Lancet* 1995; 346:671-672.
2. Spies JB, Bruno J, Czeyda-Pommersheim F, Magee ST, Ascher SA, Jha RC. Long-term outcome of uterine artery embolization of leiomyomata. *Obstet Gynecol* 2005; 106:933-939.
3. Pelage JP, Guaou NG, Jha RC, Ascher SM, Spies JB. Uterine fibroid tumors: long-term MR imaging outcome after embolization. *Radiology* 2004; 230:803-809.

Guidelines for the Use of Bead Block in Uterine Fibroid Embolisation

Patient Selection

- Women with symptomatic fibroids who have not responded to hormonal treatment
- Contraindications
 - Pedunculated fibroids
 - Desire for fertility
 - Carcinoma of pelvic organs
 - Previous pelvic irradiation
 - Bleeding diathesis and vasculitis
 - History of allergy to contrast medium

Product Selection

- Bead size and volume
 - 700-900µm increasing the microsphere size to 900-1200µm after 6ml if desired endpoint is not reached.

Technique Selection

- Addition of contrast medium
 - Directly aspirate 5ml non-ionic contrast media into the Bead Block (700-900µm) syringe to obtain an approximate 50% contrast 50% saline solution mix.
 - Gently invert the 20ml syringe and wait several minutes to allow the Bead Block microspheres to evenly suspend. Draw the Bead Block microspheres/contrast solution into the injection syringe slowly and gently to minimise the potential of introducing air into the system. Purge all air from the system prior to injection
- Catheter position
 - The embolic agent is delivered via a catheter placed in the uterine artery under fluoroscopic guidance
- Administration
 - Inject the 700-900µm Bead Block microspheres/contrast solution from the injection syringe under fluoroscopic visualisation using a slow pulsatile action whilst observing the contrast flow rate
 - If there is no effect on the flow rate, repeat the delivery process with additional injections of Bead Block increasing the microsphere size to 900-1200µm after 6ml if desired endpoint is not reached
- End point
 - The angiographic end-point is described as near-stasis in the uterine artery with sluggish antegrade flow in the horizontal segment of the uterine artery
 - Neither the ascending part nor uterine side branches should remain open
 - In order to avoid a false end point with early recanalisation, wait 5 minutes and reconfirm the endpoint angiographically. If there has been any settling of the microspheres then additional Bead Block can be injected

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