2017 대한산부인과내분비학회 연수강좌

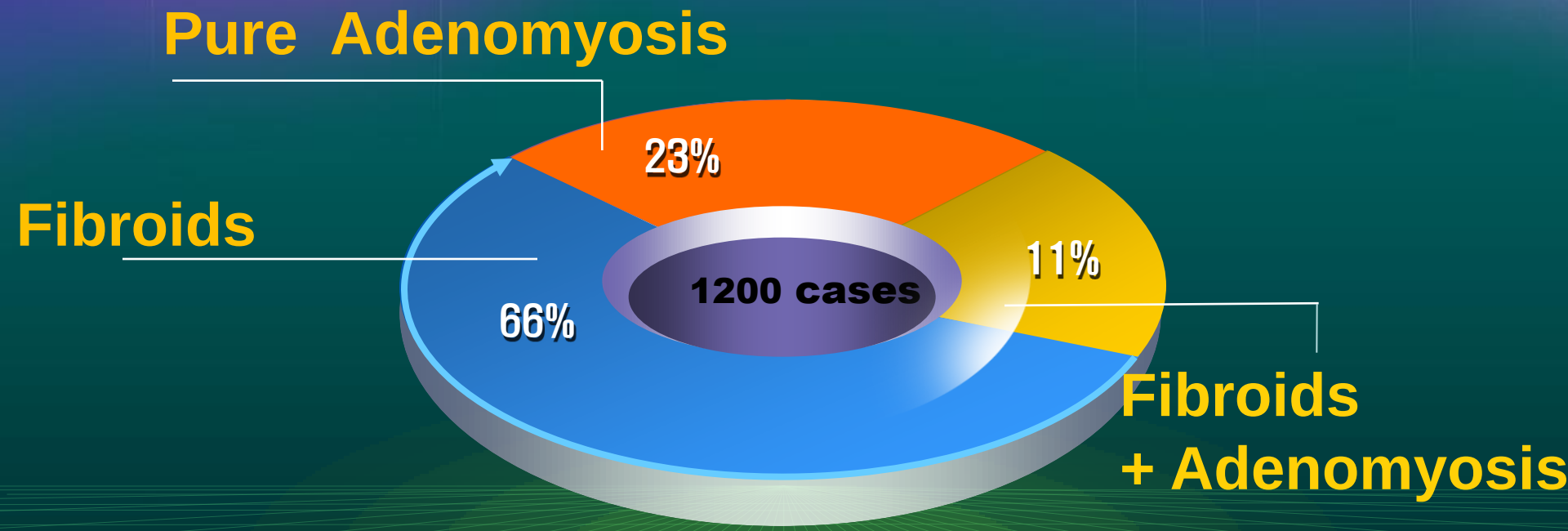
자궁 근종의 비수술적 치료 : 누구에게 어떻게 사용할 것인가?

연세의대 영상의학과 한기창

Severance UFE clinic

- 2007.1 ~ 2016.12
- 1200 UAEs
- Dedicated myoma clinic OPD & IPD 운영

❑ Severance Hospital



자궁근종의 치료

Hysterectomy	600,000/year in US alone (1/3 due to myoma)
Myomectomy	20-25% require additional surgical Tx
Hormonal treatment	Osteoporosis, Recurrence
UFE	13,000 – 14,000 / year in US alone
Others	RFA, MR-guided Focused Ultrasound

Uterine fibroid embolization (UFE)

- Ravina et al. first reported in 1995 that preoperative uterine artery embolization to decrease blood loss treated symptomatic fibroids in many cases.

Lancet 1995;346:671-672

Case	Age (years)	Site	Size (mm)	Number	Symptoms	Volume reduction (%)	Follow-up (months)	Course
Palliative treatment								
1	43	Int	80	1	Mass	*	38	Stable, then curettage at 6 months
2	47	Sm	100	1	Menorrhagia	0	1	Failure, hysterectomy
3	40	Int	>50	>1	Menorrhagia	0	48	Success, pregnancy, death from AIDS
4	48	Int, Sm	>50	>1	Menorrhagia	*	16	Success
As alternative to surgery								
5	45	Sm	35	1	Menorrhagia	0	18	Success
6	49	Int	20–30	>1	Menorrhagia	20	18	Stable, then curettage at 6 months
7	48	Int	25–75	>1	Menorrhagia	50	20	Success
8	36	Int	35–45	>1	Menorrhagia	0	6	Failure, myomectomy at 6 months
9	41	Int, Sm	60	1	Menorrhagia	80	16	Stable, then curettage at 6 months
10	44	Sm	15–60	>1	Menorrhagia	57	14	Success
11	34	Int	40	1	Menorrhagia	20	20	Success
12	47	Int, Sm	50	1	Menorrhagia	50	17	Success
13	48	Int	>50	>1	Mass	*	11	Success
14	43	Int, Sm	>50	>1	Menorrhagia	70	16	Success
15	45	Int, Sm	>50	>1	Menorrhagia	70	16	Success
16	48	Int	>50	>1	Menorrhagia	50	16	Success

Int=interstitial, Sm=submucosal. *=reduction but % unknown because patients refused echographic examination during follow-up.

ACOG PRACTICE BULLETIN

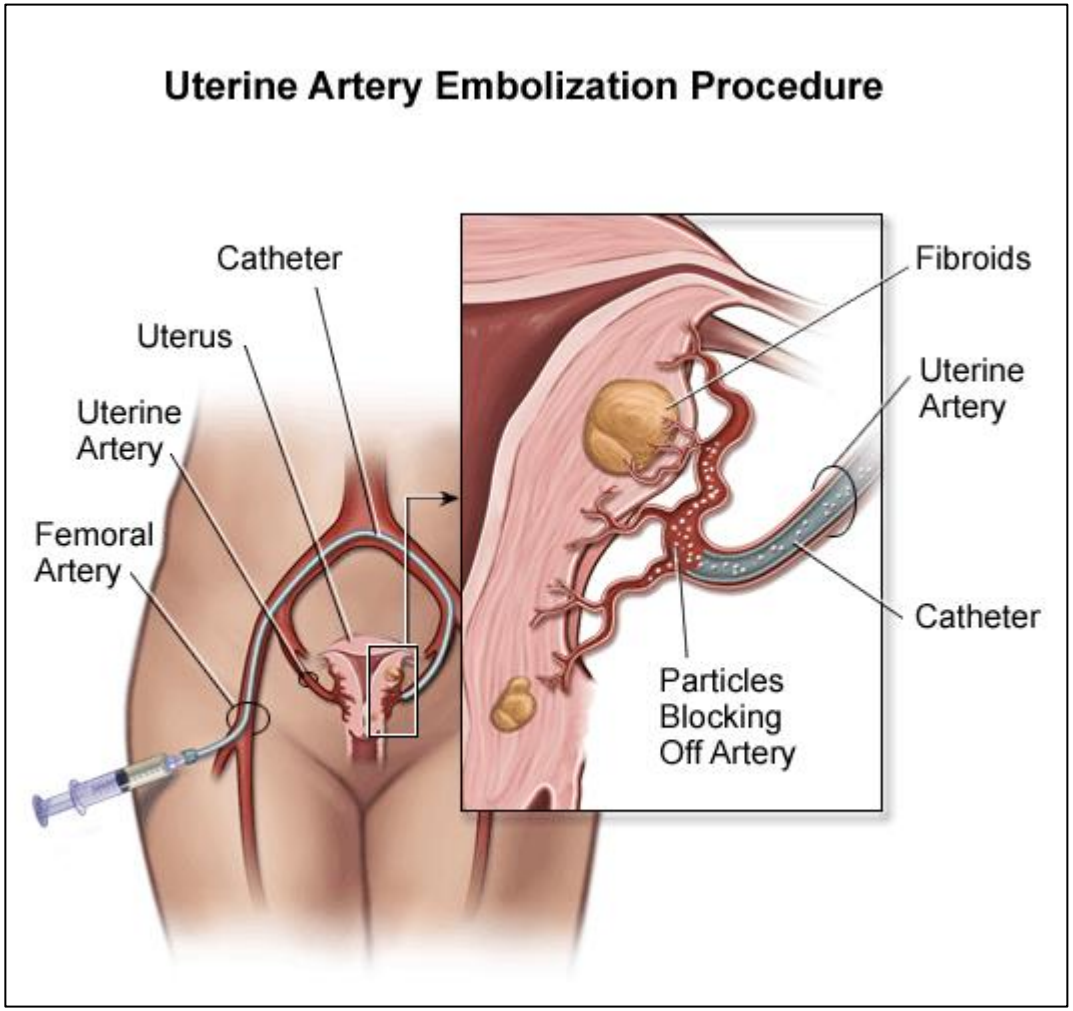
CLINICAL MANAGEMENT GUIDELINES FOR OBSTETRICIAN–GYNECOLOGISTS

NUMBER 96, AUGUST 2008

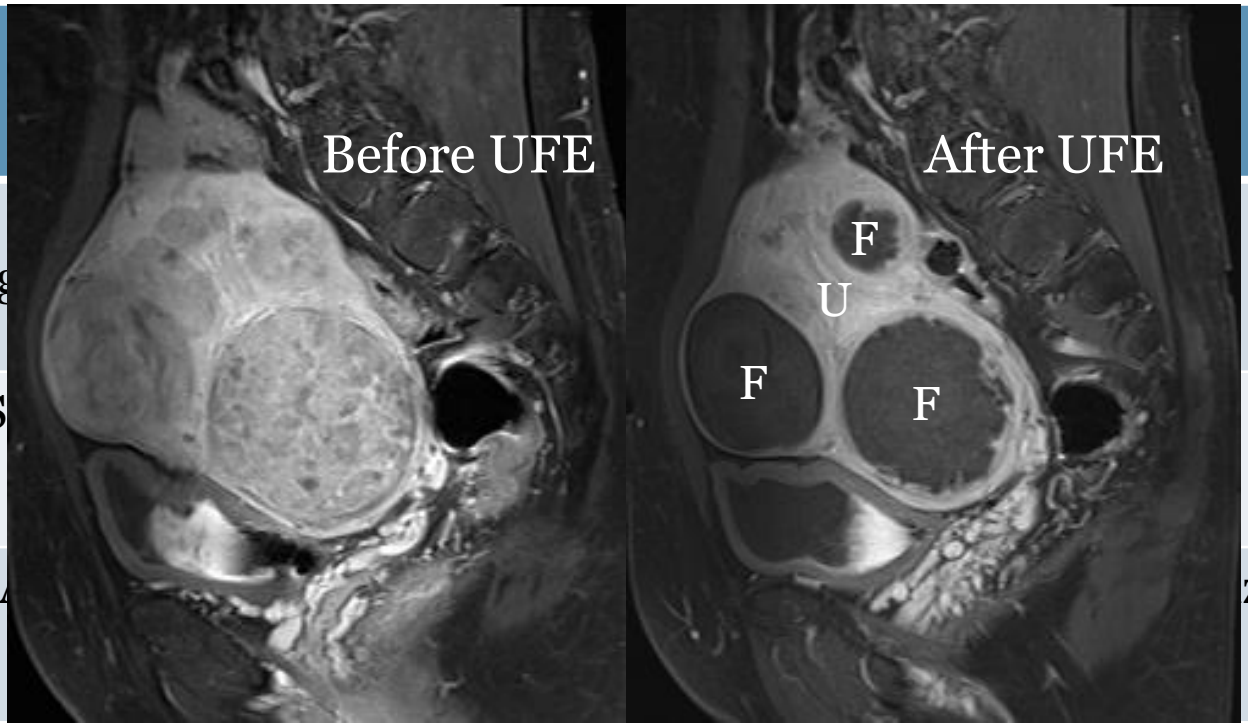
LISTS UFE UNDER "LEVEL A" TREATMENT OPTIONS

embolization (61). Based on long- and short-term outcomes, uterine artery embolization is a safe and effective option for appropriately selected women who wish to retain their uteri. Women who wish to undergo uterine

자궁근종색전술의 방법과 치료 원리

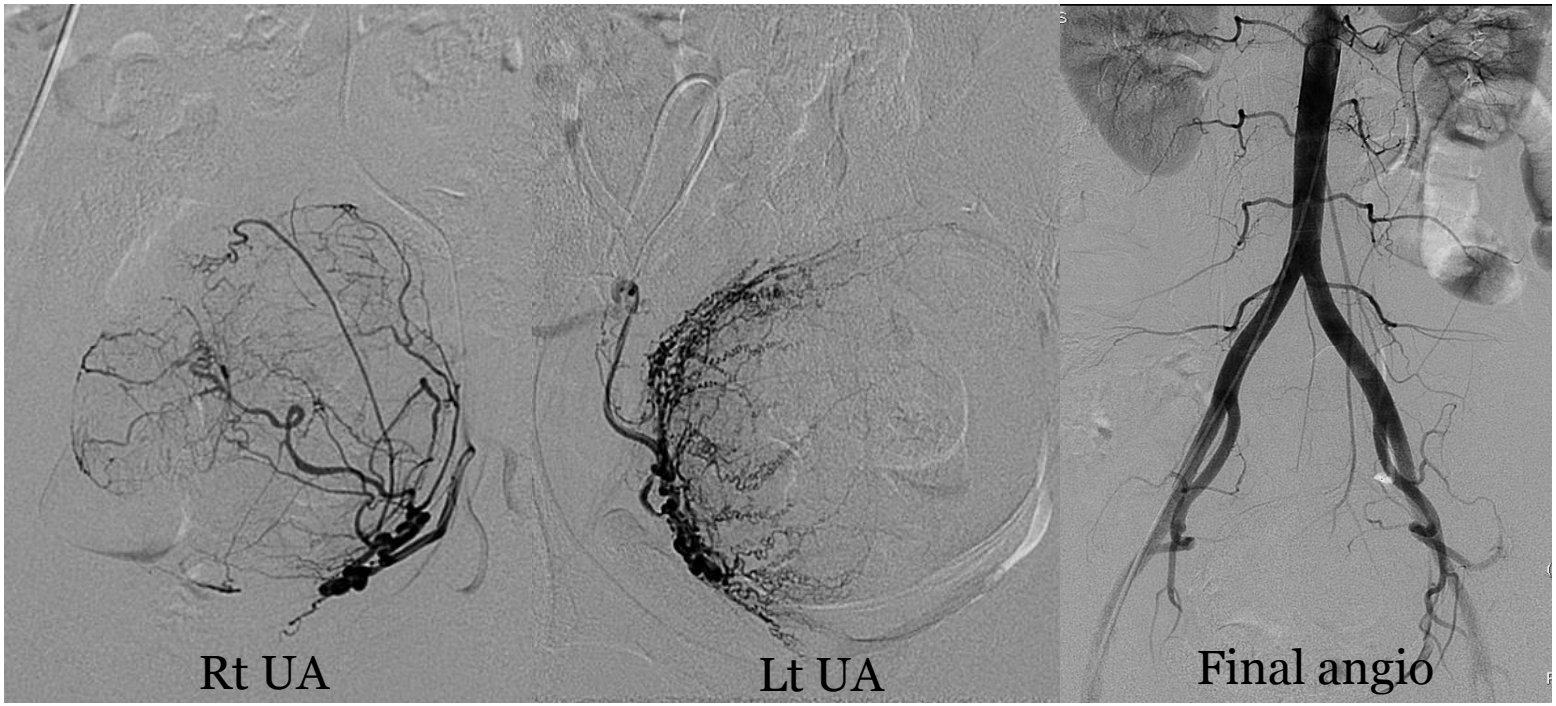


자궁근종색전술의 방법과 치료 원리



Banu NS et al. AJOG 2007;196:211-7

자궁근종색전술의 방법과 치료 원리



자궁근종색전술의 적응증

- Symptomatic fibroids
  - Menorrhagia
  - Dysmenorrhea
  - Bulk symptom

    : urinary frequency, pelvic discomfort, incontinence, back pain

자궁근종색전술의 금기증

- Pelvic malignancy
- Active pelvic infection
- Active vasculitis
- Hx. of pelvic irradiation
- Infarcted fibroid
- Huge leiomyoma (>10cm)
- Cervical leiomyoma
- Pedunculated subserosal leiomyoma

자궁근종색전술의 합병증

- Pain, Nausea/Vomiting
- Menopause
- Infection
- Expulsion of fibroids
- Pulmonary embolism

자궁근종색전술의 합병증

- Pain (opioid via IV PCA, NSAIDs, Oral anagesics)

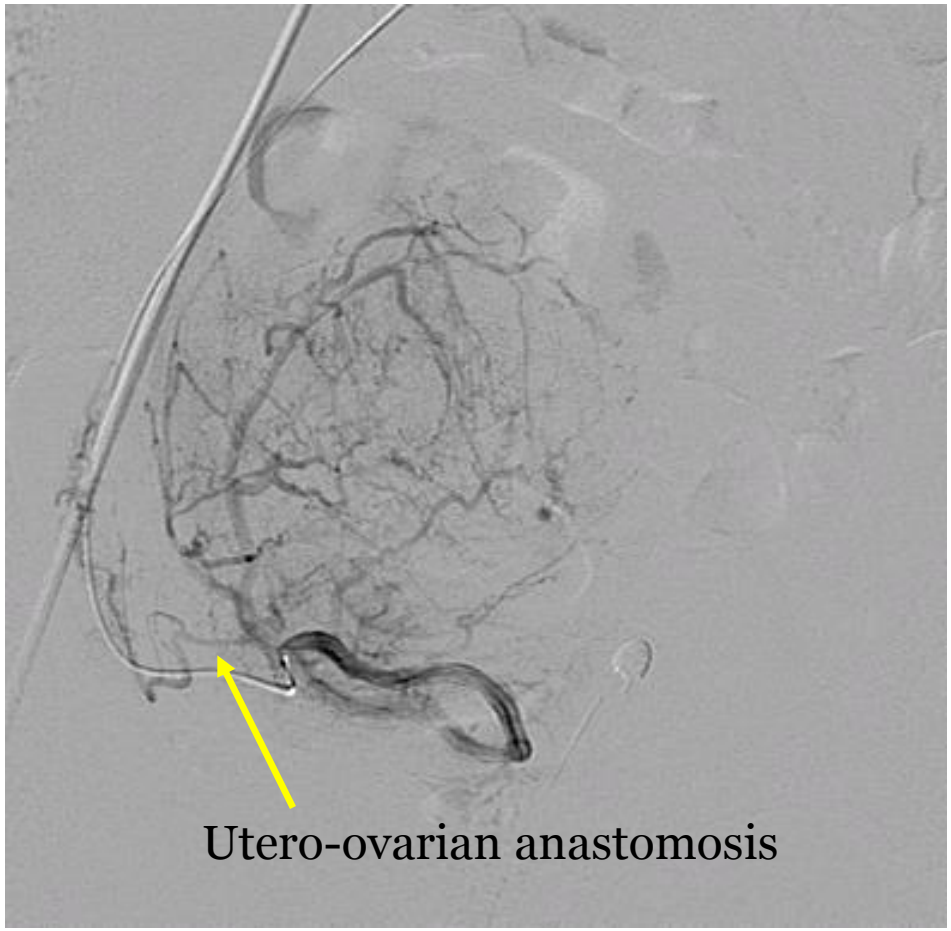
The effects of single-dose dexamethasone on inflammatory response and pain after uterine artery embolization for symptomatic fibroids or adenomyosis - a randomized controlled study

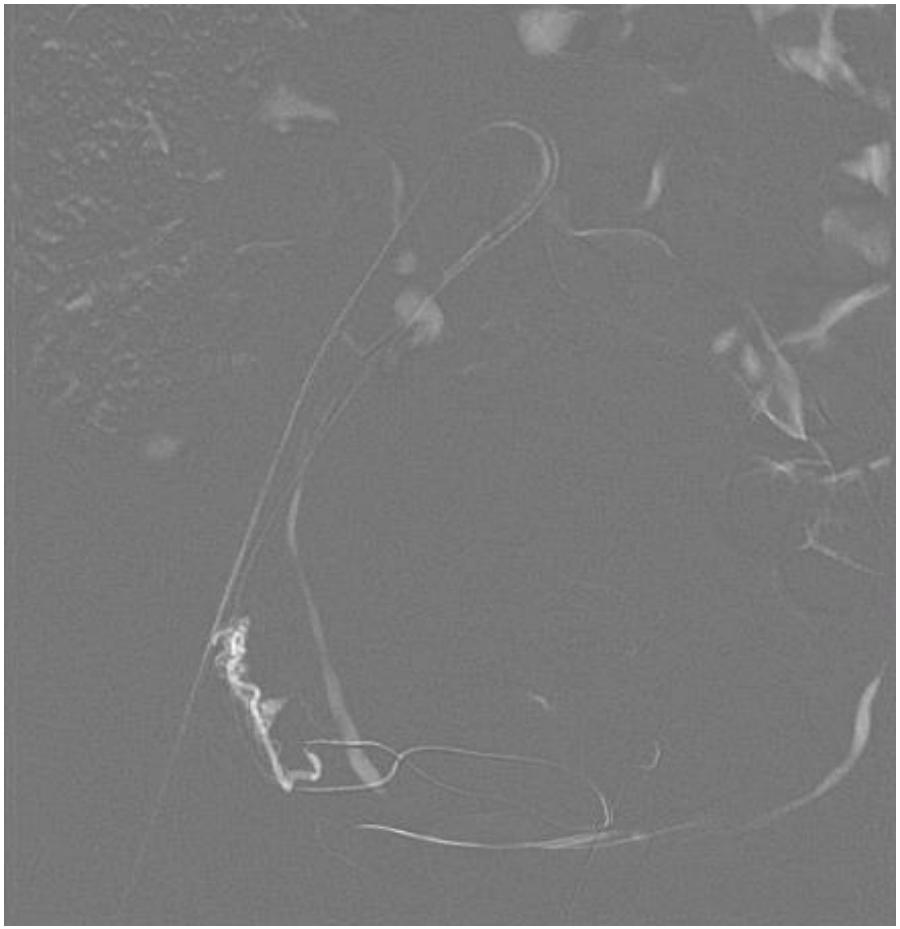
BJOG 2016

Single-dose IV dexamethasone can reduce inflammation during the 24 hours after UAE, thus decreasing post embolization syndrome including pain, nausea, and vomiting

자궁근종색전술의 합병증

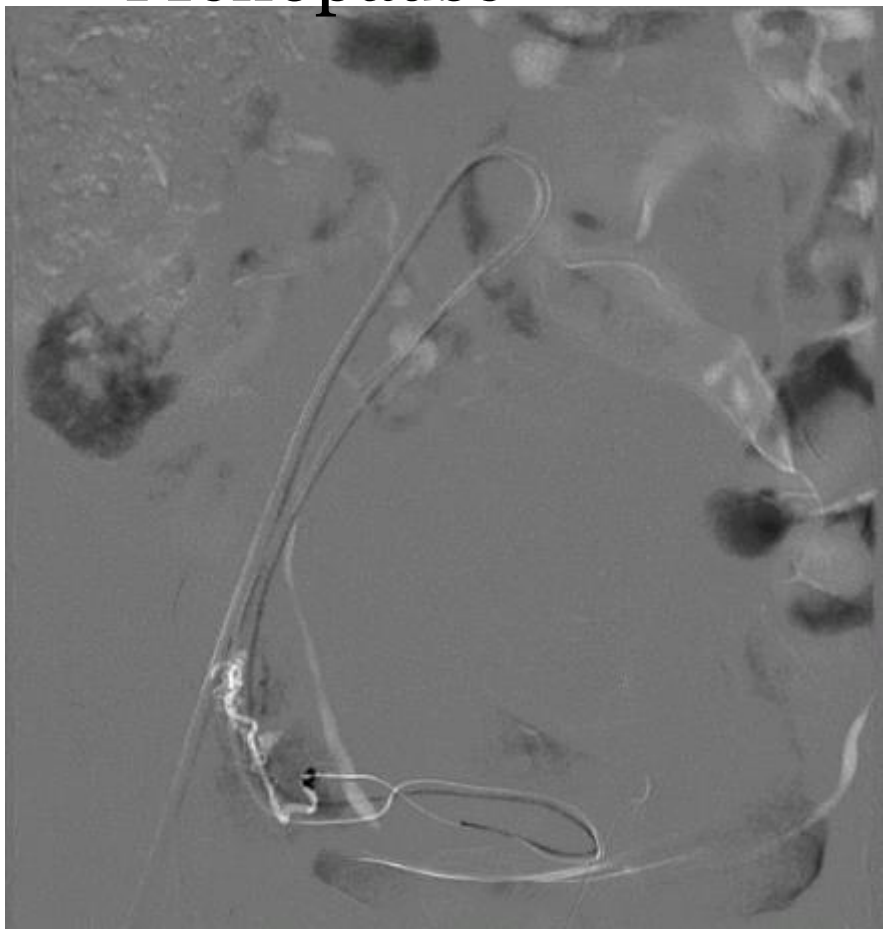
- Menopause

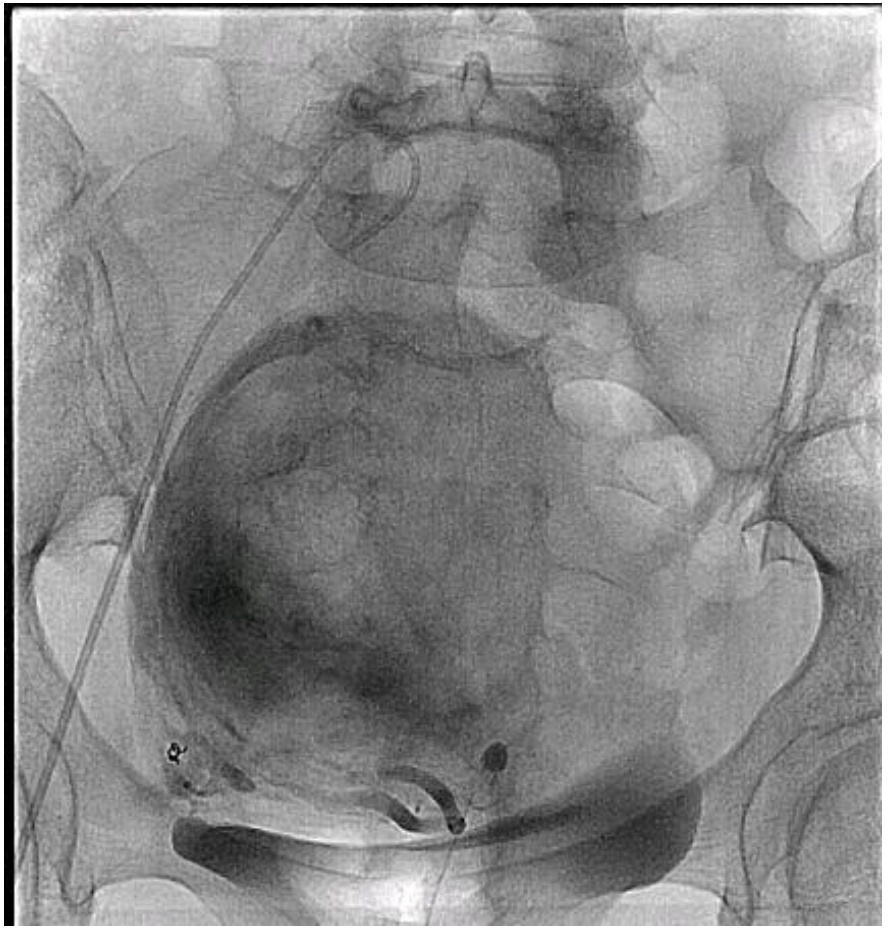




자궁근종색전술의 합병증

- Menopause





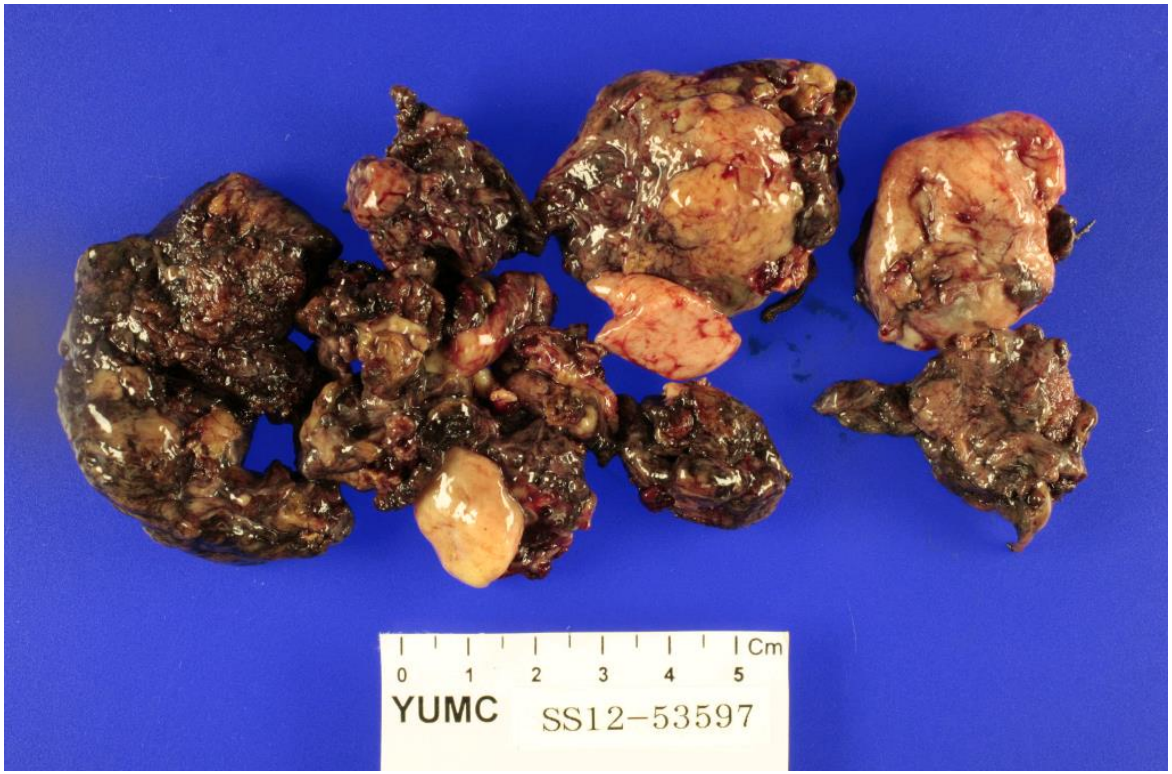
자궁근종색전술의 합병증

- Infection

43 y/o female developed septic shock 2 weeks after UFE. She underwent hysterectomy.

자궁근종색전술의 합병증

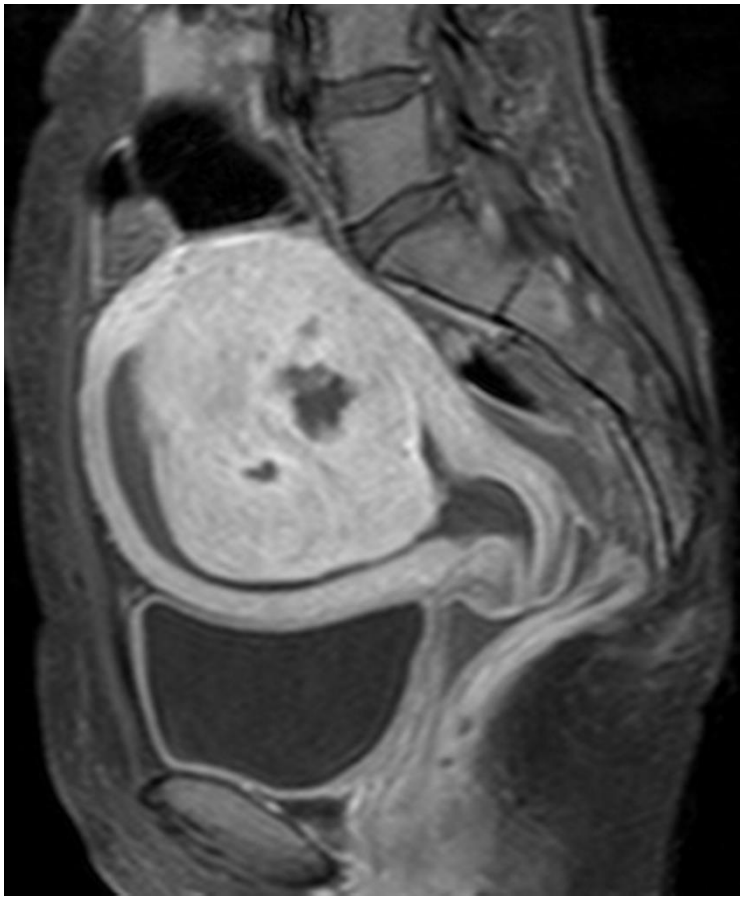
- Infection



자궁근종색전술의 합병증

- Expulsion of fibroids

44 y/o female with submucosal fibroid



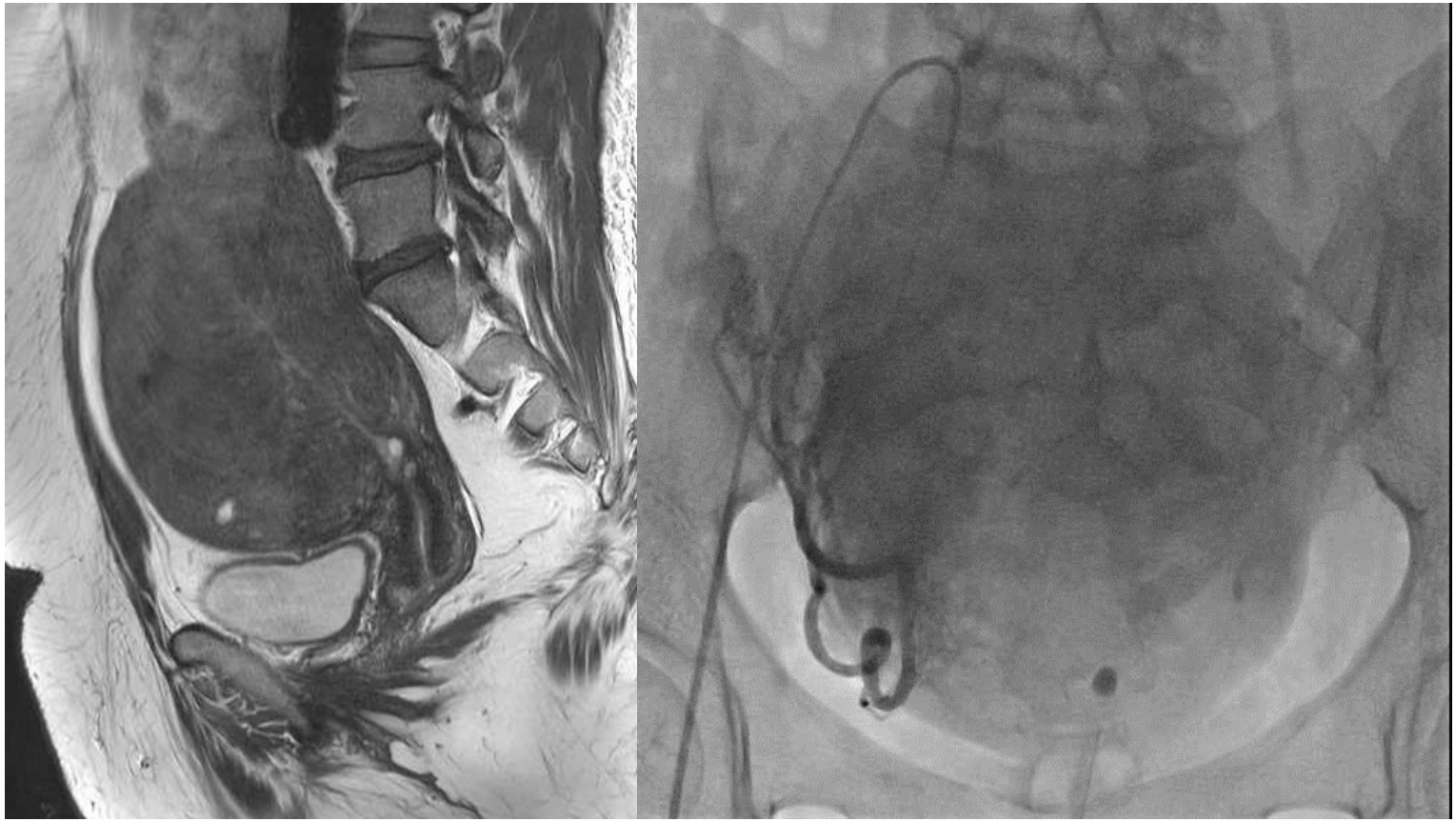
자궁근종색전술의 합병증

- Expulsion of fibroids

자궁근종색전술의 합병증

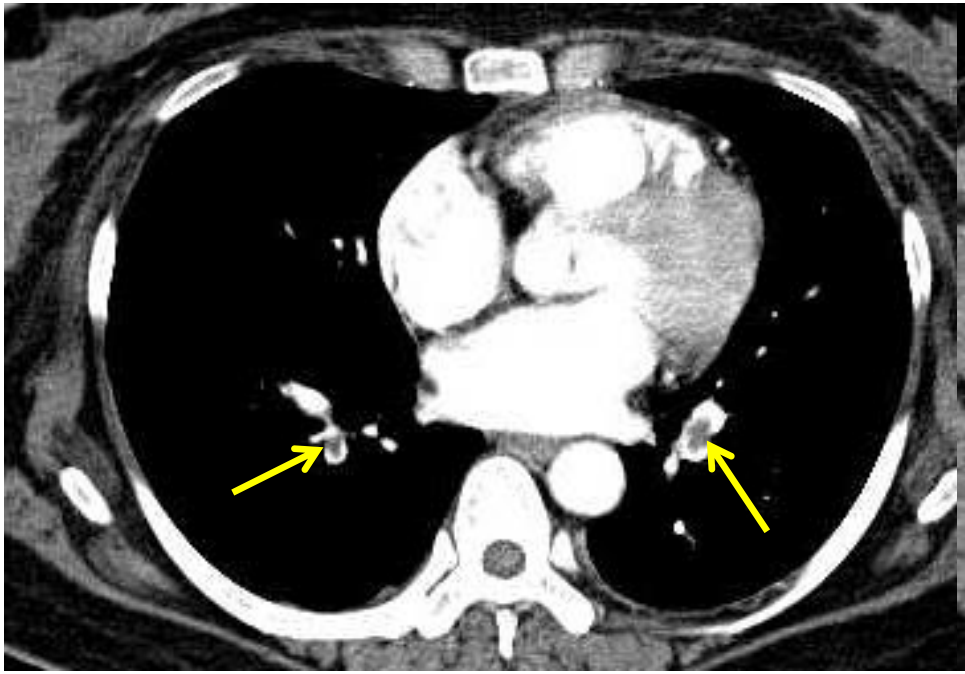
- DVT & Pulmonary embolism

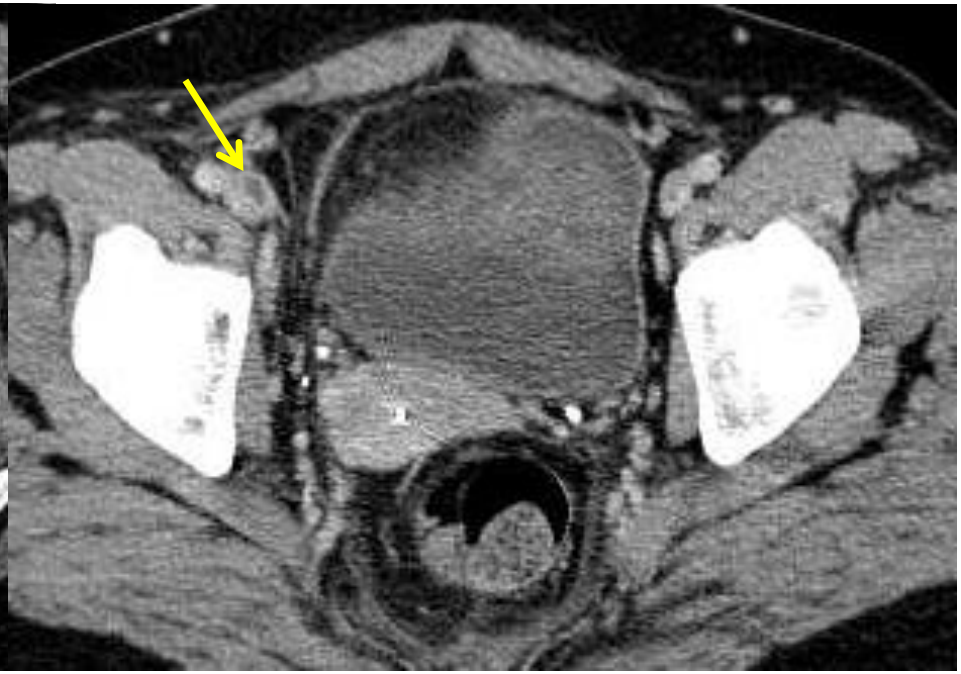
40 y/o female with adenomyosis



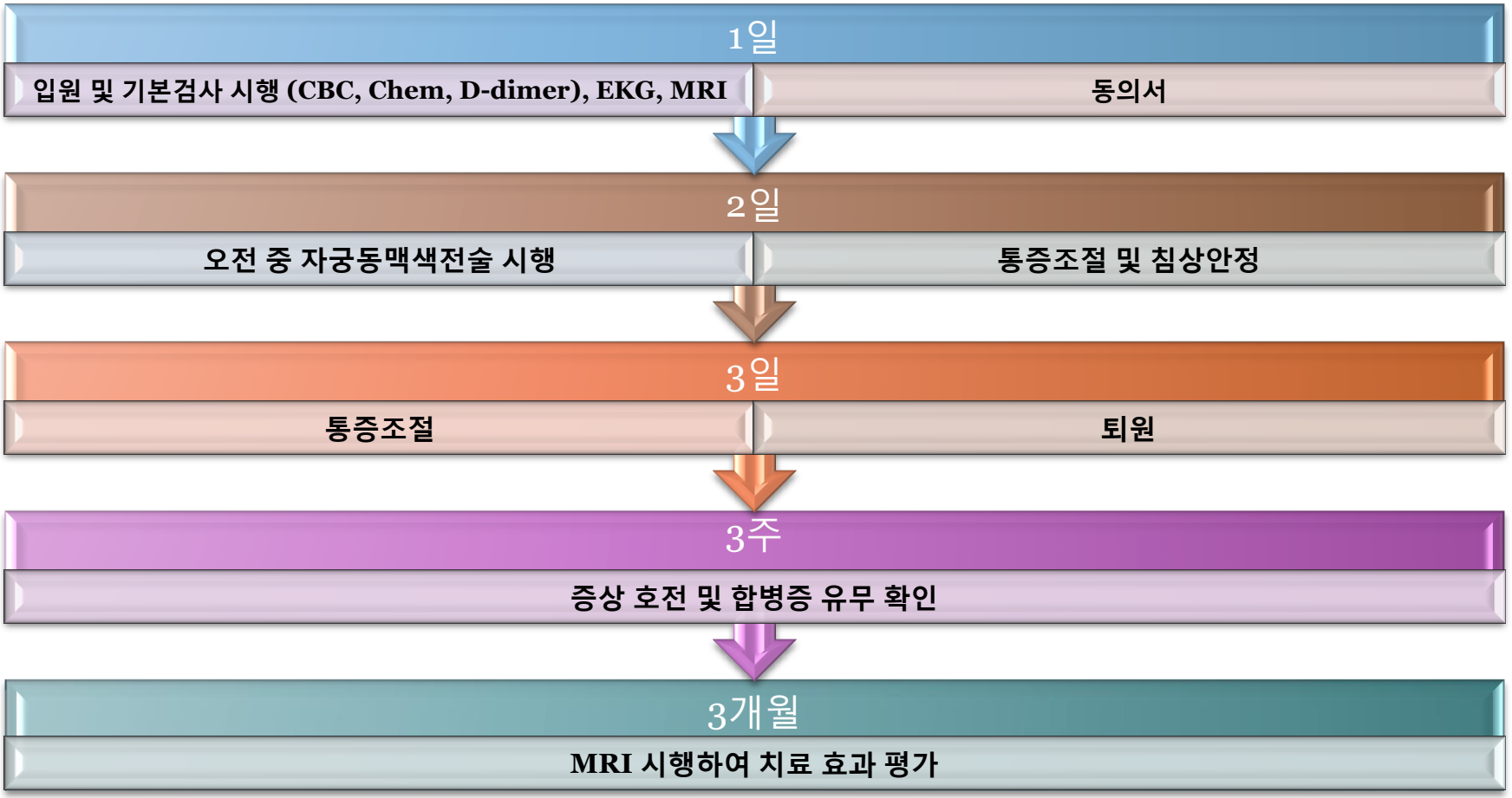
자궁근종색전술의 합병증

- DVT & Pulmonary embolism





자궁근종색전술 입원기간 및 처치



Randomised comparison of uterine artery embolisation (UAE) with surgical treatment in patients with symptomatic uterine fibroids (REST trial): 5-year results

JG Moss,[a] KG Cooper,[b] A Khaund,[c] LS Murray,[d] GD Murray,[e] O Wu,[f] LE Craig,[f] MA Lumsden[f]

BJOG 2011;118:936–944.

N=157
Symptomatic fibroids
UFE (n=106) vs. Surgery (n=51, hysterectomy (42), myomectomy (9))
Reintervention rate at 5 years: 32% (UFE) vs. 4% (Surgery)

Uterine artery embolization vs hysterectomy in the treatment of symptomatic uterine fibroids: 10-year outcomes from the randomized EMMY trial

Annefleur M. de Bruijn, MD; Willem M. Ankum, MD, PhD; Jim A. Reekers, MD, PhD; Erwin Birnie, PhD; Sanne M. van der Kooij, MD, PhD; Nicole A. Volkers, MD, PhD; Wouter J. K. Hehenkamp, MD, PhD

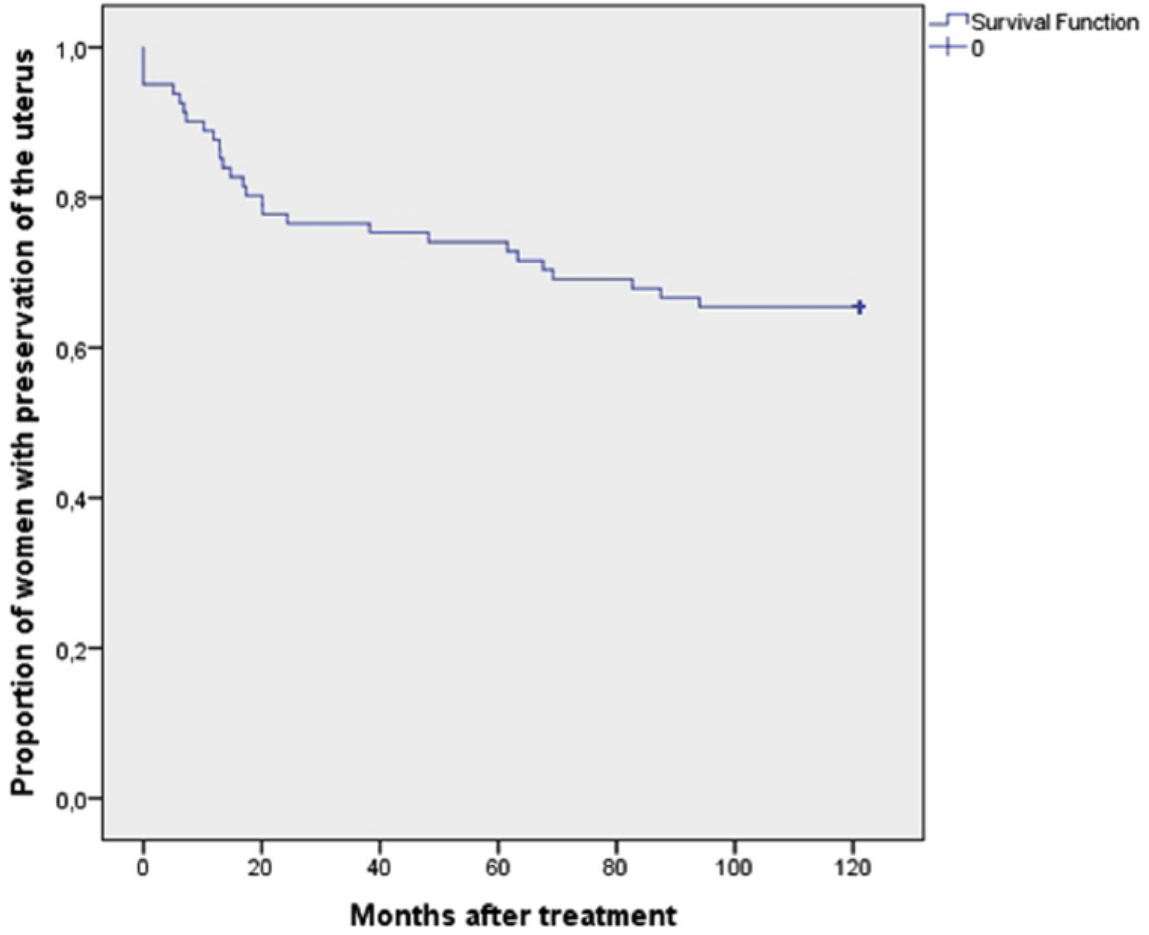
Am J Obstet Gyneol. 2016;215:745.e1-745.e2

N=156
Symptomatic fibroids
UFE (n=81) vs. Hysterectomy (n=75)

Reintervention rate at 10 years: 35% (UFE)

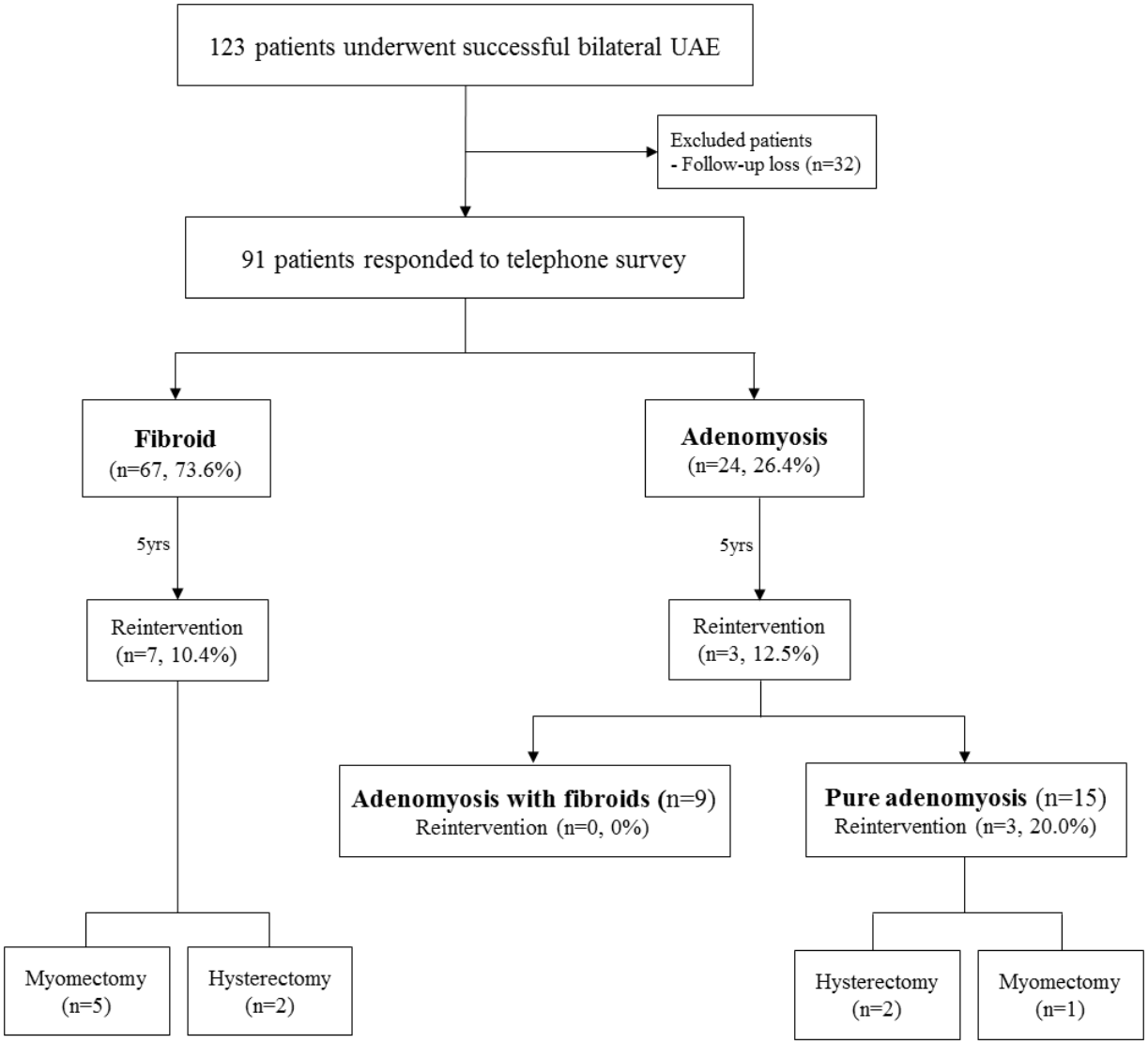
FIGURE 2

Kaplan-Meier curve for preservation of the uterus after uterine artery embolization

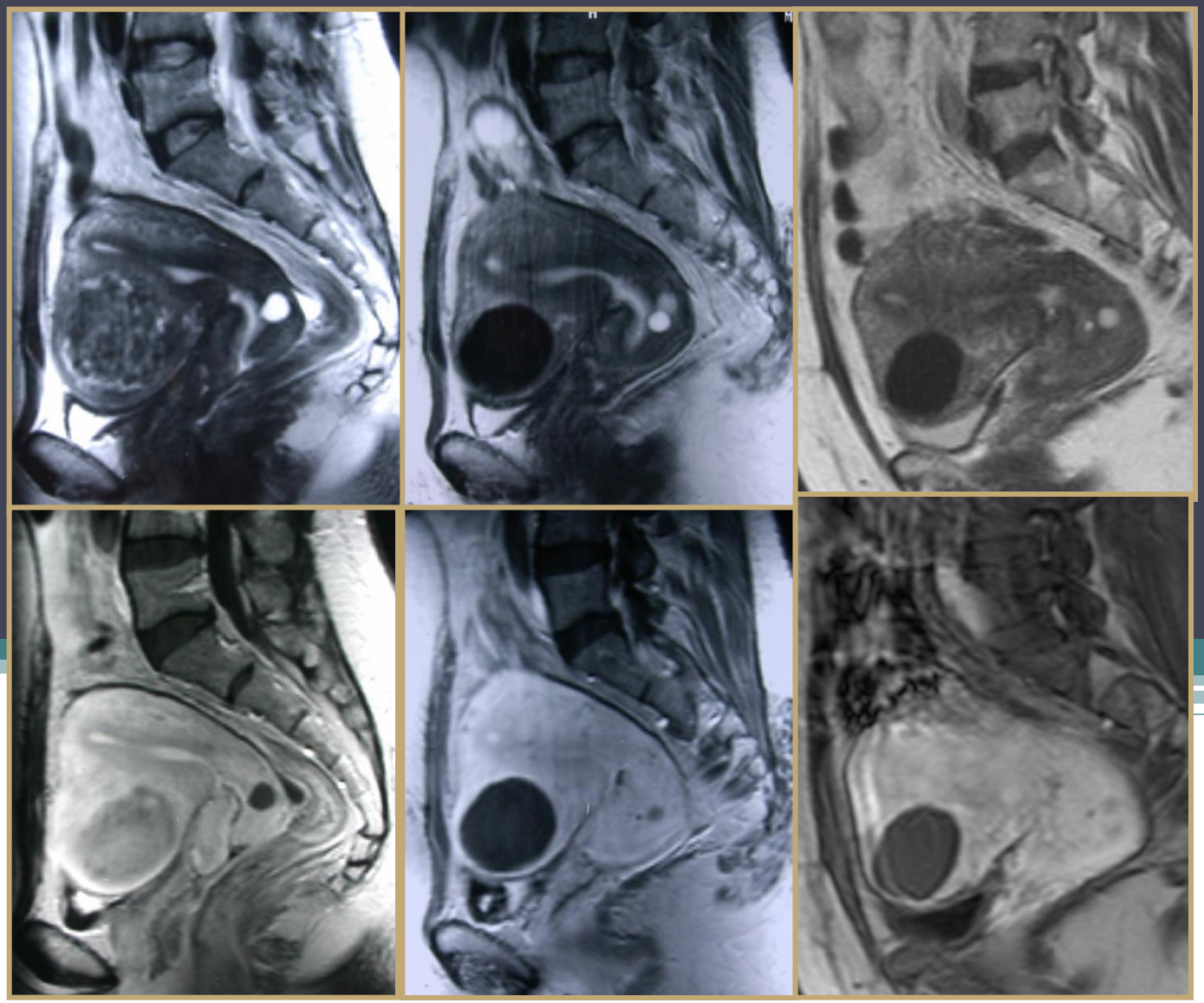


Hysterectomy-free survival for uterine artery embolization patients.

Severance Data



Unpublished data & submitted to *BJOG*



Pre UAE 3 mo 5.3yrs

자궁동맥색전술 후 임신

Table 1. Published Studies of Pregnancy after UAE for Fibroid Tumors (7–18)

Study, Year	Level of Evidence	No. of Pts.	Follow-up Duration (mo)	No. of Pts. Trying to Conceive	Mean Age (y)	Mean Age at Conception (y)	Pregnancies	No. of Pregnant Patients
Mara et al, 2008 (10)	II	58	25	26	33	NS	17	13 (50)
Pisco et al, 2011 (11)	III	74	53	74	NS	36	44	44 (59.5)
Mara et al, 2012 (13)	III	100	50	42	33	NS	42	29 (69)
Holub et al, 2008 (14)	III	112	36	39	NS	32	28	20 (51)
Pron et al, 2005 (12)	III	555	24	35	43	36	24	21 (60)
Firouznia et al, 2009 (15)	III	102	24	23	31	34	15	14 (61)
Kim et al, 2008 (16)	III	87	36	19	37	NS	15	12 (63)
Walker and McDowell, 2006 (18)	IV	1,200	NS	108	NS	37	56	33 (30.5)
Kim et al, 2005 (17)	IV	94	35	6	31	NS	6	5 (83)
Pinto Pabón et al, 2008 (9)*	IV	100	19	57	35	NS	11	10 (17.5)
Dutton et al, 2007 (7)*	IV	649	NS	187	44	38	37	27 (14.4)
McLucas et al, 2001 (8)*	IV	400	NS	131	NS	NS	17	14 (27)

Values in parentheses are percentages.
NS = not specified, UAE = uterine artery embolization.
*Excluded from pooled analysis because of inefficient or incomplete follow-up.

자궁동맥색전술 후 임신

	Spontaneous abortion rate	Postpartum hemorrhage rate	Premature delivery rate	Cesarean delivery rate	Smallness for gestational age rate	Malpresentation rate
Pregnancy after UAE	22% (11/49)	13% (4/31)	28% (9/23)	58% (18/31)	7% (2/29)	17% (5/29)
Pregnancy after UAE for leiomyomata	32% (11/34)	9% (2/23)	22% (5/23)	65% (15/23)	9% (2/22)	22% (5/23)
Pregnancy in the general population	10–15%	4–6%	5–10%	22%	10%	5%

UAE = uterine artery embolization.

Obstet Gynecol. 2002 ;100:869-72

자궁동맥색전술 후 임신

- Placental abnormalities
- Malpresentation
- Small for gestational age
- Postpartum hemorrhage
- Spontaneous abortion
- Premature Delivery

  Older age, Hx. of prior intervention, more extensive disease

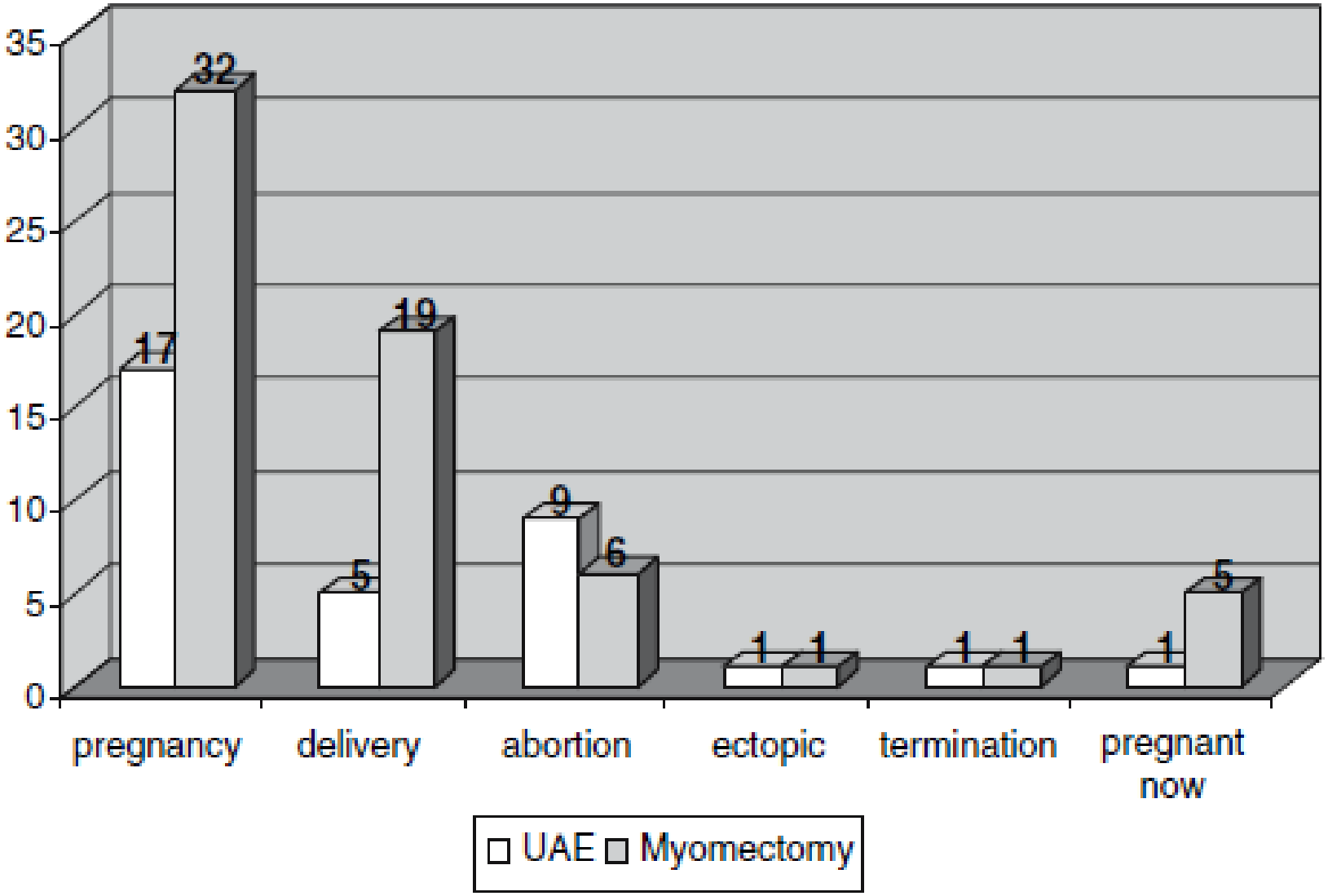
  Embolization? Vs. Residual effect of myomas

Midterm Clinical and First Reproductive Results of a Randomized Controlled Trial Comparing Uterine Fibroid Embolization and Myomectomy

Michal Mara · Jana Maskova · Zuzana Fucikova · David Kuzel · Tomas Belsan · Ondrej Sosna

Cardiovasc Intervent Radiol (2008) 31:73–85

N=120
IM fibroid > 4cm
UFE (n=58) vs. Myomectomy (n=62)
Mean f/u: 24.9 months

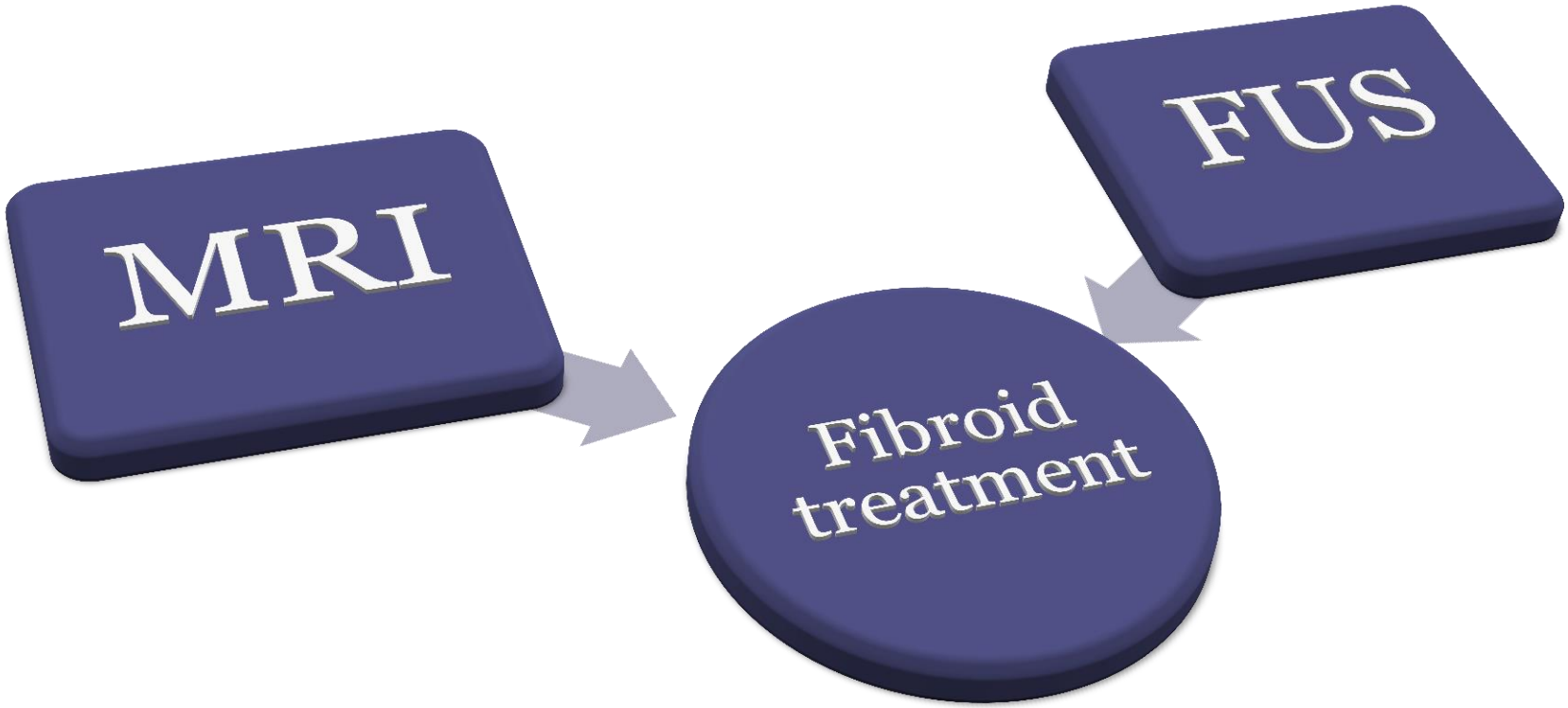


Myomectomy appears to have superior reproductive outcomes.

자궁동맥색전술과 임신

The effects of UFE on the fertility and ability to maintain an intrauterine gestation are still ***uncertain***.

MR-guided Focused Ultrasound Surgery



MRgFUS

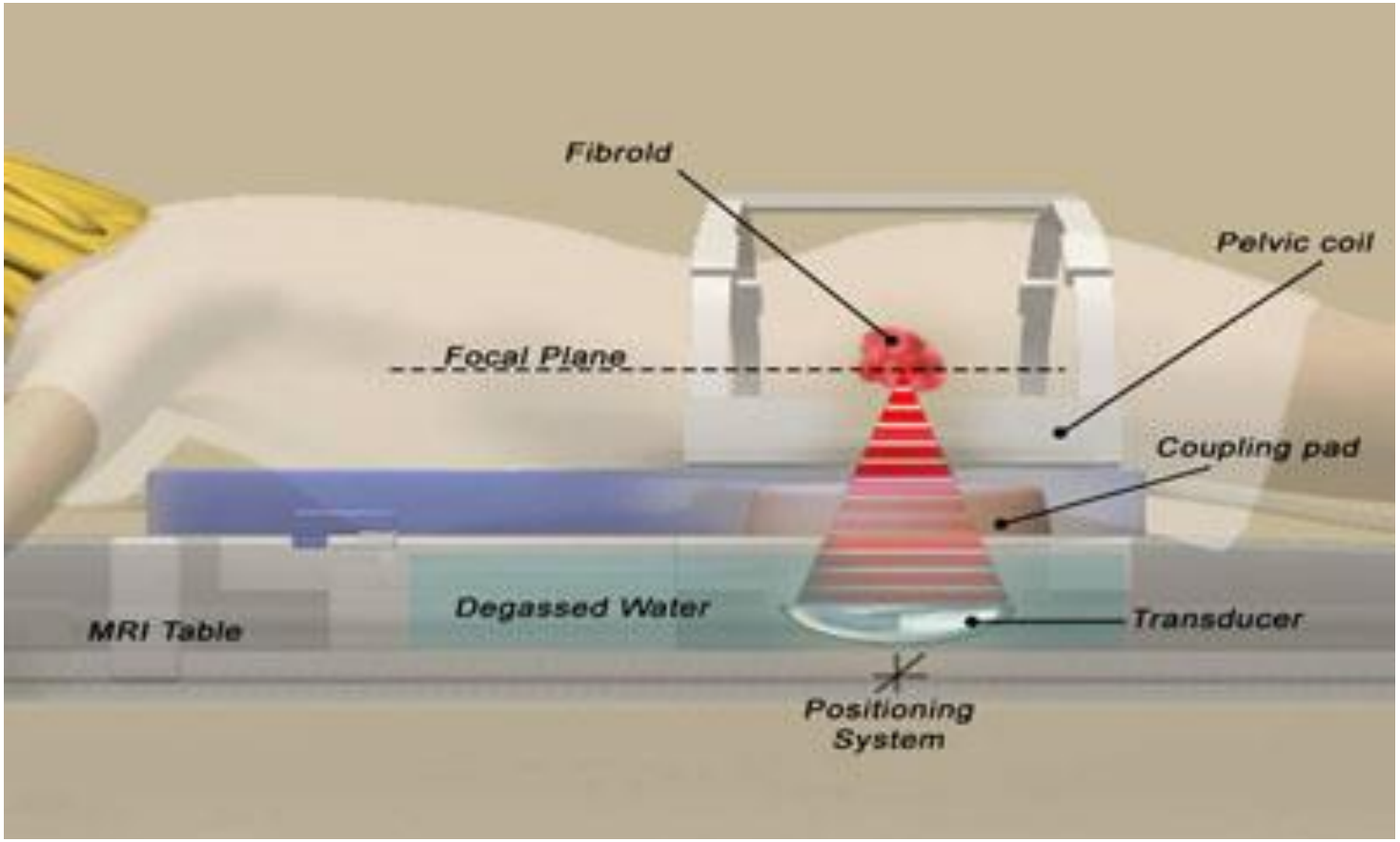
MRI

- Anatomical information & Thermal monitoring

FUS

- Thermal effects: absorption of acoustic energy in tissues
- Non-thermal effects: cavitation

MRgFUS


Fibroid
Pelvic coil
Focal Plane
Coupling pad
Degassed Water
MRI Table
Transducer
Positioning System

US vs. MRI

	장점	단점
US	✓ Lower cost ✓ Ease of use ✓ Greater availability	✓ Lack of reliable thermal feedback ✓ Limited ability to provide precise, real-time evaluation of extent of thermal ablation ✓ Limited capability for imaging bowel, bone, and neural tissues
MRI	✓ Superior soft tissue resolution ✓ Capability of tissue temperature mapping	✓ Higher cost ✓ Longer procedure time

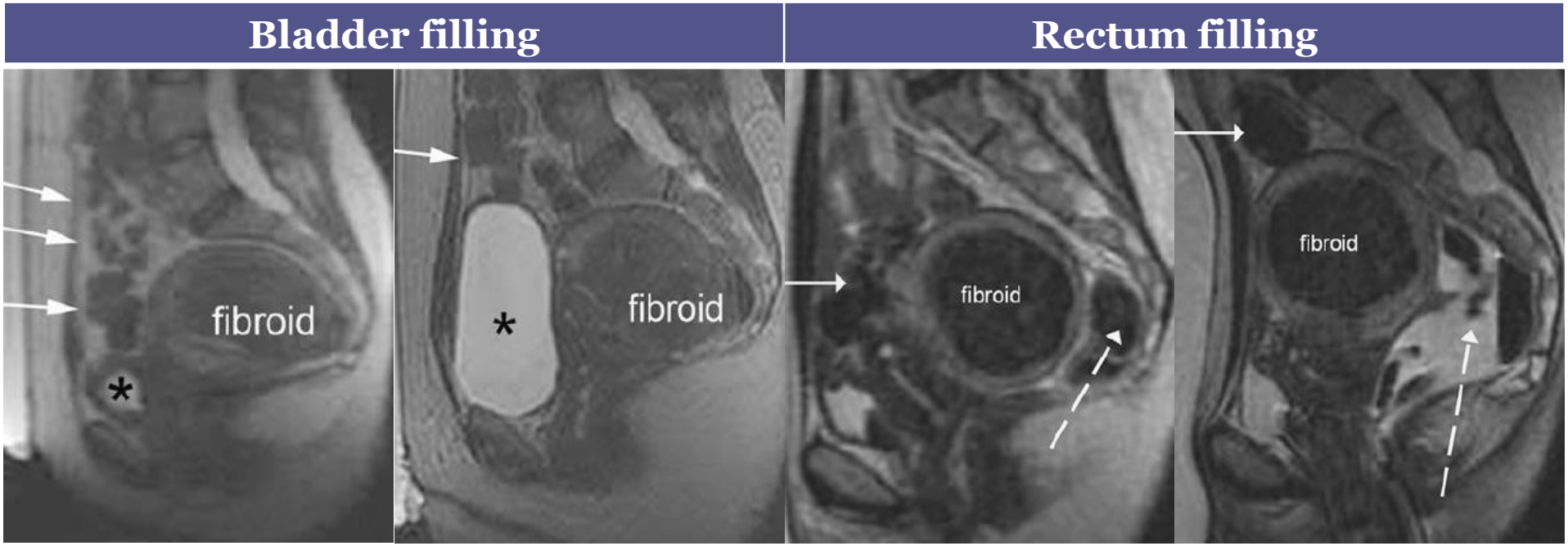
MRgFUS 적응증

- Women with symptomatic fibroids
  - Menorrhagia
  - Dysmenorrhea
  - Bulk symptom (urinary frequency, pelvic discomfort, incontinence, back pain)

자궁근종색전술의 금기증

- Pelvic malignancy
- Active pelvic infection
- Huge fibroid
- Multiple fibroids (>4)
- High T2 signal intensity
- Intervening bowel segment
- Surgical scars, metallic clips, implantable devices

Bowel displacement techniques



MRgFUS의 clinical outcomes

Study, year	No. of patient	Follow-up duration (month)	Clinical outcomes (%)	Volume reduction (%)
Hindely et al.	109	6	79.3	13.5
Rabinovici et al.	35	6	69	15
Stewert et al.	82	12	51	10
Gorny et al.	59	12	87.6	n/a

Safety and five-year re-intervention following magnetic resonance-guided focused ultrasound (MRgFUS) for uterine fibroids

S.D. Quinn [a,*], J. Vedelago [b,1], W. Gedroyc [b,2], L. Regan [a,2]

[a] Department of Obstetrics and Gynaecology, St. Mary's Hospital, Praed Street, London W2 1NY, United Kingdom
[b] Department of Radiology, St. Mary's Hospital, Praed Street, London W2 1NY, United Kingdom

European Journal of Obstetrics & Gynecology and Reproductive Biology 182 (2014) 247–251

Re-intervention rate by NPV category.

	Re-intervention at 3 years (n=180) (%)	Re-intervention at 5 years (n=162) (%)
Overall	77/180 (42.8)	96/162 (59.3)
NPV of 0–25%	25/40 (62.5)	25/38 (65.8)
NPV 25–50%	31/77 (40.3)*	43/68 (63.2)
NPV >50%	22/63 (34.9)**	28/56 (50)***

* p=0.004.
** p=0.005.
*** p=0.074.

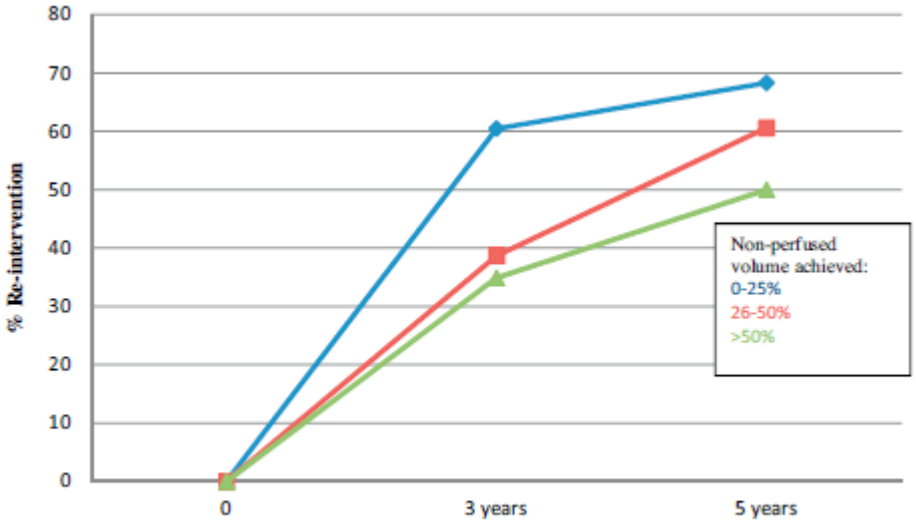


Fig. 1. Re-intervention by % NPV.

Pregnancy outcome after magnetic resonance–guided focused ultrasound surgery (MRgFUS) for conservative treatment of uterine fibroids

Jaron Rabinovici, M.D.,[a] Matthias David, M.D.,[b] Hidenobu Fukunishi, M.D.,[c] Yutaka Morita, M.D., Ph.D.,[d] Bobbie S. Gostout, M.D.,[e] and Elizabeth A. Stewart, M.D.,[e,f] for the MRgFUS Study Group

Fertility and Sterility® Vol. 93, No. 1, January 2010

- 54 pregancies in 51 women
- 41% live births
- 20% ongoing pregnancies
- 28% spontaneous abortions
- 11% elective terminations

- ✓ Women who conceive after MRgFUS should be informed that normal pregnancy outcomes and normal vaginal deliveries are possible.
- ✓ RCTs are required to provide a high level evidence about fertility and outcomes after MRgFUS.

UFE	MRgFUS
Minimally invasive	Non-invasive
Overnight stay	Outpatient
Pain (requires morphine)	Almost painless
Normal activity: 7-10 days	1-2 days
Procedure Time: 1 Hr	3 Hrs
Necrosis: Complete	Incomplete
Multiple	주로 Single
Recurrence: Low	High ?
Cost: Low	High
Availability: Wide	Limited
Radiation	Skin Burn
Ovarian failure	Nerve Injury

Future of MRgFUS for fibroids

- More long-term follow-up needed
- Need to be compared to more invasive surgical and minimally invasive UFE

Thank you for your attention!