

**Radiologic Management of Uterine Leiomyomas  
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. Van Voorhis B. A 41-year-old woman with menorrhagia, anemia, and fibroids: review of treatment of uterine fibroids. <i>Jama</i> . 2009;301(1):82-93.	Review/Other-Dx	1 Patient	To provide an evaluation and treatment options for a patient with symptomatic uterine fibroids.	No results in abstract.	4
2. U.S. Food and Drug Administration. Laparoscopic Uterine Power Morcellation in Hysterectomy and Myomectomy: FDA Safety Communication. 2014; Available at: <a href="http://www.fda.gov/medicaldevices/safety/alertsandnotices/ucm393576.Htm">http://www.fda.gov/medicaldevices/safety/alertsandnotices/ucm393576.Htm</a> .	Review/Other-Tx	N/A	To updated safety communication: the FDA discourages the use of laparoscopic power morcellation during hysterectomy or myomectomy for uterine fibroids.	FDA Actions: The FDA is concerned about women undergoing laparoscopic power morcellation for the treatment of uterine fibroids and the risk of inadvertent spread of unsuspected cancer to the abdominal and pelvic cavities. In an effort to enhance understanding of the problem and provide information on the appropriate use of laparoscopic power morcellators, the FDA: Instructed manufacturers of power morcellators used during laparoscopic hysterectomy and myomectomy to review their current product labeling for accurate risk information for patients and providers; Will convene a public meeting of the Obstetrics and Gynecological Medical Device Advisory Committee to discuss: 1) the clinical role of laparoscopic power morcellation in the treatment of uterine fibroids, 2) whether surgical techniques and/or use of accessories, such as morcellation/specimen bags, can enhance the safe and effective use of these devices, and 3) whether a “boxed warning” related to the risk of cancer spread should be required for laparoscopic power morcellators; Will continue to review adverse event reports, peer-reviewed scientific literature, and information from patients, health care providers, gynecologic and surgical professional societies, and medical device manufacturers.	4
3. Andrews RT, Spies JB, Sacks D, et al. Patient care and uterine artery embolization for leiomyomata. <i>J Vasc Interv Radiol</i> . 2004;15(2 Pt 1):115-120.	Review/Other-Dx	N/A	To discuss uterine artery embolization for symptomatic leiomyomata as a percutaneous image guided therapy.	No results in abstract.	4

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4. Ravina JH, Herbreteau D, Ciraru-Vigneron N, et al. Arterial embolisation to treat uterine myomata. Lancet. 1995;346(8976):671-672.	Review/Other-Tx	16 Patients	To investigate whether arterial embolisation of myomata might reduce or eliminate symptoms, as an alternative to surgical treatment.	With a mean follow-up of 20 months (range 11-48) in the responders, symptoms resolved in 11 patients; menstrual cycles returned to normal in ten of these. Three patients had partial improvement. Two failures required surgery. In 14 cases embolisation caused pelvic pain, which required analgesia in all.	4
5. Gupta JK, Sinha AS, Lumsden MA, Hickey M. Uterine artery embolization for symptomatic uterine fibroids (Review). 2006; Copyright ©. Issue 1: CD005073.	Review/Other-Dx	3 Trials	To review the benefits and/or harms from randomised controlled trials (RCTs) of uterine artery embolization (UAE) versus other interventions for symptomatic uterine fibroids.	Three trials were included in this review. Two RCTs compared UAE with abdominal hysterectomy in 234 women. Although the follow-up period was intended for two years, the available published results was only for six months follow-up. The second trial included 63 women comparing UAE with myomectomy in women who wished to preserve their fertility. The minimum follow-up reported was six months with a mean of 17 (± 9.3) months. The clinical success rate measured by improvement in fibroid-related symptoms e.g. menstrual loss was at least 85% in the UAE group from both trials. The mean dominant fibroid volume decreased by 30 to 46% in two trials. UAE significantly reduces length of hospital stay compared to surgery for either hysterectomy or myomectomy. Women undergoing UAE resumed routine activities sooner than those undergoing surgery. UAE was associated with a higher rate of minor post procedural complications such as vaginal discharge, post puncture haematoma and post embolization syndrome (pain, fever, nausea, vomiting), as well as higher unscheduled visits and readmission rates after discharge, compared with hysterectomy. There were no major complication differences between the two groups. Three women in the myomectomy trial had elevated FSH levels post UAE indicating possible ovarian dysfunction.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
6. Hovsepian DM, Siskin GP, Bonn J, et al. Quality improvement guidelines for uterine artery embolization for symptomatic leiomyomata. J Vasc Interv Radiol. 2004;15(6):535-541.	Review/Other-Dx	N/A	To establish guidelines for the uterine artery embolization for symptomatic leiomyomata	No results in abstract.	4
7. Walker WJ, Pelage JP. Uterine artery embolisation for symptomatic fibroids: clinical results in 400 women with imaging follow up. Bjog. 2002;109(11):1262-1272.	Observational-Tx	403 Patients	To evaluate the mid-term efficacy and complications of uterine artery embolisation in women with symptomatic fibroids and to assess reduction in uterine and dominant fibroid volumes using ultrasound and magnetic resonance imaging.	Bilateral uterine artery embolisation was achieved in 395 women, while 5 women had a unilateral procedure. With a mean clinical follow up of 16.7 months, menstrual bleeding was improved in 84% of women and menstrual pain was improved in 79%. Using ultrasound, the median uterine and dominant fibroid volumes before embolisation were 608 and 112 cc, respectively, and after embolisation 255 and 19 cc, respectively (P = .0001). Three (1%) infective complications requiring emergency hysterectomy occurred. Twenty-three (6%) patients had clinical failure or recurrence. Of these, nine (2%) had a hysterectomy. Twenty-six (7%) women had permanent amenorrhoea after embolisation including four patients under the age of 45 (2%). Of these, amenorrhea started between 4 and 18 months after embolisation, and only three had elevated follicle stimulating hormone levels when amenorrhea developed. Thirteen (4%) women had chronic vaginal discharge considered as a major irritant. Thirteen pregnancies occurred in 12 patients. Ninety-seven percent of women were pleased with the outcome and would recommend this treatment to others.	2

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8. Pron G, Bennett J, Common A, Wall J, Asch M, Sniderman K. The Ontario Uterine Fibroid Embolization Trial. Part 2. Uterine fibroid reduction and symptom relief after uterine artery embolization for fibroids. <i>Fertil Steril.</i> 2003;79(1):120-127.	Observational-Tx	538 Patients	To evaluate fibroid uterine volume reduction, symptom relief, and patient satisfaction with uterine artery embolization (UAE) for symptomatic fibroids.	Median uterine and dominant fibroid volume reductions were 35% and 42%, respectively. Significant improvements were reported for menorrhagia (83%), dysmenorrhea (77%), and urinary frequency/urgency (86%). Mean menstrual duration was significantly reduced after UAE (7.6 to 5.4 days). Improvements in menorrhagia were unrelated to pre-UAE uterine size or post-UAE uterine volume reduction. Amenorrhea occurring after the procedure was highly age dependent, ranging from 3% (1%–7%) in women under age 40 to 41% (26%–58%) in women age 50 or older. Median fibroid life-impact scores were significantly reduced after UAE (8.0 to 3.0). The majority (91%) expressed satisfaction with UAE treatment.	2
9. Spies JB, Myers ER, Worthington-Kirsch R, Mulgund J, Goodwin S, Mauro M. The FIBROID Registry: symptom and quality-of-life status 1 year after therapy. <i>Obstet Gynecol.</i> 2005;106(6):1309-1318.	Observational-Tx	2,112 Patients	To investigate the change in symptom severity and health-related quality of life among patients treated with uterine artery embolization for leiomyomata.	Of 2,112 eligible patients, follow-up data were obtained on 1,797 (85.1%) at 6 months and 1,701 (80.5%) at 12 months. At 12 months, the mean symptom score had improved from 58.61 to 19.23 ( $P < .001$ ), whereas 5.47% of patients had no improvement. The mean health-related quality-of-life score improved from 46.95 to 86.68 ( $P < .001$ ), whereas 5.0% did not improve. In the first year after embolization, hysterectomy was performed in 2.9% of patients, with 3.6% requiring gynecologic interventions by 6 months and an additional 5.9% between 6 and 12 months. Amenorrhea as a result of embolization occurred in 7.3% of patients. Of these, 86% were age 45 or older. Most patients were satisfied with their outcome (82% strongly agree or agree). Predictors of a greater symptom change score include smaller leiomyoma size, submucosal location, and presenting symptom of heavy menstrual bleeding.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
10. Goodwin SC, Spies JB, Worthington-Kirsch R, et al. Uterine artery embolization for treatment of leiomyomata: long-term outcomes from the FIBROID Registry. <i>Obstet Gynecol.</i> 2008;111(1):22-33.	Observational-Tx	1,278 Patients	To assess long-term clinical outcomes of uterine artery embolization across a wide variety of practice settings in a large patient cohort.	Mean symptom scores improved 41.41 points (P<.001), and the quality of life scores improved 41.47 points (P<.001), both moving into the normal range for this questionnaire. The improvements were independent of practice setting. During the 3 years of the study, Kaplan-Meier estimates of hysterectomy, myomectomy, or repeat uterine artery embolization were 9.79%, 2.82%, and 1.83% of the patients, respectively.	2
11. Spies JB, Spector A, Roth AR, Baker CM, Mauro L, Murphy-Skrzynarz K. Complications after uterine artery embolization for leiomyomas. <i>Obstet Gynecol.</i> 2002;100(5 Pt 1):873-880.	Observational-Tx	400 Patients	To determine the frequency and severity of complications that occur as a result of uterine artery embolization for leiomyomas.	There were no deaths and no major permanent injuries. One patient required hysterectomy as a result of a complication, and one patient had an undiagnosed leiomyosarcoma. There were ten in-hospital complications and an additional 27 complications within the first 30 days, with 34 patients experiencing a periprocedural complication for a rate of 8.5% (95% CI 6.0%, 11.7%). There were five serious complications (SCVIR class D), comprising 1.25% (95% CI 0.3%, 2.5%) of the study group. Using ACOG definitions for perioperative complications, the overall morbidity was 5% (95% CI 3.1%, 7.7%).	2
12. Katsumori T, Kasahara T, Tsuchida Y, Nozaki T. Amenorrhea and resumption of menstruation after uterine artery embolization for fibroids. <i>Int J Gynaecol Obstet.</i> 2008;103(3):217-221.	Observational-Tx	211 Patients	To determine whether women will experience permanent amenorrhea following uterine artery embolization for fibroids, and whether rates of onset differ in the long term according to age at the time of the procedure.	The likelihood of incurring permanent amenorrhea was significantly higher in group C. The cumulative rates in groups A, B, and C were 0%, 1.4%, and 19.7% at 3 years and 0%, 11.2%, and 40.4% at 6 years.	3

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13. Scheurig C, Islam T, Zimmermann E, Hamm B, Kroencke TJ. Uterine artery embolization in patients with symptomatic diffuse leiomyomatosis of the uterus. <i>J Vasc Interv Radiol.</i> 2008;19(2 Pt 1):279-284.	Review/Other-Tx	6 Patients	Patients with symptomatic diffuse uterine leiomyomatosis underwent technically successful uterine artery embolization	Six patients with symptomatic diffuse uterine leiomyomatosis underwent technically successful uterine artery embolization. After a median follow-up of 16 months, five women presented with permanent alleviation of symptoms and a normalized quality of life according to the Uterine Fibroid Symptom and Quality of Life questionnaire. Magnetic resonance imaging showed impressive recovery of the myometrium, and the infarcted leiomyomas shrank and were partially expelled. No additional treatment was necessary. Failure of therapy occurred in one patient with atypical growth of fibroid tumor tissue shortly after embolization, which was suspicious for malignancy. Hysterectomy was performed and pathologic evaluation revealed benign leiomyomatosis.	4
14. Smeets AJ, Nijenhuis RJ, van Rooij WJ, et al. Uterine artery embolization in patients with a large fibroid burden: long-term clinical and MR follow-up. <i>Cardiovasc Intervent Radiol.</i> 2010;33(5):943-948.	Review/Other-Tx	71 Patients	To report the long-term clinical and magnetic resonance (MR) results in a large series of women with a dominant fibroid of [10 cm and/or an uterine volume of > 700 cm <sup>3</sup> .	There were no serious complications of UAE. During a mean follow-up of 48 months (median, 59 months; range, 6–106 months), 10 of 71 patients (14%) had a hysterectomy. Mean volume reduction of the fibroid and uterus was 44 and 43%. Mean infarction rate of the fibroid and overall fibroid infarction rate was 86 and 87%. In the vast majority of patients there was a substantial improvement of symptoms. Clinical results were similar in patients with a dominant fibroid > 10 cm and in patients with large uterine volumes by diffuse fibroid disease.	4
15. Isonishi S, Coleman RL, Hiram M, et al. Analysis of prognostic factors for patients with leiomyoma treated with uterine arterial embolization. <i>Am J Obstet Gynecol.</i> 2008;198(3):270 e271-276.	Observational-Tx	43 Patients	To describe a clinically useful factors index predicting long-term efficacy of uterine artery embolization (UAE).	Forty-three patients were identified. Two prognostic factors were identified by multivariate analysis: vascularity (dichotomized as hypervascular vs hypovascular; RFI at 2 years, 80% vs 20%, P = .001) and number of nodules (solitary vs multiple; RFI at 2 years, 72% vs 25% at 2 years, P = .001).	2

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16. Firouznia K, Ghanaati H, Sanaati M, Jalali AH, Shakiba M. Uterine artery embolization in 101 cases of uterine fibroids: do size, location, and number of fibroids affect therapeutic success and complications? Cardiovasc Intervent Radiol. 2008;31(3):521-526.	Observational-Tx	101 Patients	To evaluate whether the size, location, or number of fibroids affects therapeutic efficacy or complications of uterine artery embolization (UAE).	Complications and outcomes were analyzed for associations with fibroid size, location, and number. Reductions in mean fibroid volume were similar in patients with single ( $66.6 \pm 21.5\%$ ) and multiple ( $67.4 \pm 25.0\%$ ) fibroids (p-value = 0.83). Menstrual improvement occurred in patients with single (93.3%) and multiple (72.2%) fibroids (p = 0.18). Changes in submucosal and other fibroids were not significantly different between the two groups (p's[0.56). Linear regression analysis between primary fibroid volume as independent variable and percentage reduction of fibroid volume after 1 year yielded an R2 of 0.083 and the model coefficient was not statistically significant (p = 0.072). Multivariate regression models revealed no statistically or clinically significant coefficients or odds ratios for three independent variables (primary fibroid size, total number, and fibroid location) and all outcome variables (percent reduction of uterus and fibroid volumes in 1 year, improvement of clinical symptoms [menstrual, bulk related, and urinary] in 1 year, and complications after UAE).	2

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17. Walker WJ, Barton-Smith P. Long-term follow up of uterine artery embolisation--an effective alternative in the treatment of fibroids. <i>Bjog</i> . 2006;113(4):464-468.	Review/Other-Tx	258 Patients	To evaluate the long-term efficacy and complications of uterine artery embolisation (UAE) for treatment of symptomatic uterine fibroids.	A total of 258 women were identified as being between 5 and 7 years post-UAE and suitable for long-term follow up in October 2004. One hundred seventy-two completed questionnaires were analysed (67% response rate). Seventy-five percent of women still had either a return to normal or an improvement in menstrual flow compared with how they were prior to UAE. More than 80% of fibroid-related symptoms were still resolved or improved. Sixteen percent of women required further treatment for fibroids. Premature menopause directly following UAE occurred in only one woman in the study group. Eighty-eight percent of women were satisfied with the outcome of the procedure at 5-7 years and would choose it again or recommend it to others.	4



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18. Bucek RA, Puchner S, Lammer J. Mid- and long-term quality-of-life assessment in patients undergoing uterine fibroid embolization. <i>AJR Am J Roentgenol.</i> 2006;186(3):877-882.	Observational-Tx	62 Patients	To assess the mid- and long-term outcomes concerning fibroid-specific and fibroid-associated quality of life in patients treated by uterine fibroid embolization.	The analysis was performed based on questionnaires from 53 (85.5%) of 62 patients. The mean follow-up was 3.0 +/- 1.0 (SD) years (range, 1.0-5.0 years). Uterine fibroid embolization led to a reduction of bleeding symptoms in 79.2% of patients (n = 48 before uterine fibroid embolization; n = 10 after uterine fibroid embolization), pain in 81.5% (n = 27; n = five, respectively), bulk-related symptoms in 78.6% (n = 14; n = three, respectively), urinary dysfunction in 60% (n = 10; n = four, respectively), sexual dysfunction in 71.4% (n = seven; n = two, respectively), fatigue in 62.5% (n = 24; n = nine, respectively), limitations in social life in 88.2% (n = 17; n = two, respectively), and a depressed mood in 89.5% (n = 19; n = two, respectively). The median impairment score for bleeding and pain decreased significantly from 6 to 0 and from 4 to 0, respectively (both p < 0.001). The general quality-of-life index increased significantly from 6 to 9 (p < 0.001). Forty-two (79.2%) patients judged the result as very satisfactory and would highly recommend uterine fibroid embolization to other patients.	3

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19. Lohle PN, Voogt MJ, De Vries J, et al. Long-term outcome of uterine artery embolization for symptomatic uterine leiomyomas. <i>J Vasc Interv Radiol.</i> 2008;19(3):319-326.	Observational-Tx	100 Patients	To evaluate long-term outcomes and factors associated with treatment failure after uterine artery embolization (UAE) in women with symptomatic uterine leiomyomas.	Follow-up was available in 93 women (median follow-up, 54 months; range, 45-87 y). Continued symptom relief was observed in 72% of patients (n = 67). Among the 26 women with treatment failure (28%), 11 (42%) underwent hysterectomy, four (15%) myomectomy, and eight (31%) repeat embolization. Three (12%) reported no improvement. In women without any additional surgery (n = 70), heavy menstrual bleeding, pain, and bulk-related symptoms improved in 97%, 93%, and 92%. Ninety percent of all women (n = 93) were satisfied or very satisfied at final follow-up. Predictors of failure were a lack of improvement in bleeding (hazard ratio [HR], 9.0; 95% CI, 3.1-26.3; P < .001) or pain (HR, 7.4; 95% CI, 2.2-24.4; P < .001) at 1 year after UAE and the percent reduction in dominant tumor volume (HR, 0.97; 95% CI, 0.95-0.99; P = .007).	2
20. Sesti F, Pietropolli A, Sesti FF, Piccione E. Uterine myomectomy: role of gasless laparoscopy in comparison with other minimally invasive approaches. <i>Minim Invasive Ther Allied Technol.</i> 2013;22(1):1-8.	Review/Other-Tx	5 Studies	To assess the role of gasless laparoscopy (GLM) in comparison with two other minimally invasive approaches to myomectomy, CO(2) laparoscopy (LM) and minilaparotomy (MM), focusing on the most recent randomized or prospective controlled studies.	One randomized controlled, one multicenter controlled, three prospective studies about GLM, four randomized controlled studies and one prospective study about LM, four randomized controlled trials and one prospective study about MM were reviewed and analyzed.	4
21. Ghiaroni J, Lopez GE, Coutinho Junior AC, Schanaider A. Uterine artery embolization with spherical PVA-PVAc particles as preparation for surgical resection of myomas. <i>Rev Col Bras Cir.</i> 2013;40(5):386-391.	Observational-Tx	12 Patients	To evaluate the use of a new spherical particle of polyvinyl alcohol and polyvinyl acetate (PVA-PVAc) for uterine artery embolization in patients with myoma with surgical indication.	The mean age was 37 years and mean uterine volume prior to treatment, 939.3 cc. Three years after embolization, there was reduction in uterine volume (p = 0.0005), increase in hemoglobin concentration after embolization (p = 0.0004), without variation after the myomectomy. There was no significant variation of the follicle stimulating hormone (p = 0.17). There was no case of ovarian failure, but one of the patients had endometrial atrophy. Two patients became pregnant, with good obstetric indicators. Signs and symptoms improved after embolization, and remained after myomectomy.	3

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22. Scheurig-Muenkler C, Koesters C, Powerski MJ, Grieser C, Froeling V, Kroencke TJ. Clinical long-term outcome after uterine artery embolization: sustained symptom control and improvement of quality of life. <i>J Vasc Interv Radiol.</i> 2013;24(6):765-771.	Observational-Tx	380 Patients	To evaluate long-term clinical efficacy of uterine artery embolization (UAE) for uterine fibroids with respect to symptom control and improvement in quality of life.	Follow-up was available for a median of 5.7 years (range, 3.1-10.1 y) after treatment in 304 of 380 (80%) patients. There were 54 TFs with subsequent reintervention in 46 women. Kaplan-Meier analysis revealed a cumulative TF rate of 23.3% after 10 years. Cox regression demonstrated a significantly higher likelihood of TF in patients <40 years old compared with patients >45 years old (hazard ratio, 2.28; P = .049). Women without TF showed sustained normalization of disease-specific quality of life (P < .001). Cessation of menstruation at a median age of 51 years was reported by 57 (22.8%) of 250 women.	2
23. Yousefi S, Czeyda-Pommersheim F, White AM, Banovac F, Hahn WY, Spies JB. Repeat uterine artery embolization: indications and technical findings. <i>J Vasc Interv Radiol.</i> 2006;17(12):1923-1929.	Review/Other-Tx	24 Patients	To determine the indications and technical aspects of procedures in patients undergoing repeat uterine artery embolization (UAE).	Twenty-four patients underwent repeat embolization 6-66 months after the initial embolization. The most common symptom at representation was pressure and/or bulk symptoms (n=15), followed by recurrent heavy bleeding (n=12) and pelvic pain or cramping (n=7). MR imaging studies before repeat embolization revealed incomplete infarction of tumors present before the first embolization in 22 of 24 patients. New tumors were identified in 12 patients, two of whom had new tumors only. During repeat embolization, nine patients (37%) required ovarian artery embolization to occlude ovarian supply to the uterus. Among 21 women with clinical follow-up after the second embolization, 19 (90%) had symptom control.	4
24. Sharp HT. Assessment of new technology in the treatment of idiopathic menorrhagia and uterine leiomyomata. <i>Obstet Gynecol.</i> 2006;108(4):990-1003.	Review/Other-Tx	N/A	To describe new technologies available for the treatment of idiopathic menorrhagia with endometrial ablation devices that use differing ablative methods, including thermal balloon, circulated hot fluid, cryotherapy, radiofrequency electrosurgery, and microwave energy.	No results in abstract.	4

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25. Rosati M, Vigone A, Capobianco F, Surico D, Amoruso E, Surico N. Long-term outcome of hysteroscopic endometrial ablation without endometrial preparation. Eur J Obstet Gynecol Reprod Biol. 2008;138(2):222-225.	Observational-Tx	438 Patients	To describe the three-step hysteroscopic endometrial ablation (EA) technique without endometrial preparation, and its long-term outcomes.	One hundred and eighty-four responders (47.8%) reported amenorrhea; 177 (46%) had light to normal flow. One patient (0.3%) underwent repeat ablation and 20 (5.2%) underwent hysterectomy: 15 (3.9%) because of endometrial ablation failure and 5 (1.3%) because of indications unrelated to the ablation (three cases of atypical endometrial hyperplasia and two cases of fibroids). Two hundred and ninety-two patients (75.8%) were very satisfied, and 78 (20.3%) satisfied with the results. No major complications occurred and three women (0.8%) became pregnant during the follow-up period.	3

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<p>26. Glasser MH, Heinlein PK, Hung YY. Office endometrial ablation with local anesthesia using the HydroThermAblator system: Comparison of outcomes in patients with submucous myomas with those with normal cavities in 246 cases performed over 5(1/2) years. J Minim Invasive Gynecol. 2009;16(6):700-707.</p>	<p>Observational-Tx</p>	<p>246 Patients</p>	<p>To estimate the safety and efficacy of the HydroThermAblator (HTA) system for performance of endometrial ablation in the medical office setting using local anesthesia and minimal oral sedation and to compare results obtained in patients with submucous myomas with those in patients with normal endometrial cavities.</p>	<p>Of the 231 patients included in the analysis, 121 (53.4%) reported postablation amenorrhea, 62 (26.8%) reported light menses or spotting, 21 (9.1%) reported normal menses, 15 (6.5%) reported menorrhagia, and 12 (5.2%) underwent hysterectomy because of bleeding. In the 136 patients with normal cavities, amenorrhea was achieved in 84 patients (61.8%), oligomenorrhea in 35 (25.7%), and eumenorrhea in 12 (8.8%). Four patients (2.9%) continued to have menorrhagia requiring medical treatment. In the 95 patients with submucous myomas, amenorrhea was reported by 37 patients (38.9%), oligomenorrhea by 27 (28.4%), eumenorrhea by 9 (9.5%), and menorrhagia by 11 (11.6%). In 11 patients (11.6%), hysterectomy was performed because of menorrhagia. All patients who underwent hysterectomy had multiple myomas, and 9 (81.8%) also had adenomyosis. The failure rate, defined as patients with menorrhagia or undergoing hysterectomy because of bleeding, was 11.7% overall. The failure rate in patients with submucous myomas and normal cavities was 23.2% and 3.7%, respectively (relative risk, 6.3; 95% confidence interval, 2.5-16.0). While the failure rate in the group with myomas was statistically significantly higher than in the group without myomas, the failure rate in the myoma group was still comparable to that achieved using electrosurgical resection and ablation of similar types of myomas as reported in the literature. The amenorrhea rate achieved in the myoma group (38.9%) was also comparable to that achieved in US Food and Drug Administration pivotal trials in patients with normal cavities treated using all of the nonhysteroscopic global ablation devices as well those treated using rollerball endometrial ablation. The rate of hysterectomy because of bleeding was 5.2% overall. The hysterectomy rate in patients with submucous myomas and normal cavities was 11.6% and 0.7%, respectively. Only 1 procedure was discontinued (at 8 minutes) because of pain. Four patients had postoperative endometritis, with 2 requiring hospitalization for intravenous antibiotic</p>	<p>2</p>

\* See Last Page for Key

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27. Hehenkamp WJ, Volkers NA, Birnie E, Reekers JA, Ankum WM. Symptomatic uterine fibroids: treatment with uterine artery embolization or hysterectomy--results from the randomized clinical Embolisation versus Hysterectomy (EMMY) Trial. <i>Radiology</i> . 2008;246(3):823-832.	Experimental-Tx	177 Patients	To prospectively evaluate health-related quality of life (HRQOL) outcomes for uterine artery embolization (UAE) and hysterectomy up to 24 months after the intervention in terms of mental and physical health, urinary and defecatory function, and overall patient satisfaction.	The SF-36 MCS and PCS, Health Utilities Index Mark 3, EuroQol 5D, and UDI scores were improved significantly in both groups at 6 months and afterward (P < .05). The DDI score was improved significantly in only the UAE group at 6 months and afterward (P < .05). No differences between groups were observed, with the exception of PCS scores at 6-week follow-up: Patients in the UAE group had significantly better scores than did patients in the hysterectomy group (P < .001). Improvement in PCS score at 24-month follow-up was significantly higher for patients who were employed at baseline (P = .035). At 24-month follow-up, patients in the hysterectomy group were significantly more satisfied than those in the UAE group (P = .02).	1
28. Jacob GP, Oraif A, Power S. When helping hurts: the effect of surgical interventions on ovarian reserve. <i>Hum Fertil (Camb)</i> . 2016;19(1):3-8.	Review/Other-Dx	N/A	To review some of the major papers that have been published on the effect of ovarian reserve after surgical interventions and outline a summary on the effect of these interventions, in terms of future fertility and menopause.	No results stated in abstract.	4
29. Moorman PG, Myers ER, Schildkraut JM, Iversen ES, Wang F, Warren N. Effect of hysterectomy with ovarian preservation on ovarian function. <i>Obstet Gynecol</i> . 2011;118(6):1271-1279.	Observational-Tx	871	To prospectively estimate the risk for earlier ovarian failure among women undergoing hysterectomy with ovarian preservation, as compared to women of similar age without hysterectomy.	Ovarian failure occurred among 60 of the women with hysterectomy and 46 of the control women. Women undergoing hysterectomy were at nearly a twofold increased risk for ovarian failure as compared to women with intact uteri (HR=1.92, 95% confidence interval (CI) 1.29 – 2.86). The proportional hazards model further estimated that 14.8% of women with hysterectomy experienced ovarian failure after four years of follow-up compared to 8.0% of the control women. Risk for ovarian failure was greater for women who had a unilateral oophorectomy along with their hysterectomy (HR=2.93, 95% CI 1.57 – 5.49), but also was significantly increased for women who retained both ovaries (HR=1.74, 95% CI 1.14 – 2.65).	1

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
30. Edwards RD, Moss JG, Lumsden MA, et al. Uterine-artery embolization versus surgery for symptomatic uterine fibroids. N Engl J Med. 2007;356(4):360-370.	Experimental-Tx	157 Patients	To compare the efficacy and safety of uterine-artery embolization with standard surgical methods for the treatment of symptomatic uterine fibroids.	Patients were randomly assigned in a 2:1 ratio to undergo either uterine-artery embolization or surgery, with 106 patients undergoing embolization and 51 undergoing surgery (43 hysterectomies and 8 myomectomies). There were no significant differences between groups in any of the eight components of the SF-36 scores at 1 year. The embolization group had a shorter median duration of hospitalization than the surgical group (1 day vs. 5 days, P<0.001) and a shorter time before returning to work (P<0.001). At 1 year, symptom scores were better in the surgical group (P=0.03). During the first year of follow-up, there were 13 major adverse events in the embolization group (12%) and 10 in the surgical group (20%) (P=0.22), mostly related to the intervention. Ten patients in the embolization group (9%) required repeated embolization or hysterectomy for inadequate symptom control. After the first year of follow-up, 14 women in the embolization group (13%) required hospitalization, 3 of them for major adverse events and 11 for reintervention for treatment failure.	1
31. Pinto I, Chimeno P, Romo A, et al. Uterine fibroids: uterine artery embolization versus abdominal hysterectomy for treatment--a prospective, randomized, and controlled clinical trial. Radiology. 2003;226(2):425-431.	Observational-Tx	36 Patients	To evaluate the effectiveness of uterine artery embolization (UAE) in the management of bleeding in patients with uterine fibroids and to compare UAE with hysterectomy, particularly with regard to length of hospital stay and associated complications (ie, safety).	The clinical success rate for the patients who underwent UAE, which was based on the cessation of bleeding, was 86% (31 of 36 patients). The mean hospital stay for group 1 was 4.14 days shorter than that for group 2 (P <.001). Ten (25%) of the 40 patients who underwent UAE experienced minor complications, in contrast to four (20%) of the 20 who underwent hysterectomy and experienced major complications.	1

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
32. Ruuskanen A, Hippelainen M, Sipola P, Manninen H. Uterine artery embolisation versus hysterectomy for leiomyomas: primary and 2-year follow-up results of a randomised prospective clinical trial. <i>Eur Radiol.</i> 2010;20(10):2524-2532.	Experimental-Tx	57 Patients	To compare uterine artery embolisation (UAE) and hysterectomy for the treatment of leiomyomas at 2-year follow-up in a prospective, randomised, single-centre study.	Two hysterectomy patients (7%) developed major complications. Hospital discharge occurred earlier after UAE than after hysterectomy ( $p < 0.001$ ). Length of sick leave was longer after hysterectomy than after UAE ( $p < 0.001$ ). Twenty-two (82%) UAE patients and 28 (93%) hysterectomy patients reported overall relief of symptoms ( $p = 0.173$ ). In 12/18 (67%) UAE patients menorrhagia was completely resolved or reduced. Improvement of pressure symptoms was reported significantly more by UAE patients than by hysterectomy patients (19/20 [95%] versus 18/26 [69%], respectively; $p = 0.029$ ). Five (19%) UAE patients underwent additional interventions due to worsening symptoms. Twenty-four (89%) UAE patients and 29 (97%) hysterectomy patients would have chosen treatment again ( $p = 0.336$ ).	2
33. van der Kooij SM, Hehenkamp WJ, Volkers NA, Birnie E, Ankum WM, Reekers JA. Uterine artery embolization vs hysterectomy in the treatment of symptomatic uterine fibroids: 5-year outcome from the randomized EMMY trial. <i>Am J Obstet Gynecol.</i> 2010;203(2):105 e101-113.	Observational-Tx	177 Patients	To compare clinical outcome and health related quality of life (HRQOL) 5 years after uterine artery embolization (UAE) or hysterectomy in the treatment of menorrhagia caused by uterine fibroids.	Patients were assigned randomly to UAE ( $n = 88$ ) or hysterectomy ( $n = 89$ ). Five years after treatment 23 of 81 UAE patients (28.4%) had undergone a hysterectomy because of insufficient improvement of complaints (24.7% after successful UAE). HRQOL measures improved significantly and remained stable until the 5-year follow-up evaluation, with no differences between the groups. UAE had a positive effect both on urinary and defecation function.	1



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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
34. Hehenkamp WJ, Volkers NA, Bartholomeus W, et al. Sexuality and body image after uterine artery embolization and hysterectomy in the treatment of uterine fibroids: a randomized comparison. <i>Cardiovasc Intervent Radiol.</i> 2007;30(5):866-875.	Observational-Tx	177 Patients	To investigate the effect of uterine artery embolization (UAE) on sexual functioning and body image in a randomized comparison to hysterectomy for symptomatic uterine fibroids.	Two validated questionnaires (the Sexual Activity Questionnaire [SAQ] and the Body Image Scale [BIS]) were completed by all patients at baseline, 6 weeks, and 6, 12, 18, and 24 months after treatment. Repeated measurements on SAQ scores revealed no differences between the groups. There was a trend toward improved sexual function in both groups at 2 years, although this failed to reach statistical significance except for the dimensions discomfort and habit in the UAE arm. Overall quality of sexual life deteriorated in a minority of cases at all time points, with no significant differences between the groups (at 24 months: UAE, 29.3%, versus hysterectomy, 23.5%; $p = 0.32$ ). At 24 months the BIS score had improved in both groups compared to baseline, but the change was only significant in the UAE group ( $p = 0.009$ ).	1
35. Spies JB, Bradley LD, Guido R, Maxwell GL, Levine BA, Coyne K. Outcomes from leiomyoma therapies: comparison with normal controls. <i>Obstet Gynecol.</i> 2010;116(3):641-652.	Review/Other-Tx	375 Patients	To assess the severity of symptoms caused by uterine leiomyomas, their effect on health-related quality of life, and the change after treatment compared with a normal control group.	A total of 375 patients completed baseline enrollment: 101 normal, 107 embolization, 61 myomectomy, and 106 hysterectomy. At baseline, the mean Uterine Fibroid Symptom and Quality of Life Symptom Severity score for women in the normal control group was 15.3 (+/-14.5) and 64.8 (+/-20) for the leiomyoma patients ( $P < .001$ ). At 6 and 12 months, the mean Symptom score for women in the normal control group was unchanged, while the leiomyoma treatment group score reduced to a mean of 17.8 (+/-17.5) at 12 months. Similar magnitude changes occurred among the Uterine Fibroid Symptom and Quality of Life health-related quality of life subscale scores for the normal control group members and leiomyoma patients. At 12 months, the hysterectomy group reported significantly lower symptoms and better health-related quality of life than the other two therapies ( $P < .001$ ).	4

**Radiologic Management of Uterine Leiomyomas  
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
36. van der Kooij SM, Bipat S, Hehenkamp WJ, Ankum WM, Reekers JA. Uterine artery embolization versus surgery in the treatment of symptomatic fibroids: a systematic review and metaanalysis. <i>Am J Obstet Gynecol.</i> 2011;205(4):317 e311-318.	Meta-analysis	4 studies; 515 Patients	To summarize the evidence on short-, mid-, and long-term results up to 5 years of uterine artery embolization in comparison to surgery.	Four randomized controlled trials with a total of 515 patients were included. On the short-term, uterine artery embolization showed fewer blood loss, shorter hospital stay, and quicker resumption of work. Mid- and long-term results showed comparable health-related quality of life results and a higher reintervention rate in the uterine artery embolization group, whereas both groups were equally satisfied.	M
37. Graebe K, Garcia-Soto A, Aziz M, et al. Incidental power morcellation of malignancy: a retrospective cohort study. <i>Gynecol Oncol.</i> 2015;136(2):274-277.	Review/Other-Tx	10 Patients	To determine the incidence of malignancies found in morcellated specimens at our institution.	10 cases of malignancies were identified including endometrioid endometrial carcinomas (3), uterine serous carcinoma (1), endometrial stromal sarcomas (ESS) (3), and leiomyosarcomas (LMS) (3). An overall risk of occult cancer on a morcellated specimen was .73%; leiomyosarcoma was 0.22%, endometrial stromal sarcoma 0.22%, and endometrial cancer 0.29%. The median uterine weight for the 10 morcellated malignancies was 293.5g whereas the median weight for the benign uteri was only 117.5g giving a theta of -106 (95% CI -261,20). There was no difference in patient age or surgeon type between the groups (See Table 1).	4
38. Miller CE. Unmet therapeutic needs for uterine myomas. <i>J Minim Invasive Gynecol.</i> 2009;16(1):11-21.	Review/Other-Tx	N/A	To provide an overview of current therapies accompanied by their strengths and shortcomings, and a therapeutic advance on the horizon.	No results in abstract.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
39. Kulshrestha V, Kriplani A, Agarwal N, et al. Low dose mifepristone in medical management of uterine leiomyoma - an experience from a tertiary care hospital from north India. Indian J Med Res. 2013;137(6):1154-1162.	Observational-Tx	143 Patients	To evaluate efficacy and safety of low dose mifepristone in medical management of myoma and to compare two doses - 10 vs. 25 mg/day.	Seventy patients in group 1 and 73 in group 2 completed treatment. Mean PBAC score reduced from 253 to 19.8 and from 289.2 to 10.4 at 1 and 3 months in groups 1 and 2, respectively. At 3 months, 67 of 70 (95.7%) patients of group 1 and 66 of 73 (90.4%) of group 2 developed amenorrhoea which reverted after median 34 (range 4-85) days. Mean myoma volume decreased by 35.7 per cent (from 176.8 to 113.7 cm <sup>3</sup> ) and 22.5 per cent (from 147.6 to 114.4 cm <sup>3</sup> ) at 3 months in groups 1 and 2, respectively. Side effects seen were leg cramps in 7 of 70 (10%) and 5 of 73 (6.8%) and hot-flushes in 5 of 70 (7.1%) and 5 of 73 (6.8%) in groups 1 and 2, respectively. Repeat endometrial-histopathology did not reveal any complex hyperplasia or atypia in either group.	2
40. Peitsidis P, Koukoulomati A. Tranexamic acid for the management of uterine fibroid tumors: A systematic review of the current evidence. World J Clin Cases. 2014;2(12):893-898.	Review/Other-Tx	N/A	To conduct a detailed systematic review of the current evidence on the administration and efficacy of tranexamic acid in patients with menorrhagia due to uterine fibroids.	A total of 36 articles were retrieved after the initial electronic search. Careful assessment of the retrieved studies led to the final selection of 5 articles for inclusion in the review	4
41. Candiani GB, Fedele L, Parazzini F, Villa L. Risk of recurrence after myomectomy. Br J Obstet Gynaecol. 1991;98(4):385-389.	Observational-Tx	622 Patients	To assess the risk of recurrence of uterine myomas after myomectomy.	The cumulative 10-year recurrence rate was 27%, and this increased steadily up to the end of the observation period. Differences were not observed in frequency of recurrence by age at diagnoses or by the site of the myomas at surgery. Patients with a single myoma tended to experience a lower rate, but this finding was not statistically significant. Women who gave birth to a child after myomectomy had a 10-year recurrence rate of 15%, against 30% for those who did not; this difference was statistically significant.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
42. Nezhat FR, Roemisch M, Nezhat CH, Seidman DS, Nezhat CR. Recurrence rate after laparoscopic myomectomy. J Am Assoc Gynecol Laparosc. 1998;5(3):237-240.	Observational-Tx	114 Patients	To determine the recurrence rate of myomas after laparoscopic myomectomy.	Follow-up data were obtained by chart review and from returned questionnaires. Variables were date of surgery, first diagnosis of recurrence, and last follow-up visit. There were 38 (33.3%) recurrences after an average interval of 27 months. Twenty-four of these women did not require treatment. Eight underwent a second laparoscopic myomectomy, and one had a third. One patient had myomectomy and then hysterectomy, and six patients chose hysterectomy to treat the first recurrence. Cumulative risk of recurrence (Kaplan-Meier curve) was 10.6% after 1 year, 31.7% after 3 years, and 51.4% after 5 years.	3
43. Rossetti A, Sizzi O, Soranna L, Cucinelli F, Mancuso S, Lanzone A. Long-term results of laparoscopic myomectomy: recurrence rate in comparison with abdominal myomectomy. Hum Reprod. 2001;16(4):770-774.	Observational-Tx	165 Patients	To analyse the recurrence rate of myomas after surgery.	At the end of the study the group of abdominal myomectomies showed nine recurrences (23%) against 11 (27%) of the laparoscopic group. In order to evaluate the recurrence rate in relation to several risk factors, laparoscopic myomectomies were performed from 1991 in 84 patients who agreed to follow-up (and were not in the randomized group). Of these, 78 patients were evaluated with transvaginal ultrasound for a mean interval of 26 months and 17 (21.78%) recurrences were found. Most recurrences (75%) were seen at ultrasound between 10 and 30 months after surgery. The patient's age, pre- and post-operative gravidity and parity had no influence on recurrence. Neither the number of myomas removed nor the depth of penetration or size were positively associated with the risk of recurrence. However, an associated risk factor was pre-operative gonadotrophin-releasing hormone agonist treatment ( $P < 0.02$ ). None of the women with recurrence required additional surgery.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
44. Sizzi O, Rossetti A, Malzoni M, et al. Italian multicenter study on complications of laparoscopic myomectomy. J Minim Invasive Gynecol. 2007;14(4):453-462.	Observational-Tx	2050 Patients	To study intraoperative and postoperative complications of laparoscopic myomectomy and patients' characteristics influencing this risk.	Single or multiple myomectomies (n = 2050) for symptomatic myomas measuring at least 4 cm in diameter were performed. Most patients (48%) had more than 1 myoma, with a maximum of 15 per patient (myomas removed for patients: 2.26 +/- 1.8, mean +/- SD). Myoma size ranged from 1 to 20 cm (mean 6.40 +/- 2.6 SD). Myomas smaller than 4 cm were removed during myomectomy for larger ones. Total complication rate was 11.1% (225/2050 cases). Minor complications accounted for 9.1% (187/2050 cases) and major complications for 2.02% (38/2050 cases). The most serious events were hemorrhages (14 cases, 0.68%) requiring blood transfusions in 3 cases (0.14%); 10 postoperative hematomas (0.48%, one in the broad ligament and 9 in the myomectomy scar); 1 bowel injury (0.04%); 1 postoperative acute kidney failure (0.04%); and 2 unexpected sarcomas (0.09%). Failure to complete planned surgery occurred in 7 cases (0.34%). Two patients were readmitted for surgery (0.09%): 1 had a laparoscopic hysterectomy because of a severe blood loss, and the other had drainage of a hematoma in the broad ligament. After a follow-up period of 41.70 +/- 23.03 months (mean +/- SD), 386 (22.9%) patients conceived, with a pregnancy rate in patients wishing pregnancy of 69.8%; among them, 1 (0.26%) recorded spontaneous uterine rupture at 33 weeks gestation. Odds ratio computed to estimate the risk of complications in relation to the patient characteristics showed that the probability of complications significantly rises with an increase in the number (more than 3 myomas OR: 4.46, p <.001) and with the intramural (OR: 1.48, p <.05) or the intraligamentous location of myomas (OR: 2.36, p <.01) whereas the myoma size seems to influence particularly the risk of major complications (OR: 6.88, p <.001).	2

\* See Last Page for Key

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
45. Goodwin SC, Bradley LD, Lipman JC, et al. Uterine artery embolization versus myomectomy: a multicenter comparative study. <i>Fertil Steril.</i> 2006;85(1):14-21.	Observational-Tx	149 UAE Patients and 60 Myomectomy Patients	To determine whether there is significant quality of life score improvement after uterine artery embolization (UAE) and to compare UAE and myomectomy outcomes.	Both groups experienced statistically significant improvements in the uterine fibroid quality of life score, menstrual bleeding, uterine volume, and overall postoperative quality of life. The mean hospital stay was 1 day for the UAE patients, compared with 2.5 days for the myomectomy patients. The UAE and myomectomy patients returned to their normal activities in 15 days and 44 days, respectively, and returned to work in 10 days and 37 days, respectively. At least one adverse event occurred in 40.1% of the myomectomy patients, compared with 22.1% in the UAE group.	2
46. Narayan A, Lee AS, Kuo GP, Powe N, Kim HS. Uterine artery embolization versus abdominal myomectomy: a long-term clinical outcome comparison. <i>J Vasc Interv Radiol.</i> 2010;21(7):1011-1017.	Observational-Tx	185 Patients	To assess long-term clinical effectiveness of uterine artery embolization (UAE) compared with abdominal myomectomy.	The retrospective cohort included 185 patients, of whom long-term follow-up was completed by 89 patients (48.1%), 48 being treated with UAE, and 41 with myomectomy. Follow-up ranged from 50 to 83 months. A higher but not statistically significant number of patients received repeat interventions after abdominal myomectomy (14%) versus UAE (8%; P = .204). Significantly higher symptom severity score improvements were seen in patients treated with UAE versus abdominal myomectomy (34 vs 31; P = .02). UAE recipients were less likely to attempt to get pregnant (P = .02), but those who did had a 66.7% success rate compared with 58.8% for patients who underwent myomectomy. Similar numbers of patients between groups were satisfied with the procedure (P = .57), reported effectiveness of symptom relief (P = .43), and would recommend the procedure to others (P = .37).	3

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
47. Siskin GP, Shlansky-Goldberg RD, Goodwin SC, et al. A prospective multicenter comparative study between myomectomy and uterine artery embolization with polyvinyl alcohol microspheres: long-term clinical outcomes in patients with symptomatic uterine fibroids. <i>J Vasc Interv Radiol.</i> 2006;17(8):1287-1295.	Observational-Tx	146 Patients	To prospectively evaluate the safety and effectiveness of polyvinyl alcohol (PVA) microspheres in patients undergoing uterine artery embolization (UAE) to treat uterine fibroid tumors and to compare the long-term changes in health-related quality of life (QOL) after UAE with the changes seen after myomectomy.	In the UAE cohort, 88.3% of patients experienced a reduction of tumor-related symptoms (increase $\geq 5$ points from baseline measurement) at 6 months, with 75.4% of patients in the myomectomy group experiencing similar improvement. Median QOL questionnaire scores at 6 months were found to be significantly higher in patients treated with UAE ( $P = .041$ ), with sustained improvement seen at 12 and 24 months. Both procedures resulted in significant reductions in 6-month menorrhagia bleeding scores, with sustained improvement in the UAE cohort at 12 and 24 months. MR imaging at 6 months revealed significant uterine and tumor volume reductions after UAE ( $P < .05$ ). At least one adverse event occurred in 42% of patients in the myomectomy group, compared with 26% in the UAE group ( $P < .05$ ).	2
48. Holub Z, Eim J, Jabor A, Hendl A, Lukac J, Kliment L. Complications and myoma recurrence after laparoscopic uterine artery occlusion for symptomatic myomas. <i>J Obstet Gynaecol Res.</i> 2006;32(1):55-62.	Observational-Tx	114 Patients	To determine the frequency and severity of complications and the recurrence of fibroids as a result of laparoscopic occlusion of the uterine artery (LOUA) in women with symptomatic fibroids.	A total of eight women (7.1%, 95% confidence intervals [CI], 3.3-14.4) experienced complications; one of these women had two complications, resulting in a total of nine adverse events. There were no intraoperative complications and no permanent injuries. Two women required supracervical hysterectomy and myomectomy, respectively, as a result of fibroid necrosis. One patient had an undiagnosed endometrial stromal sarcoma after 12 months of LOUA. The rate of fibroid recurrence was 9.0% (10 patients). The recurrence-free survival interval rate (no clinical failure, no recurrence) at 23.6 months (median) follow-up was 88.3% (CI 84.9-93.5).	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
49. Ambat S, Mittal S, Srivastava DN, Misra R, Dadhwal V, Ghosh B. Uterine artery embolization versus laparoscopic occlusion of uterine vessels for management of symptomatic uterine fibroids. <i>Int J Gynaecol Obstet.</i> 2009;105(2):162-165.	Observational-Tx	20 Patients	To evaluate the efficacy and complications of uterine artery embolization (UAE) versus laparoscopic occlusion of uterine vessels (LOUV) in the management of symptomatic fibroids.	The patients were comparable with regard to age and parity. At 6 months, there was no significant difference in the mean reduction in menstrual blood loss, uterine volume, and volume of the dominant fibroid between the two groups (P=0.436, P=0.796, P=1.00, respectively). However, higher pain scores were recorded on day 1 in the UAE group compared with the LOUV group (P=0.0002).	2
50. Cunningham E, Barreda L, Ngo M, Terasaki K, Munro MG. Uterine artery embolization versus occlusion for uterine leiomyomas: a pilot randomized clinical trial. <i>J Minim Invasive Gynecol.</i> 2008;15(3):301-307.	Experimental-Tx	16 Patients	To compare perioperative pain and institutional use for women undergoing transcatheter uterine artery embolization (UAE) and transcatheter uterine artery occlusion (UAO) for the treatment of heavy uterine bleeding associated with uterine leiomyomas.	Sixteen women were enrolled and 14 underwent study procedures (UAE n = 8, UAO n = 6). Baseline Aberdeen Menorrhagia Severity Scale scores, also known as the Ruta scores, were similar in each group (UAE = 54, UAO = 53). Median preprocedural uterine volume was similar for each group (UAE = 557 mL, UAO = 612 mL). The median postprocedural pain scale was less for UAO than UAE (UAO 1, UAE 5; p <.05). Six patients with UAE and no patients with UAO required parenteral narcotic analgesia in the recovery room (p <.05) (median UAO 0 and UAE 1). Patients with UAE used 6 hospital nights and patients with UAO used 1 hospital night (p =.09) (median UAO 0 and UAE 1). Three-month Aberdeen Menorrhagia Severity Scale scores were reduced to a similar degree in each group (UAE = 58%, UAO = 63%).	2



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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
51. Hald K, Klow NE, Qvigstad E, Istre O. Laparoscopic occlusion compared with embolization of uterine vessels: a randomized controlled trial. <i>Obstet Gynecol.</i> 2007;109(1):20-27.	Experimental-Tx	66 Patients	To compare clinical outcome 6 months after treatment with bilateral laparoscopic occlusion of the uterine artery versus uterine leiomyoma embolization.	Fifty-eight women were included; 6-month follow-up data were available for 28 participants in each group. The percentage reduction in Pictorial Bleeding Assessment Chart scores did not differ between the treatment groups (52% after uterine leiomyoma embolization and 53% after laparoscopy, P=.96). The study had 52% power to detect a 20% difference on the Pictorial Bleeding Assessment Chart. Fewer participants in the group treated with uterine leiomyoma embolization complained of heavy bleeding after 6 months (4% compared with 21%, P=.044). The postoperative use of ketobemidone was higher after uterine leiomyoma embolization (46 mg compared with 12 mg, P<.001).	2
52. Hald K, Noreng HJ, Istre O, Klow NE. Uterine artery embolization versus laparoscopic occlusion of uterine arteries for leiomyomas: long-term results of a randomized comparative trial. <i>J Vasc Interv Radiol.</i> 2009;20(10):1303-1310; quiz 1311.	Observational-Tx	66 Patients	To compare long-term symptom recurrence and 6-month magnetic resonance (MR) imaging results after two different treatments for uterine leiomyomas.	Fifty-eight patients received treatment. Median follow-up time was 48 months (range, 8-73 months). Clinical failure and symptom recurrence occurred in 14 patients after laparoscopy (48%) and in five after UAE (17%; P = .02, log-rank test). Hysterectomy was performed in two patients after UAE (7%) and in eight after laparoscopy (28%; P = .041). Six-month MR imaging results were available for 26 patients treated with UAE and 22 treated with laparoscopy. The mean uterine volume was reduced by 51% (range, 16%-86%) after UAE treatment, compared with 33% (range, 6%-77%) after laparoscopy (P = .001). Complete leiomyoma infarction was seen in all 26 patients in the UAE group and in only five patients in the laparoscopy group (P < .001). Eleven patients experienced symptom recurrence later than 6 months. Uterine volume reduction at 6 months was 24% in this group, compared with 48% in the 37 patients with no recurrence (P = .004). Incomplete infarction of leiomyomas was seen in eight of the 11 cases of recurrence (73%) versus nine of 37 cases without recurrence (24%; P = .009).	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
53. Helal A, Mashaly Ael M, Amer T. Uterine artery occlusion for treatment of symptomatic uterine myomas. JSLs. 2010;14(3):386-390.	Observational-Tx	96 Patients	To compare the effectiveness and safety of uterine artery occlusion by laparoscopy versus embolization as a treatment modality for symptomatic uterine fibroids.	Ninety women were followed for 1, 3, 6, and 12 months after both procedures. The primary outcome was comparable between the 2 groups (86.7% after laparoscopic occlusion versus 88.8% after embolization, with no statistically significant difference). After 12 months of follow-up, more patients resumed heavy periods in the uterine artery occlusion group [4/45 patients, 8.8% in occlusion group compared with 3/45 (6.6%) in embolization group, P=0.044].	2
54. Panagiotopoulou N, Nethra S, Karavolos S, Ahmad G, Karabis A, Burls A. Uterine-sparing minimally invasive interventions in women with uterine fibroids: a systematic review and indirect treatment comparison meta-analysis. Acta Obstet Gynecol Scand. 2014;93(9):858-867.	Review/Other-Tx	5 studies; 436 Patients	To evaluate the effectiveness of uterine-sparing interventions for women with symptomatic uterine fibroids who wish to preserve their uterus.	Five trials, involving 436 women were included; two compared uterine artery embolization with myomectomy and three compared uterine artery embolization with laparoscopic uterine artery occlusion. Indirect treatment comparison showed that myomectomy and uterine artery embolization resulted in higher rates of patient satisfaction (odds ratio 2.56, 95% credible interval 0.56-11.75 and 2.7, 95% credible interval 1.1-7.14, respectively) and lower rates of clinical failure (odds ratio 0.29, 95% credible interval 0.06-1.46 and 0.37, 95% credible interval 0.13-0.93, respectively) than laparoscopic uterine artery occlusion. Myomectomy resulted in lower re-intervention rate than uterine artery embolization (odds ratio 0.08, 95% credible interval 0.02-0.27) and laparoscopic uterine artery occlusion (odds ratio 0.08, 95% credible interval 0.01-0.37) even though the latter techniques had an advantage over myomectomy because of shorter hospitalization and quicker recovery. There was no evidence of difference between the three techniques in ovarian failure and complications rates. The evidence for reproductive outcomes is poor.	4

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55. Mara M, Kubinova K, Maskova J, Horak P, Belsan T, Kuzel D. Uterine artery embolization versus laparoscopic uterine artery occlusion: the outcomes of a prospective, nonrandomized clinical trial. <i>Cardiovasc Intervent Radiol.</i> 2012;35(5):1041-1052.	Observational-Tx	200 Patients	To compare outcomes of two different types of occlusive therapy of uterine fibroids.	Before the procedure, patients treated with UAE (n = 100) had a dominant fibroid greater in size (68 vs. 48 mm) and a mean age lower (33.1 vs. 34.9 years) than surgically treated patients (n = 100). After 6 months, mean shrinkage of fibroid volume was 53 % after UAE and 39 % after LUAO (p = 0.063); 82 % of women after UAE, but only 23 % after LUAO, had complete myoma infarction (p = 0.001). Women treated with UAE had more complications (31 vs. 11 cases, p = 0.006) and greater incidence of hysteroscopically verified intrauterine necrosis (31 vs. 3 %, p = 0.001). Both groups were comparable in markers of ovarian functions and number of nonelective reinterventions. The groups did not differ in pregnancy (69 % after UAE vs. 67 % after LUAO), delivery (50 vs. 46 %), or abortion (34 vs. 33 %) rates. The mean birth weight of neonates was greater (3270 vs. 2768 g, p = 0.013) and the incidence of intrauterine growth restriction lower (13 vs. 38 %, p = 0.046) in post-UAE patients.	2
56. Behera MA, Leong M, Johnson L, Brown H. Eligibility and accessibility of magnetic resonance-guided focused ultrasound (MRgFUS) for the treatment of uterine leiomyomas. <i>Fertil Steril.</i> 2010;94(5):1864-1868.	Observational-Tx	169 Patients	To evaluate patient eligibility and accessibility of magnetic resonance-guided focused ultrasound (MRgFUS) for women with symptomatic uterine leiomyomas who desire conservative therapy.	Forty-seven percent of patients (80/169) were determined clinically eligible for the procedure. Of these, 16% of patients (27/169) were found to be eligible for MRgFUS based on imaging results. Overall, the main reasons for ineligibility were very large leiomyomas (8%; 14/169), cost (12%; 21/169), and desired fertility (14%; 23/169). An additional 48% of patients declined MRgFUS for unstated reasons, often after obtaining financial and insurance coverage information.	3

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
57. Ren XL, Zhou XD, Zhang J, et al. Extracorporeal ablation of uterine fibroids with high-intensity focused ultrasound: imaging and histopathologic evaluation. J Ultrasound Med. 2007;26(2):201-212.	Review/Other-Dx	119 Patients	To evaluate the therapeutic efficacy of high-intensity focused ultrasound (HIFU) in the treatment of uterine fibroids by using imaging and histopathologic examination.	No severe complications were observed after HIFU ablation. Fifty-one (82.3%) of 62 biopsy specimens revealed obvious signs of necrosis under light microscopy, and more subtle changes in cellular structure that indicated nonviability could be found in 60 specimens (96.8%) under electron microscopy. However, viable cells still could be found in 16 specimens (25.8%). Follow-up images showed absence or reduction of blood supply in the lesions after HIFU ablation. Median reductions in tumor size as a percentage of initial tumor volume at 1, 3, 6, and 12 months after HIFU treatment were 21.2%, 29.6%, 44.8%, and 48.7%, respectively.	4
58. Funaki K, Fukunishi H, Sawada K. Clinical outcomes of magnetic resonance-guided focused ultrasound surgery for uterine myomas: 24-month follow-up. Ultrasound Obstet Gynecol. 2009;34(5):584-589.	Observational-Tx	91 Patients	To assess the volume reduction ratio, symptom improvement and reintervention rate following magnetic resonance-guided focused ultrasound surgery (MRgFUS) for uterine myomas.	The mean volume change ratios of low- and intermediate-intensity (Type 1/2) myomas were -36.5% 6 months post-procedure and -39.5% 24 months post-procedure. The mean +/- SD SSS value for patients with Type 1/2 myomas before MRgFUS was 35.1 +/- 21.0, and the values diminished significantly during the 24-month follow-up period to a mean value of around 15.0. High-intensity (Type 3) myomas were not observed to have decreased in size 6 months after MRgFUS. Of the 45 Type 1/2 myoma patients with complete follow-up, seven required reinterventional treatment within 24 months. The reintervention rates were 14.0% for Type 1/2 patients and 21.6% for Type 3 patients at 24 months post-treatment.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
59. Stewart EA, Rabinovici J, Tempany CM, et al. Clinical outcomes of focused ultrasound surgery for the treatment of uterine fibroids. <i>Fertil Steril.</i> 2006;85(1):22-29.	Observational-Tx	109 Patients	To assess outcomes at 6 and 12 months after magnetic resonance-guided focused ultrasound surgery (MRgFUS) for symptomatic uterine leiomyomas.	Seventy-one percent of women undergoing MRgFUS reached the targeted symptom reduction at 6 months, and 51% reached this at 12 months. The magnitude of improvement in SSS was greater than predicted, with subjects having a mean decrease of 39% and 36% at 6 and 12 months, respectively. This paralleled the improvement seen using the short form-36 instrument. A modest volume reduction similar in magnitude to the treated volume was seen. The incidence of adverse events was low.	2
60. Froeling V, Meckelburg K, Schreiter NF, et al. Outcome of uterine artery embolization versus MR-guided high-intensity focused ultrasound treatment for uterine fibroids: long-term results. <i>Eur J Radiol.</i> 2013;82(12):2265-2269.	Observational-Tx	77 Patients	To compare the long-term outcome after uterine artery embolization (UAE) versus magnetic resonance-guided high-intensity focused ultrasound (MR-g HIFU) for symptomatic uterine fibroids.	Re-intervention was significantly lower after UAE (12.2%) than after MR-g HIFU (66.7%) at long-term follow-up ( $p < 0.001$ ). After UAE changes in SS (50 pre-treatment vs. 6.3 post-treatment) and Total HRQoL (57.8 pre-treatment vs. 100 post-treatment) were significantly better than changes in SS (42.2 pre-treatment vs. 26.6 post-treatment) and Total HRQoL score (66.4 pre-treatment vs. 87.9 post-treatment) after MR-g HIFU ( $p = 0.019$ and $0.049$ respectively).	2
61. Mara M, Fucikova Z, Kuzel D, Maskova J, Dunder P, Zizka Z. Hysteroscopy after uterine fibroid embolization in women of fertile age. <i>J Obstet Gynaecol Res.</i> 2007;33(3):316-324.	Observational-Tx	51 Patients	To assess the types and the frequency of intrauterine abnormalities and the histological features of the endometrium after embolization.	Despite all women having no major symptoms prior to hysteroscopy, only 19 (37%) had completely normal hysteroscopic findings. There was intrauterine protrusion of fibroid/s in 19 cases (37%), yellowish coloration of the endometrium in 14 (28%), intrauterine or cervical adhesions in seven (14%), and communication between the myoma and the uterine cavity in five cases (10%). A normal, functional endometrium was histologically verified in 44 women of 49 (90%) who could be evaluated. Regressive changes (necrosis or hyalinization) of leiomyoma or of indefinite origin were found in 17 patients and embolization particles in five, including one patient with microspheres inside the endometrial vessel. No case of Asherman syndrome or endometrial atrophy was observed.	3

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
62. Kuzel D, Mara M, Horak P, et al. Comparative outcomes of hysteroscopic examinations performed after uterine artery embolization or laparoscopic uterine artery occlusion to treat leiomyomas. <i>Fertil Steril.</i> 2011;95(6):2143-2145.	Observational-Tx	111 Patients	To compare outcomes of hysteroscopic examinations performed after uterine artery embolization or laparoscopic uterine artery occlusion to treat leiomyomas	Postprocedural hysteroscopic examination revealed that patients subjected to LUAO had a statistically higher incidence of normal findings ( $P<.0001$ ; 97.3% vs. 40.5%) and a significantly reduced incidence of necrosis in the uterine cavity ( $P<.0001$ ; 2.7% vs. 43.2%), compared with patients treated by UAE.	2
63. Carpenter TT, Walker WJ. Pregnancy following uterine artery embolisation for symptomatic fibroids: a series of 26 completed pregnancies. <i>Bjog.</i> 2005;112(3):321-325.	Review/Other-Tx	24 Patients	To evaluate the outcome of pregnancies after uterine artery embolisation for uterine fibroids.	Of 26 completed pregnancies, detailed information was available for 24 and limited information for 2. Seven (27%) ended in miscarriage, there were two terminations and one ectopic pregnancy. Of 16 deliveries after 24 weeks, first and second trimester bleeding occurred in 40% and 33%, respectively, 4 (25%) had preterm deliveries and the caesarean section rate was 88%. Two (13%) women developed proteinuric hypertension and two others had preterm spontaneous rupture of the membranes. Fourteen of 16 cases were delivered by caesarean section. The rate of primary postpartum haemorrhage was 3/15 (20%). The mean birthweight of term babies was 3.39 kg (SD 0.64) and none required admission to neonatal intensive care. There was one (6.7%) case of fetal growth restriction.	4
64. Pinto Pabon I, Magret JP, Unzurrunzaga EA, Garcia IM, Catalan IB, Cano Vieco ML. Pregnancy after uterine fibroid embolization: follow-up of 100 patients embolized using tris-acryl gelatin microspheres. <i>Fertil Steril.</i> 2008;90(6):2356-2360.	Review/Other-Tx	10 Patients	To evaluate pregnancies in women who had previously undergone uterine fibroid embolization.	Eleven pregnancies in 10 women (19.2%). The pregnancies resulted in 8 live births, including 4 normal and 4 cesarean deliveries. Early miscarriage occurred in 3 cases (2 patients). None of the 8 newborns was a low-birth weight infant, and gestation lasted $\geq 37$ weeks in all the patients, except for 1 case of a macrosomic fetus delivered at 33 weeks. There were no cases of abnormal placental implantation.	4

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EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
65. Walker WJ, McDowell SJ. Pregnancy after uterine artery embolization for leiomyomata: a series of 56 completed pregnancies. Am J Obstet Gynecol. 2006;195(5):1266-1271.	Observational-Dx	33 Patients	To evaluate the incidence and outcome of pregnancies after uterine artery embolization (UAE) for symptomatic uterine fibroids.	Fifty-six completed pregnancies were identified in approximately 1200 women after UAE. One hundred eight patients were attempting to become pregnant and 33 of these became pregnant. Thirty-three (58.9%) of the 56 pregnancies had successful outcomes. Six (18.2%) of these were premature. Seventeen (30.4%) pregnancies miscarried. There were 3 terminations, 2 stillbirths, and 1 ectopic pregnancy. Of the 33 deliveries, 24 (72.7%) were delivered by cesarean section. There were 13 elective sections and the indication for 9 was fibroids. There were 6 cases of postpartum hemorrhage (18.2%)	4
66. McLucas B. Pregnancy following uterine artery embolization: an update. Minim Invasive Ther Allied Technol. 2013;22(1):39-44.	Review/Other-Tx	44 Patients	To evaluate the ability to conceive and deliver term pregnancies following uterine artery embolization.	Forty-four women under the age of 40 embolized between 1996 and 2010 stated a desire for fertility. Twenty-two of these women have reported 28 pregnancies. Of these pregnancies, 20 live births, three miscarriages, and three instances of premature labor were reported. Seventeen of these pregnancies were delivered by caesarean section and six pregnancies were vaginal deliveries. And one woman is currently pregnant. No perfusion problems, either during pregnancy or labor, were reported.	4
67. Goldberg J, Pereira L, Berghella V, et al. Pregnancy outcomes after treatment for fibromyomata: uterine artery embolization versus laparoscopic myomectomy. Am J Obstet Gynecol. 2004;191(1):18-21.	Meta-analysis	3 Studies; 139 Pregnancies	To compare pregnancy outcomes in women with fibromyomata who were treated with uterine artery embolization to the outcomes in women who were treated with laparoscopic myomectomy.	Pregnancies after uterine artery embolization had higher rates of preterm delivery (odds ratio, 6.2; 95% CI, 1.4, 27.7) and malpresentation (odds ratio, 4.3; 95% CI, 1.0, 20.5) than did pregnancies after laparoscopic myomectomy. The risks of postpartum hemorrhage (odds ratio, 6.3; 95% CI, 0.6, 71.8) and spontaneous abortion (odds ratio, 1.7; 95% CI, 0.8, 3.9) after uterine artery embolization were similarly higher than the risks after laparoscopic myomectomy; however, these differences were not statistically significant.	M

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
68. Mara M, Maskova J, Fucikova Z, Kuzel D, Belsan T, Sosna O. Midterm clinical and first reproductive results of a randomized controlled trial comparing uterine fibroid embolization and myomectomy. Cardiovasc Intervent Radiol. 2008;31(1):73-85.	Experimental-Tx	121 Patients	To compare the midterm results of a radiological and surgical approach to uterine fibroids.	Fifty-eight embolizations and 63 myomectomies (42 laparoscopic, 21 open) were performed. One hundred eighteen patients have finished at least a 12-month follow-up; the mean follow-up in the entire study population was 24.9 months. Embolized patients underwent a significantly shorter procedure and required a shorter hospital stay and recovery period. They also presented with a lower CRP concentration on the second day after the procedure ( $p < 0.0001$ for all parameters). There were no significant differences between the two groups in the rate of technical success, symptomatic effectiveness, postprocedural follicle stimulating hormone levels, number of reinterventions for fibroid recurrence or regrowth, or complication rates. Forty women after myomectomy and 26 after UAE have tried to conceive, and of these we registered 50 gestations in 45 women. There were more pregnancies (33) and labors (19) and fewer abortions (6) after surgery than after embolization (17 pregnancies, 5 labors, 9 abortions) ( $p < 0.05$ ). Obstetrical and perinatal results were similar in both groups, possibly due to the low number of labors after UAE to date.	2
69. Holub Z, Mara M, Kuzel D, Jabor A, Maskova J, Eim J. Pregnancy outcomes after uterine artery occlusion: prospective multicentric study. Fertil Steril. 2008;90(5):1886-1891.	Observational-Tx	58 Patients	To assess the reproductive outcomes after laparoscopic uterine artery occlusion (LUAO) and uterine artery embolization (UAE) in women with symptomatic fibroids.	Pregnancies after uterine embolization had a statistically significantly higher rate for spontaneous abortion (56%) than did pregnancies after surgical uterine artery occlusion (10.5%). The risk of malpresentation (20%) and the rate for cesarean section (80%) after UAE similarly were higher than was the risk after laparoscopic occlusion; however, these differences were not statistically significant. Also, there were no significant differences between the groups in preterm deliveries (15.3% in the LUAO group vs. 20% in the UAE group).	3



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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
70. Metwally M, Cheong YC, Horne AW. Surgical treatment of fibroids for subfertility. Cochrane Database Syst Rev. 2012;11:CD003857.	Meta-analysis	3 Studies	To examine the effect of myomectomy on fertility outcomes and to compare different surgical approaches.	One study examined the effect of myomectomy on reproductive outcomes and showed no evidence for a significant effect on the clinical pregnancy rate for intramural (OR 1.88, 95% CI 0.57 to 6.14), submucous (OR 2.04, 95% CI 0.62 to 6.66), combined intramural and subserous (OR 2.00, 95% CI 0.40 to 10.09) and combined intramural submucous fibroids (OR 3.24, 95% CI 0.72 to 14.57). Similarly, there was no evidence for a significant effect of myomectomy for any of the described types of fibroids on the miscarriage rate (intramural fibroids OR 0.89 (95% CI 0.14 to 5.48), submucous fibroids OR 0.63 (95% CI 0.09 to 4.40), combined intramural and subserous fibroids OR 0.25 (95% CI 0.01 to 4.73) and combined intramural submucous fibroids OR 0.50 (95% CI 0.03 to 7.99). Two studies compared open versus laparoscopic myomectomy and found no evidence for a significant effect on the live birth rate (OR 0.80, 95% CI 0.42 to 1.50), clinical pregnancy rate (OR 0.96, 95% CI 0.52 to 1.78), ongoing pregnancy rate (OR 1.61, 95% CI 0.26 to 10.04), miscarriage rate (OR 1.31, 95% CI 0.40 to 4.27), preterm labour rate (OR 0.68, 95% CI 0.11 to 4.43) and caesarean section rate (OR 0.59, 95% CI 0.13 to 2.72).	M

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
<p>71. Gupta JK, Sinha A, Lumsden MA, Hickey M. Uterine artery embolization for symptomatic uterine fibroids. Cochrane Database Syst Rev. 2012(5):CD005073.</p>	<p>Meta-analysis</p>	<p>7 RCTs = 793 women</p>	<p>To review the benefits and risks of uterine artery embolization (UAE) versus other medical or surgical interventions for symptomatic uterine fibroids. Note: Exclusion criteria: contraindication to MRI, severe allergy to iodinated contrast media, recent or ongoing pelvic inflammatory disease, pregnancy and any contraindication to surgery</p>	<p>Five RCTs were included in this review. Three trials compared UAE with abdominal hysterectomy in 291 women. A fourth trial included 157 women and compared UAE with surgery (43 hysterectomies and 8 myomectomies). The fifth trial included 121 women and compared UAE with myomectomy in women wishing to preserve fertility. There was moderately good evidence that there is no significant difference between UAE and surgery in patient satisfaction rates at two years (OR 0.69, 0.40 to 1.21, 516 women, 5 trials) nor at five years (OR 0.90, 95% CI 0.45 to 1.80, 295 women, 2 trials). There was very low level evidence suggesting that myomectomy may be associated with better fertility outcomes than UAE, but this analysis was restricted to the limited cohort of women (n=66) who tried to conceive in the single study of UAE versus myomectomy (live birth: OR 0.33, 95% CI 0.11 to 1.00; pregnancy: OR 0.29, 95% CI 0.10 to 0.85). There was no significant difference between the two interventions in the rate of major complications. Compared to surgery, UAE significantly reduced the length of the procedure, length of hospital stay and time to resumption of routine activities and also decreased the likelihood of needing a blood transfusion. However, UAE was associated with higher rates of minor short term and long term complications, more unscheduled readmissions after discharge and an increased surgical reintervention rate. This increase in the surgical reintervention rate may balance out the initial cost advantage of UAE (reinterventions within 2 years: OR 5.64, 95% CI 2.92 to 10.90, 486 women, 4 trials; within 5 years: OR 5.79, 95% CI 2.65 to 12.65, 289 women, 2 trials). There was no significant difference in ovarian failure rates at long term follow-up.</p>	<p>M</p>

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**Radiologic Management of Uterine Leiomyomas  
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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
72. Rabinovici J, David M, Fukunishi H, Morita Y, Gostout BS, Stewart EA. Pregnancy outcome after magnetic resonance-guided focused ultrasound surgery (MRgFUS) for conservative treatment of uterine fibroids. <i>Fertil Steril</i> . 2010;93(1):199-209.	Review/Other-Tx	51 Patients	To report all pregnancies to date after magnetic resonance-guided focused ultrasound surgery (MRgFUS) for the conservative treatment of clinically significant uterine fibroids.	Fifty-four pregnancies in 51 women have occurred after MRgFUS treatment of uterine leiomyomas. The mean time to conception was 8 months after treatment. Live births occurred in 41% of pregnancies, with a 28% spontaneous abortion rate, an 11% rate of elective pregnancy termination, and 11 (20%) ongoing pregnancies beyond 20 gestational weeks. The mean birth weight was 3.3 kg, and the vaginal delivery rate was 64%.	4
73. Jha RC, Takahama J, Imaoka I, et al. Adenomyosis: MRI of the uterus treated with uterine artery embolization. <i>AJR Am J Roentgenol</i> . 2003;181(3):851-856.	Observational-Tx	30 Patients	To determine the MRI features seen after uterine artery embolization and to evaluate the clinical response in patients with adenomyosis.	After uterine artery embolization, the junctional zone-myometrial ratio did not change significantly. There were regions of devascularization of adenomyosis on contrast-enhanced images in 12 patients, all with a junctional zone thickness before uterine artery embolization of more than 20 mm (mean thickness, 39.2 mm). Eleven of the 12 patients had focal or asymmetric distribution patterns of adenomyosis. All three patients with pure adenomyosis and all six patients with dominant adenomyosis reported an improvement in symptoms.	2
74. Siskin GP, Tublin ME, Stainken BF, Dowling K, Dolen EG. Uterine artery embolization for the treatment of adenomyosis: clinical response and evaluation with MR imaging. <i>AJR Am J Roentgenol</i> . 2001;177(2):297-302.	Observational-Tx	15 Patients	To evaluate the MR imaging appearance and clinical response of patients undergoing uterine artery embolization for the treatment of menorrhagia due to adenomyosis.	Of the 15 patients in this study, five had diffuse adenomyosis without evidence of uterine fibroids, one had focal adenomyosis without evidence of uterine fibroids, and the remaining nine had adenomyosis with one or more fibroids. At follow-up, 12 (92.3%) of the 13 patients reported significant improvement in presenting symptoms and quality of life. One patient continued experiencing menorrhagia, and one patient experienced amenorrhea during the 5 months of follow-up after embolization. MR imaging in nine patients, performed at a mean of 5.9 months after embolization, revealed significant reductions in median uterine volume (42%), median fibroid volume (71%), and mean-junctional-zone thickness (11 mm; 33%; $p < 0.5$ ). Six of the nine patients had subendometrial regions of decreased T2 signal intensity after embolization.	3

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
75. Kim MD, Kim S, Kim NK, et al. Long-term results of uterine artery embolization for symptomatic adenomyosis. <i>AJR Am J Roentgenol.</i> 2007;188(1):176-181.	Observational-Tx	66 Patients	To determine the long-term clinical efficacy of UAE in the management of symptomatic adenomyosis without fibroids.	Thirty-one (57.4%) of the 54 women who underwent follow-up had long-term success. Four had immediate treatment failure, and 19 had relapses. Changes in mean menorrhagia and dysmenorrhea scores at long-term follow-up were -5.3 and -5.1, respectively (p < 0.001), representing significant relief of symptoms. The time between UAE and recurrence of symptoms ranged from 4 to 48 months (mean, 17.3 months). Five patients underwent hysterectomy because of symptom recurrence. Mean reduction in volume of the uterus was 26.3% at short-term follow-up and 27.4% at long-term follow-up.	3
76. Pelage JP, Jacob D, Fazel A, et al. Midterm results of uterine artery embolization for symptomatic adenomyosis: initial experience. <i>Radiology.</i> 2005;234(3):948-953.	Observational-Tx	18 Patients	To prospectively evaluate the midterm results of uterine artery embolization for symptomatic adenomyosis.	Bilateral uterine artery embolization was achieved in all but one woman by using polyvinyl alcohol particles or trisacryl microspheres. All women resumed normal menstruation after the procedure. After 6 months, 15 (94%) of 16 women reported improvement in menorrhagia. Follow-up images at 6 months depicted a slight decrease (mean, 15%) in uterine volume in 17 (94%) of 18 women. After 1 year, 11 (73%) of 15 women had improvement in menorrhagia, and eight (53%) of 15, complete resolution. After 2 years, five (56%) of nine women had complete resolution of menorrhagia. Eight (44%) of 18 women required additional treatment during follow-up for failure or recurrence; five women (28%) underwent hysterectomy.	2
77. Popovic M, Puchner S, Berzacy D, Lammer J, Bucek RA. Uterine artery embolization for the treatment of adenomyosis: a review. <i>J Vasc Interv Radiol.</i> 2011;22(7):901-909; quiz 909.	Review/Other-Dx	511 women; 15 studies	To review studies detailing UAE as a treatment choice for adenomyosis and to determine the quality of the literature and to summarize the clinical and imaging outcomes.	Improvements were reported by 387 patients (75.7%). The median follow-up was 26.9 months. UAE as treatment for adenomyosis shows significant clinical and symptomatic improvements on a short- and long-term basis.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
78. Froeling V, Scheurig-Muenkler C, Hamm B, Kroencke TJ. Uterine artery embolization to treat uterine adenomyosis with or without uterine leiomyomata: results of symptom control and health-related quality of life 40 months after treatment. <i>Cardiovasc Intervent Radiol.</i> 2012;35(3):523-529.	Observational-Tx	40 women	To evaluate the clinical outcome for uterine adenomyosis with or without uterine leiomyomata 40 months after uterine artery embolization (UAE). Note: Embolization was performed by deploying a particulate embolic agent in a diameter range of 355–900 $\mu$ m (Embosphere, 500–700 $\mu$ m, Biosphere Medical, Rockland, MA; BeadBlock 700–900 $\mu$ m, Biocompatibles, Farnham, Great Britain; Contour 355–510 $\mu$ m, Boston Scientific/Medi-Tech, Natick, MA) suspended in a dilute solution of an iodinated contrast agent (Imeron 300, Schering Bayer Health Care Pharmaceuticals, Berlin, Germany).	Patients were followed for a median of 40 months (range 5-102 months). UAE led to symptomatic control after UAE in 29 (72.5%) of 40 patients while 11 women underwent hysterectomy (n=10) or dilatation and curettage (n=1) for therapy failure. No significant difference between women with pure uterine adenomyosis and women with uterine adenomyosis combined with uterine leiomyomata was observed. Best results were shown for UAE in uterine adenomyosis with uterine leiomyomata predominance as opposed to predominant uterine adenomyosis with minor fibroid disease (clinical failure 0% vs. 31.5%, P=0.058). Throughout the study group, HRQOL score values increased and symptom severity scores decreased after UAE. Least improvement was noted for women with pure adenomyosis.	2
79. Liang E, Brown B, Kirsop R, Stewart P, Stuart A. Efficacy of uterine artery embolisation for treatment of symptomatic fibroids and adenomyosis - an interim report on an Australian experience. <i>Aust N Z J Obstet Gynaecol.</i> 2012;52(2):106-112.	Observational-Tx	75 women	To conduct a local audit on the efficacy and safety of UAE treating symptomatic fibroids and adenomyosis.	Seventy-six UAEs were performed in 75 women. Fifty-nine women had follow-up duration of more than six months, and one woman was lost to follow-up. Clinical success was 93% overall (n = 59) and 96% for menorrhagia (n = 49). For dysmenorrhoea (n = 36), 89% of women had at least some improvement, 75% had significant improvement and 56% had resolution of pain. For urinary symptoms (n = 32), 97% of women had at least some improvement and 50% had resolution of all urinary symptoms. Adenomyosis was found in 17 (29%) women treated. The primary success rate was 96%, and secondary success rate (after repeat UAE) was 100%. MRI showed 50% uterine volume reduction and 60% dominant fibroid volume reduction. There were no significant procedural-related acute complications. There were three possible cases of endometritis, two managed conservatively and one required hysterectomy.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
80. Smeets AJ, Nijenhuis RJ, Boekkooi PF, Vervest HA, van Rooij WJ, Lohle PN. Long-term follow-up of uterine artery embolization for symptomatic adenomyosis. <i>Cardiovasc Intervent Radiol.</i> 2012;35(4):815-819.	Observational-Tx	40 women	To assess long-term outcome of UAE in 40 women with adenomyosis. Note: MRI consisted of T2- and T1-weighted contrast-enhanced images and was performed before embolization and again at 3-month follow-up.	During follow-up, 7 of 40 women (18%) underwent hysterectomy. Among these 7 women, the junction zones were significantly thicker, both at baseline (mean 23 vs. 16 mm, $P = 0.028$ ) and at 3-month follow-up (mean 15 vs. 9 mm, $P = 0.034$ ). Of 33 women with preserved uterus, 29 were asymptomatic. Four patients had symptom severity scores of 50 to 85 and overall QoL scores of 60 to 66, indicating substantial clinical symptoms. There was no relation between clinical outcome and the initial presence of fibroids in addition to adenomyosis	2
81. Kim MD, Kim YM, Kim HC, et al. Uterine artery embolization for symptomatic adenomyosis: a new technical development of the 1-2-3 protocol and predictive factors of MR imaging affecting outcomes. <i>J Vasc Interv Radiol.</i> 2011;22(4):497-502.	Experimental-Tx	40	To evaluate the safety and effectiveness of a new embolization technique named the 1-2-3 protocol to achieve complete necrosis of adenomyosis after uterine artery embolization (UAE) and to determine predictive factors on magnetic resonance (MR) imaging.	Of the 40 patients who underwent UAE for adenomyosis with the 1-2-3 protocol, 33 (82.5%) exhibited complete necrosis of adenomyosis. All six patients with dark signal intensity (SI) of adenomyosis exhibited complete necrosis (100%). Of the 28 patients with low SI of adenomyosis, 25 (89.3%) showed complete necrosis. Among the six patients with heterogenous SI or SI equal to that of myometrium, only two (33.3%) showed complete necrosis ( $P < .01$ ). Of 16 patients with complete necrosis followed up to 18 months, none reported recurrent menorrhagia. Of the five patients without necrosis, only one had no symptoms at 18 months.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
82. Maclaran K, Agarwal N, Odejinmi F. Co-existence of uterine myomas and endometriosis in women undergoing laparoscopic myomectomy: risk factors and surgical implications. J Minim Invasive Gynecol. 2014;21(6):1086-1090.	Observational-Tx	212 Patients	To investigate the prevalence of and explore risk factors for the coexistence of uterine myomas and endometriosis and to assess operative outcomes during laparoscopic myomectomy.	Coexisting myomas and endometriosis were identified in 21.2% of patients. Endometriosis was more common in those with subfertility (44% vs 25.7%; p = .02) and less common in those with bleeding disorders (20% vs 45%; p = .003). Parity, location of myoma, and race/ethnicity affected risk of endometriosis, whereas size and number of myomas did not. Of patients with endometriosis, 42% underwent surgical treatment of endometriosis during myomectomy. Significantly more patients with endometriosis also underwent ovarian cystectomy than did those without endometriosis (15.6% vs 3%; p = .004). Operative time was similar in both groups (109.6 minutes vs 116.4 minutes; p = .83), as was estimated blood loss (271 mL vs 327 mL; p = .16).	3
83. Braude P, Reidy J, Nott V, Taylor A, Forman R. Embolization of uterine leiomyomata: current concepts in management. Hum Reprod Update. 2000;6(6):603-608.	Review/Other-Tx	N/A	To examine the trans-catheter, uterine embolization procedure, its use and purported efficacy, and discuss its complications and potential hazards.	No results stated in abstract.	4

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EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
84. Katsumori T, Akazawa K, Mihara T. Uterine artery embolization for pedunculated subserosal fibroids. AJR Am J Roentgenol. 2005;184(2):399-402.	Observational-Tx	196 Patients	To assess the outcomes of uterine artery embolization as a treatment for pedunculated subserosal fibroids, which we defined as those in which the diameter of the stalk was 50% narrower than the diameter of the fibroid.	Of the 196 women, 12 (age range, 34-48 years; mean age, 42.3 years) had one or more pedunculated subserosal fibroids. Fifteen pedunculated subserosal fibroids were identified on baseline MR images in the 12 patients. The mean tumor diameter was 8.3 cm (range, 4.0-15.5 cm; 95% confidence interval [CI], 6.7-9.9 cm). The mean stalk diameter was 3.1 cm (range, 2.0-5.5 cm; 95% CI, 2.5-3.7 cm). The follow-up period ranged from 5 to 51 months (mean, 18.1 months). No serious complications such as separation of the tumors from the uterus, torsion of the tumors, or infection occurred after embolization. Enhanced MR images obtained 1 week after embolization showed that complete devascularization of the tumors had been achieved in 73% (11/15) of the tumors. The rates of mean tumor volume reduction were 41% (range, 12-73%) 4 months and 53% (range, 31-85%) 1 year after embolization. The mean stalk diameter was 3.2 cm (range, 1.7-5.4 cm; 95% CI, 2.5-3.9 cm) 4 months and 2.9 cm (range, 1.1-4.2 cm; 95% CI, 1.8-3.9 cm) 1 year after embolization. No significant difference in stalk diameters was noted 4 months (p=0.617) or 1 year (p=0.963) after embolization compared with the diameters before the treatment. The rates of mean uterus volume reduction were 35% (range, 15-47%) 4 months and 47% (range, 35-60%) 1 year after embolization. Marked or moderate improvement in bulk-related symptoms was achieved in 100% (10/10) of the women at 4-month follow-up, 100% (5/5) at 1-year follow-up, and 100% (2/2) at 2-year follow-up.	2



**Radiologic Management of Uterine Leiomyomas  
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
85. Smeets AJ, Nijenhuis RJ, Boekkooi PF, et al. Safety and effectiveness of uterine artery embolization in patients with pedunculated fibroids. J Vasc Interv Radiol. 2009;20(9):1172-1175.	Observational-Tx	29 Patients	To assess complications and outcomes of uterine artery embolization (UAE) in women with pedunculated fibroids in a large single-center patient cohort.	The mean reduction in uterine and pedunculated fibroid volume was 37% and 33%, respectively. The mean reduction in stalk diameter was 0.3 cm (95% confidence interval [CI]: 0.18, 0.52 cm) or 13% from initial mean diameter. Stalk enhancement was not affected by UAE. The mean pedunculated fibroid infarction and mean overall infarction rates were 87% and 92%, respectively, for observer 1 and 88% and 92% for observer 2, with good interobserver variability. All women returned the questionnaire and no early or late complications of UAE were reported (0%; 95% CI: 0.0%-13.9%).	2
86. Toor SS, Tan KT, Simons ME, et al. Clinical failure after uterine artery embolization: evaluation of patient and MR imaging characteristics. J Vasc Interv Radiol. 2008;19(5):662-667.	Observational-Tx	107 patients	To investigate the patient and magnetic resonance (MR) imaging characteristics associated with clinical failure after uterine artery embolization (UAE).	Fifty-eight patients were placed into the success group and 20 into the failure group. There were no differences between the baseline characteristics of the two groups. The reduction in uterine and dominant fibroid volumes was greater in the success group compared with the failure group; however, the difference was not statistically significant (success group: [295/845] 34.9% vs [80/282.5] 28.3%, respectively, P=.18; failure group: [317/733] 43.2% vs [114/337.6] 33.9%, P=.32). The reduction in total fibroid volume was greater in the success group than the failure group ([189.6/393.5] 48.2% vs [148.7/439.9] 33.8%, respectively; P=.02) despite the fact that the percentage of fibroids completely infarcted was similar between the two groups ([136/172] 79% vs [41/50] 82%, P=.77). Pedunculated subserosal fibroids were more common in the failure group than in the success group (P<.03) and did not reduce in volume as significantly (53.8% vs 14.7%, respectively; P=.02).	2

**Radiologic Management of Uterine Leiomyomas  
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
87. Margau R, Simons ME, Rajan DK, et al. Outcomes after uterine artery embolization for pedunculated subserosal leiomyomas. J Vasc Interv Radiol. 2008;19(5):657-661.	Observational-Tx	240 women	To assess the safety and efficacy of uterine artery embolization (UAE) treatment of pedunculated subserosal leiomyomas. Note: Initial follow-up was conducted at 3 months with a postprocedural transvaginal US examination, a contrast agent-enhanced MR study, and a clinic visit for all patients.	A total of 240 patients underwent embolization. Pedunculated subserosal leiomyomas were treated in 16 women, with a technical success rate of 100%. Preprocedural mean tumor and uterine volumes were 372 cm <sup>3</sup> and 789 cm <sup>3</sup> , respectively. The mean stalk diameter was 2.7 cm (range, 0.8-7.8 cm). All pedunculated leiomyomas exhibited enhancement on contrast agent-enhanced magnetic resonance (MR) imaging (n=13) or vascularity on Doppler ultrasonography (US; n=3). Stalk vascularity was noted on MR imaging in 13 patients and was not assessed in the remaining three, who underwent US imaging. Imaging follow-up (mean, 5.9 months after UAE) demonstrated mean tumor volume reduction of 39.3% (95% confidence interval [CI], 28.2%-50.5%) and mean uterine volume reduction of 37.6% (95% CI, 26%-49.3%). There were no cases of continued tumor perfusion and no major complications. There was one minor complication of prolonged hospital stay (36 hours) for pain control.	2

## Evidence Table Key

### Study Quality Category Definitions

- *Category 1*: The study is well-designed and accounts for common biases.
  - *Category 2*: The study is moderately well-designed and accounts for most common biases.
  - *Category 3*: There are important study design limitations.
  - *Category 4*: The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
    - a) the study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
    - b) the study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
    - c) the study is an expert opinion or consensus document.
  - M = Meta-analysis
- 

Dx = Diagnostic

Tx = Treatment