

## Uterine fibroid embolization

### CME update for family physicians

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#### ABSTRACT

**OBJECTIVE** To review evidence supporting the use of uterine fibroid embolization (UFE) as an alternative to hysterectomy and myomectomy for managing uterine fibroids.

**QUALITY OF EVIDENCE** MEDLINE was searched using the MeSH terms embolization, therapeutic; leiomyoma; treatment outcome; pregnancy; and clinical trials. Most published studies on use of UFE for management of uterine fibroids provide level II evidence.

**MAIN MESSAGE** For 71% to 92% of patients, UFE is effective at alleviating fibroid-related symptoms. After UFE, fibroids are reduced in size by 42% to 83%. Patients' satisfaction with the procedure is high (>90%), and UFE is safe and has a low rate of major complications (1.25%). When compared with hysterectomy, UFE is associated with fewer major complications, shorter hospital stays, and faster recovery. Although successful pregnancy following UFE is possible, there is insufficient evidence to advocate use of UFE over myomectomy for management of uterine fibroids in women wishing to preserve fertility.

**CONCLUSION** For treatment of symptomatic uterine fibroids, UFE is a safe and effective nonsurgical alternative to hysterectomy and myomectomy.

#### RÉSUMÉ

**OBJECTIF** Faire le point sur les données qui soutiennent l'utilisation de l'embolisation de l'artère utérine (EAU) comme alternative à l'hystérectomie et à la myomectomie pour traiter les fibromes utérins.

**QUALITÉ DES PREUVES** Une recherche a été faite dans MEDLINE à l'aide des termes MeSH *embolization; therapeutic; leiomyoma; treatment outcome; pregnancy; et clinical trials*. La plupart des études publiées fournissent des preuves de niveau II.

**PRINCIPAL MESSAGE** Dans 71 à 92 % des cas, l'EAU est efficace pour soulager les symptômes dus aux fibromes. L'EAU entraîne une réduction de 42 à 83% de la taille des fibromes. Le taux de satisfaction chez les patientes traitées à l'EAU est élevé (>90 %) et ce traitement est sécuritaire, comportant très peu de complications majeures (1,25 %). En comparaison avec l'hystérectomie, l'EAU s'accompagne de moins de complications majeures, d'un séjour hospitalier plus court et d'une guérison plus rapide. Bien qu'une grossesse à terme soit possible après une EAU, il n'y a pas suffisamment de preuves pour préconiser cette technique de préférence à la myomectomie chez les patientes qui désirent conserver leur fertilité.

**CONCLUSION** Dans le traitement des fibromes utérins symptomatiques, l'EAU est une méthode efficace qui représente une alternative non chirurgicale sécuritaire à l'hystérectomie et à la myomectomie.

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Cet article a fait l'objet d'une révision par des pairs.

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Uterine fibroids are the most common tumours in the female genital tract. Although the true incidence of fibroids is unknown owing to the high prevalence of asymptomatic patients, it is generally reported as 20% to 40% among those of reproductive age.<sup>1</sup>

Symptomatic fibroids usually present with vaginal bleeding, pain, and other symptoms, such as dyspareunia, urinary frequency or urgency, and constipation.<sup>2,3</sup> Presence of these tumours can reduce the likelihood of pregnancy in those attempting conception.<sup>4,5</sup>

The mainstay of treatment for fibroids has been surgery. Hysterectomy is the definitive treatment for fibroids, as there is no possibility they can recur after that operation. Hysterectomy is a major operation, however, with an overall complication rate of 17% to 23%,<sup>6,7</sup> and is unsuitable for patients wishing to remain fertile. Much has been written about the psychological effects of hysterectomy on women who undergo it.<sup>8</sup>

Myomectomy, surgical removal of fibroids without hysterectomy, is an option for women who wish to remain fertile and to retain their uteruses. Myomectomy can be performed only on patients with fibroids of a certain number, size, and position. Myomectomy can be done using a laparoscopic technique, but emergency hysterectomy might be required as a result of intraprocedural bleeding. Another disadvantage of myomectomy is the risk of fibroid recurrence and the requirement for further surgery that arises in 5.7% to 51% of patients.<sup>9-12</sup> As a result of these disadvantages, myomectomy is done less frequently than hysterectomy.

A relatively new option, uterine fibroid embolization (UFE), is now available for patients who do not wish to undergo surgery. This procedure is sometimes referred to as uterine artery embolization. Uterine fibroid embolization is performed by interventional radiologists. Since it was first described by Ravina et al in 1995,<sup>13</sup> more than 40 000<sup>14</sup> UFEs have been performed. Even the earliest studies showed predominantly favourable results.<sup>13,15-23</sup>

Uterine fibroid embolization involves introducing and manipulating a catheter through the femoral artery into the internal iliac and uterine arteries. An embolizing agent is then injected to block both uterine arteries to cut off the fibroids' essential blood supply. The fibroids become avascular and shrink.<sup>24</sup>

In these days of information available on the Internet, it is essential that both family doctors and gynecologists be informed about UFE so that they can deal with their

patients' queries and can present this minimally invasive procedure as a treatment option. Knowing about UFE is particularly important for family doctors because most patients who undergo UFE are not referred by gynecologists, but rather find out about the procedure through other means (family, friends, the Internet, or the news media).<sup>25</sup> Because UFE is a nonsurgical treatment, it might be a more acceptable choice for women who otherwise would have declined surgical management of their fibroids. We review evidence supporting use of UFE as a non-surgical alternative to hysterectomy and myomectomy for management of uterine fibroids.

Several published guidelines are available for UFE, including those jointly created by the Canadian Interventional Radiology Association and the Society of Obstetricians and Gynaecologists of Canada.<sup>14</sup>

### Quality of evidence

MEDLINE was searched using the MeSH terms embolization, therapeutic; leiomyoma; treatment outcome; pregnancy; and clinical trials. Most published data on UFE come from large case series (level II evidence) dating back to 1995. We selected the largest and most recent trials for analysis (Table 1<sup>19,26-30</sup>). We found only 1 randomized controlled trial comparing UFE with hysterectomy.<sup>31</sup>

### Efficacy of UFE

Parameters commonly used to measure the efficacy of UFE include reduction in fibroid size, relief of symptoms, and patient satisfaction. Use of UFE is associated with a median dominant fibroid volume reduction of 42% to 83%.<sup>26-28</sup> Symptoms of menorrhagia improved in 83% to 92% of patients, pain in 77% to 79% of patients, and bulk-related symptoms in 79% to 92% of patients.<sup>19,26-28</sup> Interestingly, improvements in menorrhagia were unrelated to initial fibroid size or to post-UFE fibroid volume reduction.<sup>26</sup> Nearly all patients (91% to 97%) expressed satisfaction with the UFE treatment.<sup>19,26-28</sup>

### Safety of UFE

The most common and serious complications of UFE reported in large trials are summarized in Table 1. Frequency and severity of complications post-UFE were determined by Spies et al<sup>29</sup> in a large prospective study of 400 women who underwent UFE. The overall complication rate was 10.5%, and most complications (79%) occurred within 30 days of the procedure. Complications were graded with respect to severity using the complication classification developed by the Society of Interventional Radiology (SIR) (Table 2).<sup>32</sup> The rate of serious complications (SIR class D) was only 1.25% (5 patients); 1 patient (0.25%) had pulmonary embolism, 1 (0.25%) had bilateral iliac artery thrombosis, 2 (0.5%) had endometritis secondary to fibroid passage, and 1 (0.25%) had heavy vaginal bleeding secondary to fibroid passage. There were no SIR class E or F complications.

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**Table 1. Outcome of uterine fibroid embolization**

STUDY	NO. OF PATIENTS	FOLLOW-UP TIME (MO.)	SYMPTOM RELIEF (%)	FIBROID VOLUME REDUCTION (%)	COMPLICATIONS (%)	COMPLICATION-RELATED HYSTERECTOMIES (%)	PATIENT SATISFACTION (%)
Pron et al <sup>26</sup> (2003, Canada); Pron et al <sup>30</sup> (2003, Canada)	538	3	Menorrhagia: 83 Pain: 77 Bulk-related symptoms: 86	42	Amenorrhea: 8 Infection: 0.4* Pain: 0.7* Vaginal hemorrhage: 0.2* Prolapsed fibroid: 0.2*	1.5	91
Walker and Pelage <sup>27</sup> (2002, UK)	400	16	Menorrhagia: 84 Pain: 79 Bulk-related symptoms: 79	83	Amenorrhea: 7 Chronic discharge: 4 Infection: 1*	1	97
Hutchins et al <sup>19</sup> (1999, US)	305	12	Menorrhagia: 92 Bulk-related symptoms: 92	No data	No data	No data	92
Spies et al <sup>28</sup> (2001, US); Spies et al <sup>29</sup> (2002, US)	200 (400 for complications)	12	Menorrhagia: 90 Bulk-related symptoms: 91	58	Amenorrhea: 1 Fibroid passage: 2.5 Pain: 1 Pulmonary embolism: 0.25 Arterial thrombosis: 0.25 Endometritis: 0.5 Vaginal hemorrhage: 0.25*	0.25	92

\*Complications requiring hysterectomy.

**Table 2. Classification of complications of uterine fibroid embolization according to the Society of Interventional Radiology**

CLASS	DESCRIPTION
A	No therapy, no consequences
B	Nominal therapy, no consequences
C	Requires therapy, minor hospitalization (<48 h)
D	Requires major therapy, unplanned increase in level of care, prolonged hospitalization (≥48 h)
E	Permanent adverse sequelae
F	Death

Adapted from Omary et al.<sup>32</sup>

Needing a hysterectomy after UFE is another important measure of the procedure's safety.<sup>30</sup> Complication-related hysterectomy rates have been very low (0.25% to 1.5%).<sup>19,26-28</sup> Complications requiring hysterectomy included infection, hemorrhage, postembolization pain, and a large prolapsed fibroid<sup>19,26-28</sup> (Table 1).

Overall, transcervical fibroid tissue passage is the most common complication requiring hospitalization. It occurs in about 2.5% of patients.<sup>29,33</sup> It is often associated with severe pain, infection, or bleeding. Transcervical fibroid tissue passage appears to be more common in submucosal fibroids, so hysteroscopic management should be considered instead of UFE in such cases (level III evidence).<sup>14</sup>

The most serious complication of UFE is infection, with a reported incidence of 0.4% to 1.0%.<sup>26,27,29,30</sup> It occasionally leads to sepsis, and patients require extended hospitalization, intensive care, and emergency hysterectomy.<sup>27,34</sup> To reduce the possibility of infection, UFE is contraindicated in women who have evidence of current genitourinary infection (level II evidence).<sup>14</sup>

Transient or permanent amenorrhea post-UFE has been reported in 1% to 15% of patients.<sup>15,16,20,26-29,35-37</sup> Incidence of amenorrhea after UFE is highly age-dependent, and typically occurs in women older than 50.<sup>26</sup> Other severe complications of UFE have been reported,<sup>29,30,38-41</sup> but they occur very rarely.

### Efficacy and safety of UFE compared with hysterectomy

In Spain, Pinto et al<sup>31</sup> conducted the only randomized trial comparing UFE with hysterectomy. Patients were randomly assigned to 1 of 2 groups: those offered a choice of UFE or hysterectomy (group 1) and those given only the option of hysterectomy (group 2). Forty patients underwent UFE, and 20 patients underwent hysterectomy. Patients who had UFE had shorter hospital stays (1.71 days versus 5.85 days,  $P < .01$ ) and faster recovery to normal activities (9.50 days versus 36.18 days,  $P < .01$ ) than those who had hysterectomies. There was no statistical difference in complication rates following the 2 procedures.

Spies et al<sup>42</sup> conducted a multicentre prospective, but non-randomized, clinical study of patients treated with UFE (102 patients) and hysterectomy (50 patients). Regardless of therapy, most patients were satisfied with the improvement in symptoms at 12 months (90% of UFE patients versus 97% of hysterectomy patients,  $P > .05$ ). Complications were far more frequent in patients who underwent hysterectomy (50% versus 27.5%,  $P = .01$ ). Those having UFE also had shorter hospital stays (0.83 days versus 2.3 days,  $P < .001$ ) and faster recoveries (mean return-to-work time was 10.7 days versus 32.5 days) than those who underwent hysterectomy.

### Pregnancy after UFE

In a recent meta-analysis of 34 successful term pregnancies after UFE, Goldberg et al<sup>43</sup> reported on pregnancy complication rates after UFE in comparison with rates in the general population (Table 3). It is well known, however, that older women have a higher risk of pregnancy complications, and since women having UFE (mean age 43 years)<sup>26-29</sup> are significantly older than the general population of childbearing women, these comparisons are of indeterminate value.

**Table 3. Pregnancy complication rates after uterine fibroid embolization compared with rates in the general population**

COMPLICATIONS OF PREGNANCY	RATE AFTER UTERINE FIBROID EMBOLIZATION (%)	RATE IN THE GENERAL POPULATION (%)
Spontaneous abortion	32	10-15
Postpartum hemorrhage	9	4-6
Premature delivery	22	5-10
Cesarean delivery	65	22
Small for gestational age babies	9	10
Malpresentation	22	5

Adapted from Goldberg et al.<sup>43</sup>

The largest study to date on the effects of UFE on pregnancy outcomes was recently done in Canada.<sup>44</sup> Pron et al<sup>26</sup> did a prospective multicentre study of the outcomes of pregnancy in 555 Canadian women who had UFE. Since the study was not originally designed to evaluate pregnancy outcomes, reproductive histories and other fertility factors were not investigated. Before having embolization, 164 women (30%) reported a desire for pregnancy, but only 35 women were trying to conceive 1 year later. During the 2-year follow up, 21 women (average age 34 years, range 27 to 42 years) had 24 pregnancies. Twenty-three of the 24 pregnancies were spontaneous (1 woman had had in-vitro fertilization). The pregnancies resulted in 18 live births, 4 spontaneous abortions (16.7%, 95%

confidence interval [CI] 5.4 to 41.9), and 2 elective terminations. Of the 18 births, 14 were full term, and 4 were preterm. Three women had abnormal placentation; all 3 were nulliparas (12.5%, 95% CI 3.1 to 36.3). This is much higher than would be expected in the general population (incidence of placenta previa is 3 to 6 per 1000 pregnancies).<sup>45</sup> It is uncertain whether this was directly related to UFE or to other risk factors for abnormal placentation, such as maternal age over 35 (the women were 34, 35, and 36 years old). It is also known that uterine fibroids are associated with higher complication rates during pregnancy, labour, and delivery.<sup>46</sup> Still, this study provided evidence that UFE is a potentially feasible treatment for women with fibroids who wish to remain fertile.

### Pregnancy after UFE versus after myomectomy

A recent meta-analysis by Goldberg et al<sup>47</sup> compared pregnancy complication rates in 53 pregnancies after UFE and 139 pregnancies after laparoscopic myomectomy. Pregnancies after UFE had higher rates of preterm delivery (odds ratio 6.2, 95% CI 1.4 to 27.7) and malpresentation (odds ratio 4.3, 95% CI 1.0 to 20.5) than pregnancies after laparoscopic myomectomy did. The study, however, had several limitations. The data were neither prospective nor randomized, and the 2 populations being compared were dissimilar, which was not taken into account in the statistical analysis. At least 1 case report describes uterine rupture during pregnancy following UFE, but this is also a known complication of myomectomy.<sup>48-51</sup>

### UFE in Canada

It is difficult to estimate the number of interventional radiologists performing UFE, but based on data from the Canadian Interventional Radiology Association's website, at least 8 provinces in Canada currently have centres that offer UFE (Table 4). Most UFE is done in Ontario.

Referring a patient for UFE is straightforward and simple. Most interventional radiologists accept direct referrals from family physicians, although many ultimately request the involvement of an obstetrician. A short consultation letter, briefly describing the patient and the clinical problem, along with a copy of a recent ultrasound or magnetic resonance imaging scan, should be faxed or mailed to a nearby centre offering UFE. Interventional radiologists then typically contact patients directly to arrange consultations. In general, while wait times vary by location, they are no longer than wait times for hysterectomy.

More information about UFE for both doctors and patients can be found on the websites of the Canadian Interventional Radiologists Association (<http://www.car.ca/cira/>) and the Society of Interventional Radiology (<http://www.sirweb.org>).

**Table 4. Uterine fibroid embolization providers in Canada**

**ALBERTA**

**Calgary**

Dr David J. Sadler at Foothills Hospital, telephone 403 944-1969, fax 403 944-1687  
 Dr Drew C. Schemmer, telephone 403 943-4570

**BRITISH COLUMBIA**

**Vancouver**

Dr Lindsay Machan at University of British Columbia Hospital, telephone 604 822-7080, fax 604 822-9701

**MANITOBA**

**Winnipeg**

Dr Brian Hardy and Dr Chris Preachuk at the Health Sciences Centre, telephone 204 774-6511  
 Dr Barry Rusnak and Dr Bob McGregor at St Boniface Hospital, 409 Taché Ave, telephone 204 237-2526

**NEW BRUNSWICK**

**Moncton**

Dr Jean-François Guité and Dr Michael Toupin at Imagerie médicale Beauséjour, 330 University Ave, telephone 506 862-4116

**Saint John**

Dr Darren Ferguson at Atlantic Health Sciences Corp, PO Box 5200, 400 University Ave, Saint John, NB E2L 4L4

**NEWFOUNDLAND AND LABRADOR**

**St John's**

Dr Peter Collingwood at Memorial University of Newfoundland, telephone 709 777-7104, fax 709 777-6792

**ONTARIO**

**Barrie**

Dr Robert Mason at Royal Victoria Hospital, Department of Medical Imaging, telephone 705 278-9802

**Kingston**

Dr John Ricketts and Dr Doug Walker at Kingston General Hospital, telephone 613 548-2301, extension 3701; fax 613 548-2412

**London**

Dr Roman Kozak in the Department of Radiology, St Joseph's Hospital, telephone 519 646-6035

**Oshawa**

Dr Murray R. Asch at Lakeridge Health Corporation, telephone 905 576-8711, extension 3497  
 Dr Andrew B. Myers at Lakeridge Health Corporation, telephone 905 433-4305

**Peterborough**

Dr Daniel Bourgeois at Peterborough Regional Health Center, telephone 705 876-5039, fax 705 743-1713

**Richmond Hill**

Dr Noel B. Langhorne at X-Ray Associates, telephone 416 295-6564

**Toronto**

Dr Andrew Ainslie Common at St Michael's Hospital, telephone 416 864-5680, fax 416 864-5380  
 Dr Hassan Deif at North York General Hospital, telephone 416 756-6181, fax 416 756-6095  
 Dr Eran Hayeems at Mount Sinai Hospital, telephone 416 586-3113  
 Dr Sanjoy Kundu at Scarborough General Hospital, telephone 416 431-8107  
 Dr John R. Kachura at the Toronto Hospital, General Division, telephone 416 340-4800, extension 3250; fax 416 593-0502  
 Dr Dheeraj K. Rajan at Toronto General Hospital, telephone 416 340-4911, fax 416 593-0502  
 Dr Martin E. Simons at Toronto Western Hospital, telephone 416 603-5537, fax 416 603-5522  
 Dr Kenneth W. Sniderman at University Health Network, telephone 416 340-4800, extension 3393; fax 416 593-0502

**Windsor**

Dr John Speirs at Hotel Dieu-Grace Hospital, telephone 519 973-4412

**QUEBEC**

**Montreal**

Dr Gilles Soulez, Dr Vincent Oliva, and Dr Marie-France Giroux at CHUM Pavillon Notre-Dame, telephone 514 890-8000, extension 25115; fax 514 412-7547 or [julie.boisvert.chum@ssss.gouv.qc.ca](mailto:julie.boisvert.chum@ssss.gouv.qc.ca) (secretary)  
 Dr Pierre Perreault at CHUM Pavillon Saint-Luc, telephone 514 890-8350  
 Dr Richard Satin at SMBD Jewish General Hospital, Department of Radiology, 3755 Cote-Sainte-Catherine Rd, telephone 514 340-8222, extension 5657  
 Dr David Valenti at Royal Victoria Hospital, telephone 514 843-1545 or 514 843-1705

**SASKATCHEWAN**

**Regina**

Dr Shantilal Lala of Radiology Associates of Regina (2000). Procedure done at Regina General Hospital, fax 306 766-3774

**Saskatoon**

Dr Mark Shenouda of Associated Radiologists. Procedure done at St Pauls Hospital, telephone 306 655-5140  
 Dr Grant Stoneham of University Medical Imaging Associates. Procedures performed at Royal University Hospital, telephone 306 655-2373

## Discussion

Level II evidence clearly and consistently demonstrates that UFE is effective at alleviating fibroid-related symptoms, reducing the size of fibroids, and leaving patients highly satisfied.<sup>19,26-28</sup> Level II evidence also confirms that UFE is safe and has a low complication rate. Most complications that do occur are minor and occur within 30 days of the procedure.<sup>29</sup>

How does UFE compare with the already “established” treatments for uterine fibroids: hysterectomy and myomectomy? While randomized controlled trials comparing UFE to these therapies would help to define differences in safety and efficacy, attempts at conducting such trials in Canada and the United States have been mostly unsuccessful due to patients’ unwillingness to be randomized between a major surgical procedure and minimally invasive UFE.<sup>52</sup> Nevertheless, 1 such randomized controlled trial and another prospective trial comparing UFE with hysterectomy have been published (level II evidence).<sup>41,42</sup> Uterine fibroid embolization was associated with a lower rate of serious complications, shorter hospital stays, and shorter recovery times. From a financial standpoint, Canadian data indicate that UFE is more cost-effective than either hysterectomy or myomectomy (Table 5<sup>53</sup>).<sup>5</sup>

**Table 5. Inpatient cost per patient for myomectomy, hysterectomy, and uterine fibroid embolization**

PROCEDURE	TOTAL COST* (\$)	STANDARD DEVIATION (\$)
Abdominal myomectomy (N=91)	1781.73	47.16
Total abdominal hysterectomy (N=340)	1933.37	47.68
Vaginal hysterectomy (N=29)	1515.39	66.72
Uterine fibroid embolization (N=85)	1007.44	60.65†

Adapted from Al-Fozan et al.<sup>53</sup>

\*All costs are in Canadian dollars.

†P<.0001 compared with the other 3 groups.

## Conclusion

For women with symptomatic fibroids, UFE can be considered an effective and safe alternative to classic surgical therapy. The role of UFE as an alternative to myomectomy in women desiring future pregnancies remains unclear. At present, physicians should discuss UFE with all patients with fibroids who are being offered hysterectomy or myomectomy. ❁

## Competing interests

None declared

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### EDITOR'S KEY POINTS

- Uterine fibroid embolization (UFE) is a new technique for treating the symptoms of uterine fibroids that avoids hysterectomy or myomectomy.
- Experience with UFE is limited to the past 10 years, but many cases have been described in the literature. Outcomes have been favourable with large reductions in symptoms, few serious complications, and high rates of satisfaction among women.
- Only 2 randomized controlled trials have compared UFE with hysterectomy. They had small numbers of patients, but they showed that patients having UFE had much shorter hospital stays, faster recoveries, and no increase in major complications.
- Access to uterine fibroid embolization is restricted in Canada because there are not many interventional radiologists. This is expected to change, however, as the procedure becomes more popular. Given the likely increase in demand, family physicians should prepare themselves to discuss the merits and complications of UFE with their patients.

### POINTS DE REPÈRE DU RÉDACTEUR

- L'embolisation de l'artère utérine (EAU) est une nouvelle méthode de traitement qui permet d'éviter l'hystérectomie ou la myomectomie.
- L'expérience avec l'EAU se limite aux 10 dernières années, mais plusieurs cas ont été décrits dans les ouvrages scientifiques. Les résultats ont été favorables, avec une importante réduction des symptômes, peu de complications sérieuses et des taux élevés de satisfaction chez les patientes.
- Seulement 2 études randomisées avec groupes témoins ont comparé l'EAU à l'hystérectomie. Elles portaient sur un petit nombre de patientes, mais concluaient que les patientes traitées par EAU avaient des séjours hospitaliers plus courts, des guérisons plus rapides, sans avoir plus de complications majeures.
- Au Canada, l'accès à l'embolisation de l'artère utérine est restreint parce qu'il y a peu de radiologistes d'intervention. On s'attend toutefois à ce que cela change, car cette technique est de plus en plus populaire. En prévision d'une augmentation probable de la demande, le médecin de famille devrait se préparer à discuter des mérites et des complications de l'EAU avec ses patientes.

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