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SUMMARY

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Report prepared for AETMIS
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FORWORD

Endometrial ablation techniques in the treatment of dysfunctional uterine bleeding

Dysfunctional uterine bleeding (DUB) is a deviation, from the normal pattern, in the frequency of menstruation or in the duration or amount of bleeding, in the absence of pregnancy, an infection, a tumor or some other organic lesion. Its prevalence is reportedly 20% worldwide and is even higher during adolescence and the decade preceding menopause. Dysfunctional uterine bleeding and menstrual pain (dysmenorrhea) account for one-sixth of the hysterectomies performed in Québec and are the second leading reason for undergoing this procedure. Although hysterectomy is a definitive treatment for these conditions, it is a major surgical procedure with inherent risks and the potential for complications. This is why endometrial ablation was adopted, toward the end of the 1980s, as a less invasive option and has already undergone different changes aimed at making it easier to perform.

This report, which is in response to an assessment request from the Ministère de la Santé et des Services sociaux, examines the efficacy, safety and acceptability of the different endometrial ablation techniques, specifying the status, in terms of technological evolution, to which each technique has advanced for broader diffusion. The report also looks at the health-care costs associated with the surgical treatment of dysfunctional uterine bleeding.

Nine techniques were examined. Three of them – transcervical resection of the endometrium, rollerball endometrial ablation and thermal balloon endometrial ablation – are considered accepted; another, endometrial laser intrauterine thermotherapy, is experimental; and ordinary laser ablation is no longer performed in Québec. The other four techniques receive innovative status: microwave endometrial ablation, hydrothermal endometrial ablation, endometrial cryoablation and impedance-controlled endometrial ablation. Innovative techniques should be used only in settings where the clinical outcomes can be evaluated on an ongoing basis and where, if the techniques are diffused more widely, possible training requirements can be determined.

Apart from the aspects of efficacy, safety and efficiency, women's expectations and preferences, the possibility of earlier management of dysfunctional uterine bleeding, and the organizational and economic repercussions are issues that should be explored for optimal utilization. Thus, the repercussions of endometrial ablation techniques and therefore the role of these techniques in the treatment of dysfunctional uterine bleeding cannot be fully determined until after a long-term follow-up. Lastly, this report recommends that the assessment be updated on a regular basis, given the rapid technological evolution of endometrial ablation.

In disseminating this report, the Agency wishes to provide the best possible information to the decision-makers in Québec's health-care system concerned by this important matter.

Renaldo N. Battista

President and Chief Executive Officer

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SUMMARY

CURRENT SITUATION

The first-line treatment of dysfunctional uterine bleeding is usually medical. When drug therapy fails, surgical intervention is often the next option. Hysterectomy has, for a long time, been the definitive treatment for dysfunctional uterine bleeding. Dysfunctional uterine bleeding and menstrual pain (dysmenorrhea) were the main indication for 16.2% of the hysterectomies performed in Québec in 1996-1997 and the second leading reason for undergoing this procedure. However, hysterectomy is a major surgical procedure with inherent risks and the potential for complications.

Endometrial ablation was adopted in clinical practice toward the end of the 1980s as a less invasive alternative to hysterectomy for dysfunctional uterine bleeding. This surgical procedure permits preservation of the uterus and reduces uterine bleeding in most patients. The first-generation ablation techniques are based on the use of laser or electrosurgical techniques and are aimed at destroying the entire thickness of the endometrium. All of these techniques are hysteroscopically assisted, with direct, real-time visual monitoring of the uterine cavity.

Although the first-generation endometrial ablation techniques are clearly effective, too little use is still made of them in certain cases, largely because of the need for specialized training and the fear of surgical complications. This explains the efforts made to develop most of the new endometrial ablation techniques. The purpose of these second-generation techniques is to destroy the entire thickness of the endometrium while at the same time preventing the associated risks and obviating the skill requirements that the first-generation techniques entailed. In fact, the majority of these new surgical techniques do not require hysteroscopy. Most of the second-generation techniques are available in Canada, including microwave ablation, which is presently being tested.

Objective

In the fall of 2000, the Ministère de la Santé et des Services sociaux du Québec submitted an assessment request to the Agence d'évaluation des technologies et des modes d'intervention en santé, asking it to define the role of microwave endometrial ablation in the treatment of dysfunctional uterine bleeding.

This assessment report mainly concerns the efficacy, safety and acceptability of microwave endometrial ablation and compares this technique with transcervical resection of the endometrium, which is the procedure currently performed in Québec hospitals. However, a decision was made to broaden the scope of this report so as to document the situation in Québec regarding the practice of endometrial ablation in the surgical treatment of dysfunctional uterine bleeding. Consequently, the report examines the specific status of each technique in accordance with the classification developed by the Agency: experimental, innovative and accepted status. Secondly, the report looks at the health-care costs associated with the surgical treatment of dysfunctional uterine bleeding.

DYSFUNCTIONAL UTERINE BLEEDING

Dysfunctional uterine bleeding is a deviation, from the normal pattern, in the frequency of menstruation or in the duration or amount of bleeding, in the absence of pregnancy, an infection, a tumor or some other organic lesion. Its prevalence is reportedly 20% worldwide and is even higher during adolescence and the decade preceding menopause.

The most frequent cause of dysfunctional uterine bleeding is anovulation. The exact proportion of cases of dysfunctional uterine bleeding in the presence of ovulation is apparently very low. In the West, dysfunctional uterine bleeding is the leading cause of iron deficiency anemia. The alkaline hematin test (hemoglobin assessment) is an objective method for measuring excessive menstrual bleeding. To a certain extent, a diagnosis of dysfunctional uterine bleeding is made through a process of elimination. It is therefore essential to look for the cause of the bleeding before undertaking any treatment.

TREATMENT OF DYSFUNCTIONAL UTERINE BLEEDING

The objective of treatment is twofold: to eliminate excessive bleeding and to improve the patient's quality of life. Dysfunctional uterine bleeding should be considered an endocrine disorder that is best treated first medically, the more invasive forms of treatment being reserved for refractory cases.

Medical treatment

Hormone therapy is the basis of treatment, since, in most cases, the underlying cause of dysfunctional uterine bleeding is anovulation. In the absence of a causal disease in a woman who ovulates and who has dysfunctional uterine bleeding, consideration should be given to using nonsteroidal antiinflammatories (NSAIDs) or antifibrinolytics on a first-line basis. Danazol and gonadoliberein agonists are two options used in the treatment of menstrual bleeding refractory to the other forms of therapy.

Surgical treatment

Curettage stabilizes bleeding in some women, but its effects are almost never long-lasting. This procedure is therefore not recommended in the treatment of dysfunctional uterine bleeding. Uterine artery embolization is a new therapeutic approach for patients in whom surgery would be difficult to perform. The long-term efficacy and safety of this new surgical treatment modality have not yet been demonstrated.

Hysterectomy is the most widely used treatment. It can be performed abdominally, vaginally or laparoscopically. The vaginal and laparoscopic approaches are reported to cause fewer complications and to result in a shorter hospital stay and convalescence than the abdominal approach. Although hysterectomy guarantees the permanent cessation of menstrual flow and yields a high level of satisfaction, it is a major procedure. Its invasiveness, the morbidity, mortality and costs that it incurs, and the risk of late complications that it carries have led to the development of new types of treatment.

Endometrial ablation

Dysfunctional uterine bleeding is the main indication for endometrial ablation. Endometrial ablation seems to be the surgical treatment of choice for dysfunctional uterine bleeding and

should be preferred to hysterectomy. It provides symptomatic relief without the need to remove most of the healthy uterus.

One of the drawbacks of endometrial ablation is the risk of persistent or recurrent bleeding, which requires a repeat ablation or possibly a hysterectomy. The reoperation rates given in study reports range from 0 to 38.2%, with the higher rates observed in longer studies or in women under the age of 35.

Pregnancy is rare but possible after endometrial ablation. Such pregnancy carries risks. It is also possible for endometrial cancer to develop in residual endometrium after an ablation, and such cancer can be difficult to diagnose because of the scar tissue that forms in the uterus. Lastly, the effects of hormone replacement therapy on residual endometrium in menopausal women are still unknown.

First-generation ablation techniques

The first-generation techniques are usually performed under general anesthesia but can also be performed with local or regional anesthesia. They require direct visual monitoring of the uterine cavity by means of a hysteroscope and an irrigation fluid. Even if the uterine cavity appears normal on hysteroscopy, an endometrial biopsy should be performed because hysteroscopy alone cannot rule out the possibility of a tumor or carcinoma of the endometrium. These techniques are sometimes grouped under the heading of hysteroscopic endometrial ablation techniques.

The complications associated with the first-generation ablation techniques include cervical laceration and uterine perforation. The intestine can also be injured by the conduction of electrical current or direct trauma. The fluids used to distend the uterine cavity during hysteroscopy can cause fluid overload, allergic reactions and other systemic toxic reactions. Hemorrhage can occur if the ablation extends too deeply into the myometrium and large blood vessels are cut. Lastly, gas embolism is a rare complication of surgical hysteroscopy, but it can cause death.

The first-generation techniques offer considerable advantages over hysterectomy. They take less time to perform and require a much shorter hospital stay and convalescence. Although hysterectomy guarantees the cessation of menstrual flow and yields a higher level of satisfaction, it carries a greater risk of complications than endometrial ablation.

Transcervical resection

In accordance with the Agency's terminology and criteria, transcervical resection of the endometrium is considered an accepted technique. The results of a meta-analysis, of six randomized, controlled trials and of several other studies indicate that this technique is safe, with reproducible results. It is relatively effective in reducing the quantity of menstrual flow and yields a high level of satisfaction. Some of the advantages of transcervical resection of the endometrium include the possibility of performing an endometrial biopsy in order to rule out the presence of a tumor and the possibility of surgically removing intrauterine lesions. On the other hand, this technique requires a high level of surgical skill and carries a greater risk of uterine perforation and systemic absorption of irrigation fluid as a result of blood vessel exposure. However, transcervical resection of the endometrium causes few serious complications,

especially if a rollerball electrode is used to treat the uterine fundus and cornual regions. Of the contraindications to transcervical resection of the endometrium, particular mention should be made of hemodynamic instability, coagulopathies and anticoagulant therapy.

Rollerball ablation

Rollerball endometrial ablation is an accepted technique as well. According to published study reports, it compares with transcervical resection of the endometrium in terms of efficacy, the level of satisfaction and the reoperation rate. It is the easiest first-generation technique to master and the quickest to perform. Rollerball endometrial ablation causes fewer intraoperative complications than transcervical resection of the endometrium, carrying a lower risk of uterine perforation and fluid absorption, since the tip of the rollerball is blunt. Among other things, this technique is especially indicated for uterine bleeding secondary to anticoagulant therapy.

Laser ablation

According to published study reports, laser endometrial ablation is comparable to transcervical resection of the endometrium in terms of efficacy, the level of satisfaction and the reoperation rate. The main drawbacks of laser endometrial ablation are the cost and length of the procedure. Furthermore, this technique requires more surgical skill, but it does offer the advantage of causing fewer intraoperative complications than transcervical resection of the endometrium. In Québec, laser endometrial ablation stopped being performed about ten years ago.

Second-generation ablation techniques

Most manufacturers attempt to market second-generation techniques by presenting them as procedures that can be performed on an outpatient basis. It is important that physicians and patients be aware of the diameter of the instrument to be introduced into the uterus. Given that these new techniques are performed without visual hysteroscopic monitoring (with the exception of hydrothermal endometrial ablation), the physician should make a diagnosis based on a visual examination prior to treatment, as well as a diagnosis supported by a pathophysiological study including a hysteroscopy and, at the very least, an endometrial biopsy. It is also advisable to perform a hysteroscopy after the treatment to check that only the uterine cavity was treated.

When this report was being drafted, five second-generation techniques had been the subject of rigorous assessments involving a comparison with established techniques. Only microwave endometrial ablation and impedance-controlled endometrial ablation had been compared with the standard conventional technique, transcervical resection of the endometrium. In the case of thermal balloon endometrial ablation, hydrothermal endometrial ablation and endometrial cryoablation, the comparator technique was rollerball endometrial ablation. Unfortunately, searches in the computerized literature databases did not yield any reports from randomized, controlled trials of endometrial laser intrauterine thermotherapy. Given the paucity of published data, this technique was not included in our assessment and is only briefly described in an appendix.

In relation to the first-generation techniques, the second-generation techniques assessed in this report offer the advantage of being quick, easy and amenable to local anesthesia or narcosis, and they cause fewer intraoperative complications. However, they do carry a risk of complications, including hematometra, infection and internal organ injury. It would be beneficial to examine these techniques further to determine their cost-effectiveness and to confirm their

safety when performed by a gynecologist who has not received special training (in the event that the procedure is performed in clinics).

Thermal balloon ablation

Of the second-generation ablation techniques, only thermal balloon endometrial ablation is considered accepted. The long-term results of a randomized, controlled trial and those of several other studies indicate that this technique compares with transcervical resection of the endometrium in terms of efficacy and the reoperation rate. Very few studies have examined the level of satisfaction. Furthermore, this technique seems to be reserved for normal uterine cavities and causes pain due to uterine distention. Uterine retroversion appears to be associated with a greater risk of treatment failure. Among the contraindications to thermal balloon endometrial ablation, particular mention should be made of an active genital or urinary tract infection and any anatomic abnormality or any disease that can cause myometrial weakening. When this report was being drafted, the use of thermal balloon endometrial ablation was still not very widespread in Québec.

Microwave ablation

We have fewer data on microwave endometrial ablation than on the first-generation techniques or thermal balloon endometrial ablation. Based on the medium-term results of a randomized, controlled trial and those of a few uncontrolled trials, microwave endometrial ablation compares with transcervical resection of the endometrium in terms of efficacy, the level of satisfaction and the reoperation rate. However, as of yet, there are no published long-term results of large, randomized, controlled trials. Such results would enable one to better determine the impact of the therapeutic effects and, more specifically, the reoperation rate, which seems to plateau within three years after the initial procedure. This is why this technique is considered innovative. When performed by microwave, there is the potential for endometrial ablation to be incomplete in women whose uterine cavity is hypertrophied or highly deformed. It should be noted that the cervix has to be dilated to 9 mm in order to insert the waveguide and that the dilatation process can be painful, even with local anesthesia.

Hydrothermal ablation

Hydrothermal endometrial ablation is considered an innovative technique, too. We have few data on this technique, and, as of yet, there are no published long-term results of large, randomized, controlled trials. Published reports indicate that this technique and transcervical resection of the endometrium compare in terms of efficacy and the reoperation rate. Few studies have examined the level of satisfaction. The hysteroscopy performed for diagnostic purposes prior to treatment enables the physician to check that there are no uterine perforations and to detect any intrauterine conditions that were not previously diagnosed. Controlled irrigation of the uterine cavity with heated normal saline can reportedly be used to treat benign tumors that are sometimes present in the uterus. It is important to carefully select candidates for this operation, since a large fibromyoma deforming the uterine cavity would prevent adequate irrigation. Among the contraindications to hydrothermal endometrial ablation, particular mention should be made of an active genital or urinary tract infection and any anatomic abnormality, any condition or any intervention that can cause myometrial weakening, such as a classic cesarean section or a previous transmural myomectomy. It should be noted that the cervix has to be dilated to 8 mm in order to insert the device and that the dilatation process can be painful, even with local anesthesia.

Cryoablation

Endometrial cryoablation is also considered an innovative technique. We have few data on this technique, and, as of yet, there are no published long-term results of large, randomized, controlled trials. Based on the results of one randomized, controlled trial, endometrial cryoablation compares with transcervical resection of the endometrium in terms of efficacy, the level of satisfaction and the reoperation rate. Hysterosonography is performed to confirm that the cryosurgical probe is properly positioned in the uterine cavity and to monitor the growth of the ice crystal during the treatment cycles. Uterine fibromyomas do not seem to affect the growth of the ice crystal and are easily destroyed by freezing. Endometrial cryoablation is especially contraindicated in the presence of an active genital or urinary tract infection and any anatomic abnormality, any condition or any intervention that can cause myometrial weakening, such as a classic cesarean section or a previous transmural myomectomy.

Impedance-controlled ablation

Impedance-controlled endometrial ablation is considered an innovative technique as well. We have few data on this technique, and, as of yet, there are no published long-term results of large, randomized, controlled trials. Based on the results of one randomized, controlled trial, impedance-controlled endometrial ablation compares with transcervical resection of the endometrium in terms of efficacy, the level of satisfaction and the reoperation rate. Impedance-controlled ablation offers the advantage of not requiring preoperative endometrial thinning. This procedure can be performed at any time during the menstrual cycle, even during menstruation. Impedance-controlled endometrial ablation is contraindicated in the presence of an active genital or urinary tract infection and any anatomic abnormality, any condition or any intervention that can cause myometrial weakening, such as a classic cesarean section or a previous transmural myomectomy. Furthermore, if the uterine cavity is less than 4 cm in length, the treatment will cause burning of the walls of the cervix. It should be noted that the cervix has to be dilated to 8 mm in order to insert the device and that the dilatation process can be painful, even with local anesthesia.

Endometrial laser intrauterine thermotherapy

Lastly, there are very few scientific publications on the second-generation technique that is not assessed in this report, namely, endometrial laser intrauterine thermotherapy. Consequently, there are few clinical data on its efficacy and safety. This is why this technique is considered experimental. Rigorous studies would need to be conducted to determine the efficacy, safety and cost-effectiveness of endometrial laser intrauterine thermotherapy and the associated level of satisfaction and late reoperation rate. It would also be beneficial to examine this technique further to confirm its safety when performed by a gynecologist who has not received special training (in the event that the procedure is performed in clinics).

ECONOMIC REPERCUSSIONS OF ENDOMETRIAL ABLATION IN THE TREATMENT OF DYSFUNCTIONAL UTERINE BLEEDING ON QUÉBEC'S HEALTH-CARE SYSTEM

Endometrial ablation is a surgical procedure that is gaining in popularity, as evidenced by the fact that its frequency increased by nearly 82% between 1995 and 1999. In Québec, most endometrial ablations are performed in women aged 35 and older.

The decision to perform a hysterectomy can depend on how physicians diagnose and practice and on their experience and opinions concerning the efficacy of this procedure. In turn, these

factors can depend on how recently the physician was trained and the availability of the new types of treatment and of the equipment in Québec hospitals. Certain regional variations in the frequency of endometrial ablation observed in Québec may be due to whether or not the patients live in an urban setting, where the technical skill and the know-how have already been acquired.

The first-generation techniques involve lower costs than a hysterectomy. The cost differential persists for a considerable period of time, although this gap narrows because of the relatively high reoperation rate in the years following endometrial ablation. Performing vaginal or laparoscopic hysterectomies could contribute to reducing this difference.

Quantifying the economic repercussions of the second-generation techniques is no easy task. These techniques involve relatively high purchase and utilization (single-use supplies) costs. The five second-generation techniques assessed in this report seem comparable to the first-generation techniques already performed in Québec in terms of efficacy, the level of satisfaction and the reoperation rate. From an economic standpoint, the potential benefits of these new techniques include the fact that they take less time to perform and have a lower incidence of intraoperative complications. However, the clinical impact of these two benefits has yet to be demonstrated.

The amounts spent at Québec hospitals for endometrial ablation are not made public. For now, only the purchase costs of the different apparatus and the expenses incurred for the single-use devices can be compared.

CONCLUSION

Medical treatment is seldom a lasting solution to dysfunctional uterine bleeding and is not without adverse effects. Although it is a type of definitive treatment, hysterectomy not only carries a considerable surgical risk, but also has certain drawbacks and is fairly expensive. In addition, it can cause many psychological and physical changes in women. However, hysterectomy continues to yield a high level of satisfaction, since it guarantees the cessation of bleeding.

Endometrial ablation has been proposed because it is a less invasive, more convenient and less expensive procedure when no other gynecologic condition is involved. Women with dysfunctional uterine bleeding prefer endometrial ablation to hysterectomy because this type of treatment enables them to avoid major surgery and because the hospital stay and convalescence are shorter.

Various energy sources have been used to destroy the endometrium, and all seem comparable in terms of efficacy and the reoperation rate. Since hysteroscopic endometrial ablation (by laser, rollerball or transcervical resection) and thermal balloon endometrial ablation have accepted status, there would be no particular conditions governing their use.

However, because they are innovative techniques, microwave endometrial ablation, hydrothermal endometrial ablation, endometrial cryoablation and impedance-controlled endometrial ablation should be reserved for certain hospitals, which must have the necessary resources and knowledge for systematically gathering and for analyzing all the data arising from their use and for disseminating these data to the medical and scientific communities. Clinical trials with a follow-up of at least three years after the initial ablation would need to be conducted to demonstrate the efficacy of these techniques and to determine the reoperation rate over a

long period of time. It would be beneficial to examine these techniques further to determine their cost-effectiveness and to confirm their safety when performed by a gynecologist who has not received special training (in the event that the operation is performed in clinics).

Lastly, because of its experimental nature, endometrial laser intrauterine thermotherapy (a second-generation technique not assessed in this report) should be the subject of rigorous studies aimed at demonstrating its immediate and late efficacy and safety and at determining its cost-effectiveness and the reoperation rate. Also, the use of this technique should be governed by the conditions that apply to innovative techniques.

Technologically, endometrial ablation is evolving at an extremely rapid pace, with large studies of the second-generation techniques presently underway or recently completed. The results of these clinical trials should be published within 12 to 24 months. These rapid changes require instituting a monitoring process and periodically publishing updates, which would enable one to reassess the specific status of each endometrial ablation technique.

In conclusion, we often observe a gap between clinical practice and evidence-based evaluative research. The incidence of surgical complications, the ease of use, and personal clinical experience clearly contribute to forming an opinion concerning the clinical utility and efficacy of any treatment. In addition, improvements to and the rapid diffusion of new techniques facilitate their adoption by clinicians, even in the absence of published scientific data.

Repercussions on the practice of medicine and on public health

Women's expectations and preferences seem to be important determining factors for the best type of surgical treatment for dysfunctional uterine bleeding. Often, a woman with dysfunctional uterine bleeding does not want a hysterectomy or even the cessation of menstrual flow but seeks above all relief from this painful symptom. If given the option, many will choose to keep their uterus. However, the new, much less invasive methods will not entirely supplant hysterectomy in the treatment of dysfunctional uterine bleeding. Some women will want menstruation to stop, and hysterectomy is currently the only type of surgical treatment for dysfunctional uterine bleeding that can guarantee this.

Since the second-generation endometrial ablation techniques require less surgical skill and experience, we should observe an increase in the number of gynecologists offering these therapeutic options and, consequently, greater access to these techniques by Québec women. Steps will necessarily have to be taken to ensure that surgeons have not only the technical skills, but also the training needed to carefully select candidates for this type of treatment. This is because a good knowledge of the indications and contraindications has a direct impact on the level of satisfaction with the treatment and on the failure and reoperation rates.

A woman with dysfunctional uterine bleeding who requests an endometrial ablation should have completed her family. A woman of child-bearing potential who is sexually active should subsequently use contraception, since she can become pregnant after the ablation. In menopausal women, the effects of hormone replacement therapy on residual endometrium are unknown. Any woman whose endometrium has been ablated and who is on hormone replacement therapy should receive a combination of a progestin and estrogens. Furthermore, it is possible for cancer to develop in residual endometrium after an ablation, and such cancer can be difficult to diagnose because of the scar tissue that forms in the uterine cavity. This is why one should evaluate the status of any woman with suspicious symptoms after an endometrial ablation.

The availability of the new techniques for treating dysfunctional uterine bleeding could lead women to seek surgery earlier than if hysterectomy was the only procedure available. Milder cases, which are normally treated by more conservative methods, could undergo less invasive treatment and experience an easier convalescence with endometrial ablation. Some women with serious medical conditions who would not tolerate general anesthesia and intra-abdominal surgery could have their problem, otherwise potentially life-threatening, taken care of with the new techniques.

The subsequent increase in the frequency of surgery should be counterbalanced by the decrease in the use of long-term drug therapy. Such therapy is not always effective and sometimes causes adverse effects. One should therefore weigh the new costs associated with endometrial ablation against potential drug savings. As well, the fact that the changes can affect the quality of life and the productivity of patients who abandon medical treatment for ablation should be taken into account.

Unlike hysterectomy, endometrial ablation does not guarantee the cessation of menstrual flow and may require reoperation during the years following the initial procedure. The new endometrial ablation techniques involve relatively high equipment purchase and utilization costs. Furthermore, adopting a technique with as little invasiveness as endometrial ablation could lead to substantial changes in the hospital infrastructure.

The patient's perspective on the cost of the new surgical procedures could be very different. All the endometrial ablation techniques involve less postoperative pain and are characterized by a speedier convalescence. Endometrial ablation could offer benefits for women's health, thanks to the lasting decrease in menstrual flow.

For all of these reasons, the repercussions of endometrial ablation techniques and, consequently, their role in the treatment of dysfunctional uterine bleeding can be fully defined only after a long-term follow-up.

GLOSSARY

Adenomyosis

The presence of endometrial tissue in the uterine muscle. It manifests as bleeding and pelvic pain. Called also *endometriosis interna* or *uterina*.

Amenorrhea

The absence of menses, outside of pregnancy, in a woman of menstrual age.

Anaphylactoid reactions

Anaphylactoid reactions are clinically similar to anaphylaxis but can occur after the first injection of certain drugs. They are associated with a dose-dependent idiosyncratic toxic mechanism rather than with an immunological mechanism.

Antifibrinolytic

An agent that inhibits the dissolution of blood clots. Used in the treatment of certain types of bleeding.

Classic cesarean section

A surgical incision made in the body of a pregnant uterus in order to remove the fetus and placenta. When performed at the end of pregnancy or during labour, the incision is almost always made in the lower segment of the uterus, but when a segment cesarean is impossible or contraindicated (before the lower segment has formed, in particular, in certain therapeutic abortion techniques), the incision is made in the body of the uterus.

Cornual region

One of the two upper angles of the inverted triangle formed by the uterine cavity and from which the fallopian tubes extend.

Cryoablation

An ablation technique that uses cold.

Cryoprobe

An instrument used in surgery to apply cold to deep tissues on a very localized basis.

Diathermal

Said of a surgical procedure aimed at destroying tissues by heat created when high-frequency alternating current flows between two electrodes.

Dysmenorrhea

Difficult and painful menstruation.

Electrocauterization

The destruction of tissue by means of an electrocautery, or wire loop, raised to a high temperature by electrical current.

Electrocoagulation

The destruction of tissue by coagulating the cytoplasm of its cells. It is caused by the heat emitted when high-frequency electrical current flows between a needle electrode (punctiform) and a large-surface electrode in contact with the patient.

Endometrial ablation

A surgical procedure consisting in removing the endometrium.

Endometriosis

The ectopic presence, outside the uterine mucous membrane, of functional endometrial tissue. Endometriosis can cause pelvic pain, which increases during menstruation, and reduced fertility. It can also lead to the formation, in the pelvic cavity, of cysts (endometriomas), which are sensitive to cyclical hormonal fluctuations and which can bleed during menses.

Endometritis

Inflammation of the uterine mucous membrane.

Endometrium

The inner mucous membrane of the uterus, whose structure varies with the levels of different hormones and whose desquamation, at the end of each menstrual cycle, results in menses.

Endosurgery

A deep, minimally invasive surgical technique performed in large-caliber blood vessels and internal organs by catheterization or fibroscopy.

Eumenorrhea

Menstruation that is normal in terms of duration and volume.

Fibromyoma

A uterine tumor consisting of connective tissue and smooth muscle tissue. Histologically, it is a myoma. Fibromyomas are also often called *uterine fibromas* or *leiomyomas*.

Gonadotropin-releasing hormone

A polypeptide synthesized in the hypothalamus. It is transported to the anterior lobe of the pituitary gland and stimulates the synthesis and release of both gonadotropins (sex hormones).

Hematometra

A mass resembling a tumor in appearance that results from the retention of menstrual blood in the uterus as a result of cervical atresia or total vaginal aplasia.

Hemostasis

The arrest, whether spontaneous or therapeutic, of bleeding.

Hypomenorrhea

Very light menstrual flow.

Hysterosonography

An ultrasound technique for visualizing the uterus by means of an ultrasound transducer placed on the lower part of the abdomen over the uterus.

Impedance

The resistance offered by an anatomical structure ("electrical circuit") to the flow of an alternating current traveling through it.

Laparoscopy

A direct visual examination, for diagnostic or therapeutic purposes, of the abdominal cavity, distended beforehand by pneumoperitoneum, with the aid of an endoscope (laparoscope) inserted through the abdominal wall. Called also *celioscopy*.

Laparotomy

A surgical incision through the abdominal wall and peritoneum.

Leiomyoma

A benign tumor consisting of mature smooth muscle cells. Tumors of this type occur most often in the uterus (such tumors are improperly called *fibromas*).

Menorrhagia

Abnormally heavy and prolonged menstrual flow (menstruation usually lasts from three to five days).

Metrorrhagia

Uterine bleeding unrelated to menses that occurs between menstrual periods or after menopause.

Myomectomy

The removal of a uterine myoma (fibromyoma) with preservation of the uterus.

Myometritis

Inflammation of the myometrium.

Myometrium

The muscle coat of the uterus.

Narcosis

Reversible, artificial sleep produced by the administration of drugs (narcotic, general anesthesia).

Photocautery

Destruction of tissue by means of a laser beam.

Resectoscope

An endoscopic surgical instrument introduced into natural cavities and passages for the purpose of resecting tissues or organs.

Rhabdomyolysis

The more or less extensive destruction of striated muscle due to various causes, such as severe ischemia, myopathies, poisoning, mechanical crushing or intense muscular activity.

Stenosis

Permanent, pathologic narrowing of an orifice, a duct or a hollow organ. It can be congenital or acquired.

Transcervical resection of the endometrium

The complete or partial surgical removal of the inner mucous membrane of the uterus, starting at its fundus and proceeding toward its isthmus, by means of a sharp instrument introduced through the cervix.

Uterine retroversion

A deviation of the uterus in which its body, instead of tilted forward as it normally is, is tipped toward the back from its isthmus, the cervix thus pointing upward and forward.

LIST OF ABBREVIATIONS

adm.:	administration
NSAIDs:	nonsteroidal antiinflammatory drugs
DFPY:	disability-free person-years
CO ₂ :	carbon dioxide
HPFB:	Health Products and Food Branch (Canada)
IUD:	intrauterine device
WMD:	weighted mean difference
SD:	standard deviation
FDA:	Food and Drug Administration (U.S.)
GHz:	gigahertz
CT:	control group
EG:	experimental group
HAD:	Hospital Anxiety and Depression Scale
HTA:	Hydro ThermAblator [®]
HTAC:	Health Technology Advisory Committee (U.S.)
CI:	confidence interval
kHz:	kilohertz
kPa:	kilopascal
™:	trademark
®:	registered trademark
MDA:	Medical Devices Agency (United Kingdom)
MEA:	Microwave Endometrial Ablation [®]
Nd: YAG:	Neodymium: yttrium-aluminum-garnet laser
NHS:	National Health Service (United Kingdom)
NHSCRD:	NHS Centre for Review and Dissemination (United Kingdom)
RAMQ:	Régie de l'assurance-maladie du Québec
OC:	odds ratio
RR:	relative risk
SF-36:	Short Form 36