Menorrhagia: causes, diagnosis and treatment options


Summary
This article examines the causes of menorrhagia and outlines approaches to diagnosis and treatment. It includes a description of the normal menstrual cycle and the clotting cascade. The research findings suggest that inherited bleeding disorders account for many cases of menorrhagia.

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Aims and intended learning outcomes
The aim of this article is to provide an overview of the causes of menorrhagia, the diagnosis of conditions that can result in menorrhagia and its management. Menorrhagia is defined as excessive menstrual flow. It is often associated with dysmenorrhoea (painful periods). Menstrual problems are common, a source of distress to individual women and a cause of sickness absence (Thomas and Ellertson 2000).

Menorrhagia is frequently caused by disorders of the menstrual cycle. This article provides a description of the normal menstrual cycle and the anatomy of the endometrium (inner lining of the uterus). In the past many women experiencing menorrhagia did not receive adequate explanation of their symptoms. However, many cases of abnormally heavy menstrual bleeding are now known to be caused by coagulation defects. A description of the normal clotting cascade and possible causes of bleeding problems more generally, including heavy menstrual loss, are therefore included. After reading this article you should be able to:

- Describe the physiology of the normal menstrual cycle.
- Identify the gynaecological causes of menorrhagia.
- Take the history of a woman presenting with heavy bleeding.
- Outline the events that take place when blood vessels are damaged and explain how abnormalities can result in bleeding problems, including menorrhagia.
- List the investigations routinely performed to treat menorrhagia.
- Provide an account of the treatment options available to women experiencing menorrhagia.

Introduction
Normal menstruation occurs every 21 to 35 days, and lasts two to seven days, with a loss of between 35-45ml of blood (Sherman and Korenman 1975). Menorrhagia is defined as menstrual loss of 80ml or more. It is a commonly experienced symptom. Five per cent of women between the ages of 30 and 49 consult the GP with this problem every year (Coulter et al 1989, Vessey et al 1992). However, much younger women can also be affected (Bravender and Emans 1999). Menorrhagia is often, although not inevitably, associated with painful periods. Familiarity with
the normal menstrual cycle is necessary to identify cases of abnormal bleeding and assists investigation, diagnosis and treatment.

**Time out 1**

Use a standard textbook to revise the anatomy and physiology of the female reproductive system. Ensure that you can define the following terms: gonadotrophin; endometrium; myometrium; peritoneum; ovum; corpus luteum; and cervical os.

To understand menstrual disorders familiarity with the structure and function of the endometrium is important. It consists of two layers: a basal layer next to the myometrium and an upper, superficial layer, which develops cyclically and is shed during menstruation.

**The menstrual cycle**

The menstrual cycle is controlled by a group of steroid hormones known collectively as oestrogens and progesterone. They are released cyclically from the ovary throughout the reproductive years under the control of another group of hormones, the gonadotrophins. There are two gonadotrophins: follicle-stimulating hormone (FSH) and luteinising hormone (LH). Both are released from the anterior pituitary gland. Their secretion is, in turn, stimulated by a releasing factor from the hypothalamus. Characteristic changes occur in the endometrium throughout the menstrual cycle under the influence of these hormones (Figure 1).

Menstruation begins on day one of the cycle. Over a period of about five days, the superficial endometrial layer is shed, leaving the basal layer beneath. Throughout the proliferative phase—from about day five to day 14 of a typical 28-day cycle—a few cells from the old superficial layer deep in the endometrial glands of the basal layer begin to multiply, leading to progressive thickening and increased vasculature as ovulation approaches (Sherman and Korenman 1975).

Spiral arterioles in the basal endometrium grow upwards into the superficial layer and become more coiled. While ovulation often occurs at the midpoint of a 28-day cycle, it will always take place 14 days before the beginning of menstruation in any cycle, irrespective of its length. Once ovulation has taken place, the spiral arterioles become dilated.

The secretory (luteal) phase follows ovulation. Oestrogen continues to promote endometrial development. The release of progesterone from the corpus luteum prepares the endometrium to receive a fertilised ovum. The endometrial blood supply further increases and the endometrial glands, now highly coiled, secrete glycogen to provide nourishment. If implantation does not occur, the corpus luteum degenerates, there is spasm of the spiral arterioles, blood ceases to flow through them resulting in ischaemia, and endometrial shedding begins.

During normal menstruation, approximately half the loss is blood. The remainder consists of fragments of endometrial tissue and mucus. Lytic chemicals secreted by the endometrium prevent normal menstrual loss from clotting so that it is able to escape via the cervical os into the vagina. If clotting occurs, it takes place in the vagina, not the uterus.

Although a typical menstrual cycle is considered to last 28 days, many women experience shorter or longer cycles: it is not unusual for periods to recur as often as every 19 days or for the cycle to take up to 35 days. Similarly, some women experience light bleeding, while for others it can be much heavier. The amount of blood loss can vary throughout the reproductive years for the same woman. It may become heavier and more painful after an

![Figure 1](image-url)
Menstruation and the woman’s role

Coping with menstruation can be inconvenient for any woman, but the problems are exacerbated for those who are out all day compared to women who spend much of their time at home. The expectations placed on women who are studying and those in the workplace today are high. Employers frequently record the number of days taken as sick leave, especially short, recurrent episodes. Heavy, painful periods have never been a glamorous topic for research (Higham and Shaw 1991) and these women often experience a corresponding lack of sympathy at school and in the workplace. As a result women who might once have been prepared to suffer in silence now seek help.

Menorrhagia is often regarded as a subjective complaint because some studies have found a poor correlation between what women describe as heavy bleeding and the amount actually lost. In fact, few well-controlled studies have ever taken place. It is difficult and time-consuming to assess loss objectively, and inconvenient and embarrassing for the woman as it involves collecting and weighing sanitary pads and tampons. This can be overcome by using a pictorial chart which allows women to indicate the amount of loss (Higham et al 1990). However, the chart appears to be used more as a research tool than in clinical practice, with doctors and nurses relying more on women’s accounts than objective assessment.

Sometimes lack of investigation can result in cases of incapacitating menorrhagia being undetected, leaving the woman to cope alone (Box 1). Confronted with a woman complaining of unacceptable menstrual bleeding, the nurse or doctor may elicit more meaningful information by asking about the character as well as the amount of blood loss: sudden surges in flow (‘flooding’) and clots are indicative of excessive loss meriting investigation. However, a specific cause to explain menorrhagia is identified in less than 50% of women affected (Kadir et al 1998a).

Pharmacological treatment

Most women attempt to treat themselves for heavy and painful periods before seeking medical help. Menorrhagia is usually treated using drugs in primary care. Sometimes this approach is successful and no further action is indicated. In other cases, medication is used to control symptoms until a hospital appointment. GPs are encouraged to offer at least one course of treatment with drugs before referral (NHS Centre for Reviews and Dissemination (NHS CRD) 1995).

Different pharmacological preparations are available but many are not suitable for long-term use. Danazol is a gonadotrophin inhibitor, which prevents ovulation as well as working directly on the endometrium, causing atrophy. This drug is a testosterone derivative, which can cause distressing side effects such as weight gain, acne and hirsutism (excessive body hair). It interferes with lipid metabolism and is, therefore, not suitable for long-term use. Oral contraceptives, although effective, are not an option for all women, for example, older women who smoke. The most effective medications for long-term use are non-steroidal anti-inflammatory drugs (NSAIDs) and antifibrinolytic agents such as tranexamic acid.
Mefenamic acid problems, she felt it was a good treatment option. prescribed, but in view of her severe period explained to Jane (Box 1) when the pill was possible side effects of oral contraceptives were contraception or are using another method. The month, especially if they do not need problem that occurs only four or five days a taking synthetic hormones every day to treat a dysmenorrhoea and causes periods to inflammatory pain by the same mechanism and is the other. Elevated levels of prostaglandins are also associated with painful contractions of the myometrium.

Ibuprofen is widely used by many women to self-treat period pains. Aspirin relieves inflammatory pain by the same mechanism and can also be quite effective, but is so familiar that many women experiencing moderate to severe dysmenorrhoea dismiss it as likely to be ineffective.

The combined oral contraceptive pill helps to control dysmenorrhoea and causes periods to become light because it inhibits ovulation and cyclical endometrial development. Some women dislike taking the pill to control period problems because they worry about the side effects of taking synthetic hormones every day to treat a problem that occurs only four or five days a month, especially if they do not need contraception or are using another method. The possible side effects of oral contraceptives were explained to Jane (Box 1) when the pill was prescribed, but in view of her severe period problems, she felt it was a good treatment option. Mefenamic acid Mefenamic acid is an NSAID with a longer half life than aspirin, so it is effective for longer. There are few side effects. Trials have demonstrated that mefenamic acid can reduce menstrual bleeding by 50% (Hickey and Faraquhar 2003).

Antifibrinolytic agents Antifibrinolytic agents, such as tranexamic acid, work by inhibiting plasminogen activation and fibrinolysis in the endometrium. They are effective at high doses, but can cause side effects such as nausea, vomiting, diarrhoea and dizziness.

Gonadotrophin-releasing hormone (GnRH) analogues This group includes goserelin, which is administered as an intramuscular injection and nafarelin and buserelin (nasal sprays). These drugs control menorrhagia by inducing a medical menopause. They work by reducing the sensitivity of the anterior pituitary. Gonadotrophin release is.
prevented, ovarian activity is suppressed and endometrial stimulation ceases. Side effects are those associated with the menopause: hot flushes, vaginal dryness and significant loss of bone density if medication is prolonged. Use is, therefore, limited to four to six months. These drugs are expensive and this, in addition to their side effects, limits use. Progesterone-releasing intrauterine contraceptive device Although intrauterine contraceptive devices (IUCDs) are generally associated with increased menstrual loss and pain, the progesterone-releasing IUCD reduces symptoms. The device is fitted with a reservoir that releases a small controlled amount (20mcg) of synthetic progesterone (levonorgestrel) every 24 hours. The contraceptive effect is produced mainly by reducing the monthly development of the endometrium. In randomised controlled trials it has been shown to reduce blood loss by 80%, although periods can sometimes last longer despite being lighter (Hickey and Faraquhar 2003).

The progesterone-releasing IUCD must be fitted by a doctor or specially trained nurse and replaced every five years. Women should be warned that during the first few months they may experience changes in the symptoms associated with: hot flushes, vaginal dryness and significant loss of bone density if medication is prolonged. Use is, therefore, limited to four to six months. These drugs are expensive and this, in addition to their side effects, limits use.

**Time out 4**

Look at the case study in Box 1 again. What questions would you ask Jane?

**Investigations**

Women referred to a gynaecologist for investigation of menorrhagia can expect to undergo a full medical examination to assess their general health and pelvic examination to detect possible abnormality of the genital tract. This will involve bimanual examination to detect uterine enlargement caused by fibroids or ovarian cysts, speculum examination to establish cervical disease such as polyps (see below) and cervical erosion. Haematological examination will be undertaken because of the risk of low haemoglobin. Thyroid disorders can sometimes cause menstrual problems, so endocrine function tests may be performed (Koutras 1997). Further blood tests may also be performed to explore the possibility of anaemia and/or bleeding disorders. Before examination, it is important to take a full general medical and menstrual history.

Jane should be asked about the frequency and character of her menstrual loss. Issues explored should include: regularity, the presence of intramenstrual bleeding, postcoital bleeding and pain. She should be asked about medications that she has used. Anticoagulants can trigger menorrhagia. Women like Jane should also be asked about non-prescription items, oral contraceptives and possible use of the IUCD. Even in today’s society, where people are more willing to discuss intimate subjects than in the past, a certain taboo still seems to surround menstruation. It is not easy for a woman to know whether what she experiences is normal or unusual, so questions should include the appearance of menstrual loss (bright or dark), the presence of clots and episodes of flooding. These details might not otherwise be forthcoming.

It is possible to obtain some information about the amount of loss by asking women how often they need to change pads or tampons and if they have to get up at night to do so. Modern products are designed to be highly absorptive and some women may be losing more blood than they realise.

Women presenting with menstrual problems should be asked about their general health, especially if they have chronic health conditions. The abrupt changes in circulating ovarian steroids at ovulation and premenstrually contribute to changes in the symptoms associated with: epilepsy, asthma, rheumatoid arthritis, irritable bowel disease and diabetes (Case and Reid 1998). Mental health problems may also be exacerbated before a period (Rubinow et al 1988).

**Ultrasound examination** If there is evidence of uterine enlargement, ultrasound examination can be used to explore the presence of tumours, such as fibroids. It is also useful if the woman is obese, because pelvic examination will be less informative. Endometrial thickness can be assessed. If there is evidence of thickening, further investigation is required. Transvaginal ultrasonography is able to detect pelvic abnormalities as small as 5mm in diameter, and therefore identify lesions that would not be picked up during bimanual examination.

**Dilation and curettage** In the past women referred to gynaecology services would be likely to undergo dilation and curettage (D and C). The cervix is dilated and a curette is introduced into the endometrial cavity. Fragments of endometrium are shaved off for histological examination. Although D and C can be performed as a day case procedure, a general anaesthetic is still required. Newer alternatives are more accurate, more cost effective, do not require a general anaesthetic and are associated with fewer complications. Preferred diagnostic investigations today include outpatient endometrial sampling and hysteroscopy.

**Endometrial sampling** A fine vacuum catheter is inserted through the cervix to obtain a sample of the endometrium.
Hysteroscopy A fine instrument passed through the dilated cervix is used to directly inspect the uterine cavity. Gas or fluid is pumped into the uterine cavity to separate the walls to allow full vision. Any lesions present, such as submucous fibroids or polyps, can be biopsied. It is often possible to remove them at the same time (Cravello et al 1996). Some NHS trusts have established ‘one stop’ menstrual clinics where investigations, results and often treatment are possible on the same day. These have been positively evaluated by women (Abu et al 2001).

Time out 5
Most women undergoing invasive investigations for menorrhagia are admitted as day cases. Although recovery and return to normal activities are usually uneventful, these procedures are not without risks and as women will be self-caring at home, they need to be well informed about what to expect and what to do if complications occur. Explain to a junior colleague the risks associated with invasive procedures used to investigate menorrhagia and the information that a patient should be given before she goes home.

Haemorrhage could result if the uterus is perforated or the cervix is lacerated. However, these complications are rare. Of all the investigations, hysteroscopy is associated with the fewest complications. The cervix has been opened, so endometrial infection is possible, although again unusual. Dilation of the cervix can result in cramping pain and there may be some bleeding, so women should be warned to bring a supply of pads into hospital and to have analgesia available at home. To avoid the risk of infection, women should be advised not to use tampons immediately after this procedure and not to have sexual intercourse until all bleeding has stopped. They should be aware that severe pain and heavy vaginal loss should not occur and given a telephone number or informed where to return in case of complications.

Gynaecological causes
Gynaecological causes account for only about 35% of cases of menorrhagia (Kadir et al 1998a). The most common are fibroids, endometrial polyps and endometrial hyperplasia.

Fibroids (leiomyoma) These are the most common benign tumours of the female reproductive system (Smith 2000). They can develop at different positions in the uterine wall (Box 2). Although they are thought to occur in 20% of women over the age of 35, they do not always cause symptoms (Smith 2000). A single fibroid may be present or a large number may co-exist. Size is variable. Large fibroids can cause pressure symptoms including: abdominal discomfort, backache, urinary frequency, constipation and menorrhagia. Heavy bleeding occurs because fibroids distort the inner uterine surface, increasing the surface area from which bleeding can occur. Fibroids are especially common in black women and those who have not had children, although any woman can develop them. Risk increases with age, but they do not begin to develop after the menopause. Women can be reassured that malignant change is extremely rare. Treatment depends on the extent to which fibroids are causing symptoms. Other factors to consider are the woman’s age and future fertility.

In the past many women underwent hysterectomy, but other surgical treatments are available to treat fibroids which are causing problems.

Myomectomy This involves the surgical removal of individual fibroids from the uterine wall. The operation is not often performed because it carries a significant risk of haemorrhage during surgery and the fibroids may recur. However, it is an option for women who are hoping to establish pregnancy before the fibroids grow back.

Resection Submucous and intramural fibroids can be removed during laparoscopy or hysteroscopy.

Embolisation This is a technique in which both uterine arteries are catheterised and injected with tiny particles to block the blood flow inside the fibroids, causing them to infarct and shrink, relieving symptoms. Embolisation is reported as a successful procedure with a number of advantages: there is no surgical incision, all the fibroids can be treated at once, hospital stay is short (day case procedures are possible) and the woman can return to normal activities in seven to ten days (Smith 2000). Possible side effects include haematoma formation in the groin area, cramping abdominal pain and, occasionally, uterine infection.

Endometrial polyps These polyps are common benign growths that protrude into the uterine cavity or endocervix. They are responsible for causing menorrhagia or bleeding that can be intramenstrual, postcoital or postmenopausal. Endometrial polyps usually develop before the menopause and may accompany endometrial hyperplasia. Treatment is removal by D and C.
At the time of surgery

Complications associated with hysterectomy

At the time of surgery

- Primary haemorrhage
- Uterine perforation
- Bowel perforation
- Bladder perforation
- Urinary retention

Early post-operative recovery

- Urinary tract infection
- Chest infection
- Wound infection
- Deep vein thrombosis/pulmonary embolism
- Constipation
- Secondary haemorrhage

Inherited bleeding disorders

Inherited coagulation defects account for a significant number of cases of menorrhagia (Kadir et al 1998a). Blood clotting and tissue regeneration are complex physiological processes which, when disrupted, can result in a range of problems including: fragility of the blood vessel wall, prolonged bleeding and excessive bleeding. The clotting cascade When the wall of a blood vessel is damaged, the blood coagulates and bleeding is arrested. Coagulation is a complex process involving a range of enzymes and chemicals collectively known as the clotting factors. Most are present in the plasma. The others are released by the platelets, except for thromboplastin, which is released from the damaged tissues. When blood clots, each clotting factor is activated in sequence as part of a cascade of reactions called the clotting cascade (Figure 3). Box 4 summarises key steps in blood coagulation resulting from the clotting cascade.

Kadir et al (1998a) investigated the frequency of inherited bleeding disorders in all women referred to their clinic with menorrhagia in cases where no pelvic pathology had been detected on clinical examination. An inherited blood disorder was identified in 17% (26) of 150 women screened. The most commonly diagnosed condition was von Willebrand’s disease, followed by deficiency of factor XI.

Other causes of menorrhagia were related to platelet dysfunction and deficiency of factor X. One woman was a carrier for haemophilia (lack of factor VIII). Women whose symptoms were caused by an inherited bleeding disorder were much more likely to have experienced menorrhagia ever since the menarche. Their periods lasted significantly longer than for women with normal haematological results and dangerous levels of bleeding occurred in some patients after routine gynaecological procedures, such as D and C and hysteroscopy (Kadir et al 1999). This research has been influential because GPs are now more likely to refer women with unexplained menorrhagia for haematological investigations.
Diagnosis can be difficult because some inherited haematological problems contributing to menorrhagia are rare, and women with the same underlying problem may present with symptoms of varying severity (Cutler et al 2005). Most women whose inherited bleeding disorders result in menorrhagia report a lower quality of life than other women, especially if they experience flooding and clots, although overall they consider themselves to be in good health (Kadir et al 1998b).

**Time out 6**

Read the case study in Box 5. What special care do you think Jane needed as a result of her inherited bleeding disorder when her progesterone-releasing IUCD was fitted?

It is usually possible to fit a coil safely in a primary care or outpatient setting. However, Jane was required to rest in the clinic for a few hours in case bleeding supervened. It is best for women in her position to be met and taken home by a family member or friend rather than to travel alone on public transport.

Jane may require particular support and encouragement during the first few months using the progesterone-releasing IUCD when spotting is common because, in her case, it may be more troublesome than usual. If she wants to establish a pregnancy at some point in the future, the coil will have to be removed and she will require other treatment to control bleeding. NSAIDs would not be a good choice because they can cause gastric bleeding. They present a particular risk to patients with inherited bleeding disorders and should be avoided. Before dental treatment, Jane should explain that she has von Willebrand’s disease. Mild bleeding disorders are often first

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**References**


Kadir RA, Economides DL, Sabin CA, Owens D, Lee CA (1998a) Frequency of inherited...
Learning zone: gynaecology

**Box 5**

**Case study 1b: diagnosis and treatment**

Jane's GP questioned her closely about episodes of bleeding other than menstruation, but she could not recall any. She was asked about dental problems, but although she had once had a tooth extracted in childhood, Jane had not had to return to the dentist because of excessive bleeding. She was referred to a gynaecologist, who arranged for her to undergo hysteroscopy. Nothing abnormal was detected, but Jane bled heavily afterwards and five days later had to return to the clinic because she was still losing large quantities of blood. She was admitted to hospital overnight for the bleeding to be stabilised. Her flatmate, arriving with her overnight bag, commented that Jane seemed to bleed easily and that her feet were often badly blistered, especially when she wore new shoes.

After she left hospital, Jane went to stay with her parents until she was fully recovered. Her haemoglobin levels were low, she was tired and needed to take iron supplements. Seeing the tablets, her mother recalled a long-forgotten episode in Jane's childhood when she had become anaemic, apparently for no reason, and this was before her periods started. Jane had always been aware that her mother had had painful periods until she underwent hysterectomy in her early forties, but she had not realised that her maternal grandmother had also suffered badly.

Her mother's recovery had been slow and her grandmother had experienced numerous episodes of poor healing, once after a fall and following more minor injuries. When Jane returned to see the gynaecologist six weeks later, she had compiled a list of symptoms relating to heavy menstrual bleeding and indications of poor healing, which appeared to be familial. Haematology referral established a diagnosis of von Willebrand's disease, which is frequently associated with menstruation and a history of fragile, easily damaged tissues. Jane and her family were reassured that although von Willebrand's disease is not curable, haemostatic control can be given to prevent bleeding in the event of future surgery. In the meantime, Jane was fitted with a progesterone-releasing IUCD to control her symptoms.

Diagnosis after dental procedures. However, health professionals should be aware that such episodes can be missed in families where bleeding patterns are abnormal, because those affected do not realise that anything is wrong.

**Conclusion**

Treatment of choice for menorrhagia depends on the individual woman. Important factors to consider include: her age, whether her family is complete, contraceptive requirements, the severity of symptoms, and the patient's culture and beliefs.

Troublesome periods are a common problem and nurses are likely to meet women with them in the course of their practice irrespective of whether they work in women's health or gynaecology services. It is important to be able to encourage women to describe their symptoms by establishing an open, accepting relationship, taking time and asking the correct questions. It is also important for all nurses to have a clear understanding of normal menstrual function and blood clotting, so they can identify possible abnormalities that merit further investigation.

Today much more can be done to help relieve the symptoms of menorrhagia. Women do not need to endure the upheaval of heavy, painful bleeding but they may need sympathetic support to encourage them to access what is available and select the best treatment to suit their particular circumstances.

**References continued**


**Menorrhagia**

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**Answers to SAQ no. 378**

1. a   2. b   3. d   4. d   5. c

6. a   7. d   8. c   9. a   10. c

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**1. What level of menstrual loss indicates menorrhagia?**

a) 20ml
b) 40ml
c) 60ml
d) 80ml or more

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**2. The steroid hormone group that controls the menstrual cycle is:**

a) Androgens
b) Androstenedione
c) Oestrogens and progesterone
d) Testosterone and cortisol

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**3. For patients with menorrhagia, the most effective medication for long-term use is:**

a) Antibiotics
b) Aspirin
c) Non-steroidal anti-inflammatory drugs and antifibrinolytic agents
d) Paracetamol

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**4. Prostaglandins can cause which of the following?**

a) Contraction of smooth muscles
b) Enhanced platelet clotting
c) Pain, inflammation and fever
d) All of the above

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**5. The most common benign tumours of the female reproductive system are:**

a) Basal cell carcinoma
b) Fibroids
c) Polyps
d) Squamous cell carcinoma

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**6. Investigations for menorrhagia include:**

a) Dilation and curettage
b) Endometrial sampling
c) Ultrasound examination
d) All of the above

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**7. The surgical removal of the uterus is known as:**

a) Endometrial ablation
b) Hysterectomy
c) Myomectomy
d) Resection

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**8. The term for painful periods is:**

a) Dysmenorrhoea
b) Dysmetria
c) Dyspareunia
d) Dysplasia

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**9. Normal menstruation occurs once every:**

a) Ten to 15 days
b) 15-20 days
c) 21-35 days
d) 36-40 days

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**10. Antifibrinolytic drugs are used to:**

a) Encourage bleeding
b) Encourage clotting
c) Prevent bleeding
d) Control pain