Obstetrics & Gynaecology
Hannah Kither, Sarah Kitson, Louise Wan, Emma Crosbie

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> Starter questions stimulate curiosity and learning
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Series Editors:
Janine Henderson, David Oliveira, Stephen Parker

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Obstetrics & Gynaecology

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Series Editors’ Foreword

Today’s medical students need to know a great deal to be effective as tomorrow’s doctors. This knowledge includes core science and clinical skills, from understanding biochemical pathways to communicating with patients. Modern medical school curricula integrate this teaching, thereby emphasising how learning in one area can support and reinforce another. At the same time students must acquire sound clinical reasoning skills, working with complex information to understand each individual’s unique medical problems.

The *Eureka* series is designed to cover all aspects of today’s medical curricula and reinforce this integrated approach. Each book can be used from first year through to qualification. Core biomedical principles are introduced but given relevant clinical context: the authors have always asked themselves, ‘why does the aspiring clinician need to know this’?

Each clinical title in the series is grounded in the relevant core science, which is introduced at the start of each book. Each core science title integrates and emphasises clinical relevance throughout. Medical and surgical approaches are included to provide a complete and integrated view of the patient management options available to the clinician. Clinical insights highlight key facts and principles drawn from medical practice. Cases featuring unique graphic narratives are presented with clear explanations that show how experienced clinicians think, enabling students to develop their own clinical reasoning and decision making. Clinical SBAs help with exam revision while Starter questions are a unique learning tool designed to stimulate interest in the subject.

Having biomedical principles and clinical applications together in one book will make their connections more explicit and easier to remember. Alongside repeated exposure to patients and practice of clinical and communication skills, we hope *Eureka* will equip medical students for a lifetime of successful clinical practice.

Janine Henderson, David Oliveira, Stephen Parker
About the Series Editors

Janine Henderson is the MB BS undergraduate Programme Director at Hull York Medical School (HYMS). After medical school at the University of Oxford and clinical training in psychiatry, she combined her work as a consultant with postgraduate teaching roles, moving to the new Hull York Medical School in 2004. She has a particular interest in modern educational methods, curriculum design and clinical reasoning.

David Oliveira is Professor of Renal Medicine at St George’s, University of London (SGUL), where he served as the MBBS Course Director between 2007 and 2013. Having trained at Cambridge University and the Westminster Hospital he obtained a PhD in cellular immunology and worked as a renal physician before being appointed as Foundation Chair of Renal Medicine at SGUL.

Stephen Parker is a Consultant Breast & General Paediatric Surgeon at St Mary’s Hospital, Isle of Wight. He trained at St George’s, University of London, and after service in the Royal Navy was appointed as Consultant Surgeon at University Hospital Coventry. He has a particular interest in e-learning and the use of multimedia platforms in medical education.

About the Authors

Hannah Kither is a Clinical Research Fellow in Maternal Fetal Medicine and a Specialty Registrar in Obstetrics and Gynaecology. She teaches medical students in lectures, tutorials and on the wards, and hopes to inspire new doctors to follow a career in the specialty. She is currently studying the link between stillbirth and systemic lupus erythematosus.

Y Louise Wan is a Wellcome Trust Clinical Research Fellow in Gynaecological Oncology and a Specialty Registrar in Obstetrics and Gynaecology. She has always enjoyed teaching, examining and mentoring medical students. She is investigating the role of targeting the oncofetal antigen 5T4 in ovarian cancer treatment.

Sarah Kitson is a Clinical Research Fellow in Gynaecological Oncology and a Specialty Registrar in Obstetrics and Gynaecology. She enjoys teaching medical students and is an Associate of the Higher Education Academy. She is currently investigating novel treatment strategies for endometrial cancer.

Emma Crosbie is a Senior Lecturer and Honorary Consultant Gynaecological Oncologist at the University of Manchester. She has extensive experience in teaching undergraduates and postgraduates and is a Fellow of the Higher Education Academy. She is currently developing strategies for the prevention of obesity-related endometrial cancer.
Preface

Obstetrics and gynaecology is a diverse and exciting specialty. Obstetricians are involved in some of the most important moments in a woman’s life: her birth, planning her family and the subsequent birth of her own children. Gynaecologists focus on the reproductive and sexual healthcare needs of women outside pregnancy, from the cradle to the grave.

Eureka Obstetrics & Gynaecology equips students with the knowledge needed for exam success and confident clinical practice. It is structured to make it easy to access information and is highly illustrated with images and artworks to aid understanding of key concepts. Cases are included to give an insight into how an experienced clinician would approach a patient and include graphic narratives to illustrate how patients are managed in real life.

Effective clinical care requires an appreciation of the scientific principles and mechanisms that explain how and why things go wrong: these are described in chapter 1. The clinical approach to patients, including relevant signs and symptoms, examination techniques and management options are covered in chapters 2 and 3. Normal and abnormal pregnancy, and specific gynaecological diseases are covered in subsequent chapters, followed by chapters dedicated to emergency situations and integrated clinical care. Finals-style SBA questions are included for effective revision and exam preparation.

We hope Eureka Obstetrics & Gynaecology stimulates your learning and inspires your interest in this fascinating specialty.

Hannah Kither, Y Louise Wan, Sarah Kitson, Emma Crosbie
August 2016
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<td>α-fetoprotein</td>
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<tr>
<td>AMH</td>
<td>antimüllerian hormone</td>
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<td>APTT</td>
<td>activated partial thromboplastin time</td>
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<td>BA</td>
<td>bile acids</td>
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<td>BMI</td>
<td>body mass index</td>
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<td>BRCA</td>
<td>breast cancer susceptibility gene</td>
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<td>CA</td>
<td>cancer antigen</td>
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<td>CEA</td>
<td>carcinoembryonic antigen</td>
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<td>CN</td>
<td>cranial nerve</td>
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<td>COCP</td>
<td>combined oral contraceptive pill</td>
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<td>CRP</td>
<td>C-reactive protein</td>
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<tr>
<td>DHEA</td>
<td>dehydroepiandrosterone</td>
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<tr>
<td>DHEA-S</td>
<td>dehydroepiandrosterone sulphate</td>
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<tr>
<td>DNAR</td>
<td>do not attempt resuscitation</td>
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<td>DVT</td>
<td>deep vein thrombosis</td>
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<td>ECV</td>
<td>external cephalic version</td>
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<td>FBC</td>
<td>full blood count</td>
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<td>FGM</td>
<td>female genital mutilation</td>
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<tr>
<td>FIGO</td>
<td>International Federation of Gynecology and Obstetrics</td>
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<tr>
<td>FSH</td>
<td>follicle-stimulating hormone</td>
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<td>G</td>
<td>gravidity</td>
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<td>G+S</td>
<td>group and save</td>
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<td>GnRH</td>
<td>gonadotrophin-releasing hormone</td>
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<td>GP</td>
<td>general practitioner</td>
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<tr>
<td>β-hCG</td>
<td>β-human chorionic gonadotrophin</td>
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<tr>
<td>HELLP</td>
<td>haemolysis, elevated liver enzymes and low platelets</td>
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<tr>
<td>hMG</td>
<td>human menopausal gonadotrophin</td>
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<td>HPO</td>
<td>hypothalamic–pituitary–ovarian</td>
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<td>HPV</td>
<td>human papillomavirus</td>
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<td>HRT</td>
<td>hormone replacement therapy</td>
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<td>HSV</td>
<td>herpes simplex virus</td>
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<td>ICSI</td>
<td>intracytoplasmic sperm injection</td>
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<td>Ig</td>
<td>immunoglobulin</td>
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<td>INR</td>
<td>international normalised ratio</td>
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<td>IVF</td>
<td>in vitro fertilisation</td>
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<td>LDH</td>
<td>lactate dehydrogenase</td>
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<td>LFT</td>
<td>liver function test</td>
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<tr>
<td>LH</td>
<td>luteinising hormone</td>
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<tr>
<td>LLETZ</td>
<td>large loop excision of the transformation zone</td>
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<td>LSD</td>
<td>lysergic acid diethylamide</td>
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<tr>
<td>MRSA</td>
<td>methicillin-resistant Staphylococcus aureus</td>
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<tr>
<td>NSAID</td>
<td>non-steroidal anti-inflammatory drug</td>
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<td>P</td>
<td>parity</td>
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<td>PCOS</td>
<td>polycystic ovary syndrome</td>
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<td>PID</td>
<td>pelvic inflammatory disease</td>
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<td>PMDD</td>
<td>premenstrual dysphoric disorder</td>
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<td>PMS</td>
<td>premenstrual syndrome</td>
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<td>PT</td>
<td>prothrombin time</td>
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<td>Q</td>
<td>perfusion</td>
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<td>Rh</td>
<td>Rhesus</td>
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<tr>
<td>SRY</td>
<td>sex-determining region Y gene</td>
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<tr>
<td>STI</td>
<td>sexually transmitted infection</td>
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<tr>
<td>TENS</td>
<td>transcutaneous electrical nerve stimulation</td>
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<tr>
<td>U+E</td>
<td>urea and electrolytes</td>
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<td>V</td>
<td>ventilation</td>
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<td>WHO</td>
<td>World Health Organization</td>
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We would like to thank those friends, family and students whose infectious curiosity about what makes us all tick inspired us to put pen to paper.

We are indebted to Chris, Mike, Richard and Phil, for their never-ending love, support and cups of tea.

And finally, to Susanna, Thomas and Louisa: may this book stimulate your love of learning and inspire you to achieve great things.

HK, YLW, SK, EC
Chapter 11
Inflammatory and infective disorders

Introduction

Inflammatory and infective disorders affect either the internal or external female genitalia. Disorders affecting the external genitalia cause vulval skin conditions, while those affecting the internal genitalia cause:

- chronic pelvic pain
- dyspareunia
- subfertility
- menstrual dysfunction

Chronic pelvic pain

Pelvic pain present for more than 6 months is referred to as chronic; it accounts for 10% of all gynaecological referrals. The most common causes are endometriosis and chronic pelvic inflammatory disease (PID), which are described in this chapter. The correlation between the severity of pain and the extent of pelvic pathology is poor. For example, some women with severe scarring resulting from endometriosis are asymptomatic, while some women with little scarring experience severe pain. This contradiction can be frustrating for patients, particularly when managing their pain is difficult.

Other causes of pelvic pain include fibroids (see page 316), adhesions and primary dysmenorrhoea (see page 291). The last of these is not associated with any pelvic pathology; it may result from excessive prostaglandin secretion.

No cause can be identified at laparoscopy in up to a third of women with chronic pelvic pain.

Starter questions

Answers to the following questions are on page 310.

1. What causes endometriosis?
2. Why does endometriosis cause subfertility?
3. Could HPV vaccination benefit boys?
Case 12 Painful periods

Presentation
Jane Evans, aged 32 years, presents to the gynaecology clinic with a 2-year history of period pain.

Initial interpretation
Period pain, i.e. dysmenorrhoea, is classified as primary if no underlying cause can be identified, and secondary if it is a consequence of pelvic pathology.

The aims of clinical assessment are to establish the severity of symptoms, identify any underlying cause and determine fertility intentions, because these affect a patient’s treatment options.

Further history
Jane started her periods when she was 11 years old. They were normal until 2 years ago, when they became increasingly painful. The pain starts 3 days before the onset of bleeding. She describes it as a cramping or burning sensation in her lower abdomen that builds in intensity. Once the bleeding starts, the pain begins to settle and is gone by the third or fourth day of her period.

Sometimes the pain is incapacitating, in which case Jane has to take time off from her work as a laboratory scientist and go to bed. Her work has started to suffer, and she is worried that her contract will not be renewed.

Jane’s long-term boyfriend, Steve, is supportive. However, there are tensions between them because she finds sex unbearably painful. They have talked about getting married and having children when the time is right. She has not told her family and friends how bad her symptoms are, because she worries that they will think she is exaggerating.

Endometriosis: impact on life
Jane describes the impact of chronic pelvic pain on her quality of life.

My Mum is supportive but she lives in York and I hardly ever see her. I’m sure my friends think I’m making it up. They’ve stopped inviting me out and that really hurts. This pain is unbearable and it’s ruling my life, please say you can help me....

Steve was patient with me at first. But sex is so painful I can’t bear it when he touches me. I’m scared about how much it will hurt. I love him but sex is out of the question and this freaks me out that he’ll leave...

How does it affect your life?
I’m always off sick. Sometimes I have to miss important presentations or meetings. My boss doesn’t understand and I don’t think he will extend my contract...

My Mum is supportive but she lives in York and I hardly ever see her. I’m sure my friends think I’m making it up. They’ve stopped inviting me out and that really hurts. This pain is unbearable and it’s ruling my life, please say you can help me....
Case 12 Painful periods

Case 12 continued

Jane's periods are regular. They last for 7 days on average and are heavy for the first 2 days. There is no bleeding between periods or after sex. Her cervical screening tests are up to date, and the results have been normal. On the rare occasions when she is able to have sex, she uses condoms for contraception. She is otherwise fit and well, takes no regular medications and has no medical history of note. She drinks alcohol infrequently and does not smoke.

Examination

Jane is slim, with a body mass index (BMI) of 22 kg/m². Her abdomen is mildly tender to palpation suprapubically. Speculum examination is normal but not tolerated well. Pelvic examination finds a fixed bulky retroverted uterus that is tender to palpation.

Interpretation of findings

Jane's history of cramping pelvic pain that precedes menstruation and subsides several days after the onset of bleeding is typical for endometriosis. Deep dyspareunia is another common symptom. The absence of bleeding between periods or after sex makes pelvic inflammatory disease less likely as a diagnosis.

Jane has not tried hormonal contraceptives previously; this information is important as relief of symptoms with hormonal treatment occurs in endometriosis. The examination findings of discomfort during speculum examination and a fixed, bulky, retroverted uterus that is tender to palpate also support a diagnosis of endometriosis. The latter is due to scarring caused by endometriosis pulling the uterus backwards.

Endometriosis can significantly reduce a woman’s quality of life. Its chronic and debilitating symptoms can interfere with her ability to fulfil work commitments and affect her relationships with others. Emotional difficulties and dyspareunia can cause problems between her and her partner, and she is more likely to experience subfertility.

Imaging and a diagnostic laparoscopy are required in order to investigate Jane’s symptoms; laparoscopy is needed to confirm a diagnosis of endometriosis and to establish the extent of disease. Ultrasound excludes other differential diagnoses, such as fibroids, but may not be informative in all cases of endometriosis if the disease does not cause anatomical distortion. Jane's normal BMI makes performing these investigations easier.

Investigations

Transvaginal ultrasound shows bilateral haemorrhagic ovarian cysts characteristic of endometriomas (see page 319).

Diagnostic laparoscopy confirms the presence of the bilateral ovarian cysts, which are lodged in the rectouterine pouch. The uterus is fixed in a retroverted position by dense adhesions. Endometriotic nodules are present in the uterovesical pouch.

A nodule is sent for histological review, and the results confirm endometriosis.

Diagnosis

The findings at laparoscopy of ectopic endometrial tissue confirm a diagnosis of endometriosis. Jane is relieved that her symptoms have been taken seriously and a diagnosis reached. She knew that something was wrong but was worried about being thought of as a hypochondriac. The impact of her endometriosis has been considerable, but both her and her doctor are hopeful that, with treatment, her symptoms and quality of life will start to improve.
Chapter 11 Inflammatory and infective disorders

Case 13 Vaginal discharge

Presentation
Penny Burton, who is 20 years old, presents to her general practitioner (GP) complaining of smelly vaginal discharge.

Initial interpretation
Vaginal discharge is a common complaint with many physiological and pathological causes (see Table 11.4). It is important to take a detailed sexual and contraceptive history, to carry out a speculum and pelvic examination and to take swabs for microbiological investigations to determine the cause of the discharge.

Physiological causes of vaginal discharge include pregnancy, use of the combined oral contraceptive pill, and cervical ectopy (see page 24). Infection is the most common pathological cause of vaginal discharge in young women, but other, more sinister causes are always considered, including cervical cancer.

Further history
Penny has noticed the discharge for a couple of weeks. She has had no associated pelvic pain, dyspareunia or abnormal bleeding. Her periods are normal.

Penny has had several sexual partners over the past few months. She is on the combined oral contraceptive pill but often forgets to take it. She does not always use condoms with a new partner. She has never been diagnosed with a sexually transmitted infection (STI) or been pregnant.

She is a university student, smokes 15 cigarettes per day and drinks ‘too much’ alcohol at weekends.

Apart from the discharge, she is fit and well and has no medical history of note.

Examination
Penny is slim, with a BMI of 24 kg/m². Abdominal examination is normal.

Interpretation of findings
Given the history of unprotected sexual intercourse with different partners, an infective cause for the vaginal discharge is most likely. There are no signs of PID necessitating emergency gynaecological referral, such as fever, vomiting or significant lower abdominal pain requiring parenteral analgesia.

Cervical ectopy is a common finding in women taking the combined oral contraceptive pill. This can cause postcoital or irregular vaginal bleeding, and cream-coloured watery vaginal discharge.

Microbiological swabs need to be taken from the endocervix and vagina to identify the organism causing her discharge and to establish antibiotic sensitivities.

Investigations
Penny’s GP takes various swabs for tests and contacts her with the results a few days later. The endocervical swab sample is negative for gonorrhoea. Her chlamydia screen is negative.

The sample of discharge from the high vaginal swab gives a positive result with the potassium hydroxide ‘whiff’ test, has a pH > 4.5 and has large numbers of clue cells. These findings are consistent with a diagnosis of bacterial vaginosis.

Diagnosis
The diagnosis is bacterial vaginosis, so Penny is started on antibiotic treatment.

Her GP offers sexual health advice. She suggests that Penny considers switching...
to long-acting reversible contraception, for example the contraceptive injection, and advises always using condoms with new partners. She invites Penny to attend an STI screen at the local sexual health clinic.

The GP also uses the opportunity to offer general health advice to stop smoking, reduce alcohol intake and avoid binge drinking.

**Endometriosis**

Endometriosis is the presence of endometrial glands and stroma (supportive tissue) outside the uterine cavity.

**Epidemiology**

The prevalence of endometriosis is 5–10% of women in the reproductive age group, 40% of women with subfertility and 80% of women with chronic pelvic pain.

**Aetiology**

The cause of endometriosis remains unknown. The most widely accepted theory is that retrograde menstruation allows seeding of endometrial tissue in the pelvis (Table 11.1).

Because aetiology of endometriosis is unknown, there is no proven prevention strategy. However prevalence is lower in women using hormonal contraception, suggesting hormones may be involved in the aetiology. Hormonal contraceptives do not eradicate it, but they can suppress symptoms whilst they are being taken.

**Pathogenesis**

The ectopic endometrium responds to the hormones that regulate the menstrual cycle. The resultant cyclical bleeding of this tissue causes peritoneal irritation, which in turn causes scarring and distortion of pelvic anatomy.

**Clinical features**

Endometriosis causes cyclical pelvic pain, deep dyspareunia and subfertility. In severe cases, examination findings include a fixed retroverted uterus, nodular uterosacral ligaments and tender enlarged adnexae (Table 11.2).

Endometriosis can be mild, affecting few areas (Figure 11.1), or widespread and associated with severe adhesions and fibrosis. The severity of symptoms does not correlate well with the extent of the disease, as determined at laparoscopy.

**Diagnostic approach**

Clinical findings support the diagnosis of endometriosis. Investigations are used to
confirm the diagnosis and assess the extent of the disease.

**Pelvic pain is a common symptom with many different causes.** The relationship of the pain to menstruation and bowel and urinary function can distinguish the likely cause. Gynaecological causes must be considered for every female, especially those of reproductive age.

**Investigations**

Ultrasound of the pelvis shows endometriomas, i.e. blood-filled ‘chocolate’ ovarian cysts. Endometriomas are present in 20–40% of women with endometriosis. Neither ultrasound nor magnetic resonance imaging (MRI) can be used to identify superficial disease, but the latter may be useful to assess the depth of infiltrating endometriosis.

Laparoscopy is the gold standard diagnostic technique for endometriosis. Visual

<table>
<thead>
<tr>
<th>Symptons</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclical pelvic pain</td>
<td>Tenderness in posterior or lateral vaginal fornices</td>
</tr>
<tr>
<td>Deep dyspareunia (pelvic pain during penetrative sexual intercourse)</td>
<td>Pain on movement of the uterus</td>
</tr>
<tr>
<td>Subfertility</td>
<td>Tender adnexal mass</td>
</tr>
<tr>
<td>Heavy menstrual bleeding</td>
<td>Lateral displacement of the cervix as a result of asymmetrical involvement of one uterosacral ligament</td>
</tr>
<tr>
<td>Ovulatory pain</td>
<td>Palpable tender nodules in the rectouterine pouch, uterosacral ligaments or rectovaginal septum</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Fixation of adnexa or uterus in a retroverted position</td>
</tr>
<tr>
<td>Depression</td>
<td></td>
</tr>
<tr>
<td>Symptoms suggesting irritable bowel syndrome</td>
<td></td>
</tr>
<tr>
<td>Dysuria (pain during micturition)</td>
<td></td>
</tr>
<tr>
<td>Dyschezia (pain on defecation)</td>
<td></td>
</tr>
<tr>
<td>Cyclical bleeding from other organs (rare)</td>
<td></td>
</tr>
</tbody>
</table>

Table 11.2 Symptoms and signs of endometriosis

**Figure 11.1** Laparoscopic appearance of endometriosis. (a) 1, typical small, flat, dark patches or flecks of blue–black (‘powder burns’) in the right ovarian fossa and on the right uterosacral ligament. (b) 2, fine adhesions between the sigmoid colon and the left pelvic sidewall, and between the anterior surface of the uterus and the anterior abdominal wall. Courtesy of Andrew Pickersgill.
assessment of the peritoneal cavity establishes the sites and extent of disease (Table 11.3). The clinical appearances of endometriosis are many and varied, and histological confirmation is recommended.

Endometriosis is associated with an increased risk of certain epithelial ovarian cancers, notably endometrioid, clear cell and low-grade serous ovarian cancers. This may be because endometriosis cells are transformed into cancer cells. Alternatively, risk factors or antecedent mechanisms, including genetic predisposition, immune dysregulation, and environmental factors, may be common to both conditions.

Management
Management depends on a woman’s fertility intentions. There is no role for medical management of endometriosis in women trying to conceive.

Medication
The aim of medical management is to suppress ovulation and induce amenorrhea. It includes the use of the combined oral contraceptive pill, progestogen-only pills, the contraceptive injection or implants, or the levonorgestrel-releasing intrauterine system. Gonadotrophin-releasing hormone analogues with add-back (supplementary) hormone replacement therapy simulate the menopausal state without the associated symptoms of hot flushes, night sweats, mood alterations, vaginal dryness, etc. Symptomatic management with analgesics such as non-steroidal anti-inflammatory drugs is useful in women whose symptoms are not completely resolved by hormonal treatments.

Symptom recurrence is normal after cessation of treatment.

Surgery
The aim of surgery is to excise or ablate deposits of ectopic endometrial tissue, divide adhesions and restore pelvic anatomy. Removal of endometriomas of ≥ 6 cm improves fertility rates. Recurrence rates of 20–40% have been reported after conservative surgery. Intractable symptoms may warrant hysterectomy and even bowel resection, depending on their severity and the sites of disease.

Prognosis
Endometriosis resolves spontaneously in one third of women without active treatment, but in general it is a chronic, progressive disease with significant morbidity. Patient support groups, provide much needed support and information to help women cope with the disease (e.g. Endometriosis UK). Typically, symptoms improve after the menopause as lesions become quiescent due to the lower levels of circulating oestrogen.

### Table 11.3 Laparoscopic appearances of endometriosis

<table>
<thead>
<tr>
<th>Laparoscopic finding</th>
<th>Appearance or stage of disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial or deep implants</td>
<td>‘Powder burns’</td>
</tr>
<tr>
<td>Flame lesions</td>
<td></td>
</tr>
<tr>
<td>Vesicular lesions</td>
<td></td>
</tr>
<tr>
<td>White glands</td>
<td></td>
</tr>
<tr>
<td>Nodular disease</td>
<td></td>
</tr>
<tr>
<td>Adhesions</td>
<td>Filmy or dense</td>
</tr>
<tr>
<td>Rectouterine pouch</td>
<td>Complete obliteration</td>
</tr>
<tr>
<td>Lesions visible during surgery*</td>
<td>Minimal (stage 1)</td>
</tr>
<tr>
<td></td>
<td>Mild (stage 2)</td>
</tr>
<tr>
<td></td>
<td>Moderate (stage 3)</td>
</tr>
<tr>
<td></td>
<td>Severe (stage 4)</td>
</tr>
</tbody>
</table>

*Scoring of lesions used to grade endometriosis according to the American Fertility Society classification system.
Lower genital tract infections

Lower genital tract infections (infections of the cervix, vulva and vagina) are common in young, sexually active women. Risk factors include multiple sexual partners, non-barrier methods of contraception, smoking, antibiotic use and immunosuppression. Infections can be asymptomatic or present with offensive, unusually coloured discharge. Management is based on identification of the underlying cause and appropriate antibiotic or antifungal treatment.

Sexually transmitted infections are conditions transmitted by genital, anogenital or oro-genital contact. They may be bacterial, viral, spirochaetal or protozoan. Coinfection with more than one STI is common. Changes in sexual behaviour, including having a greater number of sexual partners and reduced use of barrier contraception, have made STIs more common.

Syphilis, HIV and hepatitis B and C cause symptoms that affect organs outside of the reproductive tract. These infections use the reproductive tract as a site of entry and travel via the circulation to the tissues and cells that they later infect.

Vulvovaginitis

Vulvovaginitis is caused by infection of the vulva and vagina, and is the most common gynaecological problem for which women seek treatment. Symptoms include vaginal discharge, odour and itch. The most common infective causes are bacterial vaginitis, vaginal thrush and trichomoniasis (Table 11.4).

In contrast to oral infections, vulvovaginal thrush is not an opportunistic infection, and unlike Trichomonas vaginalis infections, it is not considered sexually transmitted. Sporadic attacks occur without an identifiable precipitating factor. However, recurrent vulvovaginal thrush is associated with type 2 diabetes mellitus, use of broad spectrum antibiotics, immunosuppression and increased oestrogen levels, such as in pregnancy and with use of the combined oral contraceptive pill.

Chlamydia

Chlamydia is the most common STI in high-income countries. The causative organism is Chlamydia trachomatis, an obligate intracellular bacterial that infects columnar epithelial cells, including endocervical cells. Symptoms include purulent discharge and postcoital bleeding. However, many women

<table>
<thead>
<tr>
<th>Condition</th>
<th>Aetiology</th>
<th>Symptoms</th>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial vaginosis</td>
<td>Overgrowth of anaerobic bacteria</td>
<td>Vaginal discharge, Fishy odour (Asymptomatic in 50% of cases)</td>
<td>At least 3 of the following: positive potassium hydroxide ‘whiff’ test result, pH &gt; 4.5, &gt; 20% clue cells on wet mount, grey discharge</td>
<td>Antianaerobic antibiotics (e.g. metronidazole)</td>
</tr>
<tr>
<td>Vaginal thrush</td>
<td>Candida albicans (fungus)</td>
<td>Itch, Erythema</td>
<td>Hyphae on wet mount, Fungal growth on culture</td>
<td>Antifungal cream, pessary or tablet (e.g. clotrimazole, fluconazole)</td>
</tr>
<tr>
<td>Trichomoniasis</td>
<td>Trichomonas vaginalis (protozoan)</td>
<td>Offensive vaginal discharge, Postcoital bleeding, Erythema</td>
<td>Trichomonads on wet mount, pH &gt; 4.5, White blood cells</td>
<td>Oral metronidazole</td>
</tr>
</tbody>
</table>

Table 11.4 Common infective causes of vulvovaginitis
Lower genital tract infections

are asymptomatic and the diagnosis follows partner notification. About 30% of women with gonorrhoea have coinfections with chlamydia.

Diagnosis is by testing a sample obtained by endocervical swab, or a sample of urine, by fluorescent monoclonal antibody test, polymerase chain reaction or nucleic acid amplification test. Treatment is with tetracycline and macrolide antibiotics such as doxycycline or azithromycin.

Chlamydia is common in young women, and although most infections are asymptomatic, about 10% of patients develop PID. Urine testing to screen women aged 18–25 years for chlamydia has been shown to reduce the prevalence of PID and associated morbidity, which includes chronic pelvic pain, tubal factor infertility and ectopic pregnancy.

Gonorrhoea

Gonorrhoea is caused by Neisseria gonorrhoeae, a Gram-negative diplococcus. The most common symptom of infection is vaginal discharge, and 10–20% of patients develop PID.

Gonorrhoea is also a cause of Bartholin’s abscess (abscess of the Bartholin’s gland), neonatal conjunctivitis (ophthalmia neonatorum) and seronegative arthropathy (joint disease). The rectum, urethra and oropharynx can also be infected. Some women have asymptomatic infection.

Treatment is with ceftriaxone and azithromycin in order to prevent drug resistance.

Genital warts

Genital warts, i.e. condyloma acuminata, are caused by human papillomavirus (HPV) and spread by skin-to-skin contact. They are the most common viral STI (Figure 11.2).

Immunosuppression and pregnancy are risk factors. Diagnosis is usually on clinical grounds. Treatment includes topical podophyllotoxin, topical imiquimod, cryotherapy or surgery, but recurrence is common.

Genital herpes

Herpes simplex virus (HSV) infection causes painful vulval ulceration (Figure 11.3). HSV type 1 is responsible for 15% of cases of genital herpes, and HSV type 2 for 85%.

Genital herpes infections are spread through intimate sexual contact and the incubation period is about 7 days. Once the ulcers have appeared, they take up to 14 days to scab over and heal. The infection lies dormant in the dorsal root ganglia, and infection can recur throughout the woman’s life.

First-episode primary HSV is characterised by malaise and fever. The first episode is usually the worst, and ulcers can be so painful that they cause urinary retention. Subsequent episodes are less painful and shorter lasting. Treatment is with oral aciclovir, which shortens the attack but is not curative.
Syphilis

Syphilis is caused by the spirochaete Treponema pallidum. Primary infection is characterised by a painless solitary ulcer at the site of infection. Untreated, this can lead to secondary syphilis, which commonly presents with malaise, a generalised rash affecting the palms and soles but not the face, lymphadenopathy (enlarged lymph nodes) and condylomata lata (warty lesions on the genitals specifically due to syphilis infections).

Latent syphilis is the term given to T. pallidum infection with no signs or symptoms and diagnosed on serological testing. Late syphilis may affect the central nervous system, causing tabes dorsalis (degeneration of nerve fibres in the spinal cord causing unsteadiness of gait, lightning pains and urinary incontinence) or dementia, or the cardiovascular system, causing aortitis (inflammation of the aorta). There may be progressive destructive lesions or gummata (soft tissue swellings in the liver, brain and heart).

Diagnosis is based on the results of serological tests: the Venereal Disease Research Laboratory (VDRL) test, rapid plasma reagin test, T. pallidum particle haemagglutination assay (TPHA) and enzyme immunoassay (EIA). Treatment is with intramuscular benzylpenicillin.

HIV

Human immunodeficiency virus is a retrovirus transmitted by:
- unprotected sex
- exposure to infected blood and other bodily fluids
- vertical transmission from mother to child through childbirth or breastfeeding

Transmission rates vary according to type of exposure. For example, the per-act risk of transmission is 5 per 10,000 with penetrative vaginal intercourse but 50 per 10,000 with anal intercourse (figures for receptive partner). The number of new heterosexually acquired HIV infections now equal those acquired by men who have sex with men. Vertical transmission and intravenous drug abuse are uncommon routes of transmission in countries with a low background prevalence of HIV, e.g. the UK.

Antibodies develop within 4–8 weeks after exposure. The initial seroconversion period can be asymptomatic or associated with a mild flu-like illness. Treatment with antiretroviral medications can defer the development of AIDS.

Acute HIV infection presents with non-specific symptoms including fever, lymphadenopathy, sore throat, rash, arthralgia (painful joints) and headache. Diagnosing acute HIV infection is essential from a public health perspective, because individuals who know they are HIV-positive are less likely to engage in unsafe sex and needle sharing. In addition, prompt initiation of antiretroviral therapy reduces viral load and thereby lessens the risk of transmission to others.

Hepatitis B and C

Hepatitis B and C can be transmitted sexually by exposure to contaminated blood or blood products or vertically from mother to baby during pregnancy and delivery. Hepatitis B vaccination is offered to high-risk individuals, including health care professionals, sex workers and people with liver disease.
Pelvic inflammatory disease

Pelvic inflammatory disease (PID) is an ascending infection of the upper female genital tract. It is the most common complication of lower genital tract infections, such as chlamydia or gonorrhoea. There is very little data regarding the incidence of PID worldwide due to poor reporting and variations in the criteria used to define it. In developed countries, however, it is estimated that 1 in 20 women will be treated for PID in their lifetime.

Aetiology

*Chlamydia trachomatis* and *Neisseria gonorrhoeae* are the most common causative organisms. Others include *Mycoplasma genitalium*, *Gardnerella vaginalis* and mixed anaerobes. Risk factors include age < 25 years, multiple sexual partners, unprotected sexual intercourse and recent insertion of a copper intrauterine contraceptive device.

Prevention

The risk of PID is reduced by the use of barrier contraception and antibiotic prophylaxis for women at high risk of sexually transmitted infections prior to insertion of intrauterine devices.

Pathogenesis

Ascending genital tract infection causes cervicitis (inflammation of the cervix), endometritis (inflammation of the endometrium), salpingitis (inflammation of the fallopian tubes) and in severe cases the development of tubo-ovarian abscesses.

Clinical features

Typical symptoms of acute PID are severe lower abdominal pain, abnormal vaginal bleeding (intermenstrual or postcoital), offensive vaginal discharge and fever.

Common examination findings are pyrexia, lower abdominal tenderness, mucopurulent or blood-stained vaginal discharge, cervical excitation (pain on cervical movement), adnexal tenderness and swelling.

Diagnostic approach

Clinical suspicion is necessary, because PID may present with non-specific symptoms. The presence of unusual vaginal discharge, bilateral lower abdominal pain and a recent change in sexual partner should prompt investigation for PID. Investigations are used to confirm the diagnosis, assess the extent of disease and guide treatment.

Investigations

Pregnancy should be excluded, because some of the antibiotics used to treat PID are teratogenic. Appropriate blood tests include a white cell count and C-reactive protein test. Microbiological investigation includes an nucleic acid amplification test for chlamydia and gonorrhoea, and for those patients at high risk of infection, serological investigation for HIV, using samples obtained by high vaginal and endocervical swabs.

Imaging

Transvaginal ultrasound or MRI can show dilated fallopian tubes or a tubo-ovarian mass (Figure 11.4). Free fluid may be visible in the rectouterine pouch.

Laparoscopy

Diagnostic laparoscopy is useful to obtain fluid for culture, assess complicated or unresolved infection and drain an inflammatory mass. Perihepatic adhesions suggest Fitz-Hugh-Curtis syndrome, a rare complication of PID often caused by chlamydia.

Management

Pelvic inflammatory disease is a polymicrobial infection requiring broad spectrum antibiotic therapy covering both aerobic and anaerobic bacteria. Empirical antibiotic treatment is started without waiting for microbiology results because a negative microbiological screen does not rule out an infection. Prompt treatment reduces the risk of chronic PID, pelvic pain and infertility.
Outpatient treatment is usually possible. However, in-patient care is necessary if the patient is clinically unwell.

Medication
Antibiotic regimens simultaneously cover chlamydia, gonorrhoea and anaerobic organisms. Ceftriaxone, doxycycline and metronidazole are commonly used in combination to treat patients with PID.

Different hospitals advise different antibiotic regimens for PID. The choice of antibiotics depends on the most common causative organisms in the local area and their sensitivity to specific antibiotics.

Surgery
This may be necessary to drain pelvic abscesses that continue to enlarge and cause pain and pyrexia despite antibiotics. Seventy-five per cent of pelvic abscesses respond to antibiotics alone.

Prognosis
The prognosis following an episode of acute PID is generally good as long as prompt antibiotic treatment is received. The longer treatment is delayed, the higher the likelihood of long term sequelae. The long-term sequelae of acute PID are chronic pelvic pain, pelvic adhesions, ectopic pregnancy and subfertility or infertility.

Vulval skin disorders
Skin disorders may affect the vulva in isolation or be one manifestation of a systemic disease such as Crohn’s disease, psoriasis or eczema. The aim of management is symptom control and maintenance of sexual function. Vulval skin disorders have various causes (Table 11.5).

Epidemiology
Up to one fifth of women are affected by a vulval skin disorder during their lifetime, typically after the menopause.

Clinical features
The most common symptoms are itching and irritation. Some disorders have characteristic appearances (Figure 11.5; see also Table 11.5), but these can be highly variable. Most vulval skin disorders are chronic conditions that tend to relapse after periods of good symptom control.
Diagnostic approach

A detailed history is required to exclude medical conditions that affect the vulva, including Crohn’s disease, psoriasis and eczema. A history of diabetes suggests candidiasis (see page 304) or an autoimmune disorder, and factors such as a change of washing powder, changes to personal hygiene routine and allergy may be relevant. Examination includes inspection of all mucosal and skin surfaces.

Investigations

Many vulval disorders can be recognised clinically and a 6-week course of treatment started empirically. If symptoms do not improve, and in ambiguous cases, a vulval biopsy is essential for histological diagnosis. This is vital when vulval cancer is suspected. Autoimmune conditions prompt exclusion of diabetes and thyroid disease.
Indications for vulval biopsy are:

- clinically suspicious lesions, i.e. those showing rapid change, with bleeding or an irregular border, and non-healing ulcers
- inability to confidently diagnose a benign condition by visual inspection
- unsuccessful empirical topical treatment
- patient concern

Most cases of vulval cancer present late. Physicians may be reluctant to examine because of time pressures, lack of a chaperone or embarrassment, and patients may be reluctant to be examined, mainly because of embarrassment. It is essential to examine every patient with vulval symptoms, because failure to do so can lead to delayed diagnosis and a fatal outcome.

Management

General advice for vulval skin care is relevant for all conditions.

- Avoid potential irritants that may exacerbate symptoms, such as soap, perfumed products, synthetic fabrics and preservatives in topical treatments
- Use soap substitutes such as an emollient

Vulval manifestations of systemic disorders are managed accordingly. Topical corticosteroids can relieve symptoms in patients with lichen sclerosus, lichen planus and vulval intraepithelial neoplasia. Surgical excision is effective but disfiguring, so it is reserved for women with unbearable symptoms and cases in which cancer is suspected.

Prognosis

Lichen sclerosus, lichen planus and vulval intraepithelial neoplasia are all premalignant conditions that carry a 5–10% risk of progression to cancer. Annual check-ups are required to exclude malignant disease. Patients are also encouraged to inspect their vulva regularly and report any concerns.

Answers to starter questions

1. The aetiology of endometriosis is unknown although several theories exist. The most widely held view is that reflux of endometrial cells through the Fallopian tubes occurs during menstruation. In some women, these cells become attached to peritoneal surfaces where they invade and grow in response to ovarian hormonal stimulation. It is unclear why this occurs in some but not all women. The amount of menstrual blood that refluxes through the tubes may be important, as well as altered or deficient immunological mechanisms that fail to ‘mop up’ endometrial cells in the peritoneal cavity. This theory does not explain distant endometriotic deposits, such as those found outside the pelvis.

2. Endometriosis is the cause of subfertility in 5–15% of couples. Minimal or mild endometriosis causes an overproduction of prostaglandins, cytokines and chemokines that impair ovarian, tubal, endometrial and peritoneal function. Moderate or severe endometriosis causes pelvic adhesions that distort pelvic anatomy and therefore interfere with oocyte release, tubal pickup and fertilisation.

3. Adolescent girls are offered HPV vaccination at 12–13 years of age, to prevent cervical cancer in many countries. In 2013, Australia became the first country to introduce HPV vaccination for boys aged 12–13 years of age. There is evidence that herd immunity against HPV could develop if enough girls are vaccinated, which will afford boys some degree of protection against infection with HPV 6, 11, 16 and 18. For example, in young men in countries where HPV vaccination of girls is widespread there has been a decline in new cases of genital warts, which are caused by HPV 6 and 11.