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Guideline

European Society of Coloproctology guidelines for the management of pilonidal disease

Dotun Ojo[1,2,*], Gaetano Gallo[3], Jos Kleijnen[4,5], Susanne Haas[6], Donatas Danys[7], Dragomir Dardanov[8], Gianluca Pellino[9,10], Johannes Jongen[11], Kathryn O'Shea[12], Luigi Basso[13], Niki Christou[14], Paola De Nardi[15], Steven Brown[16,17] and Asha Senapati[1]

[1]St Mark's Academic Institute, St Mark's Hospital, London, UK
[2]Department of Surgery and Cancer,Imperial College London, London, UK
[3]Department of Surgery, University of Rome, Rome, Italy
[4]School for Public Health and Primary Care, Maastricht University CAPHRI, Maastricht, Netherlands
[5]Research Institute, Kleijnen Systematic Reviews Ltd, York, UK
[6]Department of Surgery, Regional Hospital Randers, Randers, Denmark
[7]Faculty of Medicine, Vilnius University, Vilnius, Lithuania
[8]Department of Surgery, University Hospital Alexandrovska, Sofia, Bulgaria
[9]Department of Advanced Medical and Surgical Sciences, Università degli Studi della Campania Luigi Vanvitelli, Caserta, Italy
[10]Colorectal Surgery, Vall d'Hebron University Hospital, Barcelona, Spain
[11]Department of Proctology, Proktologische Praxis Kiel, Kiel, Germany
[12]Deapartment of Paediatric Surgery, Manchester University NHS Foundation Trust, Manchester, UK
[13]Department of Surgery, University of Rome, Rome, Italy
[14]Centre Hospitalier, Universitaire de Limoges, Limoges, France
[15]Department of Gastroenterological Surgery, San Raffaele Scientific Institute, Milan, Italy
[16]Department of Surgery, University of Sheffield, SCHARR, Sheffield, UK
[17]Department of Surgery, Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, United Kingdom

*Correspondence to: Dotun Ojo, St Mark's Academic Institute, St Mark's Hospital, London, HA1 3UJ (e-mail: dotun.ojo@nhs.net)

Introduction

Pilonidal disease (PD) is a benign condition affecting the natal cleft in young men and women usually between the ages of 20 and 40 years. Despite an increasing incidence, there is no widely accepted consensus that standardizes the management of this disease. This guideline may act as a resource for patients wanting to gain a comprehensive overview of treatment options. However, primarily, the goal of these guidelines is to provide an internationally collaborated set of recommendations for clinicians and healthcare professionals who treat patients with PD.

Methodology

Formation of Guideline Development Group

The European Society of Coloproctology (ESCP) commissioned the development of these guidelines, led by one of the authors (A.S.). An invitation to participate in the development of the guidelines was sent to the ESCP membership via the ESCP website. Applicants were vetted to include those with a surgical interest in, or those who had previously published in, PD. Contributors were selected from a wide geographical area with an intention to include clinicians from across Europe. The successful applicants formed the Guideline Development Group (GDG) (*Appendix S1*). The GDG had representation from Bulgaria, Denmark, France, Italy, Germany, Lithuania, the Netherlands, Turkey, and the UK. A further Executive Group (A.S., D.O., G.G., S.B., S.H.) met on a more frequent basis to ensure the direction and progression of the guidelines. A patient, a general practitioner, and a paediatric surgeon were included in the GDG to obtain their perspective.

Setting the scope

The development of this guideline was based on a protocol presented in previous ESCP guidelines[1]. The GDG identified potential topics to be covered by the guidelines as well as the target audience. Once agreement had been reached by the GDG, a list of outcomes (*Appendix S2*) deemed critical in making recommended statements for clinical decisions was made.

For the purpose of this guideline, the GDG refers to PD encompassing pilonidal sinus disease, pilonidal cyst, and pilonidal sinus occurring within the natal cleft.

Development of review questions

The GDG was tasked to produce review questions based on the initial topics, which included risk factors, diagnosis and evaluation, treatment options, postoperative management, special situations, and prevention. Review questions were formed using the PICO (Population, Intervention or Exposure, Comparison or Control, Outcome) framework, or similar frameworks for non-interventional questions. The initial review questions formed the basis for the literature search, as well as providing a guide for draft recommendations to be made following review of the literature. All initial review questions were reviewed by the GDG before commencement of the literature search. Details of the literature search and selection can be found in *Appendix S3*.

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Literature search

A systematic search was performed of Kleijnen Systematic Reviews (KSR) Evidence, Cochrane, MEDLINE, Ovid, and PubMed databases to identify the literature required to answer each review question. No initial restrictions were imposed on age or language of publication. Some 3840 papers were identified for initial screening. Each abstract was screened by at least two members of the executive group, using the free web tool Rayyan.ai to select studies relevant to the guideline. Inclusion criteria were systematic reviews, meta-analyses, RCTs, and observational studies with a cohort of least 50 participants. Literature published before 1990 was excluded. Finally, 1025 studies were identified to be included. These studies were grouped by relevance to each review question. GDG members were asked to add any other literature that they considered relevant but had not been included.

Review of literature

The GDG then produced draft recommendations for each review question based on the included studies. Draft statements focused on the use of the highest level of evidence (systematic reviews or meta-analyses) to formulate statements where possible. Where there was a paucity of these types of study, RCTs or observational studies were considered, according to the pyramid of evidence-based medicine.

Quality assessment of literature

Risk-of-bias assessment (*Appendix S4*) of the gathered literature was then conducted. All of the systematic reviews and meta-analyses used in the guidelines had undergone an assessment for risk of bias by the KSR team, using the Risk of Bias Assessment Tool for Systematic Reviews tool. A JBI (Joanna Briggs Institute, University of Adelaide, Adelaide, Australia)® checklist was used for risk assessment of randomized trials.

GRADE assessment

The GRADEPRO® software (Evidence Prime Inc, Hamilton, Ontario, Canada) (GRADE - Grading of Recommendations, Assessment, Development, and Evaluations) assessment was used to grade the quality of evidence used in formulating recommendations. Draft recommendations were amended based on this evidence. The overall strength of a recommendation was determined by lowest level of certainty of an outcome in each section. Where there was more than one available systematic review or meta-analysis, the most up-to-date review was used to form recommendations. The benefits and side-effects of each intervention were considered and weighed before formulating recommendations.

In the context of a moderate level of evidence being available, statements were amended to include words such as 'preferred', to reflect a moderate to high level of confidence in the quality of evidence. In the context of a low or very low level of evidence, statements were amended to include words such as 'could' or 'can be considered' or 'not necessary' to reflect the uncertainty of evidence. Where evidence was not available, expert opinion was given, by consensus within the GDG. Statements were reviewed and refined until agreement had been achieved.

Validation

The AGREE-S checklist® (*Appendix S5*) serves as an appraisal framework to assess the methodological quality of newly produced guidelines and ensure all domains have been addressed. This set of guidelines has been evaluated against the AGREE-S reporting checklist. They will be reviewed in 5 years by the ESCP guidelines committee.

List of recommendations

A succinct history should be obtained by clinicians including onset, risk factors, and previous management of PD.
Management of any modifiable risk factors can be considered before definitive management of PD (for example smoking cessation).
Expert opinion

Diagnosis of PD is based on clinical examination of the natal cleft and the perianal area; mapping the extent of disease and the distance to the anus can be considered.
Expert opinion

The diagnosis of acute pilonidal abscess is a clinical one, but imaging can be considered to rule out other anorectal disorders.
Expert opinion

If there is a history of intermittent swelling in the apocrine gland regions (axilla and inguinal), these regions should be examined and hidradenitis suppurativa considered as differential diagnosis.
Expert opinion

Serum blood tests and diagnostic imaging are not routinely required for the diagnosis of PD.
If anal fistula is suspected, appropriate evaluation should be undertaken.
Expert opinion

Histological examination of a PD specimen does not need to be performed routinely.
Expert opinion

A tested and validated classification system could be considered for documentation and stratification of disease. This will allow more robust future comparative trials and may assist clinicians in therapeutic management.
Expert opinion

Acute pilonidal abscess should be treated with lateral incision and drainage. This should be followed by definitive treatment.
Expert opinion

Drainage and curettage can be considered.
Low level of evidence

Antibiotics can be considered in an infection but are not curative. Definitive treatment should be offered.
Expert opinion

Minimally invasive endoscopic treatment such as endoscopic pilonidal sinus treatment (EPSiT) could be considered as an alternative treatment option for an acute abscess.
Expert opinion

Prophylactic intervention is not recommended for patients with asymptomatic PD.
Expert opinion

Patients with symptomatic PD should be considered for definitive surgical treatment.
Expert opinion

Patients with limited or simple disease (non-recurrent disease with simple pits with or without uncomplicated lateral extensions) could undergo minimal surgical interventions.
Very low level of evidence
A pit-picking technique could be considered in patients with disease confined to pits with or without a single lateral cavity.
Very low level of evidence

Patients undergoing PD surgery could be offered treatment with phenol.
Low level of evidence

Patients undergoing PD surgery could be offered treatment with fibrin glue.
Very low level of evidence

Endoscopic treatment can be offered for patients with PD.
Low level of evidence

Pits can be left open or closed.
Expert opinion

Laser surgery could be offered to patients with pilonidal PD.
Very low level of evidence

Real-time intraoperative ultrasonography may be considered in selected patients for PD treatment, if available.
Expert opinion

Excision and marsupialization of the wound can be considered in selected patients.
Low level of evidence

Off-midline closure is the preferred technique for patients undergoing excisional surgery for PD.
Excision and healing by secondary intention could be considered in selected patients. Excision and primary midline closure should be avoided.
Moderate level of evidence

Selected patients with recurrence could be offered an endoscopic or other minimally invasive surgical approach.
Expert opinion

The use of a drain in patients undergoing excisional surgery should be considered on an individual basis.
Low level of evidence

Use of perioperative dye is not essential for excisional surgery.
Very low level of evidence

To assess the impact of an individual procedure, a quality-of-life assessment tool should be used.
Expert opinion

Adolescent patients can be managed in line with adult practice guidelines.
Very low level of evidence

Patients undergoing intervention for PD could undergo surgery under local anaesthetic.
Very low level of evidence

There is no evidence that hair removal before surgery affects outcome.
Expert opinion

Postoperative hair removal around the natal cleft by any method is not a necessity to decrease rates of recurrence.
Low level of evidence

Showering after a haircut and attention to hygiene is recommended.
Expert opinion

No recommendation can be made about the use of laser hair epilation or any other hair removal as a primary intervention for patients with PD.
Expert opinion

Postoperative antibiotics are not indicated.
Very low level of evidence

Intraoperative antibiotic implants need not be used.
Low level of evidence

Specialized topical dressings are not necessary after open wounds in PD surgery.
Very low level of evidence

Patients undergoing PD surgery could be offered treatment with platelet-enriched plasma.
Low level of evidence

Negative-pressure wound therapy (NPWT) may be used after the breakdown of wounds in selected patients after pilonidal surgery.
Very low level of evidence

Evaluation, assessment, and diagnosis

No previous systematic reviews or RCTs were identified for this section, and most recommendations are based on expert opinion, supported where possible with case series.

A succinct history should be obtained by clinicians including onset, risk factors, and previous management of PD.
Management of any modifiable risk factors can be considered before definitive management of PD (for example smoking cessation).
Expert opinion

Obtaining a concise history is necessary as part of good clinical practice. This should include the onset of disease, previous management and surgery, family history, medication, allergies, smoking, profession, and other areas of potential inflammation suggestive of hidradenitis suppurativa (including perianal, perineal, inguinal, axillary, umbilical, subunchal, submammary, and interdigital).

There are no systematic reviews or RCTs specifically evaluating predisposing risk factors or risk factors for recurrence. Cohort studies have identified that patients with a previous family history of PD[2–5], male sex[2], and those in the second to third decade of life[2] have a greater predisposition to developing PD. Modifiable risk factors identified from previous cohort studies[4,6] include local trauma, smoking, obesity, long duration of sitting or driving, and good hygiene. Risk factors identified for recurrence in the literature include obesity, smoking, number of pits, and previous surgery, each of which has been identified by multiple cohort studies[5,7–13].

Diagnosis of PD is based on clinical examination of the natal cleft and the perianal area; mapping the extent of the disease and the distance to the anus can be considered.
Expert opinion

No systematic reviews or RCTs have evaluated the usefulness of mapping the extent of PD. Multiple pits or openings in the natal cleft are sufficient clinical features to make a provisional diagnosis of PD. Further clinical examination might show the (lateral) extent of the PD. To exclude an anal fistula as a differential diagnosis where the disease process is close to the anal canal, an anorectal examination (digital rectal examination and anoscopy) is necessary. Additional examination (ultrasound imaging and/or MRI) might be necessary in these patients.

The diagnosis of acute pilonidal abscess is a clinical one, but imaging can be considered to rule out other anorectal disorders.
Expert opinion

There are no systematic reviews or RCTs supporting the routine use of imaging modalities in addition to adequate clinical examination. However, where there is clinical doubt, endoanal ultrasonography or MRI may be indicated.

If there is a history of intermittent swelling in the apocrine gland regions (axilla and inguinal), these regions should be examined and hidradenitis suppurativa considered as a differential diagnosis.
Expert opinion

No previous systematic reviews or RCTs addressing this area were identified. However, a previous cohort studiy[14]

demonstrated a high prevalence of PD in patients with hidradenitis suppurativa.

Serum blood tests and diagnostic imaging are not routinely required for the diagnosis of PD.
If anal fistula is suspected, appropriate evaluation should be undertaken.
Expert opinion

No systematic reviews or RCTs were found relating to this topic. Routine laboratory blood tests for the diagnosis of PD are not necessary. A handful of cohort studies have examined the usefulness of imaging for the detection of PD. Ultrasonography and MRI allow mapping of the extent of disease, but are not essential for diagnosis.

Although no RCTs were identified, several moderate-sized cohort studies[15,16] have concluded that microbiological assessments before and after intervention are not warranted and should not delay antimicrobial therapy if indicated clinically.

Histological examination of a PD specimen does not need to be performed routinely.
Expert opinion

There are no systematic reviews or RCTs examining the role of histological examination of excised material from patients with PD. A recent retrospective cohort study by Akin *et al.*[17] examined 2486 patients who underwent surgery and histological examination of specimens. No malignancy was detected in any of the specimens examined. Histological examination should be requested solely where there is a high index of suspicion for malignancy, such as after a prolonged history.

A tested and validated classification system could be considered for documentation and stratification of disease. This will allow more robust future comparative trials and may assist clinicians in therapeutic management.
Expert opinion

One systematic review by Beal *et al.*[18] assessed eight published classification systems. No system was assessed as being superior. None have had any robust validation. The review recommends that a 'practical classification system to guide clinical practice is required'.

Treatment: acute abscess management

Acute pilonidal abscess should be treated with a lateral incision and drainage. This should be followed by definitive treatment.
Expert opinion

Drainage and curettage can be considered.
Low level of evidence

There are no systematic reviews or meta-analyses evaluating the management of acute pilonidal abscess. The widely accepted standard for management of an acute pilonidal abscess is adequate drainage of the abscess with a lateral drainage incision. Definitive surgery is likely required at a later date; incision and drainage is unlikely to be curative alone[19].

A single RCT by Hosseini *et al.*[20] explored drainage and delayed curative excision with closure *versus* excision and healing by secondary intention for patients presenting with PD. Another RCT, undertaken by Vahedian *et al.*[21], randomized 150 patients with acute pilonidal abscess to treatment with incision and drainage *versus* deroofing and curettage; recurrence rates were found to be significantly lower in the curettage group. However, further robust quality studies are required before a change in practice can be recommended.

Question: Incision and drainage compared with wide excision for acute pilonidal abscess (Hosseini *et al.*[20] 2006)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Recurrence									
1	RCT	Very serious*	Not serious	Not serious	Not serious	None	Analysis of 1 RCT by Hosseini *et al.*[20]. Abscess recurrence rate 14% (5 of 36) in group undergoing drainage and delayed excision after 12 months, *versus* no recurrence in group undergoing excision and secondary healing after the same time	⊕⊕◯◯ Low	Important

*No matching of patient characteristics; unclear if groups similar at baseline; patients and treating clinician not blinded to treatment (blinding not possible); unclear aetiology or severity of disease.

Antibiotics can be considered in an infection but are not curative. Definitive treatment should be offered.
Expert opinion

There is a paucity of studies in the literature examining the role of antibiotics as a curative option for management of patients with symptomatic PD, with no systematic reviews or RCTs identified. Antibiotics can be administered in the acute infection phase, but not with the aim of cure. Antibiotics should have a broad spectrum of cover including Gram-negative organisms. Treatment with antibiotics should not delay definitive treatment.

Minimally invasive endoscopic treatment such as endoscopic pilonidal sinus treatment (EPSiT) could be considered as an alternative treatment option for an acute abscess.
Expert opinion

Endoscopic techniques have been described as an alternative to incision and drainage in the acute setting[22,23]. However, there is a lack of robust evidence in the literature addressing the technique in the acute phase.

Treatment: minimally invasive management for chronic disease

Minimally invasive treatment for PD can be defined as any procedure that attempts to preserve the skin and subcutaneous tissue of the natal cleft while at the same time providing a cure. Such procedures include pit-picking with curettage with or without fibrin glue, EPSiT, phenolization, Bascom's I procedure, seton insertion, laser treatment, and laying open. The clear advantage is the reduced impact on the patient, resulting in rapid recovery. However, such interventions may not be appropriate for more extensive disease. The lack of stratification of disease in almost all of the literature means that comparisons with other surgical intervention groups are difficult. Given this significant caveat, there is no specific systematic review comparing minimally invasive procedures as a group with more major excision techniques (for example excision and open healing, midline/off-midline closure, rotational flaps).

Prophylactic intervention is not recommended for patients with asymptomatic PD.
Expert opinion

Patients with symptomatic PD should be considered for definitive surgical treatment.
Expert opinion

There are no systematic reviews or RCTs examining these topics. It is well recognized that spontaneous resolution of symptomatic PD is rare, and so definitive treatment should be offered.

Patients with limited or simple disease (non-recurrent disease with simple pits with or without uncomplicated lateral extensions) could undergo minimal surgical interventions.
Very low level of evidence

Two systematic reviews by Stauffer *et al.*[19] and Baur *et al.*[24] focused on pooled reported recurrence rates for both common (pit-picking, Bascom's I, phenol, laser, seton) and uncommon (aspiration and antibiotics, dilatation of the external opening, EPSiT) minimally invasive procedures, using merged data analysis from both randomized and non-randomized trials. These reviews suggested that recurrence rates are similar for both minimal surgical interventions and the more extensive procedures. The recurrence rate at 12 months ranged from 1 to 8.5 (i.q.r. 1.9–2.8)% after minimal surgical techniques, and from 0.2 to 5 (1.0–2.8)% after more extensive surgery. There was a substantial increase in recurrence with time after all procedures. The definition of recurrence was not given, and varied widely across the included studies.

Given the lack of stratification of disease severity and variability of recurrence definition for all trials, it is impossible to draw meaningful conclusions from these reviews and individual studies. In general, the evidence suggests that recurrence after minimally invasive procedures is not dissimilar to that after more extensive interventions, but is very dependent on the follow-up time. Overall, minimally invasive surgery could be recommended for limited disease as it results in more rapid

recovery, with a suggestion that recurrence is similar to that after more invasive interventions.

Question: Minimally invasive procedures compared with more extensive procedures for patients with limited or simple pilonidal disease (Baur *et al.*[24] 2019)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Recurrence									
12	Non-randomized studies	Not serious	Not serious	Not serious	Very serious*	None	Analysis of 13 studies including 1 RCT by Baur *et al.*[24]. Recurrence rate for minimal surgical techniques ranged from 1 to 8.5 (i.q.r. 1.9–2.8)% at 12 months. There was a substantial increase in recurrence with time after all procedures. The definition of recurrence was not given and varied widely across included studies	⊕OOO Very low	Critical

*Wide confidence intervals around recurrence estimates.

Patients undergoing PD surgery could be offered treatment with phenol.
Low level of evidence

A pit-picking technique could be considered in patients with disease confined to pits with or without single lateral cavity.
Very low level of evidence

The search criteria identified one systematic review that evaluated the use of a pit-picking method for the treatment of PD. Two RCTs evaluated 98 patients undergoing pit-picking interventions; recurrence rates of 6.5% were observed after 24 months.

Question: Pit-picking compared with other techniques for patients with pilonidal disease (Stauffer *et al.*[19] 2018)

Phenol has robust antiseptic effects. Phenolization of PD has been described as an effective conservative treatment option, either as a standalone treatment or as an adjunct to other surgical interventions.

The search strategy identified one systematic review by Hagiga *et al.*[25], which included 228 patients undergoing phenolization after dilatation of the pit external opening compared with 272 patients undergoing excisional surgery (Limberg or modified Limberg flap). It concluded that, although the use of phenol was associated with a significant decrease in duration of hospital stay, rates of complication and recurrence were comparable to those in the cohort undergoing surgery. Multiple applications of phenol may be required to

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Recurrence									
2	Randomized trials	Very serious*	Not serious	Not serious	Serious†	None	Analysis of 34 studies including 2 RCTs by Stauffer *et al.*[19]. The recurrence rate was 2.7 (95% c.i. 2.2, 3.1)% at 12 months, 6.5 (5.7, 7.3)% at 24 months, and 15.6 (13.8, 17.4)% at 60 months	⊕OOO Very low	Important

*Studies analysed as observational studies, with no comparison between different treatments (only reported recurrence rates). †Wide 95% confidence intervals around recurrence estimates, especially for rates at longer follow-up.

achieve healing. Larger trials involving appropriate stratification of disease and a constant comparator are required before phenol can be recommended definitively as an alternative treatment option to other surgical techniques. The studies each used different concentrations of phenol, and there has been no standardization. It is important to highlight that phenol has been withdrawn from use for this indication in some countries.

Question: Phenol compared with surgery for intervention in pilonidal disease (Hagiga *et al.* 2019)

Certainty assessment							No. of patients		Effect*		Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Phenol	Surgery	Relative	Absolute		
Recurrence												
2	Randomized trials	Serious†	Serious‡	Not serious	Not serious	None	27 of 197 (13.7)	26 of 241 (10.8)	RR 1.34 (0.62, 2.88)	37 more (41 fewer to 203 more) per 1000	⊕⊕◯◯ Low	Important
Duration of hospital stay												
2	Randomized trials	Serious†	Serious‡	Not serious	Not serious	None†	Analysis of 5 studies (2 RCTs, 3 observational studies) by Hagiga *et al.*[25]. Duration of stay for phenol group was 0 days, whereas for surgical treatment it ranged from 0.53 to 4.87 days				⊕⊕◯◯ Low	Important

Values are *n* (%) unless otherwise indicated; *values in parentheses are 95% confidence intervals. †Most studies showed risk of bias (low Jadad score in 4 of 5 studies). ‡Variable follow-up times. RR, risk ratio.

> Patients undergoing PD surgery could be offered treatment with fibrin glue.
> *Very low level of evidence*

Fibrin glue consists of a mixture of fibrinogen, thrombin, factor XIII, calcium, and aprotinin[26]. It is postulated to facilitate healing by inducing haemostasis followed by encouragement of macrophage ingression, angiogenesis, and collagen deposition. It has been advocated for the treatment of PD in three essential ways: obliteration of the dead space after excision; covering the defect after excision and closure of the defect; and as a filling sealant after minor excision (pit-picking and curettage or Bascom's I procedure).

There have been four systematic reviews[27–30] on the use of fibrin glue in PD. They varied with respect to the criteria for eligibility, with three[27,29,30] including mainly retrospective cohort studies. Although this technique appears safe, with minimal inconvenience to the patient and rapid recovery, further quality research is required before the use of fibrin glue as either a standalone or adjunctive treatment can be recommended as an alternative treatment to other surgical techniques.

Question: Fibrin glue compared with surgery for patients with pilonidal disease (Win *et al.*[27] 2021)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Rate of infection									
3	Non-randomized studies	Not serious	Serious*	Not serious	Serious†	None	Analysis of 3 observational studies by Win *et al.*[27]. Patients treated with pit excision and fibrin glue had comparable rates of infection to those undergoing flap surgery	⊕OOO Very low	Important
Recurrence (long-term follow-up)									
2	Non-randomized studies	Not serious	Serious*	Not serious	Not serious	None	Analysis of 2 observational studies by Win *et al.*[27]. Isik *et al.*[31] reported recurrence rate of 10% following treatment with fibrin glue in a retrospective study ($n = 40$). Sian *et al.*[32] reported recurrence rate of 27% ($n = 146$)	⊕OOO Very low	Important
Time to return to normal activities									
2	Non-randomized studies	Not serious	Serious*	Not serious	Not serious	None	Analysis of 2 observational studies by Win *et al.*[27]. Hardy *et al.*[33] reported that median time to return to daily tasks was 3 days after curettage and fibrin glue. Elsey *et al.*[34] reported that it generally took 1 week to return to daily activities after curettage and fibrin glue	⊕OOO Very low	Important

*Studies included described non-identical surgical procedures and non-identical application of fibrin glue with diverse brands and volumes; some studies had small sample sizes. †Large range of reported infection rates based on small samples.

Endoscopic treatment can be offered for patients with PD.
Very low level of evidence

The searches identified one meta-analysis and one systematic review evaluating endoscopic treatment for PD. The meta-analysis by Emile *et al.*[35] included 9 studies (1 RCT, 6 prospective studies, 2 retrospective studies) incorporating a total of 497 patients. Treatment failure was observed in 40 patients (8.0%), 20 (4.0%) had persistent PD, and 20 (4.0%) developed recurrence. A systematic review by Milone *et al.*[36] included 34 studies (1 RCT and 9 non-randomized trials) and reported a recurrence rate of 0–22%.

Question: Endoscopic interventions for management of pilonidal disease (Milone *et al.*[36] 2023)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Recurrence									
1	Randomized trials	Very serious*†	Serious‡	Not serious	Not serious	None*	Analysis of 34 studies (1 RCT) by Milone *et al.*[36]. Combination of retrospective and comparative studies with small populations; comparative studies suggested mixed results in recurrence rates between endoscopic and surgical excisional techniques, but lower risk of postoperative complications observed	⊕OOO Very low	Important

*Majority of studies observational in design. †Most studies deemed to have moderate to critical risk of bias. ‡Variability in study design, with use of different scopes and inclusion of other associated techniques including phenol, laser ablation, and dressings.

Pits can be left open or closed.
Expert opinion

There is no literature comparing closure of the wound with leaving it open after minimally invasive procedures such as pit-picking or endoscopic approaches. No recommendation from the literature can be made.t

Laser surgery could be offered to patients with PD.
Very low level of evidence

Advancements in laser technology have increased the scope for its use in coloproctology, mainly in the form of endoscopic minimally invasive procedures. Various names have been given to similar procedures (sinus laser therapy, sinus laser-assisted closure, and PD laser treatment, among others). These techniques share two common aspects: minimal invasiveness, and employment of laser energy to destroy diseased tissue and promote the formation of granulating tissue for healing.

Analysis of the literature found 1 systematic review by Romic *et al.*[37] examining 10 eligible studies (8 observational and 2 comparative studies) with 971 patients. Some 94.4% achieved primary healing with a weighted mean recurrence rate of 3.8%. The authors concluded that, according to the published literature, laser treatment is a promising procedure in the management of chronic PD. However, further adequately powered trials are necessary if this minimally invasive technique is to be recommended as an alternative treatment option.

Question: Laser techniques as a primary intervention for pilonidal disease (Romic *et al.*[37] 2021)

Real-time intraoperative ultrasonography may be considered in selected patients for PD treatment, if available.
Expert opinion

Intraoperative ultrasonography has been proposed for detection of the peripheral extent of PD, with the potential to limit the degree of surgical resection. No systematic reviews or RCTs could be identified addressing this topic. Two observational studies have reviewed its potential for the identifying the extent[38] and borders of PD, and compared intraoperative ultrasonography with palpation and methylene blue injection[39]. One recent study[40] assessed a small group of patients treated by destruction of the pilonidal sinus with a radial laser probe guided by real-time ultrasonography. Randomized, adequately powered trials are required before further recommendations can be made.

Treatment: excisional surgery for chronic disease

None of the available meta-analyses focused solely on primary disease, and the majority of studies failed to distinguish whether enrolled patients had primary or recurrent disease.

Complex disease has also been poorly defined in the literature; complex disease may be defined as recurrence, lack of healing after previous attempted curative surgery, or primary extensive manifestations (for example, wide and or bilateral, or perianal involvement, or defined by length of area involved or by the size of the external openings). Several studies have described the use of various techniques in complex and/or recurrent PD, but most failed to provide definitions of complex PD. Similarly, lines are blurred between what constitutes surgical failure and early recurrence.

Certainty assessment							Impact	Certainty	Importance
No. of studies	**Study design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**			
Primary healing									
10	Non-randomized studies	Serious*	Not serious	Not serious	Serious†	None	Analysis of 10 observational studies by Romic *et al.*[37]. Some 917 patients (94.9 (95% c.i. 92.9, 96.8)%) achieved healing after primary PiLAT ($P < 0.001$)	⊕OOO Very low	Important
Recurrence									
10	Non-randomized studies	Serious*	Not serious	Not serious	Serious†	None	Analysis of 10 observational studies by Romic *et al.*[37]. Mean recurrence rate was 3.8 (95% c.i. 21, 54)% ($I^2 = 39.2$, $P < 0.001$)	⊕OOO Very low	Important
Postprocedure complications									
10	Non-randomized studies	Serious*	Not serious	Not serious	Serious†	None	Analysis of 10 observational studies by Romic *et al.*[37]. Weighted mean complication rate was 10 (95% c.i. 5.7, 14.3)% ($I^2 = 82.28$, $P < 0.001$)	⊕OOO Very low	Important

*Majority of studies assessed as fair quality. †Most studies retrospective cohorts with small sample sizes. PiLAT, pilonidal disease laser treatment.

Varying rates of recurrence have been reported in the literature, and continue to cause dissatisfaction to both patients and clinicians alike.

No systematic review or meta-analysis has evaluated the efficacy of the various surgical techniques in the treatment of complex/recurrent PD specifically. Much of the literature identified comprised large case series reporting specific techniques in the management of recurrent or complex disease. Ultimately, trials[41–49] specifically focusing on the treatment of complex/recurrent PD are sparse, limited in size, design and follow-up, and lacking a definition of complex PD.

Extensive and recurrent disease should be assessed for complexity and treated accordingly.

> Excision and marsupialization of the wound can be considered in selected patients.
> *Low level of evidence*

There is much heterogeneity in the literature examining excision and marsupialization as treatment for PD. One meta-analysis by Stauffer *et al.*[19] reviewed eight RCTs (343 patients) of marsupialization *versus* various comparative techniques. A recurrence rate of 1.8% was observed at 12 months and 5.6% at 24 months. Lower recurrence rates, however, can be offset by prolonged wound healing that requires regular wound care and delayed return to work[50].

Question: Excision and marsupialization as an excisional technique for chronic disease (Stauffer *et al.*[19] 2018)

Two systematic reviews have analysed RCTs looking at healing by secondary intention *versus* healing by primary closure for chronic PD in adults. Al-Khamis *et al.*[51] included 26 RCTs (2530 patients); Of the 26 trials, 12 compared healing by secondary intention with midline closure and 5 healing by secondary intention with off-midline closure; the other 9 studies compared different closed methods. Wounds healed faster and patients returned to work earlier after wound closure, with no difference in postoperative complications. However, disease recurred more frequently after wound closure compared with healing by secondary intention. Six studies compared midline closure with off-midline closure. Healing times were faster, and surgical-site infection and recurrence rates were lower after off-midline closure.

More recently a meta-analysis by Stauffer *et al.*[19], considering both RCTs (102 studies) and non-RCTs (638 studies), examined recurrence based on follow-up time in a total of 89 583 patients. Primary midline closure was associated with higher rates of recurrence in the long term compared with off-midline closure techniques, with observed rates of up to 32% after 120 months *versus* 2.7% in patients undergoing Karydakis or Bascom's procedures, and 11.4% in those who had the Limberg or Dufourmental technique in the same time interval.

Milone *et al.*[52] undertook a systematic review and included all studies reporting any surgical approach for PD where there was a minimum follow-up of 5 years. Fifteen studies were included (5766 patients); 8 involved midline closure, 7 off-midline closure and 4 healing by secondary intention. Recurrence rates were lowest in the off-midline closure group.

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Recurrence									
8	Randomized trials	Very serious*	Not serious	Not serious	Not serious	None	Analysis of 63 studies including 8 RCTs by Stauffer *et al.*[19]. Recurrence rate was 1.8 (95% c.i. 1.2, 2.3)% at 12 months and 5.6 (4.5, 6.7)% at 24 months	⨁⨁◯◯ Low	Important

*Studies analysed as observational studies, with no comparison between different treatments (only reported recurrence rates).

> Off-midline closure is the preferred technique for patients undergoing excisional surgery for PD.
> Excision and healing by secondary intention could be considered in selected patients. Excision and primary midline closure should be avoided.
> *Moderate level of evidence*

Excisional surgery historically has been the standard, and can be considered for patients with primary extensive disease or for those with recurrent disease. Many different techniques have been described for excision of PD. Strategies for managing the residual wound broadly fall into two categories: primary closure (including midline closure, off-midline closure, and rotational flaps) or leaving the wound open to allow healing by secondary intention. Some common off-midline closure techniques include Bascom's cleft lift, and Karydakis, rhomboid flaps (for example Limberg and Dufourmental). Other plastic reconstructive flaps include V–Y advancement flaps and Z plasty.

A network meta-analysis by Bi *et al.*[53], including 39 studies and 5061 patients, compared the results of RCTs of different surgical interventions for both primary midline closure and off-midline closure. There was a significant increase in the recurrence rate after primary midline compared with off-midline closure. No significant difference in infection rate was observed, although primary excision and open healing technique was reported to have the lowest rate of infection. Among the different off-midline closure approaches evaluated, the modified Limberg flap had the lowest complication rate as well as the lowest incidence of recurrence.

The evidence suggests that, overall, off-midline closure is the optimum method of closure after excisional surgery. However, there is little evidence to suggest that one individual technique is superior. As mentioned in the previous section, the lack of stratification of disease means that meta-analysis of the various techniques is difficult. The type of off-midline approach should be based largely on clinician experience as well as patient preference.

Question: Off-midline closure techniques compared to primary midline closure or excision and primary open healing for patients with pilonidal disease (Bi *et al.*[53] 2020)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Recurrence (primary midline *versus* off-midline closure)									
3	Randomized trials	Not serious	Serious*	Not serious	Serious†	None	Analysis of 3 RCTs (374 patients) by Bi *et al.*[53]. There was a significant increase in rates of recurrence in primary midline closure group *versus* off-midline closure group (RR 2.73, 95% c.i. 1.11, 7.66)	⊕⊕◯◯ Low	Critical
Surgical-site infection (primary midline *versus* off-midline closure)									
2	Randomized trials	Not serious	Not serious	Not serious	Serious†	None	Analysis of 2 RCTs by Bi *et al.*[53]. Primary midline closure was ranked as the worst approach, with infection rates of up to 24% after surgical excision. There was a significant increase in risk of infection with primary midline *versus* off-midline closure (RR 1.63, 95% c.i. 0.64, 4.44; $P = 0.04$). Primary excision and open healing was reported to have the best results with lowest rate of infection, followed by off-midline closure techniques	⊕⊕⊕◯ Moderate	Critical

*Heterogeneity between studies. †Wide confidence interval.

Selected patients with recurrence could be offered an endoscopic or other minimally invasive surgical approach.
Expert opinion

Recently published case series[54–56] have advocated the use of endoscopic techniques in the management of recurrent PD. However, no systematic reviews exist, and further quality randomized trials are required before conclusive recommendations can be made.

The use of a drain in patients undergoing excisional surgery should be considered on an individual basis.
Low level of evidence

To decrease the complication rate after excision of PD, the use of drains to evacuate fluids and collections has been advocated. One meta-analysis by Milone *et al.*[57] including 7 articles and 1252 patients, compared complication and recurrence rates after excision and closure of the wound with and without drainage. The meta-analysis concluded that drainage did not significantly decrease rates of postoperative infection and recurrence.

Question: Use of a drain in patients undergoing excisional surgery (Milone *et al.*[57] 2013)

Certainty assessment							No. of patients		Effect*		Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Drain	No drain	Relative	Absolute		
Postoperative infection												
7	Randomized trials	Serious†	Not serious	Not serious	Serious‡	None	50 of 604 (8.3)	68 of 598 (11.4)	OR 0.71 (0.48, 1.03)	30 fewer (56 fewer to 3 more) per 1000	⊕⊕◯◯ Low	Important
Recurrence rate												
7	Randomized trials	Serious†	Not serious	Not serious	Serious‡	None	41 of 604 (6.8)	50 of 598 (8.4)	OR 0.80 (0.52, 1.23)	16 fewer (38 fewer to 17 more) per 1000	⊕⊕◯◯ Low	Important

Values are *n* (%) unless otherwise indicated; *values are 95% confidence intervals. †Four of seven studies high risk or unclear random sequence generation; majority of studies unclear allocation concealment. ‡Five of seven studies small sample size; majority of analysis based on experience of one of the authors[57,58].

Use of perioperative dye is not essential for excisional surgery.
Very low level of evidence

Dyes may enable easier identification of sinus tracks. Two RCTs were identified that addressed the use of methylene blue in PD surgery. One large RCT by Sahin *et al.*[58] compared 231 patients with chronic PD undergoing elective Karydakis surgery with or without intraoperative use of methylene blue. It concluded that methylene blue could be associated with lower rates of wound infection. Another RCT, by Idiz *et al.*[59], included 33 patients undergoing excisional surgery guided with use of methylene blue, and suggested that use of this dye can leave behind residual disease increasing the risk of infection or recurrence. The European Medicines Agency has restricted the use of methylene blue to intravenous application (methaemoglobinaemia). For this reason, toluidine dye is more commonly used.

Question: Perioperative dye compared with no perioperative dye for excisional surgery (Sahin *et al.*[58] 2014)

Certainty assessment							No. of patients		Effect*		Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Methylene blue	No methylene blue	Relative	Absolute		
Surgical-site infection												
1	Randomized trial	Very serious†	Not serious	Not serious	Serious‡	None	25 of 129 (19.4)	32 of 102 (31.4)	OR 1.99 (1.09, 3.66)	163 (19, 312) more per 1000	⊕○○○ Very low	Important
Recurrence												
1	Randomized trial	Very serious†	Serious§	Not serious	Serious‡	None	5 of 129 (3.9)	3 of 102 (2.9)	OR 1.33 (0.31, 5.70)	9 more (20 fewer to 118 more) per 1000	⊕○○○ Very low	Important
Wound dehiscence												
1	Randomized trial	Very serious†	Serious§	Not serious	Not serious	None	7 of 129 (5.4)	5 of 102 (4.9)	Not estimable		⊕○○○ Very low	Important

Values are *n* (%) unless otherwise indicated; *values in parentheses are 95% confidence intervals. †Unclear allocation of randomization; no blinding of participants or clinician (blinding not possible); unclear blinding status of assessor. ‡Wide confidence intervals. §Unclear follow-up time.

To assess the impact of an individual procedure, a quality-of-life assessment tool should be used.
Expert opinion

Quality of life after pilonidal surgery has not been assessed consistently until more recently[60–63]. Some authors incorporated their own custom questionnaire, whereas others used common generic tools such as Short Form 36 and visual analogue scale score. A validated patient-reported outcome measure tool is not currently available and should be developed.

Adolescent patients can be managed in line with adult practice guidelines.
Very low level of evidence

PD is increasing in incidence in the adolescent population (12–16 years); this may be related to increasing childhood obesity and more sedentary lifestyles. The adolescent population develops PD in the same way as adults, and the treatments are similar. Two

systematic reviews were identified. Grabowski *et al.*[64] reviewed 193 articles. They noted a trend towards minimally invasive procedures owing to high rates of failure of wide excisional surgery. The authors recommend that less invasive procedures such as sinusectomy, trephine (or Gips procedure) should be considered as the best initial approach, but other surgical techniques for PD, such as Bascom's cleft lift and Karydakis procedure, can be used and have moderate to excellent outcomes. Hardy *et al.*[65] included 26 studies, and concluded that, although the quality of evidence was poor, many of the treatment modalities offered to adult patients (such as off-midline closure procedures, minimally invasive techniques, and marsupialization) had the most preferable outcomes. Children presenting before puberty with suspected pilonidal sinus disease should be referred to a tertiary paediatric centre for management because of the likelihood of underlying congenital malformations.

Question: Minimally invasive procedures compared with excisional procedures for adolescent patients with pilonidal disease (Hardy *et al.*[65] 2019)

Other interventions and adjuncts

Patients undergoing intervention for PD could undergo surgery under local anaesthetic.
Very low level of evidence

Four RCTs[66–69] were identified from the literature search, with varying inclusion criteria. One RCT compared local *versus* general anaesthesia in patients undergoing elliptical excisional surgery. One compared the efficacy of spinal anaesthesia *versus* total intravenous anaesthesia. Another RCT by Rahmani *et al*[70]. compared local anaesthesia with general anaesthesia, and found that patients had less postoperative pain, a shorter recovery time, and reduced consumption of analgesia. One RCT[71] evaluated 100 patients having excisional surgery under local anaesthetic, and compared those who had primary closure *versus* secondary healing. Overall, local anaesthesia was feasible and, in some patients, preferable with better outcomes.

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Recurrence									
26	Non-randomized studies	Serious*	Not serious	Not serious	Not serious	None	Analysis of 26 observational studies by Hardy *et al.*[65]. Pooled overall risk of recurrence was 26 (95% c.i. 15, 38)% in open healing group and 6 (1, 15)% in excision and off-midline closure group. Minimally invasive techniques had an overall recurrence rate of 7 (1, 16)%	⊕OOO Very low	Critical
Wound complications									
26	Non-randomized studies	Serious*	Not serious	Not serious	Not serious	None	Analysis of 26 observational studies by Hardy *et al.*[65]. Pooled overall risk of wound complication was 21 (95% c.i. 9, 36)% in open healing group, and 30 (19, 42)% in midline closure group. Excision and off-midline closure had a wound complication rate of 14 (6, 25)% overall	⊕OOO Very low	Critical
Time to healing									
26	Non-randomized studies	Serious*	Not serious	Not serious	Not serious	None	Analysis of 26 observational studies by Hardy *et al.*[65]. Pooled time to wound healing was shorter with minimally invasive techniques (median 21–30 days). Overall median time to healing was 38–92 days in open group, and 27 days with off-midline closure	⊕OOO Very low	Critical

*All studies assessed to be at moderate to severe risk of confounding bias; 11 studies at moderate to severe risk of selection bias.

There are also many case series in the literature describing minimally invasive techniques being performed under local anaesthesia, with reasonable safety and satisfaction rates[54,72–74].

Although it appears that minimally invasive procedures can be performed safely under local anaesthesia, further randomized trials are required before the recommendation can be made that all minimally invasive techniques should be carried out under local anaesthesia.

Question: Local anaesthetic compared with general anaesthetic for patients undergoing intervention for pilonidal disease (Naja *et al.*[66] 2003)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Postoperative hospital stay									
1	Randomized trial	Very serious*†	Not serious	Not serious	Serious*	None	Analysis of 1 RCT by Naja *et al.*[66] of patients undergoing elliptical incision and primary closure. LA group had a shorter hospital stay than GA group. 67% of LA group *versus* 17% of GA group were discharged on the same day ($P = 0.001$). 10% of patients in GA group stayed > 2 nights as an inpatient *versus* none in LA group	⊕OOO Very low	Critical
Postoperative pain									
1	Randomized trial	Very serious*†	Not serious	Not serious	Serious	None	Analysis of 1 RCT by Naja *et al.*[66] of patients undergoing elliptical incision and primary closure. GA group had greater consumption of opioid analgesia than LA group at all time intervals within first 48 h ($P < 0.010$). Visual analogue scale pain scores were more favourable in LA group ($P < 0.010$)	⊕OOO Very low	Critical

*Small cohort size. †Short follow-up time; blinding not possible. LA, local anaesthesia; GA, general anaesthesia.

There is no evidence that hair removal before surgery affects outcome.
Expert opinion

There are no systematic reviews or RCTs evaluating hair removal before surgery. Nevertheless, most surgeons shave the operative area before surgery.

Postoperative hair removal around the natal cleft by any method is not a necessity to decrease rates of recurrence.
Very low level of evidence
Showering after a haircut and attention to hygiene is recommended.
Expert opinion

Two systematic reviews were identified from the analysis of the literature. Halleran *et al.*[75] reviewed laser depilation in the postoperative phase. They included 35 studies (2 RCTs) and did not provide any conclusive evidence of benefit regarding recurrence. Pronk *et al.*[76] included 14 studies (2 RCTs) and 963 patients. The recurrence rate after laser hair removal was 9% and lower than that seen with either no removal (19%) or shaving/depilation (23%). Further trials are necessary before postoperative laser hair removal can be recommended.

Question: Hair removal compared with no hair removal for patients who have undergone intervention for pilonidal disease (Halleran *et al.*[75] 2018)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Recurrence									
2	Randomized trials	Very serious*	Serious†	Not serious	Serious‡	None	Analysis of 35 studies (2 RCTs) by Halleran *et al.*[75]. Only 5 studies included a comparator group. Variable rate of recurrence, ranging from 0 to 28%	⊕OOO Very low	Critical

*Majority of studies (33 of 35) rated quality either fair or below in risk-of-bias assessment; lack of comparator groups. †Much heterogeneity in patient population assessed. ‡Wide 95% confidence intervals around recurrence estimate.

No recommendation can be made about the use of laser hair epilation or any other hair removal as a primary intervention for patients with PD.
Expert opinion

There are no systematic reviews or RCTs evaluating this area. There have been very few case series investigating the use of laser epilation as primary intervention for PD. Further quality trials are necessary if this non-operative technique is to be recommended as an alternative treatment option to other surgical techniques.

Postoperative antibiotics are not indicated.
Very low level of evidence

A systematic review by Mavros *et al.*[77], including 7 studies (1 RCT) and 690 patients, found no difference in outcomes with use of a long course of antibiotics compared with single-dose prophylaxis.

Since this systematic review, a further RCT[78] has been published in which no differences were observed in terms of wound infection with use of triclosan-coated suture *versus* conventional suture after excision of the cyst. There is no sufficient evidence that postoperative antibiotics decrease the rate of surgical-site infection.

Question: A course of postoperative antibiotics compared with no antibiotics for patients undergoing treatment for pilonidal disease (Mavros *et al.*[77] 2013)

Intraoperative antibiotic implants need not be used.
Low level of evidence

A systematic review by Nguyen *et al.*[79], including 3 RCTS and 319 patients, compared patients undergoing pilonidal surgery with *versus* without the application of gentamicin collagen sponge. Pooled data revealed a risk difference in favour of treatment with gentamicin collagen sponge, although this was not statistically significant ($P < 0.060$). No significant risk difference was observed in rates of non-healed wounds at 1 year of follow-up, and there was no difference in recurrence rates between the two groups. A previous systematic review[77], with 4 studies and 402 patients, evaluated the use *versus* non-use of gentamicin-containing sponges and the risk of surgical-site infections. There is no evidence therefore that intraoperative adjuncts decrease healing time or recurrence.

Question: Intraoperative antibiotic implants compared with no antibiotic implants for patients undergoing surgery for pilonidal disease (Nguyen *et al.*[79] 2016)

Certainty assessment							No. of patients		Effect		Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Postoperative antibiotics	No antibiotics	Relative	Absolute		
Primary healing												
1	Randomized trials	Very serious*	Serious†	Not serious	Not serious	None	30 of 34 (88.2)	29 of 33 (87.9)	Not estimable		⊕OOO Very low	Critical
Recurrence												
1	Randomized trials	Very serious*	Serious†	Not serious	Not serious	None	6 of 73 (8.2)	14 of 72 (19.4)	Not estimable		⊕OOO Very low	Critical
New outcome												
1	Randomized trials	Very serious*	Serious†	Not serious	Not serious	None	25 of 78 (32.1)	27 of 75 (36.0)	Not estimable		⊕OOO Very low	Critical

Values are *n* (%). *Majority of studies scored 5 or less on Jadad scoring. †Methodological heterogeneity among the seven studies precluded synthesis of data.

Certainty assessment							No. of patients		Effect		Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Intraoperative antibiotic implants	No antibiotic implants	Relative	Absolute		
Surgical-site infection												
3	Randomized trials	Serious*	Serious†	Not serious	Not serious	None	23 of 162 (14.2)	46 of 157 (29.3)	Not estimable		⊕⊕◯◯ Low	Important
Delayed wound healing												
2	Randomized trials	Serious*	Serious†	Not serious	Not serious	None	17 of 122 (13.9)	33 of 117 (28.2)	Not estimable		⊕⊕◯◯ Low	Important
Recurrence												
2	Randomized trials	Serious*	Serious†	Not serious	Not serious	None	9 of 122 (7.4)	15 of 117 (12.8)	Not estimable		⊕⊕◯◯ Low	Critical

Values are *n* (%). *Unclear allocation concealment; unclear blinding of participants and assessors. †Heterogeneity in application of gentamicin collagen sponge between studies.

Specialized topical dressings are not necessary after open wounds in PD surgery.
Very low level of evidence

Patients undergoing PD surgery could be offered treatment with platelet-enriched plasma.
Low level of evidence

A systematic review by Herrod *et al.*[80] of 9 RCTs comprising 932 participants showed no evidence that any dressings or topical agents for open wounds (Lietofix® (Nathura S.P.A., Italy)), hydrogel, 10% povidone–iodine, zinc oxide mesh, gentamicin collagen sponge, dialkylcarbamoyl chloride, polyurethane foam, alginate dressings) reduce time to wound healing in pilonidal surgery. Similar conclusions were drawn by Woo *et al.*[81] after a review of the current literature. An RCT published by Salehi *et al.*[82] after the systematic review found no evidence that honey gels or creams reduced healing time. There is no evidence that topical dressings decrease the time to healing of wounds after surgery.

Question: Comparison of topical dressings for open wounds secondary to pilonidal disease (Herrod *et al.*[80] 2019)

Review of the literature revealed two meta-analyses and one systematic review. Brewer *et al.*[83] included 9 studies (8 RCTs and 1 case–control) with a total of 621 (open surgery group) and 309 (minimally invasive group) patients. The meta-analysis demonstrated some benefits of platelet-enriched plasma, including a reduction in time to healing and postoperative pain, although there was significant heterogeneity among the included studies. Mostafaei *et al.*[84] reviewed 4 RCTs including 484 patients, all 4 of which were included in the meta-analysis above. They showed a benefit of using platelet-enriched plasma. A systematic review by Khan *et al.*[85] included 4 RCTs and 336 patients, and concluded that platelet-enriched plasma could potentially reduce healing time and lead to a faster return to work.

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Time to wound healing									
9	Randomized trials	Very serious*†	Serious†	Not serious	Serious‡	None	Analysis of 9 RCTs by Herrod *et al.*[80]. Dressings assessed included Lietofix, hydrogel, 10% povidone–iodine, zinc oxide mesh, gentamicin collagen sponge, dialkylcarbamoyl chloride, polyurethane foam, and alginate dressings. Uncertain whether any of the dressings or topical agents provided any benefit on time to wound healing. Recommendation for studies to further investigate interventions	⊕◯◯◯ Very low	Important

*All studies deemed to be high risk in at least one domain. †Studies reported results with use of non-identical topical dressings and agents with diverse brands. ‡Wide confidence intervals.

Question: Platelet-rich plasma compared with no platelet-rich plasma for patients with pilonidal disease (Brewer et al.[83] 2022)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Wound healing time									
6	Randomized trials	Not serious	Serious*	Not serious	Serious†	None	Analysis of 6 RCTs by Brewer *et al.*[83]. Time to healing was significantly reduced, by −13.98 (95% c.i. −18.41, −9.55) days ($P < 0.001$)	⊕⊕◯◯ Low	Important
Postoperative time off work									
3	Randomized trials	Not serious	Serious*	Not serious	Serious‡	None	Analysis of 3 RCTs by Brewer *et al.*[83]. Time off work was significantly reduced in cohort receiving PRP: MD −8.7 (95% c.i. −9.4, 8.0) days ($P < 0.001$)	⊕⊕◯◯ Low	Important

*Platelet-rich plasma (PRP) collected volume and processing techniques heterogeneous across studies. †Wide confidence intervals, probably owing to heterogeneity between studies assessed. ‡Small sample size. MD, mean difference.

NPWT may be used after the breakdown of wounds in selected patients after pilonidal surgery.
Very low level of evidence

A systematic review by Herrod *et al.*[80], including 2 RCTs and 68 patients, assessed the comparison of topical NPWT *versus* open wound healing. The systematic review failed to show that NPWT decreased healing time in PD surgery. Some retrospective and prospective case series[86–88] have demonstrated a beneficial effect of NPWT in large complex pilonidal wounds. However, this treatment was received negatively by patients participating in an outpatient forum.

Question: Topical negative-pressure wound therapy compared with open wound healing for patients with open wounds in pilonidal surgery (Herrod *et al.*[80] 2019)

Certainty assessment							Impact	Certainty	Importance
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Time to healing									
2	Randomized trials	Very serious*†	Not serious	Not serious	Not serious	Publication bias strongly suspected‡	Outcomes vary. One RCT observed a reduction in time to healing with use of TNPWT: MD −24.01 (95% c.i. −35.65, 12.37) days. Another RCT demonstrated no difference in time to wound healing (median 84 *versus* 93 days; $P = 0.44$). Only one RCT was able to provide data on proportion of wounds healed at 30 days upon request compared with open wound healing (RR 3.60, 95% c.i. 0.49, 26.54). Evidence was downgraded owing to concerns of risk of bias and significant imprecision	⊕◯◯◯ Very low	Important

*One RCT unclear risk of bias as no protocol available. No clear evidence of randomization. †Selective reporting. ‡No data reported for 6-month and 1-year time points. TNPWT, topical negative-pressure wound therapy; MD, mean difference; RR, risk ratio.

Patient forum

A patient forum was held to discuss these guidelines before finalization. Patient evaluation was considered vital as these guidelines were designed to improve the clinical care provided to patients and evaluate their experiences. Patients who had experience in the complexity of treatment for PD were approached to take part in a patient forum. The meeting took place virtually and they were sent the draft guideline document for consideration. Five patients who had been treated for PD took part in this exercise. The document was discussed systematically, and members of the forum took part in an open discussion. The draft of the guideline was scrutinized by each participant, and recommendations and comments were sought.

Overall, no significant changes were made to the guideline recommendations, but some of the feedback was well received and considered valuable. Participants welcomed the creation of guidelines, as there was uniform agreement through patients' experience that there appeared to be a knowledge gap among surgeons and other healthcare professionals concerning different treatment modalities. It was felt that a guideline should be readily available to all to bridge gaps in knowledge.

Participants highlighted that there is a proclivity for clinicians to commence NPWT, and this could often delay inevitable further surgery or intervention. NPWT, in particular, posed severe limitations on participants being able to go about their normal daily activities, for fear of dislodging dressings. They particularly disliked this treatment.

It was also highlighted that participants are still undergoing excisional surgery and midline closure, and one of the strongest recommendations was to promote education through this guideline that midline closure should be abandoned. Most participants were willing to accept bigger operations over more minimally invasive techniques if there was a better chance of reducing the risk of failure or recurrence. It was also communicated through this forum that surgeons need to have a better understanding of the impact of their treatments and that a quality-of-life survey could help promote this.

Discussion

These guidelines provide a robust set of clinical recommendations that can be applied in daily practice by clinicians involved in the management of PD. Recommendations have been developed after rigorous review of the available published literature. At the outset, it should be noted that there is a dearth of good-quality evidence to support the management of PD. Much of the literature consists of cohort studies, and even the RCTs are mainly single-centre (usually single-surgeon) studies with additional significant methodological weaknesses.

In brief, acute abscess should be incised (by a lateral incision) and drained before consideration of a definitive curative procedure. Prophylactic intervention is not recommended for patients with asymptomatic disease. For symptomatic patients presenting with disease limited to pits with uncomplicated lateral extensions, minimally invasive surgical techniques, such as endoscopic procedures, pit-picking, and fibrin glue, may be considered.

The strongest evidence was against patients undergoing skin excision techniques and primary midline closure. This appears to be associated with the highest rates of failure. If a skin excision technique is used, an off-midline closure is optimal.

The literature relating to adolescent patients is similar to that for adults, and they can therefore be offered procedures similar to those offered to the adult population.

Little evidence has been found definitively to recommend local hair removal to prevent treatment failure. Intraoperative adjuncts and wound dressings have also not been proven to improve outcomes after intervention. Use of such adjuncts is common practice, and their use may be questioned.

In addition to the almost universal poor methodology of the literature, there are other caveats that limit the present recommendations and may explain the significant heterogeneity of the evidence. The lack of a clear, validated classification for PD precludes accurate comparison of studies[18,89]. There is no obvious standard intervention, and the multiple alternative procedures make comparative studies difficult. Duration of follow-up is variable between studies and usually inadequate[53]. Recurrence remains undefined and often has not been differentiated from treatment failure in the literature. For example, in the guidelines from the Italian Society of Colorectal Surgeons[90], 85% of the literature presented failed to define recurrence at all. Other outcome measures tend not to be patient-reported. Future publications can strengthen the quality of PD research by addressing these gaps. Given the plethora of surgical options for treatment, one aim would be to develop an algorithmic approach to management. An attempt has been made to do this based on the evidence presented (*Fig. 1*).

forum were willing to accept bigger operations over more minimally invasive techniques if there was a better chance of reducing the risk of failure or recurrence. This is at variance with the published literature; a discrete-choice experiment[92] suggested that patients are willing to trade increased risk of treatment failure for more rapid recovery. Second, the view that there should be exploration of quality-of-life outcomes is illustrated in recent qualitative data suggesting that the burden of wound care, and the disparity between anticipated and actual recovery time, were the main reasons for decision regret after surgery[93].

These data illustrate the need for shared decision-making regarding the best management options for individual patients, and the fact that surgeons should have an armamentarium of interventions to optimize outcome. Surgeons who offer such an armamentarium are uncommon as survey data suggest that many have one or two favoured 'go to' techniques, and there is a need for better training[94].

Implementation

Barriers to implementation of this guideline may include lack of awareness or lack of familiarity. This set of guidelines will be

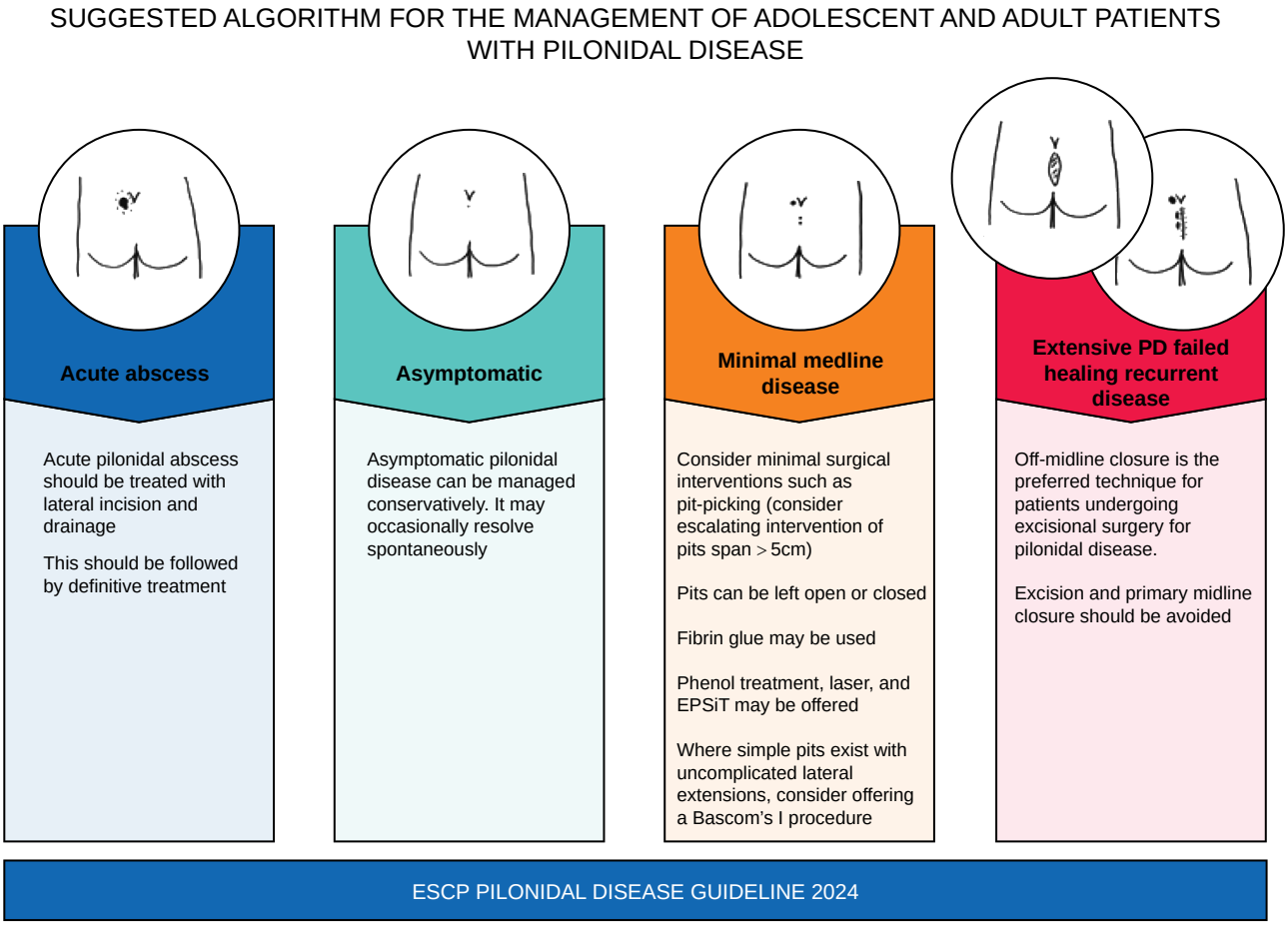

Fig. 1 Suggested algorithm for the management of adolescent and adult patients with pilonidal disease. EPSiT, Endoscopic Pilonidal Sinus Treatment.

The patient forum was useful in giving a patient perspective to the guidelines, something that is often lacking in surgical research[91], in particular PD. Although the findings of the forum were extremely supportive of the guideline process followed, two points require further comment. First, most participants in the

advertised on the ESCP website and be available as a web-based resource accessible to clinicians treating PD. For ease of navigation, a summary of recommendations has been provided at the beginning of the document. The guideline will be also be made available to patient organizations, for healthcare

professionals, and patients in order to promote best evidence-based practice.

The committee recognizes that this is European-based guideline; however, some of the resources evaluated as part of the recommendation may not available in specific health delivery systems because of economic or resource restriction. It is difficult to provide single best recommendations and so the GDG opted to produce an overall set of recommendations that can act as framework at a local level. Readers are requested to provide feedback to corresponding authors through the ESCP committee.

Monitoring

This guideline will be updated in 3 years' time and will be reviewed regularly at the annual ESCP conference.

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Disclosure

J.K. is a methodologist in the GDG and is the founder of KSR Ltd, established in 2005. The other authors declare no other conflicts of interest.

Supplementary material

Supplementary material is available at *BJS* online.

Data availability

All data related to findings in this study are available in the article and supplementary material provided.

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