A global consensus on the classification, diagnosis and multidisciplinary treatment of perianal fistulising Crohn’s disease

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ABSTRACT

Objective To develop a consensus on the classification, diagnosis and multidisciplinary treatment of perianal fistulising Crohn’s disease (pCD), based on best available evidence.

Methods Based on a systematic literature review, statements were formed, discussed and approved in multiple rounds by the 20 working group participants. Consensus was defined as at least 80% agreement among voters. Evidence was assessed using the modified GRADE (Grading of Recommendations Assessment, Development, and Evaluation) criteria.

Results Highest diagnostic accuracy can only be established if a combination of modalities is used. Drainage of sepsis is always first line therapy before initiating immunosuppressive treatment. Mucosal healing is the goal in the presence of proctitis. Whereas antibiotics and thiopurines have a role as adjunctive treatments in pCD, anti-tumour necrosis factor (anti-TNF) is the current gold standard. The efficacy of infliximab is best documented although adalimumab and certolizumab pegol are moderately effective. Oral tacrolimus could be used in patients failing anti-TNF therapy. Definite surgical repair is only of consideration in the absence of luminal inflammation.

Conclusions Based on a multidisciplinary approach, items relevant for fistula management were identified and algorithms on diagnosis and treatment of pCD were developed.

INTRODUCTION

Penner and Crohn first described perianal fistulas as complications of Crohn’s disease (CD) 75 years ago. Population based studies confirmed that perianal fistulas are the most common manifestation of fistulising CD, developing in 20% of Crohn’s patients and recurring in approximately 30% of the cases. The cumulative incidence of perianal fistulising CD (pCD) is 12% after 1 year and this doubles 20 years after diagnosis. The risk of developing a fistula depends on disease location, being most frequent in colonic disease with rectal involvement. Perianal fistulas impose a significant burden on the patients. Unfortunately there are limitations in the available literature, making it challenging to develop an evidence based approach to pCD. The objective of the working group was to develop a consensus on the classification, diagnosis and treatment of pCD, based on best available evidence and expert opinion in order to offer guidance to clinicians.

METHODS

Working group

The World Congress of Gastroenterology 2013 called for the development of state-of-the-art, evidence based views for designated areas of gastroenterology. An expert consensus group on pCD was formed and a literature review process (summarised in online supplementary figure S1) followed, covering all relevant papers and abstracts until March 2014. The search initially identified 4680 references. A selection process by the research committee members and additional references identified by manual search led to 247 retained articles.

Consensus process

Four areas of interest were identified: (1) classification and scoring, (2) diagnosis, (3) medical treatment, and (4) surgical management. For each of these areas the research committee drafted statements based on the systematic literature review and developed potential algorithms. These were discussed and revised by the group during their meetings. As a final step all participants voted on each statement, using definitions of agreement previously reported by Bitton et al. Consensus was a priori defined as at least 80% agreement. The modified GRADE (Grading of Recommendations Assessment, Development, and Evaluation) criteria were used to establish the strength of recommendations and the quality of evidence (see online supplementary table S1).

CONSENSUS STATEMENTS

Section 1: Classification and scoring

Statement 1—General considerations for classification and scoring

1.1 A clinically useful classification of perianal fistulas in CD should enable the treating physician to determine optimal management strategy.

Vote: A+ = 80%, A = 13%, D = 5%; grade of recommendation: 1C

1.2 Scoring of perianal fistula activity in CD should enable the treating physician to evaluate disease severity and response to therapy.
Discussion

Several classification and scoring systems have been developed in an attempt to quantify disease extent and severity of pCD.\textsuperscript{6-16} We propose that a distinction is made between a detailed anatomic description of perianal fistulas (ie, classification) and the assessment of fistula activity (scoring), a dynamic measure that is sensitive to change under treatment. However, both components are necessary to design an optimal therapeutic strategy and are relevant for prognosis (table 1).

Statement 2—Fistula activity

Evaluation of fistula activity is recommended both by clinical and radiological (MRI) features.

Statement 3—Fistula anatomy

3.1 The course of the fistula tract in relation to the anal sphincter and the levator plate (superficial, intersphincteric, transphincteric, suprasphincteric, extrasphincteric, and supraleval or infraleval) is an important component for classification.

Statement 4—Proctitis

The presence of proctitis, defined as any ulceration and/or stricture of the anal canal, is an important component for fistula assessment.

Statement 5—Abscess

A perianal abscess clinically defined as fluctuation and radiologically defined as a confined fluid collection (a hyperintense lesion on T2 weighted MRI images and/or a hypo- or anechoic area with endoanal ultrasound (EUS)) with a rim of inflammatory tissue (rim enhancement on post-contrast T1 weighted MRI images and/or poorly demarcated lesions on EUS) is an important component for classification.

Discussion

Parks et al\textsuperscript{8} studied the anatomy of perianal fistulas and the associated risk of post-surgical incontinence in 400 consecutive patients, as illustrated in figure 1. Section 4 describes the impact of fistula anatomy on surgical treatment.

Table 1 Descriptive and dynamic measures to evaluate perianal fistulas

<table>
<thead>
<tr>
<th>Descriptive</th>
<th>Dynamic</th>
<th>Clinical</th>
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<tbody>
<tr>
<td>Milligan and Morgan</td>
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<td>Anal Disease Activity Index\textsuperscript{12}</td>
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<td>Parks/modified Parks\textsuperscript{6}</td>
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<td>Perianal Disease Activity Index (PDAI)\textsuperscript{13}</td>
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<td>Van Assche Score\textsuperscript{16}</td>
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</table>
Section 2: Diagnosis and follow-up

Statement 6—Endoscopy
Endoscopic assessment of the rectum is essential to determine the most appropriate management strategy.

Vote: A+=85%, A=10%, A−=5%; grade of recommendation: 1C

Discussion
Endoscopy allows assessment of the extent and severity of luminal inflammation, and the presence of internal openings such as strictures and cancer. Proctitis is a predictive factor of persistent non-healed fistula tracts and higher proctectomy rate.

Statement 7—Examination under anaesthesia
Examination under anaesthesia (EUA) has an important role in the diagnosis and classification of pCD. It also allows immediate therapeutic intervention such as abscess drainage and seton placement. If a perianal abscess is suspected, EUA with drainage is the procedure of choice and should not be delayed if MRI is not immediately available. However, if additional collections are suspected, imaging is necessary.

Vote: A+=50%, A=35%, A−=10%, D−=5%; grade of recommendation: 1C

Discussion
Experienced colorectal surgeons are up to 90% accurate (95% CI 78% to 98%) in detecting and classifying perianal fistulas, sinuses, and abscesses. As shown in a study with infliximab, higher success rates and lower recurrence rates were attained in patients who underwent EUA with abscess drainage and seton placement before starting anti-tumour necrosis factor (anti-TNF) treatment.

Statement 8—MRI
8.1 Pelvic MRI is a highly accurate non-invasive modality for the diagnosis and classification of perianal fistulas; therefore it is considered the gold standard imaging technique for perianal CD. MRI provides additional detailed information on luminal disease location, disease severity, and fluid collections.

Vote: A+=90%, A=10%; grade of recommendation: 1B

Discussion
MRI accurately visualises the anal sphincter and the pelvic floor muscles, as well as the fistula tracts and abscesses, with an accuracy ranging from 76–100% (figure 2). In addition, MRI may identify clinically ‘silent’ abscesses and luminal inflammation (figure 3). T2 weighted sequence with fat suppression is the optimal technique for MR fistula imaging. A gadolinium enhanced T1 weighted sequence is useful for the differentiation between fluid/pus and granulation tissue (table 2). Phased-array external coils have larger field of view with good coverage for suprarealvator fistulae. Endoanal coils provide an
advantage in identifying internal openings; however, they are less widely available and have a restricted field of view.34

Statement 9—Endoanal ultrasound
EUS (with or without hydrogen peroxide) is a useful alternative to MRI in diagnosing perianal CD fistulas; however, accuracy can be limited by its restricted view.

Discussion
EUS (with a frequency between 5–16 MHz) allows a detailed visualisation of the anal sphincter complex with accuracy between 86–95% for correct classification and 62–94% for identification of internal openings.35–37 However, EUS cannot accurately identify ischioanal fossa or supralevator abscesses, as the penetration is limited.27 The use of endoluminal probes can
be restricted by luminal stenosis. In selected cases, local infusion of hydrogen peroxide or colour Doppler EUS with saline injection improves visualisation.\textsuperscript{38–40} When prospectively comparing hydrogen peroxide enhanced three-dimensional EUS and endoluminal MRI with surgical assessment as reference, 81% and 90% agreement was found, respectively.\textsuperscript{41} Furthermore, the Crohn’s Ultrasound Fistula Sign (CUFS) can differentiate between Crohn’s related and cryptogenic fistulae-in-ano with a positive and negative predictive value of 87% and 93%, respectively.\textsuperscript{42} As a complementary method, the accuracy of transperineal ultrasound to detect and classify fistulas was found to be comparable to EUS. However, its accuracy to diagnose deep abscesses is low (47.1%) due to restricted field of view.\textsuperscript{43} Transperineal ultrasound may offer an advantage in detecting anovulvar fistulae (88.9% vs 44.4% when compared with MRI).\textsuperscript{43} Both EUS and MRI are superior to clinical examination when assessing and monitoring perianal fistulas.\textsuperscript{27} \textsuperscript{44–46} In a meta-analysis of four studies comparing EUS and MRI, performance characteristics for MRI (0.87, 95% CI 0.63 to 0.96) and EUS (0.87, 95% CI 0.70 to 0.95) demonstrated comparable sensitivities in detecting perianal fistulas. The specificity for MRI (0.69, 95% CI 0.51 to 0.82) was higher than that for EUS (0.43, 95% CI 0.21 to 0.69).\textsuperscript{47} A comparison of EUS and MRI diagnostic features is summarised in table 3. The choice mainly depends on local availability, expertise and the complexity of the pCD.

<table>
<thead>
<tr>
<th>Table 2</th>
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<tr>
<td>T2</td>
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<tr>
<td>Fibrosis</td>
<td>Hypointense</td>
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<tr>
<td>Pus/fluid</td>
<td>Hyperintense</td>
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<tr>
<td>Granulation tissue</td>
<td>Hyperintense</td>
</tr>
<tr>
<td>Abscess</td>
<td>Hyperintense</td>
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</tbody>
</table>

Discussion Fistulography and CT are outdated modalities in the diagnostic evaluation of pCD because of exposure to radiation and poor visualisation of the anatomic relationship of the fistulas to the pelvic floor muscles.\textsuperscript{48} Only in highly selected cases may fistulograms offer additional information and influence surgical management.\textsuperscript{49}

Statement 11—Combination of diagnostic modalities
To ensure diagnostic accuracy and to determine an optimal management strategy, a combination of diagnostic modalities is recommended, namely endoscopy and MRI/EUS (depending on availability and expertise) and EUA.

Vote: A+ = 60%, A = 20%, D = 10%, D− = 10%; grade of recommendation: 2C

Discussion In a prospective study of 32 patients with perianal CD the accuracy of each diagnostic modality was excellent (EUS 91%, EUA 91%, MRI 87%) and the combination of EUA with MRI or EUS increased accuracy to 100%.\textsuperscript{27} A diagnostic algorithm for Crohn’s perianal fistulas is proposed in figure 4.

Section 3: Medical treatment
Statement 12—Treatment goals
The short term goals in the treatment of pCD are abscess drainage and reduction of symptoms. The long term goals are resolving fistula discharge, improvement in quality of life, fistula healing, preserving continence, and avoiding proctectomy with stoma.

Vote: A+ = 90%, A = 10%; grade of recommendation: 1C

Statement 13—Corticosteroids and aminosalicylates
There is no demonstrated role for aminosalicylates or corticosteroids in perianal CD.

Vote: A+ = 90%, A = 10%; grade of recommendation: 1C

Discussion Aminosalicylates have no clinical effect on perianal CD.\textsuperscript{50} Studies evaluating the effect of corticosteroid treatment...

<table>
<thead>
<tr>
<th>Table 3</th>
<th>EUS and MRI in the diagnosis of Crohn’s perianal fistulas</th>
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<tbody>
<tr>
<td>EUS</td>
<td>MRI</td>
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<tr>
<td>Simple fistulas</td>
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<tr>
<td>Complex fistulas</td>
<td>++</td>
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<tr>
<td>High tracts</td>
<td>++</td>
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<td>Abscess</td>
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<td>Internal openings</td>
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<tr>
<td>Availability</td>
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<tr>
<td>Costs</td>
<td>+++</td>
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<tr>
<td>Overall accuracy</td>
<td>62.5%–95%</td>
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</tbody>
</table>

Modified from Gecse et al.\textsuperscript{18}

*Sensitivity of MRI to detect internal openings can be enhanced by the use of endoanal coils. However, their use is not widely available.

EUS, endoanal ultrasound.

Figure 4 Diagnostic algorithm for perianal fistulising Crohn’s disease. In perianal abscess is suspected, MRI is an optional diagnostic method, if readily available, before surgical incision and drainage. Alternatively, diagnostic endoscopy can also be performed during examination under anaesthesia (EUA), to minimise patient discomfort. A second EUA might be necessary if seton placement is needed or was not successful upon the first EUA. When stricture is present, Bougie or gentle finger dilation is preferable to preserve sphincter function. EUS, endoanal ultrasound.
in fistulising CD showed worsening of discharge and increased need for surgery.\textsuperscript{51}

Statement 14
Antibiotics, namely metronidazole and ciprofloxacin, improve fistula symptoms and may contribute to healing.

*Grade of recommendation: 1C*

Therefore, antibiotics are only recommended as adjunctive treatments for fistulas.

*Vote: A+=74%, A=16%, A−=10%; grade of recommendation: 2C*

Discussion

Early small and uncontrolled series reported fistula improvement after 6–8 weeks of antibiotic therapy (metronidazole 750–1500 mg/day, ciprofloxacin 500–1000 mg/day) with frequent relapse upon discontinuation and commonly occurring side effects.\textsuperscript{32–34} Only one RCT comparing ciprofloxacin, metronidazole and placebo assessed the efficacy of systematic antibiotics for pCD.\textsuperscript{55} This short (10 weeks) and underpowered study \(n=25\) showed no difference between antibiotics and placebo for fistula closure.\textsuperscript{55} Neither topical nor systemic metronidazole led to improvement of PDAI in prospective though small trials.\textsuperscript{56,57}

Two double blind RCTs assessed the efficacy of ciprofloxacin combined with anti-TNF therapy.\textsuperscript{58,59} The first study combined ciprofloxacin with infliximab \(n=24\) and reported fistula response at week 18 in 73% of patients, versus 39% with infliximab alone \(p=0.12\).\textsuperscript{59} In another RCT the effect of combination therapy with ciprofloxacin and adalimumab was superior to adalimumab monotherapy (in the reduction of at least 50% of the number of draining fistula in 70.6% vs 47.2% \(p=0.047\)) at week 12.\textsuperscript{59} However, after discontinuation of ciprofloxacin the difference between the two groups diminished. Overall these results support the efficacy of antibiotics in reducing fistula drainage but not fistula healing.

Statement 15
Thiopurines may have a moderate effect in the treatment of pCD. Evidence for the efficacy of methotrexate and ciclosporin is limited. Tacrolimus is effective for treating active fistulas; when used, therapeutic drug monitoring is required to minimise toxicity.

*Vote: A+=32%, A=32%, A−=26%, D+=10%; grade of recommendation: 2C*

Discussion

Thiopurines There is no prospective controlled trial involving azathioprine or 6-mercaptopurine with fistula outcome assessed as the primary end point. Available results are derived from a subgroup analysis of a randomised double blind study, where 31% of patients treated with 6-mercaptopurine experienced complete fistula closure compared to 6% of the placebo patients.\textsuperscript{14} A recent meta-analysis excluding the above study did not show any efficacy of azathioprine for improving or closing fistulae (OR 4.68, 95% CI 0.6 to 36.69; \(p=0.14\), \(n=18\)).\textsuperscript{60} In contrast, an earlier meta-analysis assessing the efficacy of thiopurines in 70 patients showed that 54% of patients treated with thiouperines had fistula healing versus 21% of patients treated with placebo (\(OR 4.44, 95\% CI 1.5 to 13.2\)).\textsuperscript{61} The effect of antibiotic and azathioprine combination therapy was evaluated in a prospective open label study and showed the superiority of the combination therapy \(p=0.03\).\textsuperscript{62}

Methotrexate There are no clinically relevant trial data on the effect of methotrexate on draining fistulas.

Tacrolimus A single, short term, placebo controlled trial randomised 46 patients with actively draining Crohn’s fistulas to treatment with oral tacrolimus or placebo.\textsuperscript{18} The primary end point—defined as the closure of at least 50% of fistulas maintained for at least 4 weeks—was reached in 43% on active treatment versus 8% on placebo \(p=0.004\). However, complete closure of all fistulas was not more common in the tacrolimus group.\textsuperscript{18} There was more nephrotoxicity with tacrolimus, which was managed by dose reduction.\textsuperscript{18} Topical tacrolimus showed no significant benefit.\textsuperscript{63}

Ciclosporin Several observational studies reported on the efficacy of ciclosporin for fistulising CD. Clinical improvement was rapid, but relapse rates were high after drug discontinuation.\textsuperscript{64–66} Related adverse events limited further use of ciclosporin.

Statement 16
Infliximab (grade of recommendation: 1A) and adalimumab (1B) are moderately effective for the induction and maintenance of fistula closure. Evidence for efficacy of certolizumab pegol is weaker (1C). Anti-TNF and thiopurine combination therapy may lead to higher fistula healing response and closure rate compared to monotherapy (2C).

*Vote: A+=26%, A=42%, A−=16%, D=11%, D+=5%.*

Discussion

Infliximab Two RCTs have assessed the efficacy of infliximab in fistulising CD. In the first placebo controlled trial an induction regimen induced closure of at least 50% of fistulas for at least 4 weeks in 56–68% of patients compared with 26% treated with placebo \(p=0.002\) and \(p=0.02\), respectively. Closure of all fistulas was achieved in 38–55% on infliximab.\textsuperscript{67} The ACCENT II trial further evaluated infliximab maintenance therapy for this indication. Week 14 responders to the induction regimen were randomised to further treatment with placebo or infliximab 5 mg/kg every 8 weeks.\textsuperscript{68} Time to loss of response was significantly longer on infliximab (>40 weeks) than on placebo \(14\) weeks, \(p=0.001\). Moreover, 39% of patients who received infliximab maintenance therapy had complete closure of all draining fistulas at week 54.\textsuperscript{68}

Adalimumab There has not been a dedicated controlled trial for fistulising CD with adalimumab. In two placebo controlled trials, CLASSIC-1 and GAIN, the rates of fistula improvement and remission did not differ significantly in adalimumab treated patients at week 4 compared to placebo.\textsuperscript{69,70} In the CHARM trial—a 56-week phase III trial to assess the efficacy of maintenance treatment with adalimumab among responders to induction treatment—a subgroup analysis in patients with draining fistula(s) at baseline showed complete fistula healing in 33% of adalimumab treated patients versus in 13% of placebo treated patients \(p<0.05\).\textsuperscript{20} An open label extension of this trial showed sustained healing in 90% of patients on adalimumab treatment at 2 years follow-up.\textsuperscript{71} In further open label studies, adalimumab was effective in 23–29% of patients with fistulising CD who had lost response or become intolerant to infliximab.\textsuperscript{72–74}

Certolizumab Subgroup analysis of PRECiSE 1 and 2—two large trials assessing the efficacy of certolizumab pegol for moderate to severe CD—looked at fistula response. At week 26, 36% of patients on certolizumab pegol had complete fistula closure compared with 17% on placebo \(p=0.038\).\textsuperscript{75} In contrast, no statistical difference was found in the rate of fistula response, defined as >50% closure at two consecutive visits.\textsuperscript{76}
A meta-analysis also evaluated the efficacy of anti-TNFs in pCD, and infliximab was found to have the most available evidence.\textsuperscript{76} Immunosuppression + anti-TNFs Data remain conflicting concerning the efficacy of concomitant immunosuppression with anti-TNF agents in pCD. Subgroup analysis of the ACCENT II trial found that concomitant immunosuppressants did not improve response rates to infliximab at 1 year.\textsuperscript{68} In the SONIC trial 12% of patients had perianal fistulas, but no separate analysis was performed in this group. Nevertheless, the gain with combination therapy is of particular interest in patients with proctitis.\textsuperscript{77} In support, recent studies suggest a clear association between combination therapy and fistula closure.\textsuperscript{78}

Surgery and anti-TNFs In a large retrospective cohort, 218 patients underwent surgery alone or surgery plus biological therapy. Surgery included seton drainage, fistulotomy, rectal advancement flap, fistulotomy plus seton or other procedures. Clinical response was 35.9% in the surgery treated group and 71.3% in the combined treatment group (p=0.001), suggesting that combined treatment modalities offer a better outcome.\textsuperscript{79}

Experimental medical treatments are discussed in the online supplementary material.

Section 4: Surgical management

Statement 17—Abscess drainage Surgical drainage of perianal abscesses is generally recommended before initiating medical therapy.

Vote: A+ = 100%; grade of recommendation: 1C

Discussions In symptomatic perianal CD fistulas are frequently preceded or accompanied by perianal abscesses.\textsuperscript{80} Surgical drainage as opposed to spontaneous drainage minimises the risk of further septic complications aggravated by concomitant immunosuppressive treatment.\textsuperscript{81}

Statement 18—Setons Non-cutting seton placement is useful in order to prevent (recurrent) abscess formation.

Vote: A+ = 85%; A = 15%; grade of recommendation: 1C

Discussions As all fistulas are potential sources of pelvic sepsis, ensuring adequate drainage is fundamental. Seton drains maintain patency of the fistula tracts and hence limit recurrent abscess formation.\textsuperscript{82} Loose setons preserve the integrity of the external anal sphincter and are to be preferred.\textsuperscript{83} In contrast, cutting setons carry a high risk of anal incontinence (54%) due to scarring of the anal canal.\textsuperscript{84} A disadvantage of setons is that the fistula tract cannot ‘close’ with the seton in place. The optimal timing for seton removal is not well established. In the ACCENT 2 study, all setons were removed by week 2 and the overall new abscess rate was 15%. Several other studies report maintaining seton(s) in situ for longer, thus seton removal at week 2 may be too early.\textsuperscript{19, 85} In a small prospective trial, where setons were maintained for the duration of infliximab induction, the overall new abscess rate was 0%.\textsuperscript{86} These results show that loose seton drainage is an efficient and safe method in the treatment of Crohn’s perianal fistulas. It is recommended to keep the seton in place until at least the induction of the anti-TNF treatment period has been completed. Fistula closure can be achieved after seton removal.

Statement 19—Proctitis

The surgical treatment of pCD in patients with proctitis is limited to abscess drainage and non-cutting seton placement.

Further surgical attempt for fistula closure is recommended only after endoscopic remission of the proctitis has been achieved.

Vote: A+= 70%, A = 30%; grade of recommendation: 1C

Discussion Both proximally active luminal disease, causing increased bowel frequency, and proctitis are associated with problematic wound healing.\textsuperscript{87} Combined infliximab therapy and surgery has been more successful in the absence of luminal inflammation, especially when localised in the rectum.\textsuperscript{88} Proctitis is also associated with a higher proctectomy rate (29–77.6%).\textsuperscript{89, 90} Therefore, active luminal disease in pCD is an indication for aggressive medical treatment.\textsuperscript{88}

Statement 20—Fistulotomy Fistulotomy is a treatment option for symptomatic superficial and, occasionally, low intersphincteric fistulas, always with consideration for preservation of continence. Performing fistulotomy in low transsphincteric fistulas, especially if anteriorly located in women, is associated with a high risk of incontinence.

Vote: A+ = 60%, A = 35%; grade of recommendation: 2C

Discussion In symptomatic superficial, low intersphincteric and selected low transsphincteric fistulas, fistulotomy or lay-open is a safe method, which preserves the continence and offers high healing and low recurrence rates in the absence of proctitis (table 4). In contrast, fistulotomy for high transsphincteric, suprasphincteric and extrasphincteric fistulas is associated with decreased healing and increased incontinence rates.\textsuperscript{89} Furthermore, as the anterior part of the external anal sphincter is shorter in women, fistulotomy for low transsphincteric fistulas carries a higher risk of incontinence.

Statement 21—Definitive surgical repair

Options for definitive surgical repair of pCD include fistulotomy, mucosal advancement flaps (MAFs), bioprosthetic plugs, and ligation of the intersphincteric fistula tract (LIFT). The use of fibrin glue and stem cell injections is not well established yet.

Vote: A+ = 20%, A = 35%, a = 40%, D = 5%; grade of recommendation: 2C

Discussion Mucosal advancement flap (MAF) is a surgical treatment option for the closure of internal fistula openings. It entails mobilisation of a rectal mucosal flap to cover the primary fistula opening, thereby closing the high pressure end of the fistula,

<table>
<thead>
<tr>
<th>Study</th>
<th>Patients</th>
<th>Healing (%)</th>
<th>Recurrence (%)</th>
<th>Incontinence (%)</th>
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<tr>
<td>Hobbs and Schofield\textsuperscript{89}</td>
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ns, not stated.
whereas the sphincter complex remains untouched. The excluded fistula segment is expected to dry out over time. In a systematic review of 35 studies with an average follow-up of 28.9 months, the success rate of MAF for Crohn’s fistulas was 64% (range 33.3–92.9%). The incontinence rate was 9.4% with a wide interstudy variability (range 0–28.6%). Re-interventions were needed in almost 50% of patients.99

**Stem cell based therapy** Mesenchymal stem cells have a high degree of plasticity and ability to modulate immune cells. Peri- or intrafistular injection of autologous expanded adipose derived stem cells, as well as bone marrow derived stem cells, were previously proven to be feasible and safe.100–102 Initial results show that stem cell±fibrin glue treatment induces fistula closure in 56–82% of patients (vs 16% in the fibrin glue treated patients, p<0.001), and 53% and 30% of patients sustained fistula remission at 1 and 3 years, respectively.103–106 Although these initial results on stem cell based therapy seem promising, results of further randomised, placebo controlled, ongoing trials on Crohn’s fistulas are needed.

**Gracilis muscle transposition** In a single retrospective study including 18 CD patients, gracilis transposition was successful for complex fistulas in 64% and for persistent non-healing perineal sinuses in 50% of the cases with maintained efficacy (90% upon 10 months median follow-up).107

Statement 22—Diverting stoma
A diverting temporary stoma is an option for patients with severe, complicated, therapy refractory pCD.

Vote: A+ = 80%, A = 20%; grade of recommendation: 1C

Statement 23—Proctectomy
Transperineal intersphincteric close rectal proctectomy with permanent stoma is the treatment of last resort in severe, therapy refractory fistulising disease.

Vote: A+ = 60%, A = 35%, A− = 5%; grade of recommendation: 1C

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**Table 5** Fibrin glue

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Patients</th>
<th>FU (months)</th>
<th>Endpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grimaud et al117</td>
<td>RCT</td>
<td>77</td>
<td>8 weeks</td>
<td>Clinical remission:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>37 months (median)</td>
<td>38% vs 16% placebo (p=0.04)</td>
</tr>
<tr>
<td>Lindsey et al118</td>
<td>RCT</td>
<td>42</td>
<td>12 weeks</td>
<td>Cessation of drainage:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Simple: 50% vs 100% fistulotomy (p=0.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complex: 69% vs 13% seton–flap (p=0.003)</td>
</tr>
<tr>
<td>Witte et al119</td>
<td>OL</td>
<td>34</td>
<td>7 months (median)</td>
<td>Fistula closure: 55%</td>
</tr>
<tr>
<td>Vitton et al120</td>
<td>OL</td>
<td>14</td>
<td>3 months</td>
<td>Fistula closure: 71%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23 months (median)</td>
<td>57%</td>
</tr>
<tr>
<td>de Parades et al121</td>
<td>OL</td>
<td>30</td>
<td>4 weeks</td>
<td>Fistula closure: 57%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12 months (median)</td>
<td>50%</td>
</tr>
<tr>
<td>Loungnarath et al122</td>
<td>Retro</td>
<td>13 (Crohn)</td>
<td>26 months (median)</td>
<td>Fistula closure: 31%</td>
</tr>
<tr>
<td>Zmora et al123</td>
<td>Retro</td>
<td>24</td>
<td>12 months (mean)</td>
<td>Fistulae closure: 33%</td>
</tr>
<tr>
<td>Sentovich124</td>
<td>Retro</td>
<td>20</td>
<td>10 months (mean)</td>
<td>Fistula closure: 85%</td>
</tr>
</tbody>
</table>

FU, follow-up; OL, open label; RCT, randomised controlled trial; Retro, retrospective.

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**Table 6** Diverting stoma and proctectomy

<table>
<thead>
<tr>
<th>Study</th>
<th>Patients</th>
<th>FU (months)</th>
<th>Sustained remission (%)</th>
<th>Proctectomy (%)</th>
<th>Restored (%)</th>
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<tbody>
<tr>
<td>Yamamoto et al125</td>
<td>31</td>
<td>103 (13–332)</td>
<td>26</td>
<td>68</td>
<td>10</td>
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<tr>
<td>Bell et al126</td>
<td>34</td>
<td>ns</td>
<td>ns</td>
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<td>ns</td>
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<tr>
<td>Guillem et al126</td>
<td>28</td>
<td>72 (24–252)</td>
<td>50</td>
<td>51</td>
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<tr>
<td>Rehg et al127</td>
<td>13</td>
<td>60</td>
<td>30</td>
<td>15</td>
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FU, follow-up; ns, not stated.
**Discussion** In complicated, therapy refractory perianal disease a defunctioning stoma should be considered. Based on retrospective data, early remission rates are quite high (up to 81%); however, sustained remission can only be achieved in 26–50% of cases (table 6). Most patients with a stoma ultimately require proctectomy and intestinal continuity can only be restored in a minority of patients. The only study that was conducted in the era of biologics showed a reduced need for completion proctectomy and a relatively higher rate of restoration. Main risks of proctectomy include damage to the pelvic nerves, presacral abscesses, and delayed perineal wound healing. Overall, the use of a diverting stoma should be reserved for patients who have uncontrollable sepsis and tissue destruction, or for patients who have failed conservative therapy. Alternatively, in selected patients, permanent faecal diversion can be avoided by coloanal pull-through or Turnbull-Cutait abdominoanal pull-through procedures, provided that the colon and the anus are intact.

**CONCLUSIONS**

Optimal management of pCD requires a multidisciplinary approach. Diagnostic accuracy is usually achieved by a combination of modalities. Surgical drainage of sepsis is the first line therapy before initiating immnosuppressive treatment. Antibiotics and thiopurines are recommended as adjunctive treatments in Crohn’s fistulas. Of all available anti-TNF agents, the efficacy of infliximab is best documented. Anti-TNF can be used as first line medical treatment, optionally in combination with antibiotics and/or thiopurines. Oral tacrolimus is an option in therapy refractory patients in an attempt to avoid surgical stoma. Definitive surgical repair of fistulas, including fistulotomy, MAF, LIFT, plug and glue, is only of consideration in the absence of luminal inflammation. Proctectomy with permanent stoma is the last resort for severe, therapy refractory disease. A combined medical and surgical treatment algorithm is proposed in figure 5.

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**Figure 5** Treatment algorithm for perianal fistulising Crohn’s disease. AB, antibiotics; ADA, adalimumab; AF, advancement flap; D, drainage; I, incision; IFX, infliximab; IS, immunosuppressants; LIFT, ligation of the intersphincteric fistula tract.
Acknowledgements

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Collaborators

On behalf of the WOCG Working Party: Guillaume Bouguen: Robarts Research Institute, Amsterdam, The Netherlands, London, Ontario, Canada and San Diego, California, USA, and Service des Maladies de l’Appareil Digestif et INSERM U991, Centre Hospitalier Universitaire Pontchaillau and Université de Rennes 1, Rennes, France; Andreas Sturm: Department of Gastroenterology, Krankenhaus Waldfriede, Charité Universitätsmedizin, Berlin, Germany; Andre D’Hoore Department of Surgery, University of Leuven, Leuven, Belgium; David Laharie: CHU de Bordeaux, Hospital Haut-Lévêque, Bordeaux, France; Brian Feagan: Robarts Research Institute, Amsterdam, The Netherlands, London, Ontario, Canada and San Diego, California, USA and University of Western Ontario, London, Ontario, Canada; William Sandborn: Robarts Research Institute, Amsterdam, The Netherlands, London, Ontario, Canada and San Diego, California, USA and Division of Gastroenterology, University of California San Diego, La Jolla, California, USA; Bruce Sands: Mont Sinai Medical Center, New York, New York, USA; Jean-Frederic Colombel: Mont Sinai Medical Center, New York, New York, USA.

Contributors

KG performed systematic literature searches, drafted statements and algorithms and drafted the supporting text for the manuscript. WAB contributed with surgical aspects on finalising statements about classification and surgical treatment, revised the algorithm on management and the supporting text on surgical treatment. MAK contributed with practical aspects on implementing all statements, revised the algorithms and the supporting text. JS contributed to optimising statements and the algorithm on diagnosis and carefully revised the corresponding supporting text. RK performed systematic literature searches and drafted statements on diagnosis. SCN, JP, GvA, ZL and AH contributed to optimising statements and algorithms during the whole preparation process and carefully revised the supporting text. BGL performed systematic literature searches, drafted the supporting text for the manuscript. WAB contributed

Funding

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Competing interests

KBG reports having received speakers’ honoraria from MSD. JS has a consultancy agreement with Robarts Clinical Trials. RK and ZL have no competing interests. RC has no competing interests of interest to declare. JP reports grants and personal fees from Abbvie and Ferring Pharmaceuticals. He has received consultancy fees from Abbott Laboratories/AbbVie, Bristol Meyers Squibb, and Janssen (previously Centocor). Kallol Biopharmaceuticals, Inc, Lexicon Pharmaceuticals, Lycera Corporation, Media Pharmaceuticals (previously Alaven Pharmaceuticals), Merck Research Laboratories, Merck &Co., Millennium Pharmaceuticals (subsequently merged with Takeda), Nissin Kyojin Pharmaceuticals Co, Ltd, Novo Nordisk A/S, NPS Pharmaceuticals, Optimer Pharmaceuticals, Orexigen Therapeutics, Inc, PDL Biopharma, Pfizer, Procter and Gamble, Prometheus Laboratories, ProTarBio Limited, Purgenesis Technologies, Inc, Receptor, Relypsa, Inc, Salient Pharmaceuticals, Salix Pharmaceuticals, Inc, Santarus, Schering Plough Corporation (acquired by Merck), Shire, Sigmod Pharma Limited, Sirtis Pharmaceuticals Co, Ltd (a GSK company), S.L.A. Pharma (UK) Limited, Targacept, Teva Pharmaceuticals, Therakos, Tillotts Pharma AG (acquired by Zeria Pharmaceutical Co, Ltd), TxBell SA, UCB Pharma, Viamet Pharmaceuticals, Vascular Biogenics Limited (VBL), Warner Chilcott Limited, Wyeth (now Pfizer). He has received lecture fees from Abbott Laboratories, Bristol Meyers Squibb, Genentech, Glaxo Smith Kline, Janssen (previously Centocor), Millennium Pharmaceuticals (now Takeda), Novartis, Pfizer, Procter and Gamble Pharmaceuticals, Shire Pharmaceuticals, and UCB Pharma. BGL reports having received consulting fees from Prometheus Labs, and Santarus Inc, speakers’ honoraria from Warner Chilcott, and UCB Pharma. GDH has received consultancy fees from Abbott Laboratories, Actogenix, Boehringer Ingelheim, Centocor, Cosmo Therapeutics, Engene, Ferring Pharmaceuticals, GlaxoSmithKline, Janssen Biologics, Millennium Pharmaceuticals, Mitsubishi Pharma, Merck Research Laboratories, Novo Nordisk, PDL Biopharma, Pfizer, Schering Plough, SetPoint, Shire Pharmaceuticals, Sigmod Pharmaceuticals Ltd, Teva, Tillotts Pharma, UCB Pharma; research grants from Abbott Laboratories, Jansen Biologics, Given Imaging, MSD, Dr Falk Pharma, Photopill; speakers’ honoraria from Abbott Laboratories, Jansen Biologics, Tillotts, Tramedico, Ferring, MSD, UCB, Norgine and Shire; stock options from Engene Inc.

Provenance and peer review

Not commissioned; externally peer reviewed.

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Inflamm Bowel Dis 2003;10:199-203.

Ghorbani K, Ziech ML, Bipat S, et al

Evaluating perianal Crohn disease with endoscopy, ultrasonography, and magnetic resonance imaging in preoperative assessment of enterectomies.


Inflamm Bowel Dis 2002;8:45-51.

Horsthuis K, Ziech ML, Bipat S, et al

Evaluating perianal Crohn disease with endoscopy, ultrasonography, and magnetic resonance imaging in preoperative assessment of enterectomies.


Inflamm Bowel Dis 2002;8:45-51.
Guidelines


Supplementary Material

Supplementary Figure 1. Consensus Process
April 2012
WGO calls for topics

April 2012
IOIBD and ESCP proposes “Perianal Fistulizing Crohn’s disease”
chaired by G D’Haens, B Feagan, JF Colombel

October 2012, UEGW
Co-chairs identify Working Subgroups and Research Committee:
K Gecse, R Khanna, G Bouguen, B Levesque

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October 2012 – February 2013
Research Committee performs systematic literature search, drafts and circulates Statements

February 2013, ECCO
Working Group revises Statements and assigns Grades of Recommendations

February – May 2013
Research Committee drafts and circulates Algorithms

May 2013, DDW
Working Group revises Algorithms

May – August 2013
Voting on Agreement and preparation of supporting text

September 2013
Expert Consensus presented at WCOG 2013
### Supplementary Table 1. Level of Agreement and Grades of Recommendation

#### Level of Agreement
- **A+** Agree strongly
- **A** Agree with minor reservation
- **A-** Agree with major reservation
- **D** Disagree with minor reservation
- **D-** Disagree with major reservation
- **D+** Disagree strongly

#### Grades of Recommendation
- **1A** Strong recommendation, high-quality evidence
- **1B** Strong recommendation, moderate-quality evidence
- **1C** Strong recommendation, low-quality or very low-quality evidence
- **2A** Weak recommendation, high-quality evidence
- **2B** Weak recommendation, moderate-quality evidence
- **2C** Weak recommendation, low-quality or very low-quality evidence

Adapted from Guyatt et al. and Bitton *et al.*
Experimental Therapies

Medical therapies

Uncontrolled case series have reported the efficacy of miscellaneous treatments (MMF [9-12], nutritional therapy[13-17], hyperbaric oxygen[18-23], platelet derived growth factor[24,25] and GM-CSF[26]) for the treatment of fistulizing Crohn's disease. Controlled trials are needed to support their use in pCD. Of note, a single short and small placebo-controlled trial randomized 57 patients with perianal Crohn's fistulas to treatment with placebo or oral spherical adsorptive carbon.[27] Upon 8-weeks of follow-up, 8 of 27 patients (29.6%) achieved clinical remission, defined as a closure of all fistulas without any leakage, as compared to 2 of 30 patients (6.7%) in the placebo group.[27] However, a recent RCT including 249 patients failed to confirm the adsorptive carbon.[28] Prospective open-label series and retrospective cohort observed some efficacy of thalidomide particularly after failure of TNF antagonists, however intolerance and side effects to thalidomide were frequent.[29-35] Thus, the evidence level of efficacy of mycophenolate mofetil (MMF), thalidomide, GM-CSF, nutritional therapy and hyperbaric oxygen is low in fistulizing Crohn's disease. Evidence for oral adsorptive carbon microspheres is contradictory, therefore its use is not recommended.

Surgical and endoscopic treatments

A modification of the loose Seton, called progressive migration technique (daily self rotation of the Seton by 360 degrees) has recently been introduced for high transspincterich fistulas.[36] Although the technique is promising with regard to healing, recurrence and incontinence rates data, especially concerning Crohn's fistulae, are yet insufficient to recommend standard use.[36] Preliminary data from a recent prospective study showed that flap advancement can be successfully combined with video-assisted anal fistula treatment (VAAFT).[37] The technique involves direct visualization of the fistula tracts, potential side tracts and internal openings by a fistuloscope before performing advancement flap repair. Local anti-TNF injections have been proposed for patients who are intolerant or unresponsive to systemic therapy. Two open-label studies have examined the effect of this treatment on perianal fistulizing Crohn's. Perifistular infliximab injection was shown to induce fistula closure in 10 of 15 patients (15-20mg, 3-12 infusions).[38] In another study, of the 11 patients treated with local infliximab (20mg, repeated every 4 weeks) 8
patients achieved clinical response or remission. During follow-up (mean 10.5 months) 4 patients remained in remission.[39] A prospective open-label study showed improvement in all 12 patients and complete cessation of drainage in 9 patients treated with perifistular adalimumab.[40] Combination treatment of fistulectomy and perifistular infliximab injections (20-25mg, every 4-6 weeks until fistula closure, median 5 sessions) resulted in persistent closure in 7 of 8 patients upon 1-year follow-up according to a prospective cohort.[41] Although these reports showed beneficial effect of local biological therapy patient numbers were low and a control group was lacking, therefore further controlled clinical trials are needed to recommend their use in clinical practice.

*Carbon dioxide laser ablation.* In a prospective, single-arm study including 27 Crohn’s patients carbon dioxide laser ablation significantly improved perianal fistula drainage.[42] The technique was combined with the placement of noncutting Seton for 6 months and complete healing was reached in 11 patients at the final visit (mean 19 months). This treatment remains highly experimental.

*Over The Scope Clip (OTSC).* The OTSC (Ovesco Endoscopy, Tübingen, Germany) was tested in a porcine model to close internal fistula openings by using a transanal clip applicator.[43] This pilot study demonstrated feasibility, safety and suggested better fistula healing compared to untreated control fistulas. In a single case report on a high transsphincteric fistula, healing was observed and the OTSC was removed eight months after clip closure.[44] Further controlled trials are awaited to evaluate the role of this minimally invasive technique.

**Figure Legends**

**Supplementary Figure 1.** Systematic Literature Searches of PubMed and Embase were performed by the Research Committee (KG, RK, GB, BL) in conjunction with the Cochrane Review in IBD team at Western University, London, Ontario, Canada, using the following search terms: Crohn*, enteritis regional*, ileitis terminal*, perianal, anal, perineal, fistul*, sinus, sinus*, classssi*, grade, gradi*, index, index*, indice, scale, scale*, scali*, score, score*, scorii*, activity, diagnostic, diagnosi*, diagnose, image, image*, ultrasound*, EUS, magnetic resonance, MR, MRI, endoscop*, sigmoidoscop*, proctosigmoidoscop*, computerized tomography, CT, fistulograph*, EUA, examination under anaesthesia, antibiotic, immunomodulat*, immunosuppress*, biologic, anti-TNF, metronidazole,
ciprofloxacin, amoxicillin, 6-mercaptopurine, azathioprine, thioguanine, tioguanine, cyclosporine, tacrolimus, methotrexate, infliximab, adalimumab, certolizumab, oxygen, carbon, nutrition, mycophenolate mofetil, thalidomide, GM-CSF, surgery, surgery*, surgi*, seton, drain*, fistulotomy, fistulectomy, lay-open, flap, LIFT, bioLIFT, plug, glue, stem cell, stoma, proctectomy. Searches were limited to English language and full papers. Additionally, abstracts from Digestive Disease Week (DDW), United European Gastroenterology Week (UEGW), Annual Meeting of the Radiological Society of North America (RSNA) and European Congress of Radiology (ECR) 2012 and 2013 were also screened. The search initially identified 4680 references. Titles and abstracts were downloaded and two independent committee members reached consensus on which references were the most relevant.
References on Experimental Treatment


