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ORIGINAL ARTICLE

# Online training on how to diagnose anoperineal lesions of Crohn's disease: Do pictures matter? A nationwide randomized study

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**KEYWORDS**
Perianal lesions;

**Summary** Any gastroenterologist must be trained to properly diagnose anoperineal lesions in patients with Crohn's disease (APLOC). The aim of this study was to establish whether

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Crohn's disease;
E-learning

adding pictures would improve teaching effectiveness of the diagnosis of APLOC to French gastroenterology trainees.
*Method:* Trainees were asked to answer a first web-based survey consisting of evaluating 12 pictures of APLOC with a closed answer questionnaire. They were then randomized in 2 groups. Group A received an online teaching with typical pictures and APLOC definitions and group B definitions only. Trainees were asked again seven days later to answer a second survey with 12 other pictures of APLOC and 14 experts also answered this survey. Diagnostic scores were expressed in %. The primary endpoint was the comparison of the score of survey 2 between the two groups of trainees. Secondary endpoints were to compare results of survey 2 between trainees of both groups and experts, and assess diagnosis of each lesion.
*Results:* Two hundred fourty eight trainees among 465 answered survey 1, and 195 survey 2. The diagnostic score was 71.9% for groups A and B and 74.6% for experts (differences NS). After training diagnosis of ulceration was 72% for group A and 72.9% for group B, fistulae 85.2% versus 85.8%, erythema 44.1% vs. 55.6%, anoperineal scars 67.5% vs. 65.6%, and abscess 100% (differences NS).
*Conclusion:* There was no difference between the two teaching methods. Further research should be performed aiming at improving teaching material and quotation baremes.


## Introduction

Anopernieal lesions are frequent during Crohn's disease (APLOC), heterogeneous and their presence and nature influence the prognosis and treatment strategies [1—5]. Definitions of lesions, classifications and scores have been established [4—8]. They must be known to specialists and be subject to initial and continuous training. We previously showed that ulceration, fistulae, inflammatory external openings of fistulae, erythema and abscess obtained an acceptable inter-observer agreement between specialists [8]. During their training, future gastroenterologists have to learn how to diagnose those lesions and their diagnostic skills have to reach the level of specialists.

The use of photographic, film and e-learning media is becoming increasingly important in education and has proved its effectiveness in several areas [9,10].

The main objective of our study was to evaluate if an e-learning training with iconographic support was more efficient than an identical training but without image, for the diagnosis of APLOC by trainees in gastroenterology. The secondary objectives were to identify whether some lesions were more easily diagnosed after training with photos, and whether the trainings allowed students to achieve learning outcomes i.e. an acceptable level of APLOC diagnosis compared to senior experts.

## Material and methods

A randomized controlled, open and national study was conducted. It was approved by the Group of Ethics and Medical Research of the Paris Saint Joseph Hospital Group.

The coordinating group (PhM, CG, VdP) selected the test and training photos, elaborated the evaluation grids for diagnostic skills, analyzed results and did not participate to the votes. The 19 other experts who belong to the Groupe de Recherche En Proctologie (GREP of the French National Society of Coloproctology) answered test 2 but were not involved in teaching and did not receive the teaching material.

Training in gastroenterology specialty in France lasts 4 years. The coordinating group contacted all gastroenterology trainees in France by e-mail and these tacitly agreed to participate in this study by answering the questionnaires. They were asked to answer a first questionnaire in which they had to make a diagnosis for 12 photos of APLOC using a closed answer form (Fig. 1). Those who responded within one month were randomly assigned to two groups that received different e-learning training consisting of a one page document sent by email with unlimited availability. Group A received the APLOC definitions [11] and typical photos (Fig. 2). Group B received the APLOC definitions only (without the photos). One week after receiving this training material, the students received a second test in which they had to diagnose 12 new photos, different from the first (except for one photo).

A scoring grid with weighting of the main diagnoses was established by the coordinating group for each photo. Test 1 was scored on 167 points (Fig. 3), test 2 on 195 points and results were expressed as percentages of diagnosis fitting that of the coordinating group.

## Endpoints

The primary endpoint of the study was the comparison of the results of test 2 between groups A and B. The secondary endpoints were the comparison of diagnosis rates of ulceration, anal fistula, erythema, abscess and scrapie between groups A and B, and between trainees and senior experts.

## Statistics

Data were anonymized. The questionnaires were available via Google Drive allowing the automatic entry of results into a Microsoft Excel® database. The randomization list was established by the random function of Excel®. Statistical analyzes were performed using Excel® 2013 and SAS® softwares. For each test, a total score was assigned to each

| | |
|---|---|
| Ulceration ? | Yes<br>No<br>Don't know |
| If the answer is yes, how is this ulceration ? | Superficial<br>Deep<br>Don't know |
| Anal Fistula ? | Yes<br>No<br>Don't know |
| If the answer is yes, how is this fistula ? | Simple<br>Complex<br>Don't know |
| How are external openings ? | Inflammatory<br>Non inflammatory<br>Don't know |
| Erythema ? | Yes<br>No<br>Don't know |
| Abscess ? | Yes<br>No<br>Don't know |
| Skin tags ? | Yes<br>No<br>Don't know |
| If the answer is yes, how are this skin tags ? | Inflammatory<br>Non inflammatory<br>Don't know |

**Figure 1** Standardized answer form for each photo (for tests 1 and 2).

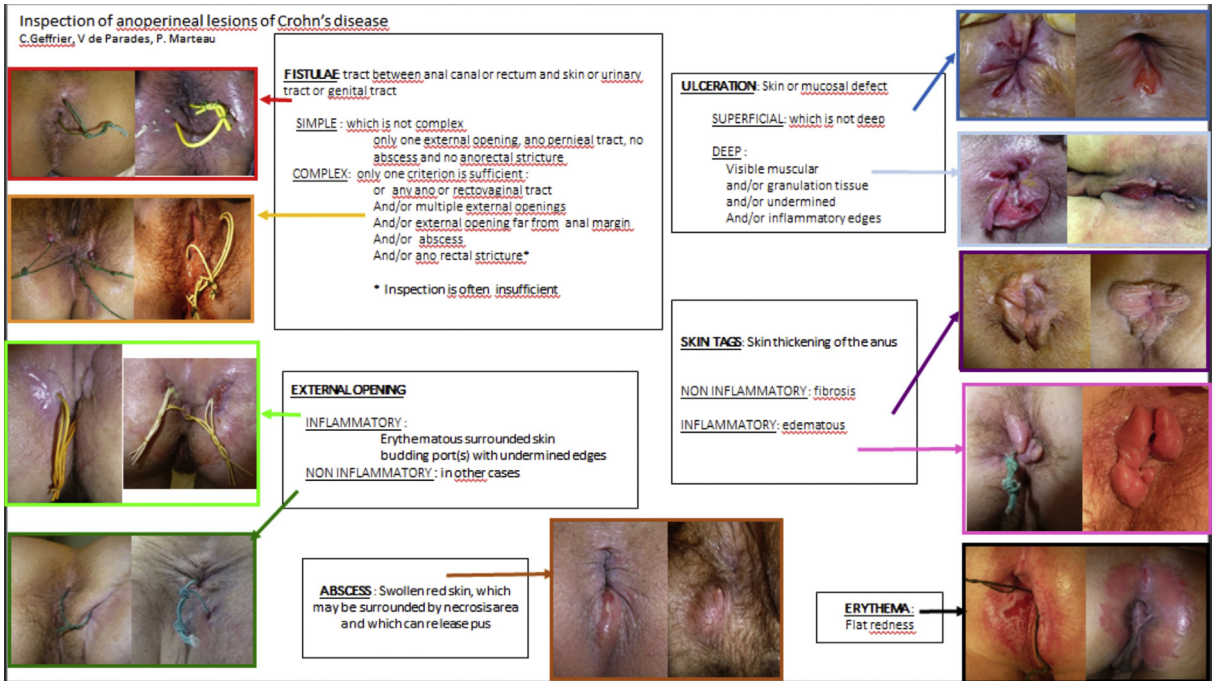



**Figure 2** A. Web-based teaching material in group A: consensual and validated definitions of APLOC 13 and photos illustrating the typical aspects of each lesion (group B received the definitions but not these photos). B. Cotation Grid of Test 2.

trainee. Comparisons of the means were carried out with a Student's test. The comparison of the percentages of exact lesion diagnosis was carried out by a $Chi^2$ test. The comparison of the test score 2 between the experts and the trainees was done with a Wilcoxon test because the number of experts, less than 30, did not correspond to a normal distribution. The comparison of lesion detection rates between experts and trainees was done using a Fisher test.

## Results

The study flowchart is shown in Fig. 4 . Two hundred and forty eight of the 465 trainees of gastroenterology in France answered test 1 (53.3%), then were randomly divided into 2 groups ; 97 trainees from group A and 98 students from group B answered the second questionnaire (21.8% and 21% lost to follow-up). The characteristics of the students, and results

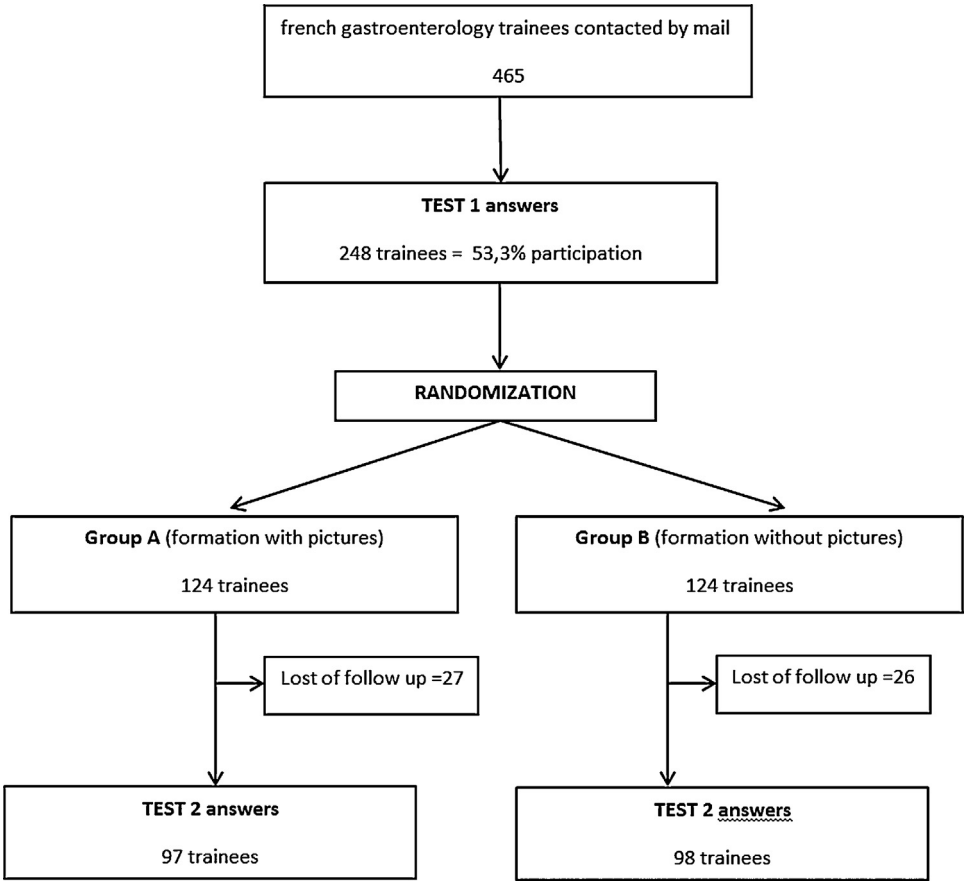



**Figure 3** Cotation grid of Test 1 (167 points).

**Table 1** Characteristics of the trainees.

| | | Group A ($n=121$[a]) | Group B ($n=117$) |
|---|---|---|---|
| Training year | 1st | 21 (17.4) | 17 (14.5) |
| | 2nd | 25 (20.7) | 34 (29.1) |
| | 3rd | 45 (37.2) | 32 (27.3) |
| | 4th | 30 (24.8) | 34 (29.1) |
| Diagnostic score at test 1 (%) | | 76.6 ± 6.2 IC95% [75.5; 77.7] | 75.9 ± 6.2 IC95% [74.8; 77.0] |

[a] Missing data for 10 patients who participated in the test 1.

of test 1 in each group are shown in Table 1; there was no stastically significant difference between the two groups.

The diagnostic score for test 2 was 71.9 % ± 6.9 (95% CI [70.5;73.3]) versus 71.9 % ± 7.1 (95% CI [70, 73.3]) for group A and B respectively ($P=0.97$) and 74.6 % ± 4.3 (95% CI [72.1;77.1]) for the group of experts ($P$-values 0.21 and 0.20 vs. group A and B respectively).

The detection rate of each elemental lesion of trainees and experts during test 2 are shown in Table 2.

## Discussion

Assessing teaching effectiveness is now felt as a priority to improve it. The diagnosis of APLOC is often thought to be difficult and requiring proper teaching. Consensual definitions of the lesions have been established [8]. In this study, the addition of typical photos to a training material did not allow trainees to better diagnose APLOC at the inspection and the students trained with or without photos reached the learning outcome.

More than 50% of the total number of trainees in gastroenterology in France participated in our study. It is possible that some of the trainees who did not answer the questionnaires felt that they did not have enough skills to describe the APLOC; indeed the percentage of those in the first year of training was lower than that of those in the 2nd and 3rd year. Trainees in the 4th year also had a lower percentage of response which may be explained by specialization in hepatology, oncology or endoscopy. The hypotheses explaining the 21% lost of follow up after completion of test 1 can be due to a lack of interest for the study, the time constraints

Picture 1

| | | |
|---|---|---|
| **Ulceration** | Yes | 5† |
| Superficial/deep | Deep | 3 |
| **Anal fistula** | No | 1 |
| Simple/complex | | |
| EO* inflammatory/non inflammatory | | |
| **Erythema** | No | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 1 |
| Inflammatory/non inflammatory | Infl | 1 |

*EO : External openings
† : number of points awarded

Picture 2

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Complex | 3 |
| EO inflammatory/non inflammatory | Infl | 2 |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

Picture 3

| | | |
|---|---|---|
| **Ulceration** | Yes | 1 |
| Superficial/deep | Superf | 1 |
| **Anal fistula** | No | 1 |
| Simple/complex | | |
| EO inflammatory/non inflammatory | | |
| **Erythema** | No | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 5 |
| Inflammatory/non inflammatory | Infl | 3 |

**Figure 4** Study flow chart. A. Picture 1, Picture 2, Picture 3. B. Picture 4, Picture 5, Picture 6. C. Picture 7, Picture 8, Picture 9. D. Picture 10, Picture 11, Picture 12. E. Picture 1, Picture 2, Picture 3. F. Picture 4, Picture 5, Picture 6. G. Picture 7, Picture 8, Picture 9. H. Picture 10, Picture 11.

Picture 4

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Simple | 3 |
| EO inflammatory/non inflammatory | Non infl | 2 |
| **Erythema** | No | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

Picture 5

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 3 |
| Simple/complex | Complex | 1 |
| EO inflammatory/non inflammatory | Infl | 1 |
| **Erythema** | No | 1 |
| **Abscess** | Yes | 5 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

Picture 6

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Complex | 2 |
| EO inflammatory/non inflammatory | Infl | 3 |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

**Figure 4** (*Continued*)

Picture 7

| | | |
|---|---|---|
| **Ulceration** | Yes | 5 |
| Superficial/deep | Superf | 3 |
| **Anal fistula** | No | 1 |
| Simple/complex | | |
| EO inflammatory/non inflammatory | | |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

Picture 8

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Simple | 3 |
| EO inflammatory/non inflammatory | Non infl | 2 |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 1 |
| Inflammatory/non inflammatory | Non infl | 1 |

Picture 9

| | | |
|---|---|---|
| **Ulceration** | Yes | 1 |
| Superficial/deep | Superf | 1 |
| **Anal fistula** | No | 1 |
| Simple/complex | | |
| EO inflammatory/non inflammatory | | |
| **Erythema** | Yes | 3 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 5 |
| Inflammatory/non inflammatory | Infl | 2 |

**Figure 4** (*Continued*)

Picture 10

| | | |
|---|---|---|
| **Ulceration** | Yes | 5 |
| Superficial/deep | Deep | 3 |
| **Anal fistula** | No | 1 |
| Simple/complex | | |
| EO inflammatory/non inflammatory | | |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 1 |
| Inflammatory/non inflammatory | Infl | 1 |

Picture 11

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Complex | 2 |
| EO inflammatory/non inflammatory | Non infl | 2 |
| **Erythema** | No | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

Picture 12

| | | |
|---|---|---|
| **Ulceration** | Yes | 5 |
| Superficial/deep | Deep | 2 |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Complex | 2 |
| EO inflammatory/non inflammatory | Infl | 2 |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

**Figure 4** (*Continued*)

Picture 1

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 3 |
| Simple/complex | Complex | 2 |
| EO inflammatory/non inflammatory | Infl | 2 |
| **Erythema** | Yes | 1 |
| **Abscess** | Yes | 5 |
| **Skin tags** | Yes | 1 |
| Inflammatory/non inflammatory | Non infl | 1 |

Picture 2

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Complex | 3 |
| EO inflammatory/non inflammatory | Infl | 2 |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 3 |
| Inflammatory/non inflammatory | Infl | 2 |

Picture 3

| | | |
|---|---|---|
| **Ulceration** | Yes | 5 |
| Superficial/deep | Deep | 3 |
| **Anal fistula** | Yes | 2 |
| Simple/complex | Simple | 2 |
| EO inflammatory/non inflammatory | Non infl | 1 |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 1 |
| Inflammatory/non inflammatory | Infl | 1 |

**Figure 4** (*Continued*)

Picture 4

| | | |
|---|---|---|
| **Ulceration** | Yes | 2 |
| Superficial/deep | Don't know | 1 |
| **Anal fistula** | No | 1 |
| Simple/complex | | |
| EO inflammatory/non inflammatory | | |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 5 |
| Inflammatory/non inflammatory | Infl | 3 |

Picture 5

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 3 |
| Simple/complex | Simple | 3 |
| EO inflammatory/non inflammatory | Non infl | 2 |
| **Erythema** | No | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | yes | 2 |
| Inflammatory/non inflammatory | Non infl | 1 |

Picture 6

| | | |
|---|---|---|
| **Ulceration** | yes | 5 |
| Superficial/deep | Deep | 3 |
| **Anal fistula** | No | 1 |
| Simple/complex | | |
| EO inflammatory/non inflammatory | | |
| **Erythema** | yes | 2 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 2 |
| Inflammatory/non inflammatory | Non infl | 2 |

**Figure 4** (*Continued*)

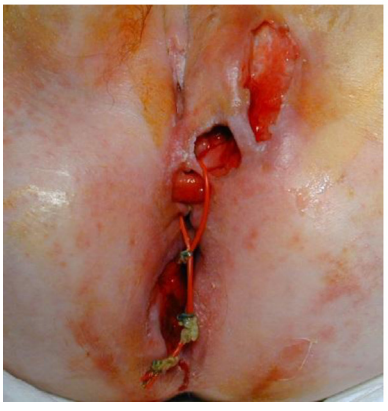
Picture 7

| | | |
|---|---|---|
| **Ulceration** | Yes | 3 |
| Superficial/deep | Deep | 2 |
| **Anal fistula** | Yes | 3 |
| Simple/complex | Complex | 2 |
| EO inflammatory/non inflammatory | Infl | 2 |
| **Erythema** | No | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 2 |
| Inflammatory/non inflammatory | Non infl | 1 |

Picture 8

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Complex | 3 |
| EO inflammatory/non inflammatory | Infl | 3 |
| **Erythema** | Yes | 2 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 3 |
| Inflammatory/non inflammatory | Infl | 2 |

Picture 9



| | | |
|---|---|---|
| **Ulceration** | Yes | 3 |
| Superficial/deep | Deep | 2 |
| **Anal fistula** | Yes | 3 |
| Simple/complex | Simple | 2 |
| EO inflammatory/non inflammatory | Infl | 2 |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

**Figure 4** (*Continued*)

Picture 10

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Simple | 3 |
| EO inflammatory/non inflammatory | Infl | 2 |
| **Erythema** | Yes | 2 |
| **Abscess** | No | 1 |
| **Skin tags** | No | 1 |
| Inflammatory/non inflammatory | | |

Picture 11

| | | |
|---|---|---|
| **Ulceration** | Yes | 5 |
| Superficial/deep | Superf | 3 |
| **Anal fistula** | Don't know | 1 |
| Simple/complex | Don't know | 1 |
| EO inflammatory/non inflammatory | Don't know | 1 |
| **Erythema** | Yes | 2 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 2 |
| Inflammatory/non inflammatory | Non infl | 1 |

Picture 12

| | | |
|---|---|---|
| **Ulceration** | No | 1 |
| Superficial/deep | | |
| **Anal fistula** | Yes | 5 |
| Simple/complex | Simple | 3 |
| EO inflammatory/non inflammatory | Non infl | 2 |
| **Erythema** | Yes | 1 |
| **Abscess** | No | 1 |
| **Skin tags** | Yes | 2 |
| Inflammatory/non inflammatory | Non infl | 1 |

**Figure 4** (*Continued*)

**Table 2** Diagnostic scores for test 2.

| Test 2 | n[a] | Experts n = 14 | p1[b] | Group A n = 97 | p2[c] | Group B n = 98 | p3[d] |
|---|---|---|---|---|---|---|---|
| Abcess | 1 | 100 | 0.11 | 100 | 0.18 | 100 | 0.84 |
| Ulceration | 6 | 97.6 ± 5.8 | 0.69 | 72.0 ± 32.3 | 0.69 | 72.9 ± 31.2 | 0.82 |
| Fistula | 9 | 92.1 ± 19.1 | 0.58 | 85.2 ± 30.6 | 0.17 | 85.8 ± 29.8 | 0.80 |
| Skin tags | 10 | 75.7 ± 31.6 | 0.54 | 67.5 ± 24.8 | 0.54 | 65.6 ± 20 | 0.10 |
| Erythema | 10 | 34.3 ± 29.9 | | 44.1 ± 21.7 | | 55.6 ± 20.8 | |

[a] Number of lesions of each type present in test 2 according to the organizing group.
[b] p1: comparison of group A and experts.
[c] p2: comparison of group B and experts.
[d] p3: comparison of group A and B.

and accessibility to the test. The organizing group did its best to limit the last 2 hypothesis.

The lack of difference of teaching effectiveness when pictures were added is contra-intuitive. It may be related to the equal quality of the two formations or to a lack of discrimination of our evaluation test. We decided not to give the same questionnaires for test 1 and 2. The 12 photos of each test were chosen by the organizing group with in order to propose a short questionnaire, carried out in 10—15 minutes to obtain a high participation rate, have pictures representative of the different APLOC, and address a wide range of diagnostic difficulty. This can explain the score of only 75% obtained by the experts. Overall, after teaching, the differences in interpretation were not different between trainees and experts. The presence of one or two setons on some photos has undoubtedly helped in the diagnosis of fistula. But, these photos allowed to evaluate the description of the characteristics of the fistulas (for example recognizing some complex fistulae). The scoring grid was established by the organizing group; it weighted the main diagnoses and provided points for negative diagnoses (for example diagnosing the absence of ulceration on a photo added 1 point to the score). The experts obtained a score not significantly higher than that of the students trained by the two methods. By analyzing item-by-item responses and calculating the detection rate of each lesion, numerous discrepancies were observed between the experts. For example, for erythema, the detection rate by the experts was 34% ± 30, which means that almost 2/3 of the erythema labeled as such in the scoring grid by the 3 organizers, were not for the experts. This confirms previous studies with this variable, which also has a poor reproducibility in endoscopic scores [8,11,12,13]. Our study design would have been improved if we had planned independence between the experts who provide the teaching and those who evaluate it by test and grids. Finally, the lack of difference between the two types of training may also reveal the limitations of APLOC diagnosis at the inspection as indicated by expert. Indeed, palpation and often MRI are required to properly diagnose stenosis and perforating lesions such as some fistulas, abscesses, and deep ulcers [4—6,8,14,15].

Ano-perineal lesions of Crohn's disease are a diagnostic and therapeutic issue, and this was to our knowledge the first study evaluating web based teaching methods in this field. We conclude that the result of the present study showing no apparent benefit of adding photos to the training trainees should not be considered as definitive but that although trainees reached the level expected, better training methods can be developed and that evaluation of teaching should also progress.

## Disclosure of interest

The authors declare that they have no competing interests.

## Acknowledgment

The photo database was created from photographs by Drs. Manuel Aubert, Boubekeur Bennadji, Jean-François Contou, Elise Crochet, Nadia Fathallah, Philippe Marteau, Benoit Mory, Vincent de Parades, Elise Pommaret, Laurent Siproudhis and Ghislain Staumont, (in the majority, members of Research Group of Proctology, GREP).

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