Comparison of revised American Fertility Society and ENZIAN staging: a critical evaluation of classifications of endometriosis on the basis of our patient population

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Objective: To develop a classification that takes deep infiltrating endometriosis into account, the ENZIAN score was introduced. The ENZIAN classification supplements the revised American Fertility Society (AFS) score with regard to the description of deep infiltrating endometriosis, retroperitoneal structures, and other organs. The null hypothesis was that classifying a lesion by the revised AFS as well as the ENZIAN system is not meaningful, because the two systems express different locations.
Design: Retrospective.
Setting: Hospital admissions.
Patient(s): Two hundred nineteen women admitted for endometriosis.
Intervention(s): Surgical interventions.
Main Outcome Measure(s): Classification of the severity of endometriosis according to the revised AFS and the ENZIAN classification, focusing on the distribution pattern in deep infiltrating endometriosis, and the identification of duplicate classifications of the same lesions in the revised AFS as well as the ENZIAN systems.
Result(s): Deep infiltrating endometriosis was diagnosed in 160 of 219 patients (73%). These patients had 236 lesions of deep infiltrating endometriosis, which were classified by ENZIAN as follows: compartment a (vertical): 26%; compartment b (horizontal): 41%; compartment c (dorsal): 24%; uterine adenomyosis: 4%; bladder disease: 2%; ureter disease: 1%; and bowel disease: 2%. The severity of deep infiltrating endometriosis according to ENZIAN (grades 1 = mild to 4 = severe) was as follows: grade 1: 45%; grade 2: 26%; grade 3: 19%; grade 4: 10%. Fifty-eight patients were classified according to ENZIAN although they did not fulfill the criteria of deep infiltrating endometriosis and had previously been classified according to the revised AFS classification. Adaptation of the ENZIAN score would reduce the diagnoses of deep infiltrating endometriosis by 36% (95% confidence interval [CI] 29%–44%).
Conclusion(s): The ENZIAN score is a helpful aid to describe deep infiltrating endometriosis, but needs to be adapted. (Fertil Steril® 2011;95:1574–8. ©2011 by American Society for Reproductive Medicine.)

Key Words: Endometriosis, deep infiltrating endometriosis, DIE, classification, AFS, ENZIAN, laparoscopy

Endometriosis is one of the most common gynecological diseases in women of reproductive age. The estimated incidence in Germany is currently 40,000 new diseases per year (1).

Given this enormously high rate, which signifies a substantial cost factor for public health in addition to being a cause of prolonged suffering for the patient, there is a persistent need for unambiguous classification and documentation of endometriosis.

Following descriptions of the disease by Carl von Rokitansky, Thomas Stephen Cullen and Johannes Pfannenstiel, Lockyer (2) tried in 1918 to classify endometriosis on the basis of its anatomical location. Acosta et al. (3) introduced a new classification in 1973. In German-speaking countries, a distinction was made between internal, external and extragenital endometriosis (4). Finally, in 1979 the American Fertility Society (AFS) introduced the AFS score (5) which, after certain modifications, became the revised AFS in 1985 (6) and the revised American Society for Reproductive Medicine in 1997 (7). Further suggestions concerning the classification of endometriosis came from Batt et al. (8), Adamyan (9), Chapron (10), and Martin (11). A classification of fertility in the presence of endometriosis is being demanded for a long time. A very elegant complementary classification has been provided by the *Endometriosis fertility index* (12).

The revised AFS classification still is the most widely used. Deeply infiltrating endometriosis and the involvement of other organs are not taken into account. Therefore, the ENZIAN score was introduced to provide a means of registering deeply infiltrating endometriosis (13).

THE ENZIAN SCORE

The ENZIAN classification supplements the revised AFS score with regard to the description of deeply infiltrating endometriosis, retroperitoneal structures, and the involvement of other organs. The latter is easily classified by simple mention of the organs themselves, such as intestinal (FI), uterine (FA), intrinsic ureteral (FU), or bladder (FB) disease, or disease at other locations (FO). The prefix "F"

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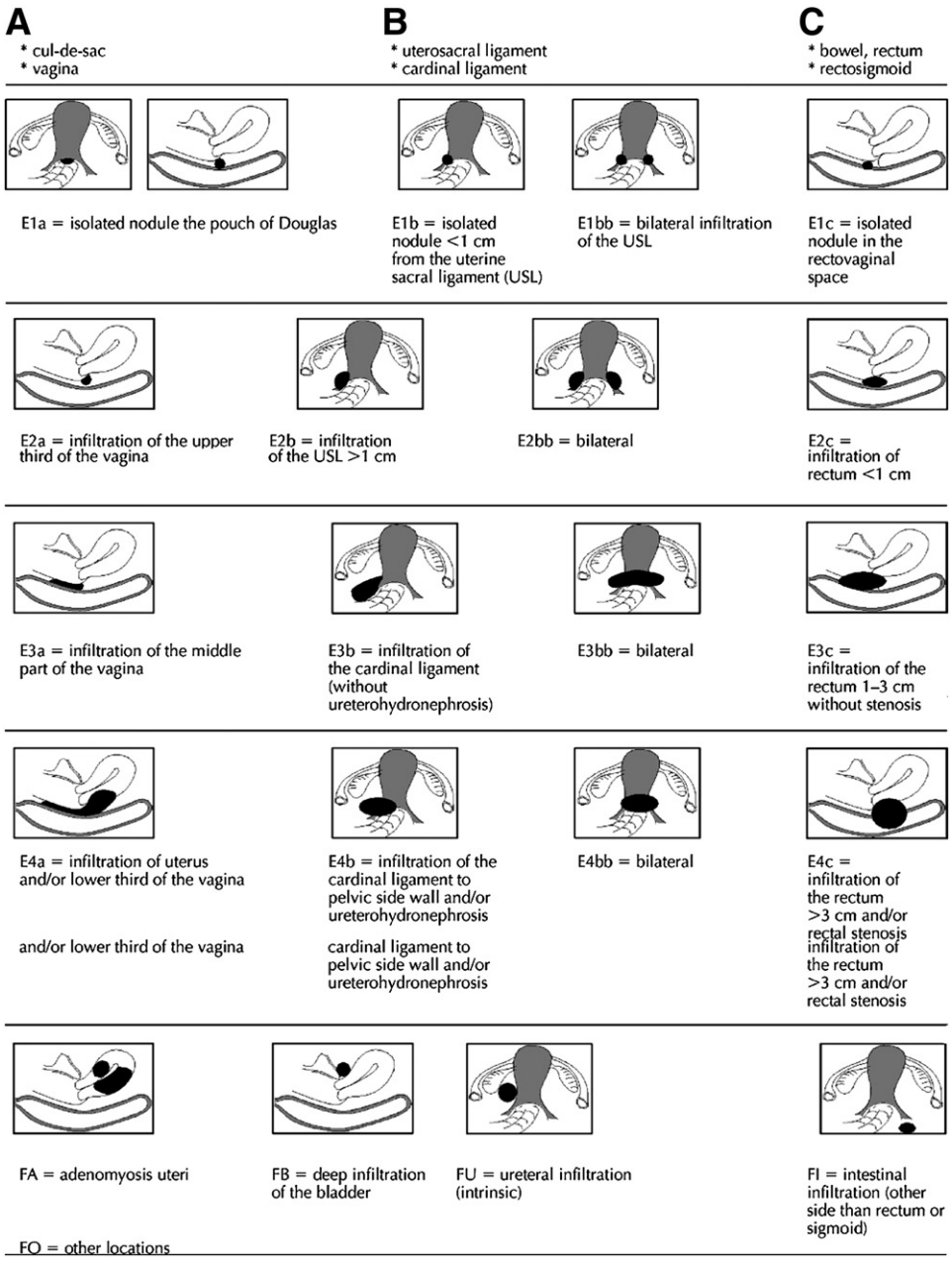
stands for external disease (F = fremd in German, which means foreign or external). These manifestations at other sites are only described in ENZIAN, but are not divided into grades of severity.

The ENZIAN score also encompasses three axes or levels in compartments a, b, and c, as well as classifies the severity of endometriosis (1–4), depending on its spread. The prefix "E" indicates the presence of a tumor of the endometriosis. The number that follows describes the size of the lesion (Fig. 1) (13), and the subsequent lowercase letter marks the location or the affected compartment. Two letters signify bilateral disease (e.g., E1bb).

Compartment a is a vertical plane extending from the pouch of Douglas cavity (E1a), encompasses the vagina (E2a and E3a), and includes the spread of disease in the entire vagina, the posterior wall of the uterus, and invasion of the latter (E4a). Compartment b is a horizontal plane including the uterosacral ligaments (E1b, E2b), the parametria, and the pelvic wall. E3b describes invasion of the parametria without hydronephrosis of the ureter, whereas E4b signifies complete involvement of the parametria up to the pelvic wall and/or hydronephrosis of the ureter. Compartment c is located dorsally and expresses spread of the disease to the bowel.

FIGURE 1

The ENZIAN score.



Haas. Comparison of revised AFS and ENZIAN staging. Fertil Steril 2011.

Lesions of the rectovaginal septum (E1c), bowel lesions measuring less than 1 cm in size (E2c), those measuring 1–3 cm in size (E3c), and lesions that are larger than 3 cm and/or cause stenosis of the rectum (E4c), are assigned to this compartment. The revised AFS classification as well as the ENZIAN score are descriptive in nature. Factors such as principal symptoms or sterility are not taken into account by either method.

AIM

After presenting the results of the revised AFS and the ENZIAN classifications on the basis of our patient population, the problems encountered in classification will be described. Because both classifications are focused on a morphological description of endometriosis, the question arises as to whether the ENZIAN score simply complements the revised AFS classification with respect to deeply infiltrating endometriosis, or whether the two would signify a duplicate registration of the same phenomena.

MATERIALS AND METHODS

Institutional Review Board approval was obtained. At the department of obstetrics and gynecology, General Hospital of Linz, 219 patients were operated on for histologically confirmed endometriosis between January 1, 2009 and January 31, 2010. Of these, 214 patients could be classified by revised AFS, whereas 5 patients could only be classified according to ENZIAN because the AFS score does not take into account uterine adenomyosis.

It should be noted that, in the ENZIAN classification, a single lesion is classified only once (i.e., it is assigned to compartment a, b, or c). When tumors due to endometriosis were located at the margin between two intersecting compartments, the lesion was assigned to the larger compartment affected by the tumor, not to both compartments. Multiple nominations were only made when several lesions were found at different locations (i.e., when several compartments were affected). When several lesions were observed within a single compartment, only the larger lesion was taken into account for the purpose of classification. In those cases in which the tumor was situated in a broad-based fashion on the bowel but only affected the serous membrane, the lesion was not assigned to compartment c in the present evaluation.

RESULTS

Outcome of the Revised AFS Classification

Of 219 patients who were operated on because of endometriosis, 73 (34%) were assigned to revised AFS I, 36 (17%) to revised AFS II, 46 (21%), to revised AFS III, and 59 (28%) to revised AFS IV (Fig. 2). Five patients could be classified only according to ENZIAN because the AFS score does not take into account uterine adenomyosis.

Deeply infiltrating endometriosis was diagnosed, or the clinical suspicion confirmed, perioperatively in 160 of 219 patients (73%). Further classification of these 160 patients yielded 236 ENZIAN classifications.

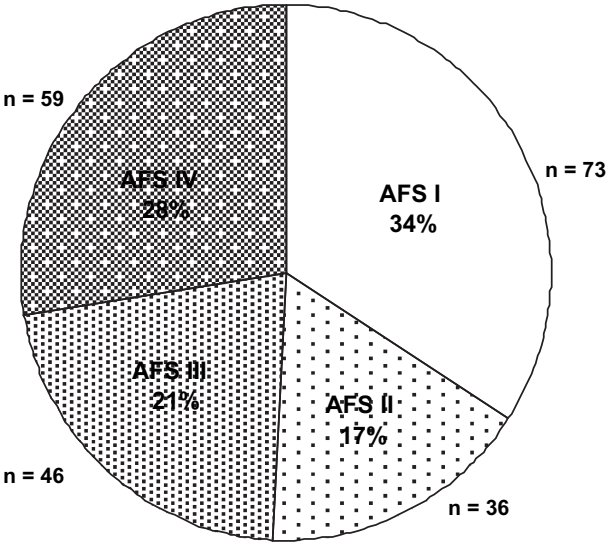
Endometriosis is known to simultaneously affect several organs and structures. In this regard, the ENZIAN score is a descriptive morphological classification that permits multiple nominations when various manifestations exist.

Outcome of the ENZIAN Classification

Distribution Of 236 ENZIAN classifications, 61 (26%) were assigned to compartment a, 98 (41%) to compartment b, and 56 (24%) to compartment c. Nine ratings (4%) referred to uterine adenomyosis, five (2%) involved the bladder, three (1%) referred to intrinsic ureter disease, and four (2%) to bowel disease (Fig. 3).

FIGURE 2

Number of patients classified by the revised American Fertility Society (AFS) classification: n = 214.



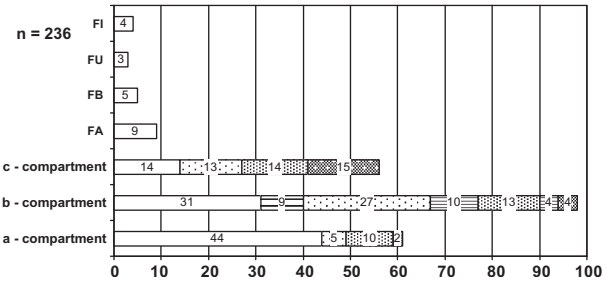
Haas. Comparison of revised AFS and ENZIAN staging. Fertil Steril 2011.

Grades of severity in compartments a, b, and c Summarizing compartments a, b and c, and dividing these into severity grades 1–4 showed that 215 lesions could be assigned to the different compartments. Of these, 98 (45%) were classified as grade 1, 55 (26%) as grade 2, 41 (19%) as grade 3, and 21 (10%) as grade 4 disease (Fig. 4).

Duplicate registration by the revised AFS and the ENZIAN classification The pouch of Douglas cavity (E1a), which had already been classified according to the revised AFS, was included in 44 of 236 (19%) ENZIAN classifications (Fig. 3). As shown in Figure 2, we considered superficial disease of the uterosacral ligament in 40 of 236 classifications (17%); 31 of these were unilateral disease, whereas 9 were bilateral disease (E1b and E1bb). Analogous to peritoneal endometriosis involving the pouch of Douglas,

FIGURE 3

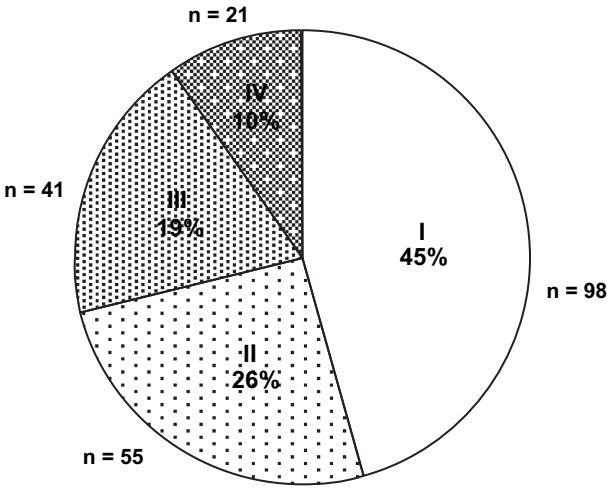
Distribution of the 236 ENZIAN classifications. Severity grades in compartments a, b, and c: ▭ severity grade 1; ▨ severity grade 2; ▨ severity grade 3; ▨ severity grade 4; ▤ bilateral disease in compartment b.



Haas. Comparison of revised AFS and ENZIAN staging. Fertil Steril 2011.

FIGURE 4

Distribution of severity grades (1–4 [I–IV]) in the 215 ENZIAN classifications.



Haas. Comparison of revised AFS and ENZIAN staging. Fertil Steril 2011.

these had already been classified according to the revised AFS and were thus registered twice.

Fifty-eight of 160 patients had solitary superficial peritoneal disease in the pouch of Douglas cavity (E1a), the uterosacral ligament (E1b and E1bb), or a combination of the two. Removal of these manifestations of endometriosis from the ENZIAN score, which had already been classified by the revised AFS, would have reduced the number of patients diagnosed with deeply infiltrating endometriosis by 58 (36%; 95% confidence interval [CI] 29%–44%).

DISCUSSION

The revised AFS classification is currently the international standard and has been successfully used for several years. The ENZIAN score is a meaningful adjunct to the revised AFS classification because it permits registration of retroperitoneal disease by way of deeply infiltrating endometriosis. Despite consistent efforts to implement the ENZIAN score as a supplement to the revised AFS classification for deeply infiltrating endometriosis, the former is poorly accepted by gynecologists. Internationally it is practically unknown. This fact is attributed to the complexity of its documentation and to the absence of significant factors, such as pain or fertility, which are undoubtedly the principal symptoms of this condition. Gynecologists and self-help groups consider it essential to take these factors into account. However, this requirement cannot be fulfilled by the ENZIAN score, which is a purely morphological and descriptive supplementation of the revised AFS classification.

Does the ENZIAN Score Really Supplement the Revised AFS Classification or Does it Signify a Duplicate Scoring?

The ENZIAN classification supplements the revised AFS score with regard to the description of deeply infiltrating endometriosis, retroperitoneal structures, and the involvement of other organs. The latter is easily classified by simple mention of the organs themselves, such as intestinal, uterine, intrinsic ureteral, or bladder disease, or disease at other locations. Because the ENZIAN score permits several classifications into different compartments and organs certainly renders this score more complex, but it is also very precise in demonstrating endometriosis.

Classification of endometriosis of the peritoneum by the revised AFS also offers the option of multiple nominations. For instance, deep peritoneal disease in the pouch of Douglas cavity, with a lesion measuring 2 cm in size, is assigned 4 points on the revised AFS. This is rated E1a on the ENZIAN score. Thus, it is not clear why peritoneal disease in the Douglas cavity is also rated in the ENZIAN classification, especially if one considers that such involvement is not to be interpreted as retroperitoneal disease. Such duplicate scoring results in a strong correlation between the ENZIAN and the revised AFS classifications, which actually should not occur if one intends to achieve a supplementary classification, and renders the finding ambiguous and poorly reproducible.

Figure 3 shows that 44 of 236 classifications were rated as E1a (i.e., mild peritoneal disease in the pouch of Douglas cavity). In E1a, "1" stands for mild disease and "a" for the pouch of Douglas cavity. This corresponds to about 19% of all ENZIAN classifications, which would have been previously classified by the revised AFS as well, because the revised AFS also takes peritoneal disease into account. Thus, 19% of all classifications were scored twice. Inclusion of peritoneal endometriosis in the pouch of Douglas is shown in Figure 4. The frequency of grade 1 endometriosis, which includes peritoneal endometriosis in the pouch of Douglas (E1a), is markedly increased here. It was observed in 45% of all patients, as opposed to the remaining 55% who shared grades 2, 3, and 4.

As mentioned previously, 160 of 219 patients had deeply infiltrating endometriosis and were classified by the ENZIAN score. Twenty-four patients had no additional signs of deeply infiltrating endometriosis except for endometriosis in the pouch of Douglas. Excluding the latter from the ENZIAN collective, only 136 patients would be categorized by the ENZIAN classification. Thus, 15% of the reports were registered twice.

Inclusion of the uterosacral ligaments in the ENZIAN score (E1b, E1bb, E2b, E2bb) is similar. When differentiating between grades 1 and 2, which correctly requires determination of the resection margins by a pathologist (is the legion larger or smaller than 10 mm in size?), the principal determinant factor is the depth of the lesion. If the uterosacral ligaments are interpreted as duplicates of the peritoneum, which enclose the hypogastric plexus among other structures, it is not comprehensible why superficial peritoneal lesions should be classified by ENZIAN, because these are already included in the revised AFS classification. Deeper invasion of the uterosacral ligaments should definitely be classified by ENZIAN. If one were to eliminate the categories E1b and E1bb from the score and merely evaluate deep disease in the uterosacral ligaments, analogous to endometriosis in the pouch of Douglas, one would achieve the previously described simplification of the classification and a marked reduction of case numbers.

As shown in Figure 3, 40 of our patients had superficial disease of the uterosacral ligament. Of these 31 had unilateral (E1b) and 9 had bilateral (E1bb) disease. This amounts to about 17% of all ENZIAN classifications, which had already been classified by the revised AFS, analogous to endometriosis in the pouch of Douglas, and were therefore registered twice.

Of our 160 patients with deeply infiltrating endometriosis, 24 had a solitary superficial lesion of the uterosacral ligament. Thus, duplicate registrations were made in 15% of cases. Furthermore, 10 of 160 patients (6%) had binary peritoneal disease in the pouch of Douglas and unilateral (E1b) or bilateral (E1bb) involvement of the uterosacral ligament.

In summary, 58 of 160 patients had solitary superficial peritoneal disease in the pouch of Douglas (E1a), the uterosacral ligament (E1b and E1bb), or a combination of the two. Once these manifestations of endometriosis had been excluded from the ENZIAN score (the manifestations had already been classified by revised AFS), the diagnoses of deeply infiltrating endometriosis were reduced by 58 patients (36%; 95% CI 29%–44%). Removal of these entities from the ENZIAN score would strengthen the value of ENZIAN as a complementary score because it was designed to serve as a supplement to the revised AFS classification for deeply infiltrating endometriosis.

Planes a, b, and c: a Three-Dimensional Intersection of Roads?

With regard to the options of classification according to ENZIAN and for an explanation of the spatial axes a, b, und c, we refer to the introductory section The ENZIAN Score. A difficulty of the ENZIAN classification is that the three compartments naturally intersect each other in three-dimensional space. As in an intersection of roads, it is difficult to assign the site of intersection itself to one of the two roads. One example would be a conglomerate endometriosis tumor with involvement of the parametrium to the rectosigmoid junction: the horizontal plane with the parametrium (compartment b) as well as the bowel (compartment c) would be affected in this case. To adequately describe the extent of the tumor, the clinician would have to consider compartment b (the parametria) as well as compartment c (the bowel). The ENZIAN nomenclature of this condition should be such that the presence of a solitary cross-compartment lesion (as opposed to two separate lesions) is immediately identified. An appropriate nomenclature could be one that mentions the affected compartments in parentheses, for example, E(2b,3c). Thus the overlapping of compartments b and c, as well as their severity, could be expressed. At present this is left to the surgeon's judgment to assign a cross-compartment lesion to a specific compartment. Appropriate modification of the ENZIAN nomenclature would standardize the classification as well as enhance the descriptive value of the ENZIAN score.

In conclusion, the revised AFS score is a proven international tool to describe endometriosis despite its postulated weakness, namely that it does not take deeply infiltrating endometriosis into account. In this regard the ENZIAN classification is an ideal complement to the revised AFS score in describing deeply infiltrating endometriosis. Because duplicate codings are currently made with both systems (36% of all patients are registered twice; 95% CI 29%–44%) and the application has proved to be difficult in some instances, a modification of the ENZIAN score would be desirable.

Jointly the AFS score and the ENZIAN classification permit very highly reproducible description and classification of endometriosis. With regard to the urgent demand to include principal symptoms such as pain and sterility, we have several solutions including the endometriosis fertility index.

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