Histopathologic assessment using Geboes score for Ulcerative Colitis in a tertiary care hospital

Prabhu Mural M H[1], Nunna Venkat Kalyan[2], Shivakumar S Inamdar[3], Mallikarjun Pattanashetti[4]

[1]Associate Professor, Department of Pathology, S. Nijalingappa Medical College, Bagalkot.
[2]Medical Officer, NTPC, Vishakpatnam, India
[3]Professor and Head, Department of Pathology, S. Nijalingappa Medical College, Bagalkot, Karnataka, India
[4]Assistant Professor, Department of Pathology, Gadag Institute of Medical Sciences, Gadag, Karnataka, India

Abstract

Background: Ulcerative Colitis (UC) is a chronic relapsing Inflammatory Bowel Disease. The Geboes score (GS) is histologic grading system which evaluates all aspects of mucosal injury seen in UC. This study was designed to assess histological activity in patients with UC and to identify patients who were at risk of relapse.

Methods: This is a retrospective study done in Department of Pathology, S.Nijalingappa Medical College, Bagalkot, Karnataka. All the cases diagnosed on histopathology as Ulcerative Colitis were included in the study. Biopsies were retrieved and sections stained with hematoxylin and eosin (H and E) were reviewed. Various histological parameters as per Geboes Score were studied. They were graded as per criteria proposed by Geboes. The data collected was analysed using Microsoft Excel and results were tabulated in numbers and percentages.

Results: Out of 34 cases, there were 14 cases with Geboes Score less than 3.1 which were categorised as Ulcerative colitis with no active histological inflammation. There were 20 cases (58.82%) of Ulcerative colitis with active histological inflammation. There were 10 cases (29.41%) with GS score of Grade 5.1 to 5.4 which indicates that there is high risk of relapse in these cases.

Conclusion: Histologic activity assessment by Geboes Score is definitely beneficial if used in routine reporting of Ulcerative colitis for therapeutic monitoring and treatment modifications in these patients to prevent relapses.

Key words: Ulcerative colitis; histopathology; Geboes Score

Introduction

Ulcerative Colitis (UC) is a chronic relapsing Inflammatory Bowel Disease. It is characterized by erythema, loss of vascular pattern, friability of mucosa and/or ulceration. On endoscopy there is involvement of predominantly distal colon in a continuous pattern. Histopathology examination shows mucosal ulceration, basal plamacytosis, villiform or polypoidal surface, abnormalities of crypt architecture with loss of goblet cells. The final diagnosis of ulcerative colitis requires correlation between clinical, endoscopic and histological features. In India the incidence of ulcerative colitis is 6.02 per 100,000 population per year.[1]

A precise diagnosis of UC is of paramount importance for appropriate treatment. The diagnosis of this disease requires a multidisciplinary approach. Histologic examination has been shown that treatment can be altered by the microscopic diagnostic features and signs of disease activity. Residual microscopic acute inflammation in patients is indicator that they are more likely to have relapse[2]. The Geboes score (GS) is histologic grading system which evaluates all aspects of mucosal injury seen in UC including crypt architecture, lamina propria chronic inflammation, lamina propria eosinophils, lamina propria neutrophils, intraepithelial neutrophils, crypt destruction and surface epithelial injury. The Geboes score has 6 grades: 0, structural change only; 1, chronic inflammation; 2, lamina propria eosinophils / neutrophils; 3, neutrophils in epithelium; 4, crypt destruction; and 5, erosions or ulcers.[2] Around 20% of

Corresponding Author:
Dr. Mallikarjun Pattanashetti
Department of Pathology, Gadag Institute of Medical Sciences, Gadag, Karnataka, India
E-mail: drmallikarjun.88@gmail.com

patients are refractory to therapy and require surgery for ulcerative colitis. There are around 30 histologic scoring systems in UC which have been described.[3]

The purpose of our study was to evaluate a Geboes Score index for UC based on different grades of activity. To our knowledge, there is limited data available; therefore this study was designed to assess histological activity in patients with UC and to identify patients who were at risk of relapse. It is important to recognize such parameters so that patients with an increased risk of relapse can be managed effectively with longer maintenance therapy.

Materials and methods

This is a retrospective study done in Department of Pathology, S. Nijalingappa Medical College, Bagalkot, Karnataka from 2015 to 2017. There were total of 34 cases included in the study. All the cases diagnosed on histopathology as Ulcerative Colitis were included in the study irrespective of age & gender. Inadequate biopsies, Non-specific colitis and Non specific ulcers of colon were excluded from the studied. Biopsies were retrieved and sections stained with hematoxylin and eosin (H and E) were reviewed. Various histological parameters as per Geboes Score which includes crypt distortion, cryptitis, crypt abscess chronic inflammatory cells in lamina propria and increased eosinophils and neutrophils in lamina propria were studied. They were graded as per criteria proposed by Geboes et al as shown in Table 1. The Geboes score ranges from 0 to 5.4, with higher scores indicating more severe inflammation, and UC was defined as active histological inflammation when a Geboes score was ≥3.1.[4,5] Geboes score less than 3.1 was categorized as Ulcerative colitis with No active histological inflammation. Age and gender distribution with tissue reaction pattern for all the lesions was studied. The data so collected was analysed using Microsoft Excel and results were tabulated in numbers and percentage.

Results

In present study, 34 cases who were diagnosed with ulcerative colitis were included. There were 21 males and 13 females as shown in Table 2. Mean age of all patients was 44 years with youngest patient being 22 years and oldest being 78 years. Mean age of female patients was 42 years. Mean age of male patients was 45 years. Majority of the patients, 23.53% (8/34) were in the age group of 21-30 years and 41-50 years. Geboes grades and scores were allotted as shown in Table 1 for all the cases. The following were the grades as per Geboes scores : Grade 0: 100%, Grade 1: 100%; Grade 2A - 44.11%, Grade 2B -73.52%, Grade 3 - 47.05%, Grade 4- 58.82%, Grade 5- 29.41%. Out of 34 cases, there were 14 cases with Geboes Score less than 3.1 which were categorised as Ulcerative colitis with no active histological inflammation. There were 20 cases (58.82%) of Ulcerative colitis with active histological inflammation. There were 10 cases (29.41%) with GS score of Grade 5.1 to 5.4 which indicates that there is high risk of relapse in these cases. Distorted crypt architecture ranging from mild to severe was seen in all 34 cases. Increased number of eosinophils was seen in 15 cases (44.11%) and increased neutrophils in lamina propria were seen in 25 cases (73.52%). Cryptitis was noted in 48.05% cases and crypt destruction with marked attenuation of crypt was seen in 58.82% cases. These histologic features are indicators of high disease activity and increased risk of relapse.

Discussion

Ulcerative colitis shows chronic inflammation which is diffuse and continuous without skip areas involving rectum. It spreads proximally with gradually reducing severity of inflammation.[6] UC which is untreated in an active phase shows features of prototypic diffuse active colitis. Biopsy specimens a diffuse abnormality which implies that changes are of approximately the similar intensity in all areas of the biopsy tissue.[7]

Activity of disease is defined by neutrophil granulocyte infiltration of lamina propria or epithelium and there may be epithelial damage.[8] Quiescent disease is characterised by the lack of mucosal neutrophils, although degrees of chronic inflammation may sustain.[9] There are various histological scoring systems that have been designed for assessment of disease activity. Usually they combine chronic and more acute changes, and epithelial as well as inflammatory features. Microscopic activity is based on the presence of neutrophils or defined as unequivocal damage of the surface and crypt epithelium typically in conjunction with neutrophils[10]. The use of neutrophils as an indicator of disease activity is supported by studies of leucocyte scanning[11]. Neutrophils appear to be the effector cell causing epithelial damage histologically[12]. In a study done by Azad et al, relapsers were more likely to have neutrophilic inflammation on biopsy compared with non-relapsers of UC[13].

Mucosal healing is established to be associated with reduced need for surgical intervention, sustained clinical remission and decreased risk of colon cancer[14]. Histological improvements may be associated with better clinical outcomes, including reduced cancer risk and relapse. Among several histological indices developed for UC, the Geboes score exhibits good reproducibility and modest

agreement with the endoscopic grading system[2]. Geboes et al. established a good correlation between the location of neutrophil and occurrence of crypt destruction. Hence, reduction or absence of neutrophils in the epithelium in consecutive biopsies is an important sign of reduction of disease activity and indicates the efficacy of a given treatment.

We noticed abnormal crypt architecture in all cases (100%) which is similar to study by Shah et al[1] (100%) and higher incidence as compared to study done by Dhakhwa et al.[7] which had 75% cases. Numerous studies have demonstrated distorted crypt architecture in the range of 57 to 100% of cases. Restoration of architecture may result in a normal mucosa in long standing cases.[7] The earliest diagnostic feature with the highest predictive value for the diagnosis of UC is presence of plasma cells in between the crypts and the muscularis mucosae (basal plasmacytosis).[7]

Cryptitis is defined by presence of neutrophils within crypt epithelium and crypt abscesses is the presence of neutrophils within crypt lumina are features suggestive of active inflammation.[7] Our study showed variable degree of crypt architectural distortion in the form of crypt branching and budding and crypt atrophy as shown in Figure 1. Cryptitis was seen in 16 cases (47.05%) of the patients as shown in Figure 2 which is close to 53.33% cases seen in study done by Azad et al.[13]

Eosinophil infiltrate was prominent in 15 cases (44.11%) as shown in Figure 3 which is slightly higher as compared to study by Shah et al[1] which had 6.3% cases. Studies have shown increasing evidence about the involvement of eosinophils in the pathogenesis of Ulcerative colitis. Eosinophils play an important role as pro-inflammatory and pro-motility agents thus producing diarrhoea, tissue destruction and later fibrosis.

Inflammation may cause mucin depletion of the epithelium. In our study goblet cell depletion was seen in 20 cases (58.85%) which is similar to study done by Dhakhwa et al[7] but is lower in comparison to Shah et al.[1] Ajioka et al have reported that in the remission phase of ulcerative colitis, goblet cell mucus and inflammation is reduced. But, evidence of earlier inflammation defined by irregular crypts, muscularis mucosa hypertrophy and paneth cell metaplasia is still appreciated.[15]

In our study, no invasive carcinoma was present. Studies have shown risk of colorectal carcinoma is associated with disease duration and disease extent. It raises at the rate of approx. 0.5 to 1% per year after a total duration of UC of 8 to 10 years.[7] In a meta-analysis of 1443 patients, it was found that the presence of endoscopic or histologic inflammation or histologic inflammation alone increased the risk of colorectal cancer.[16] Extensive study with regular follow up biopsies is required to know the risk for dysplasia or malignancy associated with ulcerative colitis.

Conclusion

Accurate diagnosis of Ulcerative colitis requires thorough assessment with histopathological examination. Histologic features assessment using Geboes Score categorized that majority of the patients in our group were at risk of relapse. Hence, histologic activity assessment by Geboes Score is definitely beneficial if used in routine reporting of Ulcerative colitis for therapeutic monitoring and treatment modifications in these patients to prevent relapses.

Acknowledgements

We thank Department of Pathology and Department of Surgery, S. Nijalingappa Medical College and HSK Hospital, Bagalkot in conducting this study. We also acknowledge technical staff, postgraduates and teaching staff of our department for all the support.

References

1. *Shah SN, Amarapurkar AD, Shrinivas N, Rathi PM. Atypical histological features of ulcerative colitis. Tropical Gastroenterology.2011;32(2):107–11.*
2. *Geboes K, Riddell R, Öst A, Jensfelt B, Persson T, Löfberg R. A reproducible grading scale for histological assessment of inflammation in ulcerative colitis. Gut 2000;47:404–9.*
3. *Mosli MH, Parker CE, Nelson SA, et al. Histologic scoring indices for evaluation of disease activity in ulcerative colitis. Cochrane Database Syst Rev.2017;5:CD011256.*
4. *Rosenberg L, Nanda KS, Zenlea T et al. Histologic markers of inflammation in patients with ulcerative colitis in clinical remission. Clinical Gastroenterology and Hepatology. 2013;11(8):991–6.*
5. *Bessissow T, Lemmens B, Ferrante M et al. Prognostic value of serologic and histologic markers on clinical relapse in ulcerative colitis patients with mucosal healing. The American Journal of Gastroenterology. 2012;107(11):1684–92.*
6. *Magro F, Langer C, Driessen A, et al. European concensus on the histopathology of inflammatory bowel disease. Journal of Crohns and colitis. 2013;7:827-51.*
7. *Dhakhwa R, Shrestha HG, Acharya IL.Histopathological evaluation of ulcerative colitis in colonoscopic biopsies. Journal of Pathology of Nepal. 2016;6:932-6.*
8. *Langner C, Magro F, Driessen A, et al. The histopathological approach to inflammatory bowel disease: a practice guide. Virchows Arch 2014; 464:511-27.*
9. *Bryant RV, Winer S, Travis SPL, Riddell RH. Systematic review: histological remission in inflammatory bowel disease. Is "complete" remission the new treatment paradigm? An IOIBD initiative. J Crohns Colitis 2014;8:1582-97.*
10. *Goldman H. Interpretation of large intestinal mucosal biopsy specimens. Hum Pathol 1994;25:1150-9.*

11. *Stahlberg D, Veress B, Mare K, et al. Leucocyte migration in acute chronic inflammatory bowel disease: comparison of histological assessment and TC-99m-HMPAO labeled leucocyte scan. Am J Gastroenterol.1997;92:283–8.*
12. *Keren D.F., Appelman H.D., Dobbins W.O., III, Wells J.J., Whisenant B., Foley J., Dieterle R., Geisinger K. Correlation of histopathologic evidence of disease activity with the immunoglobulin containing cells in the colon of patients with inflammatory bowel disease. Human Pathology. 1984;15:757-63.*
13. *Azad S, Sood N, Sood A. Biological and histological parameters as predictors of relapse in ulcerative colitis: A prospective study. Saudi J Gastroenterol 2011;17:194-8.*
14. *Dae Bum Kim, Kang-Moon Lee, Ji Min Lee, Yoon Yung Chung, Hea Jung Sung,Chang Nyol Paik, Woo Chul Chung, Ji-Han Jung, Hyun Joo Choi. Correlation between Histological Activity and Endoscopic, Clinical, and Serologic Activities in Patients with Ulcerative Colitis. Gastroenterology Research and Practice. 2016:1-6.*
15. *Ajioka Y, Nishikura K, Watanabe G. Pathomorphology of ulcerative colitis. Nippon Risho. 2005;63:763-9.*
16. *Flores BM, O'Connor A, Moss AC. Impact of mucosal inflammation on risk of colorectal neoplasia in patients with ulcerative colitis: a systematic review and meta-analysis. Gastrointest Endosc. 2017;86:1006-11.*

Conflict of interest: Nil
Source of funding: Nil

Date of submission: July 26th 2020
Date of acceptance: December 9th 2020