Anemia at Diagnosis of Pediatric Inflammatory Bowel Disease (IBD)

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Background Information

- Anemia is the most common systemic complication in IBD¹
- Anemia in children varies with age groups and sex.
- Anemia may affect physical health, emotional and cognitive functions, school attendance, hospitalization and health care costs.
- Iron Deficiency Anemia (IDA) is the most common anemia in IBD.
- Iron is an essential element for proliferation of pro-inflammatory intestinal microorganisms and its use to treat IDA may exacerbate colitis disease activity. Thus, overuse of iron may be a problem.
- Confirmation of true iron deficiency associated with inflammation is of clinical importance to prevent unnecessary and potentially dangerous therapy.

- The gold standard for diagnosis of IDA would require an invasive and painful bone-marrow aspirate.
- Many indicators for iron deficiency (e.g. ferritin) are difficult to interpret in the presence of inflammation due to its acute nature of change.
- Newer tests such as high soluble transferrin receptor (sTfR) and a high ratio of sTfR to log ferritin (TfR-F) index have been identified for their utility to indicate true iron deficiency in the presence of inflammation.

Objectives

1) Assess the utility of serum soluble transferrin receptor (sTfR) in the determination of iron deficiency and iron deficiency anemia.
2) Assess the utility of a calculated TfR-F ratio in the determination of iron deficiency and iron deficiency anemia.

Methods

- Data IBD patients followed at CHEO from September 2012 to June 2016 were retrospectively collected.
- Crohn’s disease (CD) and Ulcerative colitis (UC) diagnosis was made by standard clinical, biochemical, endoscopic, radiologic and histological criteria.
- Disease severity was determined by Pediatric Crohn’s Disease Activity Index for Crohn’s Disease (PCDAI) or Pediatric Ulcerative Colitis Activity Index for Ulcerative Colitis (PUCAI)⁴.
- Hemoglobin reference values for age and sex¹ were utilized.
- TfR-F index was calculated by calculating the sTfR/log Ferritin
- Basic demographic characteristics were expressed as means with standard deviation.
- Comparative statistics between CD and UC patients utilized t-tests.
- Difference between laboratory results in anemic and non-anemic IBD patients were evaluated using X² test and Fisher’s exact test.
- p<0.05 was considered significant for all tests.

Results

Table 1: Patient Characteristics

<table>
<thead>
<tr>
<th>Total Cohort</th>
<th>218</th>
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<tr>
<td>Male: n (%)</td>
<td>118 (54)</td>
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<tr>
<td>Age at Diagnosis years (SD)</td>
<td>13.1 (3.6)</td>
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<tr>
<td>Crohn’s disease: n (% of all IBD)</td>
<td>125 (57)</td>
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<tr>
<td>Ulcerative colitis: n (% of all IBD)</td>
<td>90 (42)</td>
</tr>
<tr>
<td>IDU-Unclassified: n (% of all IBD)</td>
<td>3 (1)</td>
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Table 2: Clinical Disease Severity

| Remission | 7 (6) |
| Mild | 14 (11) |
| Moderate | 59 (47) |
| Severe | 45 (36) |

Table 3: Laboratory Testing in all IBD Patients by Disease Subtype

- Low Hgb
- Low MCV
- High ESR
- High CRP
- Ferritin

Conclusions

- In our IBD cohort, we found high prevalence (45%) of anemia.
- There was a correlation between the incidence of anemia with clinical and biochemical parameters of disease activity.
- Prevalence of low ferritin inversely correlated to elevated ESR & CRP.
- Indirect testing of iron deficiency using elevated sTfR may have most utility in identifying IDA in IBD patients.

Future Directions

- Determine whether abnormal iron markers are associated with markers of inflammation and disease activity using linear regression analysis controlling for confounding factors such as age, sex, time since diagnosis, and site of disease.
- Assess indirect serology testing following response in follow-up of those receiving iron supplementation.

References