Section: Pathology

Case Report

PSEUDOMELANOSIS DUODENI: A RARE ENDOSCOPIC FINDING IN A 64-YEAR-OLD FEMALE

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ABSTRACT

Pseudomelanosis duodeni is an extremely uncommon endoscopic condition marked by unique black or brown mottled pigmentation of the duodenal lining, with less than 100 recorded instances in medical literature. We describe a case involving a 64-year-old woman who requested medical help because of ongoing nonspecific abdominal issues such as pain, bloating, and constipation that had lasted for multiple years. Laboratory tests indicated microcytic anaemia (haemoglobin 11 g/dL), leading to additional diagnostic assessment. Upper gastrointestinal endoscopy unexpectedly revealed mucosal redness, erosions, and a thickened mucosal fold in the duodenum, featuring distinctive speckled black pigmentation. Histopathological analysis of duodenal biopsies showed intact villous structure with no signs of acute or chronic inflammation. The notable observation was the build-up of golden-brown to black pigment within seemingly unremarkable macrophages found in the lamina propria, especially at the villi tips. Specific staining with Perl's iron verified the existence of iron in these macrophages filled with pigment, confirming the diagnosis of pseudomelanosis duodeni. This rare condition mainly impacts older women and has been linked to several comorbidities such as chronic kidney disease, hypertension, and diabetes mellitus, along with medication usage, especially iron supplements and specific antihypertensive. Our case contributes to the small reservoir of understanding surrounding this benign condition and emphasizes the significance of identifying this entity to prevent needless interventions. This detailed report covers the clinical symptoms, endoscopic findings, histopathological characteristics, possible pathogenetic processes, clinical importance, and examines the existing literature on this uncommon and fascinating condition.

Keywords: Pseudomelanosis duodeni, rare intestinal condition.

INTRODUCTION

Pseudomelanosis duodeni, initially detailed by Bisordi and Kleinman in 1976, is an uncommon benign disorder marked by pigment accumulation in the duodenal mucosa, resulting in a mottled black look during endoscopic evaluation.[1] It is frequently seen in middle-aged to older women and is often linked to several comorbidities such as hypertension, chronic kidney disease, diabetes mellitus, and gastrointestinal bleeding.[2,3] The condition usually shows no symptoms and is found incidentally during endoscopic procedures conducted for other reasons.

The cause of pseudomelanosis duodeni is still not well understood, yet it has been linked to the consumption of specific medications, notably iron supplements, antihypertensives (especially hydralazine and furosemide), and oral iron formulations.[4,5] Histologically, the condition is marked by the buildup of pigment-rich macrophages in the lamina propria of the duodenal mucosa, with the pigment mainly comprising iron sulfide or hemosiderin.[6]

Case Report

Clinical Presentation

A 64-year-old woman arrived at the gastroenterology department with long-standing nonspecific abdominal issues such as pain, bloating, and constipation lasting for several years. Laboratory tests indicated microcytic anaemia with a haemoglobin concentration of 11 g/dL.

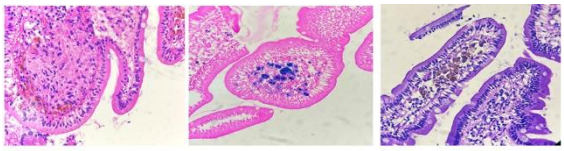
Endoscopic Findings

Because of the persistent nature of symptoms, an upper gastrointestinal endoscopy was conducted. Notable results comprised mucosal erythema and erosions observed in the duodenum. Moreover, a thickened mucosal fold was observed at the incisura, which underwent biopsy. Biopsies from the gastric body and antrum were also collected to exclude dysplasia and Helicobacter pylori infection.

Histopathological Examination

The gross examination showed duodenal biopsy tissue totalling 0.2 cc, which was fully embedded for histological analysis. Microscopic analysis revealed small intestinal mucosa with intact villous structure, showing no signs of acute or chronic inflammation. No parasites were found, and there was no sign of acute mucosal bleeding. Significantly, the mucosal tips exhibited a build-up of golden-brown to black pigment inside benign-looking macrophages in the lamina propria of the villi. Special staining using Perl's iron stain showed a positive result for this pigment, confirming the existence of iron. The pigment was not detected in epithelial cells or near blood vessels.

A diagnosis of pseudomelanosis duodeni was made based on these specific endoscopic and histopathological features.



H & E stain Perl stain Melanin Bleach

DISCUSSION

Pseudomelanosis duodeni is a rare endoscopic finding, with fewer than 100 cases documented in medical literature since it was first described.[7] The term "pseudomelanosis" was coined to differentiate this condition from actual melanosis, since the pigment is not melanin but mainly consists of iron sulfide and various minerals.[8]

Epidemiology: The condition mainly impacts women, showing a female-to-male ratio of around 2:1, and is more frequent among older patients, typically aged 60-70 years.[9] Our patient matches this demographic profile being a 64-year-old woman. The true prevalence is probably underestimated because of the mild nature of the condition and its lack of symptoms.

Clinical Associations: Even though our patient showed nonspecific abdominal symptoms, pseudomelanosis duodeni is generally regarded as an incidental discovery without particular related symptoms. An in-depth examination of the literature shows notable links with different comorbidities and the use of medications. Chronic kidney disease is the most significant comorbidity, found in around 48-64% of documented instances,[10] followed by hypertension (54-68%),[11] diabetes mellitus (29-45%),[12] and congestive heart failure (29-37%).[13] The history of medication is essential in the progression of this condition, with iron supplements being the primary culprits, linked to 70-83% of reported cases.[14] Additional medications often associated with pseudomelanosis duodeni comprise antihypertensive, especially hydralazine and furosemide (45-58% of cases),[15] along with less frequently noted links to antipsychotics,[16] and propranolol.[17] Regrettably, our case report does not include detailed information about the patient's full medical history, such as comorbidities and medication use that might have offered additional insights into possible contributing factors in this specific presentation.

Pathogenesis: The precise pathogenesis of pseudomelanosis duodeni is still not fully understood despite many studies, with various possible mechanisms suggested in the literature. The most commonly accepted theory focuses on drug-induced deposition, indicating that particular pharmacologic agents, especially oral iron supplements and certain antihypertensive drugs, gather within macrophages in the duodenal mucosa via phagocytosis.[18] Another important hypothesis pertains to changed mucosal permeability, where abnormal alterations in the duodenal mucosa promote enhanced absorption and subsequent accumulation of iron and other minerals in the lamina propria.[19] Certain researchers have suggested that ongoing microscopic bleeding from the duodenal mucosa could result in hemosiderin accumulation in tissue macrophages, which accounts for the iron-positive staining associated with this condition.[20] Furthermore, biochemical interactions between iron and sulfur-based compounds created by intestinal microbiota can lead to the formation of iron sulfide complexes, which contribute to the unique dark pigmentation seen during endoscopy and histology.[21] The increased occurrence in individuals with chronic kidney disease indicates that compromised kidney function might modify mineral metabolism or diminish the elimination of specific drugs, making these patients more susceptible to pigment accumulation in the duodenum.

Histopathological Features: The histopathological results in our case reveal the typical microscopic characteristics consistently noted in the literature for pseudomelanosis duodeni. The duodenal mucosa shows a normal structural arrangement with intact villous formations and no signs of substantial inflammation, ulceration, or neoplastic alterations. The characteristic sign is the buildup of pigment-filled macrophages in the lamina propria, particularly favouring the tips of the villi. These macrophages are

filled with numerous intracytoplasmic granules of golden-brown to black pigment that differ in size and distribution. Special staining methods are essential for accurate diagnosis and for differentiating this entity from other pigmented lesions in the gastrointestinal tract. Perl's Prussian blue stain reliably shows significant positivity for iron levels in these pigment deposits, as validated in our case.[22] On the other hand, the Fontana-Masson stain generally produces negative outcomes, thereby excluding melanin as the main pigment component. Likewise, periodic acid-Schiff (PAS) staining usually results in negative outcomes, thus refining the differential diagnosis. Previous reports from electron microscopic studies have identified these pigment granules as electron-dense, membrane-enclosed structures that contain various minerals, mainly iron and sulfur, which bolsters the theory that dark pigmentation arises from the formation of iron sulfide.

Differential Diagnosis: The differential diagnosis for dark pigmentation in the duodenum includes:

1. Melanosis duodeni (true melanosis)
2. Hemosiderosis
3. Charcoal ingestion
4. Lipofuscin deposition
5. Heavy metal deposition (copper, lead, mercury)

Careful histopathological examination with appropriate special stains is crucial for distinguishing these entities.[23]

Clinical Significance and Management

Pseudomelanosis duodeni is regarded as a non-threatening condition lacking recognized clinical importance or related complications. No particular treatment is needed, and the condition does not require any special monitoring or follow-up.[24] Management should prioritize addressing underlying conditions and reassessing medications that could lead to pigment deposition. In certain documented instances, the pigmentation has improved following the cessation of potentially responsible medications, especially iron supplements.[25] Nevertheless, in numerous instances, the pigmentation remains even with changes to medication.

Comparison with Previous Case Reports

Analysing our case alongside previously documented cases in the literature shows various similarities and differences:

Demographic profile: The age of our patient (64 years) and her gender (female) correspond with the usual demographic profile noted in earlier studies.[26]

Clinical presentation: Contrary to numerous documented instances where pseudomelanosis duodeni was an incidental discovery in symptom-free patients, our patient exhibited abdominal symptoms. Nonetheless, these symptoms are general and may not be explicitly associated with the pseudomelanosis.[27]

Endoscopic observations: The endoscopic observations of duodenal erythema and erosions in this case are not generally linked solely with pseudomelanosis duodeni and could indicate concurrent pathology.[28]

Distribution pattern: In our case, the pigmentation was observed in the duodenum, which is the location most frequently documented. Nonetheless, comparable pigmentation has been documented in various sections of the gastrointestinal system, such as the stomach (pseudomelanosis gastrica), small intestine (pseudomelanosis jejuni), and colon (pseudomelanosis coli).[29,30]

Histopathological characteristics: The histopathological results in our case correspond with those noted in earlier reports, including the presence of macrophages filled with pigment in the lamina propria that show positive staining with Perl's iron stain.[31]

CONCLUSION

Pseudomelanosis duodeni is an uncommon benign disorder marked by black or brown spotted pigmentation of the duodenal mucosa. Our case contributes to the sparse literature on this atypical condition and emphasizes its appearance in an older woman exhibiting nonspecific abdominal symptoms. This condition is generally linked with different comorbidities and the use of medications, especially antihypertensive and iron supplements.

Although the precise pathogenesis is not fully understood, histopathological analysis utilizing special stains is essential for diagnosis. No particular treatment is necessary for pseudomelanosis duodeni, and management should concentrate on addressing underlying conditions and reviewing medications.

Additional studies are required to gain a deeper insight into the causes, development, and lasting impact of this uncommon condition. Healthcare professionals need to recognize this entity to prevent unnecessary interventions and anxiety when it appears during standard endoscopic procedures.

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