Osseous Metaplasia in a Colon Polyp

Michael Hjelkrem, Kevagh Fair, Ajay Pabby

Osseous metaplasia occurring in colorectal neoplasia is extremely rare. The incidence, severity, morbidity and mortality are poorly documented in the literature. A 44-year-old male presented for colonoscopy due to a report of bright red blood per rectum. During the colonoscopy, a 5mm sigmoid polyp was removed with snare electrocoagulation. Histology showed osseous metaplasia embedded within a hyperplastic colon polyp. Eleven cases have now been described in the literature of osseous metaplasia in benign colorectal neoplasia. Osseous metaplasia is predominately found in left colon lesions as 64% of cases occurred in the rectum and sigmoid. Isolated cases have been found in the ileum, jejunum, stomach and esophagus. This is the first case of osseous metaplasia in a hyperplastic polyp of the sigmoid colon. Osseous metaplasia is a rare finding in colorectal polyps with undetermined clinical significance.

CASE REPORT

A 44-year-old male presented to his primary care provider reporting bright red blood per rectum. He had no prior history of a colonoscopy and no family history of colon cancer. Review of systems and physical examination were unremarkable. Laboratory examination showed normal complete blood count and normal metabolic panel including calcium and phosphate. The patient was referred for a colonoscopy. Internal hemorrhoids were found and this was likely the cause of bleeding. A 5mm sigmoid polyp was found upon colonoscopy and removed by snare electrocoagulation. Macroscopic examination of the resected specimen showed a fungating, normal appearing polyp without any unusual features. The polyp was fixed in 10% formalin and processed routinely for paraffin embedded, hematoxylin and eosin-stained sections. Microscopic examination revealed lobules of metaplastic bone and cartilage within hyperplastic intestinal-type epithelium. Dysplasia or other atypical changes were not seen. (Figure 1.)

Discussion

The ectopic formation of bone occurs in many pathological conditions. It has been described in both benign and malignant tumors of the breasts, prostate, uterus, salivary glands, skin appendages, pulmonary system and gastrointestinal organs. It has also been found in the metastases of gastrointestinal tumors to include pulmonary metastases of gastric adenocarcinoma, skeletal muscle metastasis of gastric cancers, retroperitoneal metastasis of colon cancers and metastatic axillary lymph node from transverse colon adenocarcinoma. Other gastrointestinal lesions with ectopic bone formation have included gastric carcinoid, hepatocellular carcinoma and lesions of the appendix and gallbladder. The most frequent tumor in the digestive system containing bone formation...
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Figure 1.

appears to be adenocarcinoma of the rectum. Yet osseous metaplasia in an adenocarcinoma of the rectum is still extremely rare. Dukes estimated the incidence to be 0.4%, however, less than 30 cases of osseous metaplasia in any GI lesions have been reported, thus, the actual incidence is probably a lot less.

In 1981, Sperling first described bone formation within a benign lesion, a rectal polyp. Since then, upon literature review, it has been described 11 more times (Table 1.). The majority of the occurrences have been rectal or left sided lesions (7 cases including the present case). Other case reports comment on lesions located in the ileum, stomach and Barrett’s esophagus. In one case report of a patient with Peutz-Jeghers Syndrome, osseous metaplasia was found in 3 of 15 polyps in the jejunum. Also of note is the young age of many patients as 6 of the 11 cases were younger than 50. None of the cases discussed repeat colonoscopies or follow up care.

The exact mechanism of bone formation within gastrointestinal neoplasia is unknown but is likely due to mesenchymal precursor cells transforming into osteoblasts capable of osteoid production. The stimuli responsible for this abnormal differentiation into osseous tissue have yet to be identified. Dukes first described the process in 1939 and suggested osseous formation followed dystrophic calcification of necrotic tissue. Van Patter and Sanerkin thought mucinous stromal infiltration was associated with osseous metaplasia and, similar to dystrophic calcification, frequently occurred close to tumor necrosis or squamous metaplasia. Groisman first described bone formation within a benign tubulovillous adenoma without signs of necrosis or mucinous accumulation. Randall observed that the heterotopic ossification was not in regions of necrotic tissue but in areas adjacent to the metastatic adenocarcinoma. Heterotopic bone formation can occur in both benign and malignant tumors without the
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Table 1. Heterotopic Bone Formation in Benign Gastrointestinal Neoplasia

<table>
<thead>
<tr>
<th>Author</th>
<th>Age/Sex</th>
<th>Location</th>
<th>Size (Cm)</th>
<th>Neoplasia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sperling,10 1981</td>
<td>25 M</td>
<td>Rectum 10 cm from anus</td>
<td>1.0</td>
<td>Benign</td>
</tr>
<tr>
<td>Ohtsuki,16 1987</td>
<td>71 M</td>
<td>Gastric</td>
<td>NA</td>
<td>Hyperplastic polyp</td>
</tr>
<tr>
<td>Byard,12 1988</td>
<td>28 M</td>
<td>Rectum</td>
<td>NA</td>
<td>Juvenile polyp</td>
</tr>
<tr>
<td>Byard,12 1988</td>
<td>59 M</td>
<td>Ileum</td>
<td>NA</td>
<td>Fibrosarcoma</td>
</tr>
<tr>
<td>Groisman,13 1994</td>
<td>67 M</td>
<td>Rectum 10 cm from anal margin</td>
<td>1.8</td>
<td>Tubulovillous adenoma</td>
</tr>
<tr>
<td>Groisman,13 1994</td>
<td>3 F</td>
<td>Rectum 2 cm from anal margin</td>
<td>2.0</td>
<td>Juvenile polyp</td>
</tr>
<tr>
<td>Narita,18 1995</td>
<td>40 M</td>
<td>Jejunum (3 of 15 polyps) (Peutz-Jeghers Syndrome)</td>
<td>NA</td>
<td>Hamartomatous polyp</td>
</tr>
<tr>
<td>Haque,17 1996</td>
<td>76 M</td>
<td>Barrett’s Esophagus</td>
<td>NA</td>
<td>Barrett’s Esophagus</td>
</tr>
<tr>
<td>Nakajima,14 1997</td>
<td>29 F</td>
<td>Rectum 3 cm from dentate line</td>
<td>1.6</td>
<td>Hyperplastic polyp</td>
</tr>
<tr>
<td>Al-Daraji,15 2004</td>
<td>85 F</td>
<td>Left colon, 30 cm from anus</td>
<td>1.5</td>
<td>Tubular adenoma</td>
</tr>
<tr>
<td>Present Case</td>
<td>44 M</td>
<td>Sigmoid</td>
<td>0.5</td>
<td>Hyperplastic polyp</td>
</tr>
</tbody>
</table>

Cm (centimeter), F (female), M (male), NA (not available)

The occurrence of necrosis, inflammation, calcification or extracellular mucin.

Ossification within tumors, both benign and malignant, is most likely caused by local factors released from cells undergoing differentiation and/or by the tumor epithelial cells. These local factors have yet to be defined. Randall5 found alkaline phosphatase in osteoblast-like cells and in surrounding epithelial cells; although probably involved in mineralization, its role in inducing osseous formation is unknown. Other factors of osteogenesis may include growth factors such as TGFβ1 and β2 or other paracrine factors;19 however, this warrants further investigation. Nakajima13 discussed that predisposing factors for osseous metaplasia may be repeated local trauma or special properties of rectal mucosa itself. There is evidence that local trauma may be involved as heterotopic bone formation has occurred in abdominal scars after surgical procedures20 and after radiotherapy in soft tissues.11

CONCLUSION

This is the first reported case of osseous metaplasia in a hyperplastic polyp of the sigmoid colon. Heterotopic bone formation can occur in both benign and malignant tumors without the occurrence of necrosis, inflammation, calcification or extracellular mucin.
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inflammation, extracellular mucin, calcification and/or increased stromal vascularity. It is likely due to local osteogenic factors released from cells undergoing differentiation or metaplasia and may be induced by repeated local trauma. The significance and clinical prognosis of heterotopic bone formation is undefined.

References

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