

Osseous Metaplasia in a Colon Polyp

Michael Hjelkrem, Kevaghn 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.¹ It has also been found in the metastases of gastrointestinal tumors to include pulmonary metastases of gastric adenocarcinoma,² skeletal muscle metastasis of gastric cancers,³ retroperitoneal metastasis of colon cancers⁴ and metastatic axillary lymph node from transverse colon adenocarcinoma.⁵ Other gastrointestinal lesions with ectopic bone formation have included gastric carcinoid,⁶ hepatocellular carcinoma⁷ and lesions of the appendix and gallbladder.⁸ The most frequent tumor in the digestive system containing bone formation

Michael Hjelkrem, MD¹ Kevaghn Fair, DO²
Ajay Pabby, MD, MPH³ ¹Brooke Army
Medical Center, Gastroenterology Clinic,
Fort Sam, Houston TX ²Macdonald Army
Health Center, Pathology Department, Fort
Eustis, VA ³MacDonald Army Health Center,
Gastroenterology Clinic, Fort Eustis, VA

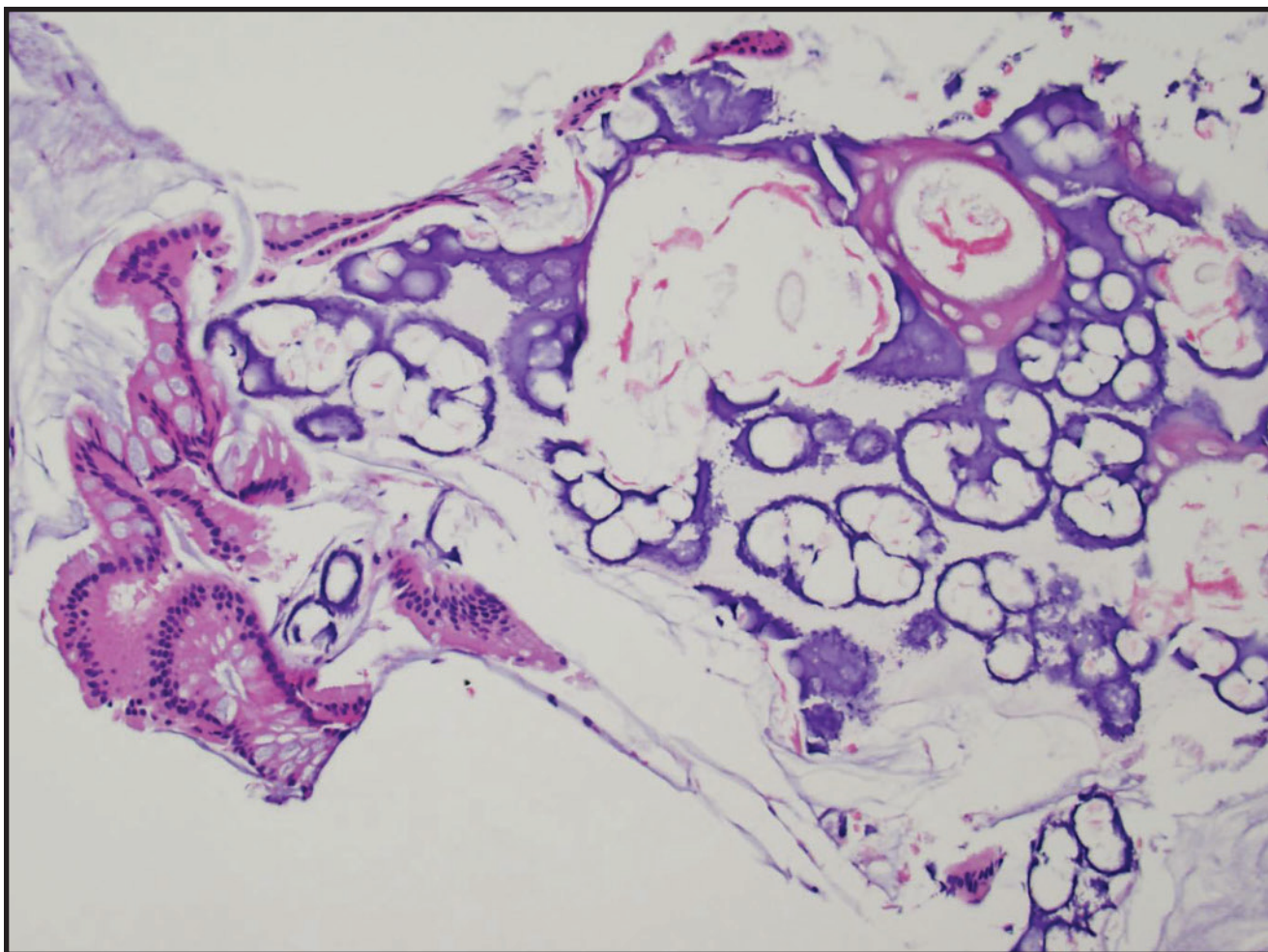


Figure 1.

appears to be adenocarcinoma of the rectum.^{8,9} Yet osseous metaplasia in an adenocarcinoma of the rectum is still extremely rare. Dukes estimated the incidence to be 0.4%,¹⁰ 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.⁹ 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).^{9, 11-14} Other case reports comment on lesions located in the ileum,¹¹ stomach¹⁵ and Barrett's esophagus.¹⁶ In one case report of a patient with Peutz-Jeghers Syndrome, osseous metaplasia was found in 3 of 15 polyps in the jejunum.¹⁷ 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.⁸ 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.¹⁰ Van Patter⁸ and Sanerkin¹⁸ thought mucinous stromal infiltration was associated with osseous metaplasia and, similar to dystrophic calcification, frequently occurred close to tumor necrosis or squamous metaplasia. Groisman¹² first described bone formation within a benign tubulovillous adenoma without signs of necrosis or mucinous accumulation. Randall⁵ 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

A CASE REPORT

Table 1. Heterotopic Bone Formation in Benign Gastrointestinal Neoplasia

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

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

preoccurrence 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 preoccurrence of necrosis,

(continued on page 62)

A CASE REPORT

(continued from page 60)

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. ■

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