Intraabdominal Intravascular Papillary Endothelial Hyperplasia (Masson's Tumor): A Rare and Novel Cause of Gastrointestinal Bleeding

Michael C. Meadows^{a, d} Xiu Sun^b Michael Dardik^b
Deborah R. Tarantino^a Ronald S. Chamberlain^{a, c, d}

Departments of ^aSurgery and ^bPathology, Saint Barnabas Medical Center, Livingston, N.J., and ^cDepartment of Surgery, University of Medicine and Dentistry of New Jersey, Newark, N.J., USA; ^dSt. George's University School of Medicine, Grenada, West Indies

Key Words

Masson's tumor · Intravascular papillary endothelial hyperplasia · Gastrointestinal hemorrhage

Abstract

Intravascular papillary endothelial hyperplasia (IPEH), or Masson's tumor, a rare benign vascular lesion, occurs mainly in the head, neck, and hands in the human population. Aberrant tumor locations have been rarely reported. We present a case of a patient with chronic abdominal pain and melena of variable severity due to a Masson's tumor, with no apparent Masson's tumor-associated comorbidities, along with a comprehensive review of the literature. Using PubMed, a search engine provided by the U.S. National Library of Medicine and the National Institutes of Health, we searched for all reports of Masson's tumor limited within the abdominal cavity. Furthermore, keywords such as 'intravascular papillary endothelial hyperplasia', 'renal', 'gastrointestinal', 'hepatic' and 'intraabdominal' were used to facilitate the search. We thus found fourteen cases of intraabdominal Masson's tumors published. Six (42.9%) of these were located in the renal vein, 4 (28.6%) were reported in the gastrointestinal tract, 1 (7.1%) in the adrenal gland, 1 (7.1%) in the liver, and 1 (7.1%) instance with multiple lesion sites including the renal hilum and retroperitoneum. Among these patients, 9 (64.3%) were female and 5 (35.7%) male, with a mean age of 38.9 years (7–69). IPEH is a reactive process, having three subtypes, all involving the proliferation of epithelial cells around a thrombus in the setting of venous stasis. In its pure form, the organized thrombus is solely localized within the vascular lumen. Mixed-form IPEH is formed in preexisting vascular lesions (such as arteriovenous malformation, hemangioma, pyogenic granuloma, etc.). The rarest

form is the extravascular variety, which arises in hematomas often from recent trauma to the area. In its pure form, IPEH has a zero recurrence rate when an R0 resection is performed; all mixed and extravascular forms show the highest recurrence rates. The exact histogenesis of these epithelial cells remains a mystery and multiple theories have been offered. Although difficult to distinguish from malignant angiosarcomas solely on presentation and radiologic work-up, Masson's tumors occur more frequently in women, demonstrate no local invasion, do not metastasize, are commonly located intravascularly, and are associated with a significantly more favorable prognosis than angiosarcomas. Only four Masson's tumors have been reported in the gastrointestinal tract, two of these cases were related to microvascular thrombosis secondary to paroxysmal nocturnal hemoglobinuria and two were formed secondary to arteriovenous malformations. Our case lacked solitary evidence of either of these comorbidities. An incidental finding of an enlarged ovary, which was removed during our exploratory laparoscopy, plus strong demographic statistics that suggest women have an increased prevalence of this lesion may help support a hormonal theory of pathogenesis.

Introduction

Intravascular papillary endothelial hyperplasia (IPEH), or Masson's tumor, is a benign reactive process whereby endothelial cells organize around fragmented thrombi in the presence of venous stasis [1–3]. This benign tumor has been well described, affecting blood vessels of the head, neck, and fingers. Less frequently, IPEH has been documented in the upper respiratory tract, skeletal muscle, urogenital systems, renal and hepatic systems, and rarely in the gastrointestinal tract. To date, 14 cases of IPEH arising within the abdominal cavity have been reported [4–16], and only 4 cases involved the gastrointestinal tract [13–16]. In each of the 4 cases in which IPEH involved the gastrointestinal tract, a primary pathologic etiology was elucidated. We present a novel case of IPEH presenting as a gastrointestinal hemorrhage without any discoverable cause. A comprehensive discussion of the clinical presentation, management, and prognosis of these rare tumors is provided.

Case Report

A 50-year-old female presented with a history of intermittent abdominal pain, black tarry stools and anemia of variable severity over the prior 1.5 years. Her medical history was only significant for hypertension. Surgical history was remarkable for a tubal ligation, exploratory laparotomy for a ruptured ectopic pregnancy and a cesarean section. She denied fever, vomiting or weight loss. Cardiovascular and respiratory systems exhibited no abnormalities on physical examination and there was no evidence of hepatomegaly or splenomegaly.

At the initial onset of symptoms she was treated with H2 blockers and subsequent upper endoscopy showed only mild gastritis. Upon recurrence of black tarry stools, a colonoscopy and capsule endoscopy were performed and revealed no cause of bleeding. She subsequently underwent a balloon enteroscopy which revealed a hemorrhagic lesion within the proximal small bowel, which was marked with Indian ink to facilitate location during a planned laparoscopic resection. Preoperative computed tomography of the abdomen revealed a large left ovarian cyst with complex architecture and the patient elected to undergo total abdominal hysterectomy with a bilateral salpingo-oophorectomy concurrent with the planned bowel resection.

At surgery, the area of Indian ink was located 45 cm distally to the ligament of Treitz. The surrounding mesentery revealed multiple nodular-like fibrotic areas from the ligament of Treitz to the lesion. Frozen sectioning of the mesentery revealed nonspecific fibroblastic proliferation and reactive mesothelial cells. A 20 cm segment of jejunum was resected, and a primary anastomosis was performed.

The patient recovered uneventfully and at seven-month follow-up she remains well without recurrent bleeding.

On gross examination, the small bowel mucosa revealed a polypoid tan-grey lesion measuring $0.4 \times 0.4 \times 0.2$ cm with a pinpoint ulceration located 4 cm from the inked area ([fig. 1](#)). Microscopically, the polypoid lesion was a 0.4×0.4 cm well-circumscribed endothelial proliferation located within the submucosa ([fig. 2](#)). The lesion was confined to the vascular lumen and consisted of a complex network of vascular channels, papillary structures and an organizing thrombus. The papillae consisted of a central fibroconnective core and a surrounding attenuated single layer of endothelium. There was no necrosis, pleomorphism, or atypical mitoses present. Immunohistochemical staining for Factor VIII and CD34 (markers of endothelial cells) were positive in the cells lining the papillae ([fig. 3a, b](#)). Histochemical staining for elastin demonstrated a circumferential elastic lamina of the vessel ([fig. 3c](#)), and a pathologic diagnosis of IPEH was made.

Discussion

IPEH was first described by Pierre Masson in 1923 [17]. This sentinel paper involved a 68-year-old male with a thrombosed hemorrhoidal vein. IPEH was initially termed a 'hémangioendothéliome végétant intravasculaire' [3]. Nine years later, Henschen [18] described this proliferation as a reactive process rather than a true neoplasm and named the lesion 'endovasculite proliférante thrombopoïétique'. In 1976, Clearkin and Enzinger [2] coined the current name 'intravascular papillary endothelial hyperplasia', which has gained wide acceptance as the best description of this lesion.

The precise pathogenesis of IPEH lesions remains elusive. In 1923, Masson [17] proposed that the lesion represented a true neoplasm with secondary thrombosis. However, other authors have demonstrated that the growth pattern of IPEH suggest a benign reactive process consisting of endothelial cells organizing and proliferating around a thrombosis in the setting of venous stasis [1–3]. On a cellular level, IPEH closely resembles granulation tissue, which further supports the theory that this process is reparative [19]. The endothelial cells appear to originate, in its earliest formation, with a histiocytic phenotype before transformation to an endothelial phenotype [20], further lending support to a reactive theory.

In 1983, Hashimoto et al. [1] described three distinct types of IPEH, and in 1993 Pins et al. [21] calculated the incidence of each type after a comprehensive literature review. The 'pure' form (55.8%) arises de novo in a dilated vascular space with no causative comorbidity. The 'mixed' form (39.9%) is found superimposed over a preexisting vascular anomaly. Such associated anomalies may include arteriovenous malformations, hemangiomas, pyogenic granulomatosis, and chronic illnesses such as paroxysmal nocturnal hemoglobinuria, which is associated with venous thrombosis [13, 14]. The 'extravascular' form (4.3%) is associated primarily with trauma-induced hematoma formation, which acts as a template for endothelial proliferation.

To date, only 15 cases of intraabdominal Masson's tumors have been reported, including the current case ([table 1](#)). Six cases (40.0%) were located in the renal vein [4–8], five (33.3%) were reported in the gastrointestinal tract [13–16], two (13.3%) in the adrenal gland [10, 11], and one (6.7%) in the liver [12]. An additional case (6.7%) involved multiple lesions located in the renal hilum and the retroperitoneum [9]. Among these patients, 10 (66.7%) were female and 5 (33.3%) male, with a mean age of 38.9 years (range 7–69). Among the five cases of IPEH involving the gastrointestinal tract (including the current case), three (60%) were located in the jejunum, one (20%) was located in both the distal duodenum and proximal jejunum, and once case (20%) occurred at the ileocecal valve. In the previously published four cases of IPEH involving the gastrointestinal tract, a

preexisting diagnosis of paroxysmal nocturnal hemoglobinuria was believed to be the attributable cause of microvascular thrombi in both the ileocecal and duodenal/jejunal cases [13, 14], and the two cases of jejunal IPEH (prior to this case) attributed to arteriovenous malformations [15, 16]. All four previous reports of the IPEH involving the gastrointestinal tract were a 'mixed' form lesion. The current case of jejunal IPEH represents the first report of a 'pure' form IPEH involving the gastrointestinal tract and presents a novel cause of hemorrhage which the clinician should be aware of.

IPEH are very rare lesions, making diagnosis difficult, and confusion with other clinical entities such as angiosarcoma is common [21, 22]. Given that confusion with angiosarcomas occurs primarily because of the unique factors of IPEH, which include their ability to outgrow the confines of the vascular lumen and rupture the vessel similarly to an invasive angiosarcoma, evaluation by an expert surgical pathologist or referral center should be done if there is any doubt and prior to beginning antineoplastic therapy. There are no definitive or specific radiographic appearances for IPEH. Computed tomography, magnetic resonance imaging, and angiographic patterns of IPEH can mimic other benign and malignant processes such as pyogenic granuloma, Kaposi's sarcoma, hemangioma, bacillary angiomatosis, and papular angioecrosis [9, 22].

Demographically, females appear slightly more susceptible to IPEH than males (1.2:1) [1], with an no age predilection (range 7 months to 81 years) [1, 21]. Irey and Norris [23] have suggested that a hormonal factor may be operational in the slight female prevalence to IPEH, however this has not been further substantiated. In the current case, the epithelial cells of the IPEH were ER-/PR-.

Surgical resection is curative for IPEH in its pure form and no recurrence of Masson's tumor has been reported after surgical resection with clear margins. Recurrence rates in various skin cases have been documented in a range of 7–10% for mixed and extravascular varieties [1, 2, 22, 24].

Conclusion

IPEH is a very rare lesion that most commonly involves the head, neck and fingers. IPEH rarely arises within the abdominal cavity and typically presents with pain, anemia and bleeding. Surgery remains the only treatment for IPEH and is associated with an excellent prognosis and a low recurrence rate. Females demonstrate a slight prevalence of IPEH, but hormonal theories for the pathogenesis of IPEH remain unsubstantiated. More aggressive lesions such as angiosarcoma should be excluded when considering the histologic diagnoses of IPEH, and expert pathologic review is vital. A thorough work-up to exclude associated systemic illnesses is important when a 'pure' form of IPEH is diagnosed. This report represents the first 'pure' form of an IPEH within the gastrointestinal tract and represents a novel cause of gastrointestinal bleeding which the clinician should consider when evaluating a patient with atypical or difficult gastrointestinal bleeding sources.

Acknowledgment

The authors thank Ms. Margaret M. Eng (SBMC Library) for her assistance.

Table 1. All reported cases of intraabdominal IPEH by location

Case	Reference	Location	Age	Sex	Presenting symptoms	Tumor type	Causative comorbidity	Treatment
1	Garber et al., 1990 [4]	right renal vein	57	M	gross hematuria	pure		nephrectomy
2	Steffe and Iskandar, 1996 [5]	renal allograft	63	F	nausea, vomiting, diarrhea, abrupt decline in urine output	mixed	arteriovenous malformation	transplant nephrectomy
3	Johraku et al., 1997 [6]	right renal vein	55	F	incidental finding	mixed	N/A	resection of the mass, sparing the kidney
4	Kim et al., 2000 [7]	left renal vein	7	F	intermittent abdominal pain, gross hematuria	mixed	N/A	nephrectomy
5	Akhtar et al., 2005 [8]	left renal vein	40	M	intermittent left loin pain with gross hematuria	N/A	N/A	nephrectomy
6	Akhtar et al., 2005 [8]	left renal vein	48	M	incidental finding	N/A	N/A	nephrectomy
7	Petry et al., 2009 [9]	right renal hilum, retroperitoneum and spine	47	M	persistent low back pain	mixed	Wegener granulomatosis	nephrectomy
8	Gaffey et al., 1989 [10]	adrenal	49	F	hematuria	pure		adrenalectomy
9	Kawashima et al., 1986 [11]	adrenal	60	F	occasional back pain	pure		adrenalectomy
10	Hong et al., 2004 [12]	left hepatic lobe	69	F	myalgia, fever, chill, epigastric pain	N/A		left hemihepatectomy with surrounding lymphadenectomy
11	Gartner et al., 1988 [13]	ileocecal valve	13	F	right lower abdominal pain	mixed	paroxysmal nocturnal hemoglobinuria	resection
12	Dunphy et al., 1994 [14]	distal duodenum and proximal jejunum	17	M	malaise, abdominal pain, nausea, vomiting, anorexia, weight loss, jaundice, hematuria, anemia	mixed	paroxysmal nocturnal hemoglobinuria	resection
13	Okauchi et al., 1982 [15]	jejunum	30	F	melena, anemia	mixed	associated with arteriovenous malformation	resection
14	Mestiri et al., 2007 [16]	jejunum	20	F	melena, anemia	mixed	associated with arteriovenous malformation	resection
15	Current study	jejunum	50	F	melena, anemia	pure		resection

N/A = Not available.

Fig. 1. Macroscopic imaging: A polypoid tan-grey lesion on the mucosa of the small bowel with focal ulceration.

Fig. 2. The lesion was composed primarily of a complex network of vascular channels, papillary structures and an organizing thrombus confined to the vascular lumen. H&E, 40×.

Fig. 3. Histological staining for Factor VIII, CD34 and elastin, 40×. Factor VIII (**a**) and CD34 (**b**) stains in endothelial cells were positive and an elastic stain highlighted a circumferential elastic lamina (**c**).

References

- 1 Hashimoto H, Daimaru Y, Enjoji M: Intravascular papillary endothelial hyperplasia: a clinicopathologic study of 91 cases. *Am J Dermatopathol* 1938;5:539–546.
- 2 Clearkin KP, Enzinger FM: Intravascular papillary endothelial hyperplasia. *Arch Pathol Lab Med* 1976;100:441–444.
- 3 Salyer WR, Salyer DC: Intravascular angiomatosis: Development and distinction from angiosarcoma. *Cancer* 1975;36:995–1001.
- 4 Garber BB, Prestipino AJ, Pollack HM, Levine SR, Whitmore KE: Masson's tumor of the kidney: a new renal lesion. *J Urol* 1990;143:344–346.
- 5 Steffe CH, Iskandar SS: Intravascular papillary endothelial hyperplasia in a thrombosed renal allograft vein. *Hum Pathol* 1996;27:986–999.
- 6 Johraku A, Miyanaga N, Sekido N, et al: A case of intravascular papillary endothelial hyperplasia (Masson's tumor) arising from renal sinus. *Jpn J Clin Oncol* 1997;27:433–436.
- 7 Kim HS, Park EJ, Lee JH, et al: Intravascular papillary endothelial hyperplasia in the kidney of a child. *Virchows Arch* 2000;436:398–400.
- 8 Akhtar M, Aslam M, Al-Mana H, Bamefleh H, Al-Khateeb SS, Lindstedt E: Intravascular papillary endothelial hyperplasia of renal vein: report of 2 cases. *Arch Pathol Lab Med* 2005;129:516–519.
- 9 Petry M, Brown MA, Hesselink JR, Imbesi SG: Multifocal intravascular papillary endothelial hyperplasia in the retroperitoneum and spine: A case report and review of the literature. *J Magn Reson Imaging* 2009;29:957–961.
- 10 Gaffey MJ, Mills SE, Fechner RE, Bertholf MF, Allen MS: Vascular adrenal cysts: A clinicopathologic and immunohistochemical study of endothelial and hemorrhagic (pseudocystic) variants. *Am J Surg Pathol* 1989;13:740–747.
- 11 Kawashima A, Johsen T, Murayama S, Russell WJ: Intravascular papillary endothelial hyperplasia of the adrenal gland. *Br J Radiol* 1986;59:610–613.
- 12 Hong SG, Cho HM, Chin HM, et al: Intravascular papillary endothelial hyperplasia (Masson's hemangioma) of the liver: a new hepatic lesion. *J Korean Med Sci* 2004;19:305–308.
- 13 Gartner JC, Hashida Y, O'Gorman M, Jaffe R: Endothelial proliferation in paroxysmal nocturnal hemoglobinuria. *Pediatr Pathol* 1988;8:313–320.
- 14 Dunphy CH, Sotelo-Avila C, Luisiri A, Chu JY: Paroxysmal nocturnal hemoglobinuria associated with venous thrombosis and papillary endothelial hyperplasia presenting as ulcerated duodenal mass. *Arch Pathol Lab Med* 1994;118:837–839.
- 15 Okauchi S, Kurooka N, Nagata J, Yamasaki R, Kohnoike T, Kohrai F, Sano T, Ii K: Arteriovenous malformation associated with intravascular papillary endothelial hyperplasia. *Rinsho Hoshasen* 1982;27:139–142.
- 16 Mestiri S, Karoui M, Charachon A, Deux JF, Chaumette MT: Intravascular papillary endothelial hyperplasia of the jejunum: An unusual cause of melena. *Int J Surg Pathol* 2007;15:192–195.
- 17 Masson P: Hémangi endothéliome végétant intravasculaire. *Bull Soc Anat Paris* 1923;93:517–523.
- 18 Henschen F: L'endovasculite proliférante thrombopoïétique dans la lésion vasculaire locale. *Ann Anat Pathol* 1932;9:113–121.
- 19 Kreutner A Jr, Smith RM, Trefny FA: Intravascular papillary endothelial hyperplasia. Light and electron microscopic observations of a case. *Cancer* 1978;42:2304–2310.
- 20 Albrecht S, Kahn HJ: Immunohistochemistry of intravascular papillary endothelial hyperplasia. *J Cutan Pathol* 1990;17:16–21.
- 21 Pins MR, Rosenthal DI, Springfield DS, Rosenberg AE: Florid extravascular papillary endothelial hyperplasia (Masson's pseudoangiosarcoma) presenting as a soft-tissue sarcoma. *Arch Pathol Lab Med* 1993;117:259–263.
- 22 Kuo T, Sayers CP, Rosai J: Masson's 'vegetant intravascular hemangioendothelioma': A lesion often mistaken for angiosarcoma: Study of seventeen cases located in the skin and soft tissues. *Cancer* 1976;38:1227–1236.

- 23 Irey NS, Norris HJ: Intimal vascular lesions associated with female reproductive steroids. Arch Pathol 1973;96:227–234.
- 24 Avellino AM, Grant GA, Harris AB, Wallace SK, Shaw CM: Recurrent intracranial Masson's vegetant intravascular hemangioendothelioma. J Neurosurg 1999;91:308–312.

All the authors listed declare that there are no conflicts of interest and that they accept no financial sponsorship in producing and presenting this article. Each of the authors listed is in agreement with the content of the paper.