Neuroendocrine tumours within a Meckel's diverticulum

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ABSTRACT

A Meckel's diverticulum is a common anomaly of the gastrointestinal tract. Although the majority of patients do not have any symptoms, malignancies can develop inside these diverticula, with neuroendocrine tumours being the most common. Diverticulectomy is the best option for complicated diverticula but prophylactic resection of asymptomatic diverticula in adults remains controversial. We present a case series of three patients with a neuroendocrine tumour found in a Meckel's diverticulum. Given the number of asymptomatic diverticula not resected, it seems likely that incidental neuroendocrine tumours are more prevalent than thought previously. With the minimally invasive techniques now available and the low complication rate for incidental diverticulectomy, we believe that the benefits of resection of this high risk area for cancer outweigh the risks of surgery.

KEYWORDS

Meckel's diverticulum – Diverticulectomy – Neuroendocrine tumour – Carcinoid

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Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract, with a general population prevalence close to 2%.¹ MD is a remnant from the incomplete obliteration of the vitelline duct during gestation; it is commonly asymptomatic and the average rate of complications being approximately 4%.^{1,2} According to previous reports, diverticulectomy is the best option for complicated diverticula as well as the accepted treatment for incidental MD in the paediatric population. Prophylactic resection of asymptomatic diverticula discovered incidentally in adults remains controversial.¹ MDs may contain malignancies (eg adenocarcinomas or neuroendocrine tumours [NETs]). NETs are the most common neoplasms found in MDs, representing approximately a third of MD associated tumours.¹ Around 0.5–0.75% of all NETs occur inside a MD and they are often found incidentally.^{1,2} We present a case series of three patients with a NET arising from a MD.

Case 1

A 56-year-old man was admitted to the emergency department with an 18-hour history of abdominal pain in the right iliac fossa, diffuse abdominal tenderness, a positive Blumberg sign and a white cell count of $11.6 \times 10^9/\text{l}$. Owing to the suspicion of acute appendicitis, emergency surgery was undertaken. Intraoperatively, a normal appendix was found as well as an inflamed MD. Appendicectomy and segmental ileal resection was performed. Pathological examination revealed diverticulitis and a well differentiated (low grade) NET was found (measuring 0.7cm) inside the MD, with no

invasion of the muscular layer (European Neuroendocrine Tumor Society [ENETS] G1, American Joint Committee on Cancer [AJCC] stage I). Segmental ileal resection was considered adequate treatment. The follow-up duration was 122 months and there was no evidence of recurrence.

Case 2

A 60-year-old man was referred to the emergency department for severe diffuse abdominal pain with sudden onset 1 hour earlier. He was haemodynamically unstable, and examination revealed a painful and distended abdomen. Urgent computed tomography showed a massive haemoperitoneum. An urgent laparotomy was performed with atypical liver resection and prophylactic ileal resection including a MD, which had an indurated base. Histological analysis revealed a hepatocellular carcinoma and a 1.5cm incidental neoplasm in the MD with invasion to all layers of the gastrointestinal wall. A mesenteric lymph node metastasis measuring 2cm was found. The Ki-67 index was 10% (ENETS G2, AJCC stage IIIB). On follow-up review, the hepatocellular carcinoma was found to have progressed with extrahepatic metastases and no additional treatment was performed. The patient died 19 months after diagnosis. There were no signs of NET dissemination.

Case 3

A 58-year-old man was referred with a 2-month history of skin flushing, diarrhoea and abdominal discomfort.

Laboratory tests revealed elevated urinary 5-hydroxyindoleacetic acid (165.1mg/24h, normal range: 2–9mg/24h). Computed tomography demonstrated multiple liver lesions with hypervascularity on the arterial phase and a thickening in the ileum. Octreoscan showed foci in the liver and the right iliac fossa. Fine needle aspiration of the liver obtained cells from a low grade NET. An ileal resection was performed including an MD, with a mass found through palpation. Histological examination detected a 2.5cm NET in the MD, with invasion to all layers of the gastrointestinal wall and mesenteric infiltration. In addition to the surgery, the patient was treated with somatostatin analogues (lanreotide depot). He died 185 months later due to tumour progression.

Discussion

Finding a NET inside a MD is uncommon, with fewer than 200 cases described in the literature. Only short series (<10 patients) have been reported.^{3,4} Three cases were discovered among 66 MD specimens resected in our centre between 1994 and 2015 (4.5%), the finding being incidental in two of these.

The association between NETs and MD seems to be supported by a common embryological origin due to aberrant interactions between the neural crest and the endoderm. The mean age of patients with a MD associated NET is 55 years and the incidence is 2.5 times higher in men.^{2,5} The five-year tumour specific survival rates range from 100% for stage I to 84.8% for stage IV.⁵ In terms of NET grades, the survival rates are around 95.8% for low grade, 85.0% for intermediate grade and 50.0% for high grade tumours.

In most cases, MDs are asymptomatic and diagnosis is accidental during surgical exploration. The correct approach in these situations is controversial. Some authors advocate for incidental diverticulectomy as the postoperative complication rate from prophylactic resection is low, morbidity and mortality usually being related to the primary operation. Thirunavukarasu *et al* concluded that the incidence of MD associated malignancy increases with age and

that the risk of a malignancy is 70 times higher in a MD than in other ileal locations.¹ They proposed incidental diverticulectomy as the best treatment, resulting in early detection of NETs and preventing their progression. Moreover, based on the number of asymptomatic MDs not resected, it seems likely that incidental NETs are more prevalent than thought previously. In our series, the malignancy rate was 4.5%, a little higher than rates reported by other authors.^{1,3}

Conclusions

With several minimally invasive techniques currently available to achieve a successful resection for MD and a low complication rate for incidental diverticulectomy, we suggest that the benefits of resection of this high risk area for cancer outweigh the risks of surgery.

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